United States Environmental Protection Agency

Region 6 - Enforcement & Compliance Assurance Division

INSPECTION REPORT

Inspection Date(s):	08/14-18/2023	
Media Program:	Air	
Regulatory Program(s)	Risk Management Program	
Company Name:	**Shell Chemical LP**	
Facility Name:	**Deer Park Chemical Plant**	
Facility Physical Location:	5900 Block of State Highway 225	
(city, state, zip code)	Deer Park, Texas 77536	
Mailing address:	5900 Block of State Highway 225	
(city, state, zip code)	Deer Park, Texas 77536	
County/Parish:	Harris County	
Facility Phone Number	(713) 246-7301	
Facility Contact:	Nicole Roper	Environmental Team Lead
	nicole.roper@shell.com	
FRS Number:	110031267064	
Identification/Permit Number:	Air Permit 0-01668	
Media Identifier Number:	RMP: 1000 0013 7372	
NAICS:	32511- Petrochemical Manufacturing	
SIC:	2911 - Petroleum Refining	

Personnel participating in inspection:		
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SECTION I – INTRODUCTION

PURPOSE OF THE INSPECTION

EPA Region 6 inspectors Howard Cole and Aimee Boss arrived at Shell Chemical LP (Shell Deer Park) at 9:00 AM on August 14, 2023, for an announced inspection. EPA convened an opening conference and met with several representatives from the facility. Howard Cole presented his credentials to the opening conference attendees and informed them that this was an EPA inspection to determine Shell Deer Park's compliance with Section 112(r) of the Clean Air Act (CAA), the General Duty Clause, and Risk Management Program (RMP) requirements. Shell Deer Park has assigned Nicole Roper (Site Environmental Team Lead) with the overall responsibility for overseeing the implementation of the elements of the RMP, including accident prevention activities. Jeff Lewis a representative for the United Steel Workers Union also attended the opening conference.

FACILITY DESCRIPTION

Shell Deer Park operates a chemical plant located at the 5900 block of State Highway 225, Deer Park, Texas, 77536. Shell Deer Park, is located on the Houston Ship Channel, 20 miles east of downtown Houston, is home to a fully integrated chemical plant. Shell Deer Park manufactures base chemicals or raw material chemicals for other chemical companies, who then processes them into thousands of consumer products.

The chemical products include benzene, toluene, ethylene, propylene, isoprene, butadiene, piperylene, dicyclopentadiene, acetone, and phenol. Most chemicals from Shell Deer Park are shipped via pipelines; however, Shell Deer Park also uses ships, barges, railcars and trucks to supply customers in the U.S. and foreign countries.

Shell Deer Park has approximately 479 full-time employees working at the facility, and the parent company, Shell Oil Products, employs approximately 12,712 corporate-wide. Shell Deer Park handles many substances regulated by the RMP rule in sufficient quantities to be covered by the RMP rule. The regulated substances handled at the facility and the total usage quantities in each process are listed under Section 1 of the RMP plan. The company has on site twenty-four (24) regulated RMP flammable chemicals used in nine (9) processes. The following is a list of RMP flammable substances stored in quantities above applicable thresholds designated the RMP regulation:
Flammables:

- Butene, Propane, Isoprene, Butane, Isobutane
- Methane, 1,3 Butadiene, 1-Pentene, 2-pentene
- 1-Butene, 2-butene, 1,3 Pentadiene, Pentane, Isopentane
- 2-methyl-1 butene, 3-methyl-1 butene, 2-Methylpropene
- Methane, Ethane, Ethylene, Propylene, 2-methyl propene

SECTION II - OBSERVATIONS

On August 14, 2023, Shell Deer Park provided EPA with a driving tour of the facility and EPA conducted a walkthrough of the area at Shell Deer Park where the May 5th-7th, 2023 incident occurred, accompanied by Nicole Roper (Environmental Team Lead) and Kris Harrison (Process Safety/ Unit Manager). EPA observed the covered process, equipment, operations, and control rooms. EPA identified Shell Deer Park employees and asked questions about their training, the management of change (MOC) process, process hazard analysis (PHA) process, mechanical Integrity, and the facility's normal operating and emergency procedures.

Incident Summary – May 5- May 7, 2023

On May 3, 2023, the lead operator prepared equipment for maintenance on a heat exchanger (E-P3-1133), which involved replacing the tube bundle inside the exchanger. This heat exchanger is used in the cracked heavy gas oil (CHGO) system in the Olefins OP-3 Unit at Shell Deer Park. On May 5, 2023, Shell employees and contractors were preparing to install blinds to remove and replace the cooling tube bundles located inside the heat exchanger. Three of the four motor operated valves (MOV) were successfully closed, blinded, and locked-out.

(Motor operated valves (commonly abbreviated as MOV) are valves that are actuated by electric motors. Motor operated valves are generally large valves used in different kinds of operations. Due to the large size of the valve actuator, an electric motor is needed to open or close the valve.)

While attempting to close the last of the four valves for the heat exchanger, CHGO from MOV 2516 began leaking from the MOV because the valve was unable to open and close properly. A small amount of residual CHGO leaking from the MOV is typical. However, more CHGO than what was expected continued to leak from the valve. At this point, the workers resecured the leaking valve, issued a stop work order, and notified the foreman. There was an attempt to drain the excess product using the vacuum truck, but the leak continued to flow. Workers then attempted to close the valve manually but were unsuccessful. A specialty valve contractor was called to Shell Deer Park, who attempted to close the valve manually but was also unsuccessful. The specialty valve contractor determined that the valve needed to be closed using the attached motor.

