EPA Region 10
Deemed Releasable
JULIE VERGERONT
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## SUMMARY OF FINDINGS

| CAA 112(r)(7), 40 CFR Part 68: Summary of RMP Findings | | |
|---|---|---|
| **CAA Finding No.** | **Description** | **Citation** |
| 1 | The facility failed to identify major commercial, office, and industrial buildings as receptors in the RMP. | 40 CFR § 68.30(b) |
| 2 | The facility failed to update and ensure that the process safety information for safe upper and lower limits were accurate. | 40 CFR § 68.65(c)(1)(iv) |
| 3 | The facility failed to update and ensure that process P&IDs accurately reflected the design of a covered process as installed in the field. | 40 CFR § 68.65(d)(1)(ii) |
| 4 | The facility failed to ensure that equipment complies with recognized and generally accepted good engineering practices and is designed and operating in a safe manner. | 40 CFR § 68.65(d)(2) |
| 5 | The facility failed to develop and implement written operating procedures that provide clear instructions for safely conducting activities in each covered process. | 40 CFR § 68.69(a) |
| 6 | The facility failed to develop and implement written operating procedures that address the personal protective equipment necessary to prevent exposure. | 40 CFR § 68.69(a)(3)(ii) |

8/24/2016
Report Author (date)

11/30/16
Report Reviewer (date)

USEPA REG
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# Enforcement Confidential: DO NOT RELEASE

## Clean Air Act - Section 112(r)
## Risk Management Program
## Inspection Report

**FACILITY INFORMATION**:

| | |
|---|---|
| Name: | Puget Sound Refinery - Shell Oil Products US |
| Physical Address: | 8505 South Texas Road, Anacortes, Washington 98221 |
| Phone Number: | (360) 293-0800 |
| Latitude/Longitude: | 48.478917/ -122.570861 |
| EPA Facility ID# | 1000 0009 9252 |

**CONTACT INFORMATION (RMP Implementation)**:

| | |
|---|---|
| Name: | Shirley Yap, General Manager |
| Phone Number: | |
| E-mail: | |

**EMERGENCY CONTACT INFORMATION**:

| | |
|---|---|
| Name: | Joe Solomon |
| Phone Number (24-hr): | (360) 293-0800 |
| E-mail: | joe.solomon@shell.com |

**CONDITIONS**:

| | |
|---|---|
| Weather: | cloudy, (74° Fahrenheit) |
| Dates of Inspection: | August 10 to 14, 2015 |

**United States Environmental Protection Agency RMP Inspection Team:**

Javier Morales, U.S. EPA Region 10, RMP Inspector
Craig Haas, U.S. EPA Headquarters, RMP Inspector
Anthony Gaglione, Eastern Research Group Inc., Contractor, Technical Expert Support
Trent Rainey, U.S. EPA, NEIC, Project Manager, Lead Inspector
Linda Tekrony, U.S. EPA, NEIC, Project Team Manager, Inspector
Jon Jones, U.S. EPA Region 10, RCRA Inspector
Jackie Vega, U.S. EPA, NEIC, Project Team Manager, Inspector

**DATE AND PROGRAM LEVELS OF SUBMITTED RMP:**

| | |
|---|---|
| Date of Initial Submission: | June 21, 1999 |
| Date of Latest Update: | April 22, 2015 |

The following table presents the Program level 3 processes as reported in the most recent RMP submittal. These processes exceed the respective RMP threshold amounts.