During the previous attempts to try and close the MOV, the MOV had been electrically disabled (i.e., locked-out). Since the motor was locked-out, an operator was called to remove the lock-out device and electrically enable the MOV. The employees/contractor began to push the control buttons, start then stop (i.e., "bump") the electrical connection to the MOV in an attempt to "unstick", then close the valve. The motor eventually was not responding to the control buttons and the valve became stuck in the open position. Upstream of the MOV, a CHGO charge pump, operating at 90 lbs of pressure, was connected to the Pyrolysis Fractionator. The liquid CHGO from the Pyrolysis Fractionator began to flow past the MOV and into the exchangers, which was open to the atmosphere in preparation for maintenance.

CHGO began to fill the heat exchanger, then flow out of the open heat exchanger, and pool around the heat exchanger onto the ground. Approximately 7,000 barrels of CHGO spilled out of the heat exchanger, was ignited from a currently undetermined source, and caused a fire in the OP-3 Unit. The emergency response team, made up of Shell, Pemex, and Westlake employees, responded to the incident. As the pool fire was spreading to the west side of the exchangers, toward the furnaces, emergency responders sprayed water on the chemical release which was successful in preventing the

product from reaching the furnaces. On the evening of May 6, 2023, the fire had been put out. However, the fire reignited on May 7, 2023, after operator's blocked-in steam that may have been serving as a vapor suppressant.

40 Code of Federal Regulations (C.F.R.) § 68.10 Applicability – Shell Deer Park Chemical Plant is the owner/operator of a stationary source that has more than the threshold quantities of twenty-four (24) flammable regulated substances in its processes; therefore, the RMP regulations are applicable. Shell Deer Park has a Clean Air Act Title V permit, an Air Operating Permit, and is classified under the North American Industrial Classification System (NAICS) Code 32511 (Petrochemical Manufacturing). In addition, Shell Deer Park is subject to the Occupational Safety and Health Administration's (OSHA) Process Safety Management (PSM) Standard (29 CFR §1910.119), and EPA regulations, which categorizes Shell Deer Park as a Program 3 facility. Shell Deer Park submitted a Risk Management Plan to EPA on June 6, 2019, and then again in November 2023 which describes the processes containing the regulated chemicals stored at more than threshold quantities. The company also made an administrative update in February 2022.

40 C.F.R. § 68.12 General requirements – The owner or operator of a stationary source subject to this regulation must submit a Risk Management Plan, as provided in 40 C.F.R. § 68.150 to § 68.185. The RMP plan must include a registration that reflects the covered processes. I reviewed the re-submission of the Shell Deer Park RMP. It listed the flammable regulated chemicals and the associated Program 3 processes.

40 C.F.R. § 68.15 Management – Shell Deer Park developed a management system to oversee the implementation of the RMP elements. It assigned a qualified person (Nicole Roper, Environmental Team Lead) with the overall responsibility for the development, implementation, and integration of the RMP elements. Responsibility for implementing individual requirements of this part was assigned to persons other than the person identified, so the names or positions of these people were documented, and the lines of authority were defined through an organizational chart or similar document.

Subpart B – Hazard Assessment

40 C.F.R. § 68.20 Applicability – Shell Deer Park is a Program 3 stationary source subject to this subpart; therefore, it is required to prepare a worst-case release scenario analysis and complete the five-year accident history.

40 C.F.R. § 68.22 Off Site Consequence Analysis Parameters – Shell Deer Park employed the parameters specified by EPA in this rule by using the RMP*Comp ™ software. EPA reviewed the offsite consequence analysis and supporting documentation to assure the data was accurate and correct.

40 C.F.R. § 68.25 Worse-case release scenario analysis – Shell Deer Park identified and analyzed worst-case scenarios for each flammable substance in its Program 3 process using the RMP*Comp™ software, thus meeting the requirements of the regulation. Shell Deer Park identified and analyzed an additional worst-case scenario, after determining that a release from another covered process at the stationary source could potentially affect public receptors differently from those potentially affected by other scenarios identified.

40 C.F.R. § 68.28 Alternative Release Scenario Analysis – Shell Deer Park identified and analyzed at least one alternative release scenario for each flammable substance in its Program 3 process using the RMP*Comp™ software, thus meeting the requirements of the regulation.

40 C.F.R. § 68.30 Defining Off-Site impacts - Population – Shell Deer Park used the most current (2010) Census Bureau population data and the distances to endpoints, as specified in the regulation, to calculate the population numbers reported in their RMP plan. Shell Deer Park used the Circular Area Profiles application to define the population surrounding the facility. In addition, Shell Deer Park provided a map documenting the nearest public receptor.

40 C.F.R. § 68.33 Defining Off-Site impacts – Environment – Shell Deer Park used US Geological Survey maps data to determine the environmental receptors and the distances to endpoints.

40 C.F.R. § 68.36 Review and Update – Shell Deer Park reviewed and updated its offsite consequence analysis every 5 years.

40 C.F.R. § 68.39 Documentation – Shell Deer Park maintained records of the offsite consequence analyses in accordance with this subpart. These records included:

- a description of the vessel or pipeline and substance selected as worst case and alternate release scenarios, assumptions and parameters used, and the rationale for selection of specific substances;
- documentation of estimated quantity released, release rate, and duration of release;
- methodology used to determine distance to endpoint; and,
- data used to estimate population and environmental receptors.

40 C.F.R. § 68.42 Five-year accident history – The regulation requires Shell Deer Park to include, in its five-year accident history in its RMP plan submission, all accidental releases from covered processes that resulted in deaths, injuries, or significant property damage on site, or known off-site deaths, injuries, evacuations, sheltering in place, property damage, or environmental damage. Shell Deer Park indicated that one reportable incident had occurred at the site in May of 2023.

Shell Deer Park was performing planned maintenance activities when a fire started at the facility in the Olefins Unit (OP-3) at approximately 3:00 pm on May 5, 2023. The products involved in the fire were cracked heavy gas oil (CHGO), cracked light gas oil, and gasoline (including chemicals such as ethane, butane, acetylene, butene, pentene, and 1,3, butadiene.) This initial fire burned until approximately 4:00 AM on May 6, 2023. Then on May 6, 2023, at approximately 3:14 PM, the fire re-ignited and was finally extinguished on May 7, 2023, at approximately 7:00 PM. One recordable injury was reported, no offsite impacts were reported with this incident; and a shelter-in place order was not issued.