| Process ID | Process Chemical ID | Process Name | Program Level | Chemical Name | CAS Number | Quantity (lb) |
|---|---|---|---|---|---|---|
| 1000062338 | 1000076789 | Alkylation Unit #1 | 3 | Isobutane | 75-28-5 | 330,000 |
| | 1000076790 | | | Butane | 106-97-8 | 51,000 |
| | 1000076788 | | | Propane | 74-98-6 | 21,000 |
| | 1000076791 | | | Isopentane | 78-78-4 | 18,000 |
| | 1000076917 | | | 2-Butene-trans | 624-64-6 | 13,000 |
| | 1000076916 | | | 2-Butene-cis | 590-18-1 | 10,000 |
| 1000062344 | 1000076831 | Alkylation Unit #2 | 3 | Isobutane | 75-28-5 | 650,000 |
| | 1000076832 | | | Butane | 106-97-8 | 150,000 |
| | 1000076834 | | | Isopentane | 78-78-4 | 25,000 |
| | 1000076828 | | | Propane | 74-98-6 | 18,000 |
| 1000062348 | 1000076858 | Boiler House / Cogeneration | 3 | Ammonia (anhydrous) | 7664-41-7 | 91,000 |
| 1000062342 | 1000076817 | Catalytic Reformer #1 | 3 | Isopentane | 78-78-4 | 17,000 |
| 1000062343 | 1000076824 | Catalytic Reformer #2 | 3 | Isobutane | 75-28-5 | 26,000 |
| | 1000076825 | | | Butane | 106-97-8 | 24,000 |
| | 1000076822 | | | Propane | 74-98-6 | 21,000 |
| | 1000076826 | | | Isopentane | 78-78-4 | 11,000 |
| 1000062420 | 1000076950 | Crude Distillation Unit | 3 | Butane | 106-97-8 | 8,000 |
| 1000062421 | 1000076951 | Delayed Coking Unit | 3 | Butane | 106-97-8 | 4,200 |
| 1000062345 | 1000076840 | FCCU / GRU | 3 | Propylene | 115-07-1 | 19,000 |
| | 1000076841 | | | Isobutane | 75-28-5 | 15,000 |
| | 1000076924 | | | Isopentane | 78-78-4 | 12,000 |
| 1000062340 | 1000076801 | Hydrotreating Unit #1 | 3 | Pentane | 109-66-0 | 20,000 |
| | 1000076799 | | | Butane | 106-97-8 | 15,000 |
| | 1000076800 | | | Isopentane | 78-78-4 | 13,000 |
| 1000062341 | 1000076807 | Hydrotreating Unit #2 | 3 | Butane | 106-97-8 | 35,000 |
| | 1000076809 | | | Pentane | 109-66-0 | 10,000 |
| 1000062347 | 1000076926 | Hydrotreating Unit #3 | 3 | Isopentane | 78-78-4 | 12,000 |
| 1000062346 | 1000076847 | Poly | 3 | Propane | 74-98-6 | 230,000 |

| Process ID | Process Chemical ID | Process Name | Program Level | Chemical Name | CAS Number | Quantity (lb) |
|---|---|---|---|---|---|---|
| | 1000076848 | | | Propylene | 115-07-1 | 69,000 |
| | 1000076850 | | | Butane | 106-97-8 | 53,000 |
| | 1000076849 | | | Isobutane | 75-28-5 | 45,000 |
| 1000062339 | 1000076793 | Railcar Loading Rack | 3 | Butane | 106-97-8 | 3,900,000 |
| | 1000076919 | | | Isobutane | 75-28-5 | 2,300,000 |
| | 1000076918 | | | Propane | 74-98-6 | 820,000 |
| | 1000076921 | | | Propylene | 115-07-1 | 50,000 |
| | 1000076920 | | | Isopentane | 78-78-4 | 48,000 |
| 1000062335 | 1000076762 | Tank Farm | 3 | Butane | 106-97-8 | 8,500,000 |
| | 1000076763 | | | Isopentane | 78-78-4 | 7,600,000 |
| | 1000076759 | | | Isobutane | 75-28-5 | 4,200,000 |
| | 1000076862 | | | Pentane | 109-66-0 | 4,000,000 |
| | 1000076758 | | | Propane | 74-98-6 | 1,300,000 |
| | 1000076859 | | | 2-Butene-cis | 590-18-1 | 240,000 |
| | 1000076764 | | | Propylene | 115-07-1 | 180,000 |
| | 1000076860 | | | 2-Butene-trans | 624-64-6 | 170,000 |
| | 1000076760 | | | 1-Butene | 106-98-9 | 170,000 |
| | 1000076861 | | | 2-Methylpropene | 115-11-7 | 150,000 |
| | 1000076863 | | | Ethane | 74-84-0 | 47,000 |

**PURPOSE**:
The purpose of the inspection was to determine whether this facility is in compliance with the requirements outlined in Section 112(r) of the Clean Air Act and Title 40 Code of Federal Regulations (CFR) Part 68 and the Resource Conservation and Recovery Act (RCRA). The Shell Puget Sound Refinery is identified as a high risk facility based on the following criteria: 1) facilities who reported RMP worst-case scenario population impacts that exceed 100,000 people; 2) any RMP facility with a hazard index greater than or equal to 25; and/or 3) facilities that have had one or more significant accidental releases within the previous five years. The refinery has no prior RMP inspection and compliance history.

This report presents the observations and findings for the EPA Region 10 portion of the RMP inspection. EPA Region 10 inspector evaluated the following risk management program elements: compliance audits, incident investigations, and employee participation.

U.S. EPA National Enforcement Investigation Center (NEIC), EPA Headquarters and Eastern Research Group (ERG), Inc. prepared separate reports containing their RMP inspection observations and findings.

- NEIC inspectors evaluated the following risk management program elements: mechanical integrity, management of change, pre-startup safety review, hot work, emergency response, and contractors (See Attachment A).
- ERG and EPA Headquarters inspectors evaluated the following risk management program elements: hazard assessment, process safety information, process hazard analysis, operating procedures, and training (See Attachment B).

**INSPECTION NOTICE, ENTRY, AND OPENING CONFERENCE:**

The Shell Puget Sound Refinery (Shell PSR) management was notified in a letter dated July 13, 2015 that the EPA would conduct an RMP inspection at the facility from August 10 through August 14, 2015. In the same letter EPA included a list of documents, and asked that PSR provide the documents to EPA at the time of the inspection.