EPA examined incident investigations conducted at the facility and the Shell Deer Park OSHA Form 300 Logs from 2017 to present to determine if there had been additional releases from the facility, which could possibly be included in the Shell Deer Park's five-year accident history; however, no other incidents were found.

40 C.F.R. § 68.65 Process Safety Information (PSI) – Shell Deer Park maintains a variety of technical documents that are used to help sustain safe operation of the process by using the PSI to help train employees, perform process hazard analyses, and design and maintain process equipment. These

documents address chemical properties and associated hazards, limits for key process parameters, specific chemical inventories, and equipment design basis information.

EPA reviewed the Shell Deer Park PSI. The written PSI enables the owner or operator and the employees involved in operating the process to identify and understand the hazards posed by those processes containing a regulated substance. Shell Deer Park's compilation of written PSI included information pertaining to the hazards of the regulated substances used or produced by the process, information pertaining to the technology of the process, and information pertaining to the equipment in the process.

Shell Deer Park has provided an electrical classification drawing for the OP-3 G.O. Furnace Area (P&ID E-80920-02-Issued 12/94) that fails to designate an area adjacent to the location of the incident as Class 1 Divison 2. This area adjacent to the location of the incident has identified furnaces, heat exchangers, process piping, pumps, etc., and a building (Substation #115), which are currently electrically unclassified on the drawing. The Piping and Instrument Diagram (P&ID) indicates that the design code selected by Shell Deer Park for this determination of electrical classification for this area is National Fire Protection Association (NFPA-497).

Many variables must be incorporated in area classification assessments including: the properties and behavior of materials, volumes, pressures, temperatures, flows, piping and equipment construction, building construction, and adequacy of mechanical ventilation and gas detection systems (where buildings are present). Careful evaluation of all data is necessary.

In determining an electrical area classification for a particular area, the volume of flammable or combustible materials released is of extreme importance in determining the extent of a hazardous location (NFPA Section 5.6.6). An operating unit may have many interconnected sources of flammable or combustible materials including pumps, compressors, tanks, vessels, and heat exchangers (NFPA 5.7.3). In some cases, individual classification of a multitude of point sources in a processing unit is neither feasible nor economical (NFPA 5.7.4). In such cases, the entire unit could be classified as a single-source entity. As a practical matter, areas with large quantities of process equipment and piping that handle flammable/combustible materials can, as an area, be considered a release source. In the assessment, a process flow diagram showing the pressures, temperatures, flow rates, composition, and quantities of various materials (i.e., mass flow balance sheets) passing through the process is needed (NFPA 5.9.2.3). The potential sources of leaks should include atmospheric discharge from pressure relief valves (5.9.4.1). Shell Deer Park failed to document that the electrical classification map represented by (P&ID E-80920-02-Issued 12/94) properly describes the appropriate electrical classification for the area (Class 1 Division 2), where the incident occurred. **AOC 1 - 40 C.F.R. § 68.65(d)(1)(iii)**

National Electrical Code NEC 500.4 General (A) Documentation. All areas designated as hazardous (classified) locations shall be properly documented. This documentation shall be available to those authorized to design, install, inspect, maintain, or operate electrical equipment at the location.

Shell Deer Park has in place pressure vessels at the facility that have atmospheric relief valves and pressure relief devices, which have the potential to release flammable and toxic chemicals into the environment. Based on their proximities within the covered process areas, and as documented in a process hazard analysis (PHA), the relief devices do not vent to safe locations in accordance with American Petroleum Institute (API) Standard 521, the Center for Chemical Process Safety (CCPS) Guidelines for Pressure Relief and Effluent Handling Systems, and recommendations of the Chemical

Safety Board's (CSB) March 6, 2023 Safety Alert: "Hazards Posed by Discharges from Emergency Pressure-Relief Systems". Under such circumstances, the potential also exists for release of flammables in areas where a fire may have already occurred, thus creating the potential risk of additional catastrophic fires and explosions at the facility during an accidental release incident. The Shell Deer Park 2018 Heavy Olefins BD-3 Unit Process Hazard Analysis identified atmospheric relief valves that can release flammable hydrocarbons into the ambient air creating the potential for a fire and/or vapor cloud explosion risk resulting in fatalities. These chemicals include 1,3, butadiene, isoprene, butane, and butene.

EPA believes that there are accidental release situations under which a release to the environment would include potential chemical exposures to the public at hazardous levels. Vessel over-pressurization is one of these scenarios, where if emergency relief devices function as designed and vent hazardous gas streams away from the covered process and into the ambient air, they could be carried downwind. EPA believes that all facilities should routinely consider sources of chemical releases and address such possibilities by integrating the protection of the public and the environment into their design of safety systems. **AOC 2 - 40 C.F.R. § 68.65(d)(2)**

40 C.F.R. § 68.67 Process Hazard Analysis (PHA) – Shell Deer Park has a comprehensive program to help ensure that hazards associated with the various processes are identified and controlled. Within this program, each covered process is systematically examined to identify hazards and ensure that adequate controls are in place to manage these hazards. The Shell Deer Park facility primarily uses the hazard and operability (HAZOP) technique to perform these evaluations. The analyses are conducted using a team of people who have operating, maintenance, and engineering expertise. The PHAs were performed by a team with expertise in engineering and process operations. The team included at least one employee who had experience and knowledge that was specific to the process being evaluated and one employee who was knowledgeable in the specific PHA methodology used.

EPA reviewed the following Shell Deer Park PHAs: 2018 BD-3, 2021 OP3 FURNACES PHA & 2020 OP3 HS FRAC BZ STR AUX, and OP-3 Compression & Treating Unit and the 2015 and 2020 Facility Siting studies. The facility siting PHAs identified buildings in which building occupants were exposed to substances with fire, flammable and toxic impacts. An overall risk to building occupants has been evaluated, which includes factors such as probability of fatality, building occupancy, weather, time of day, etc., and is based on a single scenario involving a 1" hole release of a flammable or toxic chemical from process equipment. The study does not address modifications of buildings, which would protect building occupants from all hazards related to fire, flammable, and toxic release scenarios such as the May 5, 2023. **AOC 3 - 40 C.F.R. § 68.67(c)(1)**

Shell Deer Park failed to: establish a system to promptly address the team's findings and recommendations; assure that the recommendations are resolved in a timely manner and that the resolution is documented; document what actions are to be taken; complete actions as soon as possible; and, develop a written schedule of when these actions are to be completed regarding the following recommendations:

The following Shell Deer Park 2020 Facility Siting Study PHA recommendations were not addressed: to complete the building checklist using *Guiding Questions for Phase II Assessment on Impacted Buildings* developed for Phase II of Fire and Toxic Impact Assessment and to evaluate emergency

response measures for the buildings and assembly areas, including input from the Subject Matter Expert, Health Safety and Environmental, Civil and Emergency Response personnel.

The Shell Deer Park 2015 Facility Siting Study PHA finding that 22 buildings *(Table 1- page 6)* were identified as not suitable for 40 hour per week occupancy was not addressed.

The PHAs provided also did not document if the recommendations were resolved in a timely manner or what actions were taken. **AOC 4 - 40 C.F.R. § 68.67(e)**

40 C.F.R. § 68.69 Operating Procedures –Shell Deer Park maintains written procedures that address various modes of process operation such as: (1) initial startup of a new process, (2) startup following a turnaround, (3) startup after an emergency shutdown, (4) normal operations, (5) temporary operations, (6) emergency operations, (7) normal shutdown, and (8) emergency shutdown. These procedures are periodically reviewed and certified.

The operating procedures reviewed addressed: the steps for each of the operating phases. Operating procedures are accessible by going to any Shell Deer Park computer and getting the procedures from SharePoint. There is also a binder of the operating procedures in the control room that can be used if the internet is down.

The RMP standard requires that operating procedures be reviewed as often as necessary to assure that they reflect current operating practice, and the owner or operator shall certify annually that these operating procedures are current and accurate. It is extremely important for the safe operation of covered processes that operating procedures remain current and accurate. To protect against the use of outdated or inaccurate operating procedures, Shell Deer Park must verify annually that the operating procedures are current and accurate. The annual interval for review represents the minimum required for review. If there are changes during the year, then reviews would be required more frequently to assure that the current operating practices are up to date. It is not plausible or realistic for a facility to certify operating procedures that have not been reviewed. It is inherent in the annual certification that a one-year time period is required.

A 2021 Compliance Audit Finding identified 16 Operating Procedures to be overdue the 3-year review interval Shell required, and the annual review required by the RMP standard. This failure to review operating procedures annually is a failure of Shell Deer Park to comply with its own policy and with 40 C.F.R. § 68.69(c). **AOC 5 - 40 C.F.R. § 68.69(c**)

EPA reviewed the Shell Deer Park safe work procedures, including lock out/tag out procedures and energy isolation procedures. The safe work procedures apply to both employees and contractors.

Shell did not implement written operating procedures that provide clear instructions for safely performing maintenance on MOV 2516, which is equipment in the covered process. On the day of the May 5, 2023 incident, Shell Deer Park failed to implement safe work practices to provide for the control of chemical and electrical hazards during lockout/tagout and opening process equipment prior to performing maintenance on heat exchanger (EP3-1133A/B) and MOV 2516 in the Olefins 3 (OP3) unit. **AOC 6 - 40 C.F.R. § 68.69(d)**

40 C.F.R. § 68.71 Training – Shell Deer Park is required to train each employee involved in operating a process in an overview of the process and in the operating procedures. Each employee presently involved in operating a process and each employee before being involved in operating a new process

must be trained. In addition to initial training, employees must undergo refresher training at least every 3 years. To complement the written procedures for process operations, Shell Deer Park has implemented a comprehensive training program for all employees involved in operating a process, emergency response, process hazards, incident prevention, mechanical integrity, and other programs. New employees receive basic training in operations before being assigned to a specific unit and later are paired with a senior employee to learn process-specific duties and tasks until they can work independently. In addition, all employees periodically receive refresher training every three years in the operating procedures to ensure that their skills and knowledge are maintained at an acceptable level. All the training is documented for each employee, including the means used to verify that the employee understood the training.

EPA requested the training records for operators in the OP-3 Unit that were working on the day of the May 2023 incident and other operators that worked in the Unit. There were employees that had not completed the necessary refresher training applicable to their job tasks at the required interval as required. **AOC 7 - 40 C.F.R. § 68.71(b)**

40 C.F.R. § 68.73 Mechanical Integrity

The mechanical integrity program ensures that systems continue to operate as designed. Shell Deer Park has well-established practices and procedures to maintain pressure vessels, piping systems, relief and vent systems, controls, pumps and compressors, and emergency shutdown systems in a safe operating condition. The basic aspects of this program include: (1) conducting training, (2) developing written procedures, (3) performing inspections and test, (4) correcting identified deficiencies, (5) applying quality assurance measures, and (6) monitoring completion of required inspection and maintenance duties. In combination, these activities form a system that maintains the mechanical integrity of the process. The site incorporates quality assurance measures into equipment purchases and repairs, which are an integral part of the mechanical integrity program. Shell Deer Park employs Recognized and Generally Accepted Good Engineering Practices, such as API 510, 570 and ASME Section VIII Division I.