Trent Rainey, U.S. EPA NEIC, led the inspection entry at the Main Security Building. The inspection team included Javier Morales and Jon Jones of U.S. EPA Region 10; Craig Haas of EPA Washington D.C. Headquarters; Linda TeKrony and Jackie Vega of U.S. EPA NEIC and Anthony Gaglione of Eastern Research Group (ERG), Inc., (Contractors). The inspection team signed in at the guard gate and presented their credentials to the Shell PSR security and representatives, Steve Williams, Nate Biletnikoff and Adam Filby. The inspection team was escorted to a conference room for the opening conference at the Annex Building.

In the conference room Lead Inspector, Trent Rainey, gave an overview of the inspection process to the thirteen PSR representatives. A Sign-In sheet was passed around to record who attended the opening conference (See Attachment F). A Health & Safety orientation was given to the inspection team by Juan Soto, WSU Safety Coordinator. Required personal protective equipment (PPE) included steel-toed boots, hard hats, safety glasses, safety goggles, fire-resistant coveralls, hearing protection and H2S monitors. Shell PSR also required a camera permit in order for the EPA inspection team members to carry a camera and take photographs.

After the facility tour Mr. Archer, Shell PSR Speaker led a presentation on refinery operations and provided a process description overview.

Under the CAA Section 112(r)(6)(L) requirement facility employees and employee representatives (such as a union representative) have the right to participate in the RMP inspection. Brian Ricks, United Steelworkers (USW) Process Safety Representative Local 12-591, participated in the RMP inspection.

**GENERAL INFORMATION:**

The Shell PSR is located at 8505 South Texas Road, Anacortes, Washington on March Point near the city of Anacortes and adjacent to the Tesoro Corporation Refinery. In September 1958 the refinery owned by Texaco began operations to produce up to 45,000 barrels of crude oil per day. In 1998 Texaco and Shell merged their refining and marketing operations to form a company called Equilon Enterprises LLC. In 2001 Shell purchased Texaco's interest in Equilon Enterprises LLC and became the owner of the refinery. In 2002, Equilon Puget Sound Refining Company changed name to Shell Puget Sound Refinery.

The refinery has the capacity to process up to 145,000 barrels (5.7 million gallons) of crude oil per day. Shell PSR receives crude oil from Canada via pipeline and by tanker from the Alaska North Slope. The refinery produces oil products such as three grades of gasoline, fuel oil, diesel fuel, propane, butane, and petroleum coke that is used by companies that refine high-grade aluminum, sulfur, and a petrochemical called nonene.

The refinery has 455 full-time employees and is the largest employer in the area. The Shell PSR has fourteen (14) Program 3 covered processes (See processes listed above).

The Shell PSR distills the crude oil in a crude distillation unit called the Vacuum Pipe Spill (VPS) consisting of an atmospheric tower, a gas oil tower, and a vacuum tower heats the crude under pressure to separate light fractions such as propane, naphtha, kerosene and diesel. Heavy residuum from the gas oil tower is processed in the Delayed Coking Unit (DCU) to produce petroleum coke, gas oils, naphtha, and fuel gas. The DCU operates two drums on a 16-24 hour cycle time to produce petroleum coke that is sent to ships or barges by rail or truck. Kerosene and straight run naphtha (SRN) are hydrotreated in Hydrotreating Unit, HTU #1. Crude unitSRN (from the Crude Unit), light gas oil (from the Coker), FCCU's light cycle gas oil (from the Fluid Catalytic Cracking Unit), and diesel (from the Crude Unit) are hydrotreated in Hydrotreating Unit, HTU #2. Heavy gas oils from the VPS are processed in the Fluid Catalytic Cracking Unit (FCCU) and separated into gasoline, fuel gas, propane and butanes. Hot FCCU gasoline (from the bottom of debutanizer column) is hydrotreated in HTU#3 to remove sulfur. The propane and butane are used as feedstock for the Alkylation and Polymerization units. Light straight run (LSR) naptha from HTU #1 and HTU #2 are isomerized in in the isomerization unit (ISOM) to produce isomerate. Heavy straight run (HSR) naptha from the HTU #1 and HTU #2 are sent to a decyclohexanizer (DCH), and the DCH bottoms are sent to the Catalytic Reformers Units, CRU #1 and CRU #2 to produce high octane gasoline blend stocks. Propylene from the DCU and FCCU are sent to the catalytic polymerization unit (CPU) to produce polymer gasoline and nonene. Propylene and butylene are mixed with isobutane and a sulfuric acid catalyst in the Alkylation Unit, Alky #2 to produce alkylate, propane, and normal butane and isobutane. Mixed olefins from the debutanizer/depropanizer are sent to Alky #1 to produce mixed butanes and alkylate.