Shell Deer Park provided a list of process equipment which were overdue for inspection. The list of equipment was reviewed to determine if the system for deferring equipment inspections was in accordance with API standards, which is the design code selected by Shell Deer Park. API 510 Section 6.7 and API 570 7.13 Deferral of Inspections, Tests, and Examinations outlines the requirements for deferring equipment inspections.

API 510 6.7 Deferral of Inspections, Tests, and Examinations
Inspections, tests, or examinations for ***pressure vessels and associated pressure-relieving devices*** *that cannot be completed by their due date may be deferred for a specified period, subject to the requirements in the following subsections. Pressure vessels or pressure-relieving devices that are operated beyond the due date without a valid deferral in accordance with these requirements are not permitted by this code. Deferrals should be the occasional exception, not a frequent occurrence. All deferrals shall be documented. Pressure vessels or pressure-relieving devices that were granted a deferral can be operated to the new due date without being considered overdue for the deferred inspections, tests, or examinations.*

API 570 7.13 Deferral of Inspections, Tests, and Examinations

*Inspections, tests, or examinations for **piping and associated pressure-relieving devices** that cannot be completed by their due date may be deferred for a specified period, subject to the requirements in the following sub-sections. Piping or pressure-relieving devices that are operated beyond the due date without a valid deferral in accordance with these requirements are not permitted by this code. Deferrals should be the occasional exception, not a frequent occurrence. All deferrals shall be documented. Piping or pressure-relieving devices that were granted a deferral can be operated to the new due date without being considered overdue for the deferred inspections, tests, or examinations.*

API 510 Section 6.7.1 and API 570 Section 7.13.1 Simplified Deferral

*A simplified short-term deferral may be approved by the owner-user **if all** of the following conditions are met:*

a) The current due date for the inspection, test, or examination has not been previously deferred.

b) The proposed new due date would not increase the current inspection/servicing interval or due date by more than 10 % or six months, whichever is less.

c) A review of the current operating conditions, as well as the pressure vessel or pressure-relieving device history, has been completed, with results that support a short-term/one-time deferral.

d) The deferral request has the consent of the inspector representing or employed by the owner-user and an appropriate operations management representative(s).

e) Updates to the pressure vessel or pressure-relieving device records with deferral documentation are complete before it is operated beyond the original due date.

API 510 Section 6.8 Deferral of Inspection Repair Recommendation Due Dates

Inspection repair recommendations that cannot be completed by their due date can be deferred for a specific period of time, if appropriate, by a documented change in date of required completion. The deferral of the due date shall be documented in the inspection records and have the concurrence with the appropriate pressure equipment inspection personnel including the inspector and the inspection supervisor. Inspection recommendations that have not been completed by the required due date without a documented and approved change of date are not permitted by this code and are considered overdue for completion. The deferral of inspection recommendations should be the occasional exception not a frequent occurrence. Equipment must remain within the limits of the minimum required thickness as determined in this code or by other engineering evaluation during the period of deferral.

Shell Deer Park had pressure vessels that were operated beyond the due date without a valid simplified deferral, in accordance with the requirements of the code API 510 Section 6.7, Simplified Deferral and/or Inspection and were not in accordance with API 510 Section 6.3 and 6.5.

Shell Deer Park had also deferred pressure vessels that required repair that were not completed by the required due date and without a documented and approved change of date, which is not permitted by this code and are considered overdue for completion, in accordance with the requirements of API 510 Section 6.8, Deferral of Inspection Repair Recommendation Due Dates Simplified Deferral. **AOC 8 - 40 C.F.R. § 68.73(d)(2)**

40 C.F.R. § 68.75 Management of Change (MOC) – The management of change (MOC) program requires that the impact of changes to the process be evaluated and approved prior to the work being conducted. Shell Deer Park has a comprehensive system to manage changes to all covered processes. This system requires that changes to items such as: process equipment, chemicals, technology (including process operating conditions), procedures, and other facility changes be properly reviewed and authorized before being implemented. Changes are reviewed to (1) ensure that adequate controls are in place to manage any new hazards and (2) verify that existing controls have not been compromised by the change. Chemical information, process operating limits, equipment information, and procedures are updated to incorporate these changes. In addition, operating and maintenance personnel are provided any necessary training to any changes that are authorized.

40 C.F.R. § 68.77 Pre-startup review (PSSR) – Shell Deer Park implemented a PSSR program to ensure that safety features, procedures, personnel, and the equipment are appropriately prepared to startup prior to placing the equipment into service. The site conducts PSSRs of any new process or modifications that requires a change in the process safety information. This review provides one additional check to make sure construction is in accordance with the design specifications and that all supporting systems are operationally ready. For complex or extensive modifications, the PSSR team uses checklists to verify all aspects for readiness. A PSSR involves field verification of the construction and serves as a quality assurance function by requiring verification that other prevention program requirements were properly implemented and confirming that all affected employees are trained before the process is started.

EPA reviewed Shell Deer Park's written PSSR procedures and various PSSRs completed by the facility within the past five years. The PSSR review confirmed that, prior to the introduction of a regulated substance into the process, the construction and equipment design were completed in accordance with design specifications, the required safety, operating, maintenance, and emergency procedures were in place, and that training of each employee involved in operating a process was completed.

40 C.F.R. § 68.79 Compliance audits – EPA reviewed Shell Deer Park's two most recent compliance audits (conducted April 16-19,2018 and April 5-18,2021). Shell Deer Park certified compliance with the provisions of this subpart at least every three years to verify that procedures and practices developed under this subpart are adequate and are being followed. Both compliance audits were conducted by at least one person knowledgeable in the process. The audit team consists of corporate employees and employees from other Shell sites. When conducting its RMP compliance audits, Shell Deer Park uses a sample size of various units to assess compliance. The facility determined and documented an appropriate response to each of the findings of the compliance audit and documented that deficiencies have been corrected.