The refinery has two Sulfur Recovery Units, SRU #3 and SRU #4, that processes acid gas and sour water gas from all units to produce elemental sulfur. The Sulfur is trucked to local customers.

Shell PSR has three flares on a common header identified as the North, South, and East flare. All flares share a single flare gas recovery unit (FGR) during normal operating conditions. Shell PSR mainly uses the East flare. The North and South flare are used if the relieving capacity of the East flare is exceeded. The flares are not a RMP covered process.

Shell PSR uses a Boiler House (BOHO) Utilities and Cogeneration (COGEN) Unit for producing electricity that is entirely exported to the grid. The BOHO converts water to produce 600 psig steam, instrument and plant air, boiler feed water and fire and service water for the refinery. Three COGEN units burn natural gas and FCCU off-gas that each produce 45 MW of electricity.

Shell's wastewater treatment plant (WWTP) treats all sewage and wastewater from the refinery that is discharged into Fidalgo Bay. In addition, the WWTP handles ballast water from the oil tanker ships and recovers oil for recycling.

Shell PSR is a first responder that will respond to an accidental release of a regulated substance such as a flammable mixture and anhydrous ammonia. Shell PSR coordinates with the Skagit County Dept. of Emergency Management for emergency response support.

**5-YEAR ACCIDENT/RELEASE HISTORY**:
Shell PSR has no reported releases in the last five years that meet the five year accident history requirements.

On February 20, 2015, Shell PSR was conducting routine maintenance on their East flare. During the decontamination process of the KO Drum using steam, water was dumped from the C6 Seal Pot into the heated KO Drum causing vapors to release up the flare header into the air. The vapors contained a mixture of hydrocarbons and mercaptan. Due to weather conditions, a vapor cloud reached the city of La Conner and the Swinomish Reservation. The Anacortes 911, Northwest Clear Air Agency, EPA Region 10-Seattle, WA and Skagit County Emergency Management received numerous odor complaints. No injuries were reported.

On March 19, 2015, EPA sent an information request letter to Shell PSR, requesting information on the February 20, 2015 incident and other incident investigations that occurred in the last five years. On April 30, 2015, Shell PSR responded to the information request (See Attachment C).

**DOCUMENT REVIEW**:
During the inspection the following list of RMP related documents and records were provided for review (See Attachment D). The requests were made to Shell PSR on written document request forms.

- Shell PSR Site Plan (PSR01267).
- Shell PSR Block Flow Diagram, no date (PSR03904).
- Shell PSR Simplified Process Flow Diagram, 2/10/2008 (PSR01351).
- 2008 Shell PSR Process Safety Management, pgs. 1-13, 38-117 (PSR012026-PSR01198).
- Shell PSR RMP Unit List, 7/29/2015 (PSR00002).
- Shell PSR Plant Standing Instructions, PSIA061, A.120.3, Incident Investigations, 7/10/2014, pgs. 1-15 (PSR03905-PSR03919).
- Audit Report – Puget Sound Refinery PSM/RMP Compliance Audit 2014, Audit No. 2014-8, 5/12/14 to 5/16/14, pgs. 1-4 (PSR02937-PSR02936).
- Shell PSR Action ID 836275, Review All PSM Investigation Reports dating back to 2006, Printed 8/13/2015, pgs. 1-2 (PSR05699-PSR05700).
- Shell PSR 2011 PSM/RMP Compliance Audit Action Item List, Printed 8/11/2015, pgs. 1-5 (PSR03994-PSR03998).
- Puget Sound Refinery PSM/RMP Audit Compliance Report 2011, Audit No. 2011-11, 7/28/2011, pgs. 1-5 (PSR03920-PSR03924).
- RMP Standard Compliance Audit 2011 Certification Page, Signed 10/31/2011, pg. 1 (PSR05400 and duplicate PSR05401)
- Puget Sound Refinery PSM/RMP Regulatory Compliance Audit Terms of Reference, Report 2011, no date, pgs. 1-4 (PSR03925-PSR03928).
- Shell PSR 2013/2014 Near Misses Tracking List, no date, pgs. 1-9 (PSR04858-PSR04866).
- Shell PSR 2015 Near Misses Tracking List, no date, pg. 1-2 (PSR05221).
- Puget Sound Refinery Near Miss Forms, Near Miss No. 2011-13, 2011-34, 2011-42, 2012-12, 2012-17, and 1 (8/11/2012), pgs. 1-10, (PSR05222-PSR05231).

- Shell PSR Plant Standing Instructions, PSIA053, A.120.10, Process Safety Management Compliance Audits, 5/7/2015, pgs. 1-2 (PSR04567-PSR04568).
- Shell PSR 2011/2012 Near Misses Tracking List, no date, pgs. 1-5 (PSR03929-PSR03933).
- Shell PSR Plant Standing Instructions, PSIA083, Tracking Audits & Assessment Action Items, 1/24/2014, pgs. 1-2 (PSR03981-PSR03982).
- Shell PSR Plant Standing Instructions, PSIA035, A.080.4, Notification of Air Releases, Unit Upsets and Outside Complaints, 7/21/2015, pgs. 1-19 (PSR04442-PSR04461).
- Shell PSR Plant Standing Instructions, PSIA054, A.120.11, Process Safety Management Employee Participation Program, 5/19/2015, pgs. 1-6 (PSR03987-PSR03993).
- Process Safety Rep JHSC July 2015 Meeting Minutes, no date, pg. 1 (PSR05288).
- Shell Puget Sound Refinery RMP Responsibilities (Org Chart.pptx), 7/29/2015, pg. 1 (PSR00001).

**ON-SITE OBSERVATIONS**:

The EPA inspection team was provided a walking tour of the facility on August 10, 2015 from 12:30 PM to 2:06 PM. The Shell PSR representatives on the guided tour were Scott Mayhew and Sean Cornett. The EPA inspection team, including Javier Morales, Jon Jones, Craig Haas, Anthony Gaglione, Trent Rainey, Jakie Vega and Linda Tekrony, observed the general areas of the refinery where the covered processes are located. The refinery process areas are designated into unit areas. No photographs were taken of the process area equipment. The EPA inspection team observed the following process areas:

- Fire hall – fully staffed for fire and medical emergencies.
- Vacuum Pipe Spill (VPS) Unit/Gat Oil System (GOS)
- Delayed Coking Unit (DCU) - produces petroleum coke, gas oils, naphtha, and fuel gas; operates two drums on a 16-24 hour cycle time.
- Hydrotreating Unit (HTU #1) – treats jet fuel from low sulfur crude. Heaters/reformer reactors not in service.
- Isomerization Unit (ISOM) - produces isomerate.
- Hydrotreating Unit (HTU #2) – treats ultralow sulfur diesel fuel.
- Coke Unit – three reactors for main fracking/lean amine.
- Catalytic Reformers Units (CRU #2) – adds octane to gasoline.
- Hydrotreating Unit (HTU #3) – takes sulfur out of gasoline (debutnaptha).
- Decyclohexanizer (DCH)/Debutanizer (DEBUT) Unit
- Sulfur Recovery Units (SRU #4)/Tail Gas Treating Unit (TGTU)
- Alkylation Unit (Alky #2)
- Alkylation Unit (Alky #1) – runs in parallel with Alky #2.
- Catalytic Polymerization Unit (PCU/Poly Unit) – produces LPGs and polygas.
- Fluid Catalytic Cracking Unit (FCCU)/Gas Recovery Unit (GRU) – main producer of gasoline; wastewater strippers used for sour water.
- Boiler House (BOHO) Utilities and Cogeneration (COGEN) Unit
- Ammonia Storage Tank – used for controlling NOx emissions to the air for COGEN Unit.
- Tank Farm – butane storage spheres, Tank 1 to 6 and 19, for Alkylation Units; seven crude tanks storing Alaska North Slope crude.
- Chemtrade Facility – produces sulfuric acid for refinery.
- Two Water Reservoirs – water supplied by City of Anacortes for boiler house and effluent plant.
- LPG Storage Tanks

- Final Blending (Unit 24) – blending for gasoline before shipping.
- Tanker Truck Loading Racks (TTLR) Unit – owned by Shell Distribution to load tanker trucks with LGP and gasoline.
- Effluent Unit – wastewater treatment plant uses two bioreactors (Tank 74 and open tank) and sodium hypochlorite to treat waste water. 3.50 to 4.0 million gallons of treated waste water per day discharged into Fidalgo Bay.
- Tanker Car Loading Racks (TCLR) Unit – owned by Shell Distribution to unload/load tanker railcar with LGP and isobutane. Diesel pipeline used to load tanker trucks only.
- Control Building – only used for monitoring the units. Operator buildings are located at the units.
- Linde and Air Liquide Facilities – supply pure hydrogen to the refinery.

On August 11, 2015 at approximately 10:30 AM, the EPA inspection team toured the Digital Control Center building (DCS) for the refinery. The Shell PSR representatives on the guided tour were Brian Ricks, USW Process Safety Representative and Carlos Alonso. The EPA inspection team, Javier Morales, Craig Haas, and Anthony Gaglione observed the control room area. Robin Fakkema, HTU #2/HTU #3/Hydrogen System/CRU #2/DEBUT Operator, was briefly interviewed. The operator demonstrated that the HTU #2 emergency shutdown procedures were accessible online electronically as well as in hardcopy. The Shell PSR representatives explained that during a power outage there is a generator and batteries that provide emergency backup power to the control room. In addition, the Shell PSR representatives stated that control room operator positions are three to four levels deep. No photographs were taken of the control room.