40 C.F.R. § 68.81 Incident investigation – Shell Deer Park is required to investigate each incident which resulted in or could reasonably have resulted in a catastrophic release of a regulated substance. EPA reviewed the Shell Deer Park incident investigation procedure to ensure that if such an incident occurred, the facility would initiate the investigation, prepare the report, and document, correct, and communicate the incident investigation findings according to the RMP regulations. When required, Shell Deer Park prepared reports at the conclusion of the investigations, which includes at a minimum: (1) Date of incident; (2) Date investigation began; (3) A description of the incident; (4) The factors that contributed to the incident; and, (5) Any recommendations resulting from the investigation. Shell Deer Park promptly addressed and resolved the investigation findings and recommendations and documented the resolutions and corrective actions.

40 C.F.R. § 68.83- Employee Participation – Shell Deer Park recognizes the value of employee participation, provides for, and encourages employees to participate in all facets of process safety management and accident prevention. Examples of employee participation ranges from updating and compiling technical documents and chemical information to participating as a member of a process hazard analysis team or investigation team. Employees have access to all information created as part of the location accident prevention program. In addition, Shell Deer Park has a number of initiatives under way that address process and employee safety. These initiatives include forming teams to promote both process and personal safety. The teams typically have members from various areas of the plant, including operations, maintenance, engineering, and plant management.

EPA reviewed Shell Deer Park's written plan of action regarding the implementation of employee participation. This plan outlines how Shell Deer Park consults with employees and their representatives on the conducting and development of process hazards analyses and on the development of the other elements of process safety management.

40 C.F.R. § 68.85 Hot work permit – EPA reviewed hot work permits issued by Shell Deer Park. Each permit that was reviewed documented that fire prevention and protection requirements were implemented prior to beginning hot work operations. The permits indicated the dates authorized for hot work and identified the object on which the hot work was performed.

40 C.F.R. § 68.87 Contractors – Shell Deer Park uses contractors to supplement its workforce during periods of intense maintenance or construction activities. It also has a standing contractor workforce to support Shell Deer Park during normal activities. Shell Deer Park has established a contractor program, in partnership with the Houston Area Safety Council and contractor businesses, to foster safe work at the facility. This program is monitored and driven by Shell Deer Park's Contractor HSSE Management Team, composed of both Shell and Contractors.

Subpart E- Emergency Response

40 C.F.R. § 68.90 Applicability – Shell Deer Park is a responding stationary source and must comply with the requirements of 40 C.F.R. § 68.93, 68.95, and 68.96.

40 C.F.R. § 68.93 – Emergency response coordination activities – Shell Deer Park maintains an emergency response program to protect employees, the public, and the environment in the event of loss of containment of hazardous materials or any other adverse consequences. The program consists of a highly trained contingent of emergency responders, fixed and mobile equipment, and arrangements with community and private organizations to either support or coordinate response and recovery. The location emergency response program is coordinated with three area Local Emergency Planning Committees (LEPC). This coordination includes periodic meetings with the committee, which includes local emergency response officials, local government officials, and industry representatives. Shell Deer Park has 24-hour a day communications capability with appropriate LEPC officials, municipal emergency response organizations, and industrial mutual aid emergency response organizations. Shell Deer Park conducts periodic emergency drills in cooperation with the area LEPC, local municipal fire departments, and the Channel Industries Mutual Aid Organization.

Shell Deer Park coordinates response needs with local emergency planning and response organizations to ensure that they are aware of the regulated substances at the stationary source, their quantities, the

risks presented by covered processes, and the resources and capabilities at the stationary source to respond to an accidental release of a regulated substance.

40 C.F.R. § 68.95 Emergency response program – EPA reviewed Shell Deer Park's emergency response plan. The plan includes procedures for informing the public and local emergency response agencies about accidental releases; documentation of proper first aid and emergency medical treatment necessary to treat accidental human exposures; and, procedures and measures for emergency response after an accidental release of a regulated substance. The plan also includes procedures for the use of emergency response equipment, for its inspection, testing, and maintenance, and for training for employees in relevant emergency response procedures There are approximately 44 employees who are on the emergency response team. Shell Deer Park provides approximately 20 employees who are emergency responders and other facilities provide employees to serve on the emergency response team (ERT). EPA reviewed inspection and testing records for various emergency response equipment and training records for those who serve on the ERT.

40 C.F.R. § 68.96 Emergency response exercises – As a part of coordination with local emergency response officials required by 40 C.F.R. § 68.93, Shell Deer Park will be required to conduct an emergency response tabletop exercise before December 21, 2026 and at a minimum of at least once every three years thereafter.

Subpart G- Risk Management Plan

40 C.F.R. § 68.190 Updates – Shell Deer Park resubmitted its latest RMP plan on November 29, 2023.

40 C.F.R. § 68.195 Required corrections – The Shell Deer Park next RMP re-submission is due by November 29, 2028, unless an update or correction is required by 40 C.F.R. § 68.190 and/or 40 C.F.R. § 68.195.

Closing Conference: I, EPA Region 6 inspector Howard Cole conducted a closing conference at the Shell Deer Park facility on Friday, August 18, 2023. During the closing conference, I reviewed the following Areas of Concern noted during the inspection: the CAA General Duty Clause, safe work practices, employee training, process hazard analysis, and hot work permits. I also indicated that there may be additional Areas of Concern once I received the additional documents requested during the inspection.

SECTION III – AREAS OF CONCERN

AOC 1: Process Safety Information- 40 C.F.R. § 68.65(d)(1)(iii)

The owner or operator shall complete a compilation of written process safety information before conducting any process hazard analysis required by the rule. The compilation of written process safety information is to enable the owner or operator and the employees involved in operating the process to identify and understand the hazards posed by those processes involving regulated substances.

Shell Deer Park failed to document that the electrical classification map (P&ID E-80920-02-Issued 12/94) properly depicts the appropriate electrical classification (Class 1 Division 2) for the incident area which

contains roadways, walkways, furnaces, and a substation building #115, using procedures, in accordance with, and such as but not limited to, NFPA Section 5.9 and the National Electrical Code NEC 500.4.