On August 13, 2015, Brian Ricks, USW Process Safety Representative, introduced the EPA inspection team to Jim Caddell, Alky 1 Operator who brought to EPA's attention several concerns on the process water separator on Poly (CPU) Unit and the spent acid tanks for the Alky Units. At approximately 2:50 PM, the EPA inspection team toured the Poly Unit (CPU) and the spent acid tanks for the Alky Units. The Shell PSR representatives on the guided tour were Ron Norwood, Carlos Alonso, Marshall Basham and Mike Osborne, Process Specialist for Alky. Javier Morales and Anthony Gaglione observed these process areas of the refinery. Photographs were taken of the process area equipment by Anthony Gaglione, ERG Inc. (See Attachment B, ERG Inspection Report for photos.). The following process areas were observed:

- Process Water Separator: The gas separator (5JC-94) located in the CPU separates light hydrocarbons from oily liquid bottoms from process vessels. The process water is discharged to the oily sewer system (OWS). The operator's two main concerns were (1) buildup of hydrocarbons in the capped sewer catch basin creates a potential lower explosive limit (LEL) atmosphere; and (2) continuous releasing of VOCs to atmosphere without documenting and measuring.[1] Reference ERG Inspection Report for information on analysis (See Attachment B).
- Alky Spent Acid Tanks: There are two spent acid tanks (TK-402 and TK-403) located within Alky 1. Spent acid from the Alky 1 blowdown drum is automatically pumped to the spent acid tanks (TK-402 and TK-403) using a level control. A nitrogen blanket is used to maintain an inert atmosphere to prevent an explosive mixture of hydrocarbons gases from building up in the tanks. Each tank has a top vent that feeds into an oil bath at the grade of the tank. Hydrocarbon gases vent out of the oil bath when the tank pressure exceeds the backpressure. On spent acid tank TK-403 the PRV5035 on vent oil bath line (35X80012) had a NWCAA for LDAR leaker tag dated August 4, 2015 with a reading of 50,000 ppm that was tagged for repair. A strong

[1] Jim Caddell, Alky 1 Operator, e-mail on workplace compliance issues, dated 8/21/2015.

hydrocarbon odor was observed by the vent line. The operator's two main concerns were (1) venting hydrocarbon gases create a hazardous condition for workers; and (2) continuous releasing of hydrocarbon gases to the atmosphere without documenting and measuring.[2] Reference ERG Inspection Report for information on analysis (See Attachment B).

Compliance Audit:
Shell PSR's Plant Standing Instructions, PSIA053, A.120.10, Process Safety Management Compliance Audits, dated 5/7/2015, provides the compliance audit requirements of Washington State PSM Standard (WAC 296-67-057) and RMP (40 CFR 68.79). The audit requirements are the following:

- Verify at least every three years that the procedures and practices required by PSM/RMP are being implemented and followed.
- Prepare a report identifying the audit findings, identify target completion dates, resolve the findings, and document the corrected deficiencies.
- Keep two most recent audits reports on file.
- Complete scheduled audit activities prior to the next three year cycle.
- Refinery Managers certify two separate certifications for PSM and RMP after the audit report is issued.

Shell PSR develops a written "Terms of Reference" prior to conducting a compliance audit at the refinery. The "Terms of Reference" identifies the audit team, objective, scope, standards, methodology, schedule, audit report elements, report distribution, and audit follow-up. The scope of Shell PSR's audits focus on "all activities under the operational control of the auditee for this location and interfaces with other business activities, contractors and projects." In addition, the methodology of Shell PSR's audits involve the "review of facility procedures and documents related to the subject compliance areas." The Shell PSR's audit does not identify the fourteen (14) Program 3 covered processes that are subject to the compliance evaluation. Listed below are the "Terms of Reference" for 2011 and 2014.

- Puget Sound Refinery PSM/RMP Regulatory Compliance Audit Terms of Reference, Report 2011, no date, pgs. 1-4 (PSR03925-PSR03928).
- Terms of Reference for RMP/PSM Compliance Audit completed in 2014 - Request 101, Terms of Reference for RMP/PSM Compliance Audit 2014, Audit No. 2014-8, 5/12/-16/2014, pgs. 1-4 (PSR06194-PSR06197).

Shell PSR conducts their compliance audits at least every three years and has the following two certified audits reports on file listed below. The Shell PSR's audit reports evaluate business unit/facility specific standards and procedures related to RMP regulations. The audit reports did not identify the fourteen (14) Program 3 covered processes that were subject to the compliance evaluation.

- Puget Sound Refinery PSM/RMP Audit Compliance Report 2011, Audit No. 2011-11, 7/28/2011, pgs. 1-5 (PSR03920-PSR03924).
- RMP Standard Compliance Audit 2011 Certification Page, Signed 10/31/2011, pg. 1 (PSR05400 and duplicate PSR05401)
- Audit Report – Puget Sound Refinery PSM/RMP Compliance Audit 2014, Audit No. 2014-8, 5/12/14 to 5/16/14, pgs. 1-4 (PSR02937-PSR02936).
- Certification of RMP/PSM Compliance Audit completed in 2014, Signed Certification of RMP/PSM Compliance Audit in 2014, dated 7/09/2014 (PSR06192-PSR06193).

[2] Jim Caddell, Alky 1 Operator, e-mail on workplace compliance issues, dated 8/21/2015.

Shell PSR's Plant Standing Instructions, PSIA083, Tracking Audits & Assessment Action Items, dated 1/24/2014, describes the process for tracking and managing audit/assessment action items. The following process is used in tracking action items:

- Data Manager Coordinator inputs action item requests into electronic tracking system (Fountain). Action items are assigned due dates in Fountain. Fountain sends automatic e-mails to personnel assigned action items.
- Verbal agreement between action recipient and personnel assigning action item, including the line manager. Then action item is loaded into Fountain.
- Changes to action, due dates, and/or action party requires approval using a Change Protocol Matrix.
- Line Manager informs Data Manager Coordinator when action item is reassigned to new owner.
- Data Manager Coordinator creates a bi-monthly report on the status of action items due.
- Manufacturing Business Assurance Committee (MBAC) assigns action items from audits that is tracked in Fountain. MBAC action item due dates will be extended based on risk ranking and type of audit. The Fountain Assurance Coordinator or Action Party must approve the extension.
- To close an action item the following must be met: document action taken, date completed, attach supporting documents, and change status to action complete. Closed action items are audited each month by the USW Health and Safety Representative.

The 2011 and 2014 audit report findings listed below identify the specific RMP regulation with no information what covered process was evaluated. The audit findings identified deficiencies in Process Safety Information[3], Mechanical Integrity, Hot Work Permits and Incident Investigation[4].

- Shell PSR 2011 PSM/RMP Compliance Audit Action Item List, Printed 8/11/2015, pgs. 1-5 (PSR03994-PSR03998).
- Shell PSR Action ID 836275, Review All PSM Investigation Reports dating back to 2006, Printed 8/13/2015, pgs. 1-2 (PSR05699-PSR05700).

The 2011 audit report action items for Hot Work Permits (Action ID 576593) and Mechanical Integrity (Action ID 576588 and 576617)[5] were closed on 10/29/2012, 4/9/2012 and 6/5/2012. The 2014 audit report action item for Incident Investigation (Action ID 836275) was closed on 5/28/2015.

Incident Investigation:

Shell PSR's Plant Standing Instructions, PSIA061, A.120.3, Incident Investigation, dated 7/10/2014, provides the process for identifying the cause of incidents and near misses. The incident investigation requirement has the following nine steps:

1. Incident and near miss review: All incidents[6] reported in the Fountain Incident Management (FIM) system are reviewed by the Investigation Steering Team (IST) to decide if an investigation is initiated.
2. Decide on the level of investigation: Minimum level requirements are set to conduct investigations of significant or high potential incidents based on actual incident severity or assessed risk.[7]
3. Sponsor the investigation: Sponsor charters investigation team for Level 1, 2 and 3 Triangle of

[3] 2014 audit finding for the relief system design basis for thermal relief valves that was unavailable at the time of audit was not tracked in Fountain.

[4] 2011 audit finding was closed during the audit report review. Shell PSR audit team concluded that the "H2 in Tank 25" incident investigation report had a typographical error for the date the investigation began. The investigation began within 48 hours with the correct date of 3/30/2009.

[5] Both action items were reopened after an audit was done to verify completion.

[6] Process Safety, Personal Injury/Illness, Near Miss, Reliability, Product Quality, and Capital Projects/Turnaround are incident categories given in Table 1: Incident Reporting Avenues and Responsible Parties.

[7] PSIA061 references DSM-0525001-ST, Incident Reporting and Review, for minimum standard investigation level requirements; PSIA061, Appendix A: Incident Investigation Criteria and Appendix C: Investigation Level Requirements and Deliverables.

Prevention (TOP)/Causal Learning (CL) investigations.[8]

4. Conduct the investigation: Shell PSR uses trained investigators both represented (hourly) and staff. Investigators must either conduct two investigations within the last 12 months or do a combination of investigation/training. Level 2 and 3 investigations need a minimum of two investigators consisting of one represented (hourly) and one staff. PSM/RMP investigations are required to begin within 48 hours of the incident.[9]
5. Learn from the investigation (Learning Sessions): Sessions or meetings allow the investigation team to provide information on the findings to refinery personnel to understand what happened during the incident and understand the causes.
6. Decide what to address (Decision Making Meeting): A Decision Making Meeting (DMM) is held for each Level 1, 2, and 3 investigation. Sponsor(s) select the managers or their delegates who have the authority to make decisions in the meetings. Action items from the DMM are entered into the FIM system by the TOP Representative.
7. Documentation of investigation: An approved report format is used for all investigations. DMM meeting minutes are documented for PSM/RMP incidents.[10] TOP Representative maintains investigation register (TOP webpage) for employee access to completed investigation reports.
8. Develop and implement solutions: Depending on the complexity of the investigation, the DMM may create a solution development team (using a formal Charter and tracked by the CL Focal Point and/or TOP Representative) to implement a solution(s) that will be tracked in the FIM system.
9. Audit effectiveness: On a semi-annual basis the CL Focal Point will audit a minimal of two investigations that were completed in the last 6-18 months.