AOC 2: Process Safety Information- 40 C.F.R. § 68.65(d)(2)

The owner or operator shall document that equipment complies with recognized and generally accepted good engineering practices.

Shell Deer Park has in place pressure vessels at the facility that have atmospheric relief valves and pressure relief devices, which have the potential to release flammable and toxic chemicals into the environment. Based on their proximities within the covered process areas, the relief devices do not vent to safe locations in accordance with American Petroleum Institute (API) Standard 521, the Center for Chemical Process Safety (CCPS) Guidelines for Pressure Relief and Effluent Handling Systems, and recommendations from the Chemical Safety Board (CSB)'s March 6, 2023 Safety Alert: "Hazards Posed by Discharges from Emergency Pressure-Relief Systems". The following pressure vessels have pressure relief valves that would release flammable hydrocarbons to the atmosphere:

Pressure Vessel	**Relief Valve**
V-BD-901	RVBD-901/ 902
V-BD-902	RVBD-904/905
V-BD-903	RV-9023/9024
V-BD-933	RV-9001/9002/9026/955
V-BD-993/994	RV-9001/9002/9026/955
V-BD-991	RV-907/908
V-BD-934	RV-9004/9005
V-IP-950	RV-919A/B
V-BD-920/921	RV-915/923

The following pressure relief valves that would release flammable hydrocarbons into the atmosphere air:

CIPX: V-IP-4108/RV-IP-4108 V-IP-4119/RV-IP-4119 V-IP 4122/RV-IP-4122 V-IP-4124/RV-IP-4124

HT-2

RV-OL -5067	RV-OL -6038	RV-OL -6039	RV-OL -6056
RV-OL -6059	RV-OL -6060	RV-OL -6061	RV-OL -6062
RV-6081	RV-OL -638	RV-OL -940	RV-OL -941
RV-OL -942	RV-OL -944	RV-OL -637	

AOC 3: Process Hazard Analysis (PHA) Facility Siting - 40 C.F.R. § 68.67(c)(1)

The PHA shall address the hazards associated with facility siting and be appropriate to the complexity of the process and shall identify, evaluate, and control the hazards involved in the process.

Shell Deer Park failed to evaluate and control the hazards of the process identified in the Deer Park 2020 Facility Siting Study. The study included the following findings:

Major findings of this facility siting study include:

-**FN Curve for CB 84 OP-Ill Control Room (Board-Field) crosses the intolerable line as shown in Figure ES.1.**

-Flammable and fire impact assessment shows that:

a. 25 occupied buildings are in the flammable gas impact area.

b. 19 occupied buildings are in the 9.5 kW /m2 fire heat impact area.

c. 20 occupied buildings are in the 6.3 kW /m2 fire heat impact area.

-Toxic impact assessment show that:

a. 27 occupied buildings are in the H2S toxic impact area.

b. About 139 occupied buildings are in the H2S toxic impact area.

c. RB 120 SHCU Control Room {Field) is in the NH3 toxic impact area.

d. Aromatics Training Blast Resistant Modules is in the Benzene toxic impact area.

Third party toxic impact assessment show that:

-The whole Deer Park site is in the OXY chlorine {Cl2} toxic impact area.

-There are 66 occupied buildings are in the HEXION (Methyl Mercaptan) (MESH) impact zone for F2.

- There are 8 occupied buildings are in the OXY (ethylene dichloride) EDC impact zone for F2.

-There are 6 occupied buildings are in the OXY hydrogen chloride (HCI) impact zone for F2.

Fire and toxic impacts are present in the emergency plan Assembly Areas.

AOC 4: Process Hazard Analysis - 40 C.F.R. § 68.67(e)

The owner or operator shall establish a system to promptly address the team's findings and recommendations; assure that the recommendations are resolved in a timely manner and that the resolution is documented; document what actions are to be taken; complete actions as soon as possible; develop a written schedule of when these actions are to be completed.

Shell Deer Park failed to establish a system to promptly address the team's findings and recommendations; assure that the recommendations are resolved in a timely manner and that the resolution is documented; document what actions are to be taken; complete actions as soon as possible; and develop a written schedule of when these actions are to be completed regarding the following recommendations:

-The Shell Deer Park 2020 Facility Siting Study PHA findings contained the following recommendations:

For the occupied buildings in the impact zones, complete the building checklist: *Guiding Questions for Phase II Assessment on Impacted Buildings* developed for Phase II of Fire and Toxic Impact Assessment.
-Evaluate emergency response measures for the buildings and assembly areas, including Subject Matter Expert input from Health, Safety, and Environmental, Civilian, and Emergency Response personnel.

-Shell Deer Park 2015 Facility Siting Study PHA findings contained the following recommendation:

22 buildings *(Table 1- page 6)* were identified as not suitable for 40 hour /week occupancy.

-Shell Deer Park did not provide the tracking status information for the PHA recommendations for 2018 BD-3, 2021 OP3 FURNACES PHA & 2020 OP3 HS FRAC BZ STR AUX, and OP-3 Compression & Treating Unit for which it could be determined if the recommendations were resolved in a timely manner, the resolution was documented, and what actions were taken.

AOC 5: Operating Procedures - 40 C.F.R. § 68.69(c)

The operating procedures shall be reviewed as often as necessary to assure that they reflect current operating practice, including changes that result from changes in process chemicals, technology, and equipment, and changes to stationary sources. The owner or operator shall certify annually that these operating procedures are current and accurate.

Shell Deer Park failed to perform a review of their operating procedures annually or in accordance with its own internal policy, which requires a review of operating procedures every 3 years. A 2021 Compliance Audit Finding identified 16 Operating Procedures were overdue for the Shell 3-year review interval.

For the Shell Deer Park operating procedure "Procedure loss of Electrical Power BEU-ESD.001H" the Shell 3-year review is overdue March 29, 2021, and the operating procedure is overdue for the RMP annual review requirement.

AOC 6: Operating Procedures - 40 C.F.R. § 68.69(d)

The owner or operator shall develop and implement safe work practices to provide for the control of hazards during operations such as lockout/tagout; confined space entry; and opening process equipment or piping; These safe work practices shall apply to employees and contractor employees.

On May 5, 2023, Shell Deer Park failed to develop and implement safe work practices, including energy control procedures, to ensure that employees and contractors performing maintenance activities involving the operation of MOV-2514 (motorized operated valve) were protected from the release of hazardous chemicals.

Shell Deer Park failed to ensure that prior to performing maintenance on MOV-2516, which included the opening and closing of an MOV, the valve was isolated from connected piping under 90 lbs of pressure.

AOC 7: Training - 40 C.F.R. § 68.71(b)

Refresher training shall be provided at least every three years, and more often if necessary, to each employee involved in operating a process to assure that the employee understands and adheres to the current operating procedures of the process.

Shell Deer Park failed to ensure that the following operators completed and passed the required refresher training applicable to their job tasks in a 3-year period.

Employee	Course	Due Date
RC	HOS1	5/16/2022
RC	HOS2	3/18/2023
EM	HOS2	8/18/2023
JP	HOS2	9/7/2023
AP	HOS1	10/10/2022
RM	HOS1	5/7/2023
CJ	HOS1	3/2022

AOC 8: Mechanical Integrity - 40 C.F.R. § 68.73(d)(2)

Inspection and testing procedures shall follow recognized and generally accepted good engineering practices.

i. Shell Deer Park failed to ensure the Risk Based Inspections (RBI) assessments for piping circuits was updated at least every 10-years for the following piping circuits in accordance with API 570, Section 5.2.5 - Frequency of RBI Assessments.

-AMS Cumene Side Draw FR V-8309 (last inspection 5/15/2007)
RBI Pipe Renewal
-AMS Top Column Bottom (last inspection 9/6/2007)
RBI Pipe Renewal
-ATC Bottoms Piping (last inspection 3/23/2006)
RBI Pipe Renewal
-ED Columns Top (last inspection 1/12/2010)
RBI Pipe Renewal
-Ammonia (last inspection 10/4/2011)
RBI Deadleg Renewal

ii. Shell Deer Park failed to ensure that when the RBI interval for internal or on-stream inspection exceeds the 10-year limit, the RBI assessment is reviewed and approved by the engineer and inspector at intervals not to exceed 10 years in accordance with API 510 10th Edition,6.3.2, RBI. At the time of this RMP inspection the RBI assessment had not been performed for the following process equipment:

-Acetylene Converter (last inspection 7/22/2002)
RBI Vessel Renewal
-Ethylene Product Demethanzier (last inspection 10/3/1996)
RBI Exchanger Renewal

iii. Shell Deer Park failed to conduct RBI-thinning-tubes inspection and testing at least every 10-years for the following heat exchangers in accordance with API 510, Section 6.3, 6.5 and 6.7.1:

-Solvent Recovery Column Feed
Bottom Exchanger -Tubes (last inspection 5/21/1999)
-Post Fractionation Reboiler- Tubes (last inspection 3/16/1999)

-SS Column to Number 2
Reboiler- Tubes (last inspection 3/20/1999)

iv. Shell Deer Park failed to conduct inspections of deadleg piping inspections at a minimum of every 10-years in accordance with API 570, Section 6.3.3 Setting Inspection Intervals Without the Use of RBI and 7.13.1 - Simplified Deferral for the following piping circuit:

-Acetone STR SEP to V-8362 (last inspection 1/6/2010)
Class E deadleg

-Phenol water to storage circulation (last 3/23/2004)
Class E deadleg

v. Shell Deer Park failed to ensure that for 26 equipment deferrals requiring repairs or replacement in the Isoprene Recovery Unit there was no record of when the repair recommendation was made in accordance with API 510, Section 6.5 and Section 6.8 Deferral of Inspection Repair Recommendation Due Dates. The deferral does not indicate how long the repair or replacement has been deferred.

AOC 9 – Clean Air Act (CAA) § 112(r)(1) – The General Duty Clause

Section 112(r)(1) states: Prevention of Accidental Releases (1) Purpose and General Duty - It shall be the objective of the regulations and programs authorized under this subsection to prevent the accidental release and to minimize the consequences of any such release of any substance listed pursuant to 40 CFR Part 68, or any other extremely hazardous substance. The owners and operators of stationary sources producing, processing, handling or storing such substances have a general duty, [in the same manner and to the same extent as the general duty clause in the Occupational Safety and Health Act (OSHA)] to identify hazards which may result from such releases using appropriate hazard assessment techniques, to design and maintain a safe facility taking such steps as are necessary to prevent releases, and to minimize the consequences of accidental releases which do occur.

Shell Deer Park failed to design and maintain a safe facility by not taking such steps as are necessary to prevent a flammable liquid (cracked heavy gas oil) from releasing into the ambient environment resulting in a fire and multiple explosions. Shell did not ensure that prior to performing maintenance on MOV 2516, that safeguards were in place by isolating the valve from potential chemical and electrical hazardous energy. This would include assuring that the energy isolation list and energy isolation drawing matched and electrical energy isolation devices had been executed and were in place. The failure to perform proper maintenance and implement safe work practices and administrative controls resulted in the release of 7,000 barrels of cracked heavy gas oil liquid.

SECTION IV – FOLLOW UP

At the closing conference the following potential areas of concern were discussed; the General Duty Clause, safe work practices, process hazard analysis, training, and hot work permits. Also discussed were procedures related to the claim of Confidential Business Information and the manner in which additional

supporting would be provided. Additional documents were provided by Shell via SharePoint on August 31, 2023.

SECTION V – LIST OF APPENDICES – Not applicable

There are no appendices to this inspection report.