The following documentation was reviewed on the reported near misses from 2011 to 2015:

- Shell PSR 2011/2012 Near Misses Tracking List, no date, pgs. 1-5 (PSR03929-PSR03933).
- Puget Sound Refinery Near Miss Forms, Near Miss No. 2011-13, 2011-34, 2011-42, 2012-12, 2012-17, and 1 (8/11/2012), pgs. 1-10, (PSR05222-PSR05231).
- Shell PSR 2013/2014 Near Misses Tracking List, no date, pgs. 1-9 (PSR04858-PSR04866).
- Shell PSR 2015 Near Misses Tracking List, no date, pg. 1-2 (PSR05221).

The near miss tracking lists identify the near miss number, date of near miss, description of incident, TOP/CL Investigation, status in FIM or follow-up, plant mailing, author, and type of incident.[11]

Listed below are the 2011/2012 Near Miss Forms reviewed:

| Near Miss No. | Description of Incident | Date of Near Miss |
|---|---|---|
| 2011-13 | H2S release on 11PK101 compressor shutdown. | 3/2/2011 |
| 2011-34 | PRV4500 replacement issue | 10/10/2011 |
| 2011-42 | Tubing fitting leaking on suction line to 10P209 propane pump. | 12/6/2011 |

[8] PSIA061, Appendix B: Roles & Responsibilities.

[9] The Get Organized (GO) Team initially gathering information or deciding to investigate begins the investigation.

[10] PSIA06, Table 2: Investigation Documentation.

[11] Shell PSR indicates the following: "yes" or "no" if a TOP/CL investigation is required, "open" or "closed" for status in FIM, "on-line" for plant mailing, refinery unit such as "Boho, Alky/Poly, FCCU, SRU4, etc." for author, "Safety, Enviro, or Other" for type of incident.

| Near Miss No. | Description of Incident | Date of Near Miss |
|---|---|---|
| 2012-12 | FCCU startup causes PRVs on 5JC102 in Poly Unit to relieve to flare exceeding upper range limit (200 MSFC-HR). | 6/12/2012 |
| 2012-17 | HTU2 Unit running above HAZOP max charge rate of 2,000 bph. | 7/8/2012 |
| 2012-21 | PRV relieved LPG to atmosphere due to over pressurization in piping. LPG sent to flare from Alky2 degassing drum. | 8/11/2012 |

A TOP/CL investigation was not initiated for these documented 2011/2012 near misses.

Listed below are the 2013/2014 near misses with an initiated TOP/CL investigation done:

| Near Miss No. | Description of Incident | Date of Near Miss | TOP/CL Investigation Report |
|---|---|---|---|
| 2013-2 | Job permitted to pull FCCU PRV4059 with steam still lined up | 1/31/2013 | 329541 |
| 2013-16 | East Flare flange flash fire | 4/6/2013 | 330733 |

The 2013/2014 near miss list shows that the TOP/CL investigations are "open" in FIM. Investigation Report No. 329541 did not document due dates on completing the findings and recommendations in resolving the process issues for isolating PRVs and LOTO for steam block valves. Investigation Report No. 330733 documented due dates on completing the findings and recommendations in resolving the flange fires of the East flare.

The following incident investigations began later than 48 hours after the date of the incident:

| Incident Date | Date Investigation Began | Description of Incident |
|---|---|---|
| 11/24/2010 | 11/29/2010 | H2S exposure near 11PK101 (HTU/CRU2) |
| 12/1/2010 | 12/13/2010 | 6D6g Debut pump failure (CRU1) |
| 3/9/2014 | 5/12/2014 | Alky2 Iso-butane release |

The Shell PSR 2014 Compliance Audit Finding ID# 836273, identified an issue with beginning investigations within 48 hours. Shell PSR reviewed 288 investigation reports dating back to 2006 to evaluate the documented date the initial investigation began.[12] In 2014, Shell PSR revised the Incident Investigation Report Template to include the date the investigation began (date of initial data gathered). In addition, the above three incident investigation reports did not document if the report was reviewed

[12] Shell PSR reviewed investigator logs, photo logs, and e-mails related to the investigation reports to determine if investigation began within 48 hours. Action ID# 836275 was closed 5/28/2015.

with affected Shell PSR personnel.[13]

Employee Participation:
Shell PSR's written action plan, Plant Standing Instructions, PSIA054, A.120.11, Process Safety Management Employee Participation Program (EMP), dated 5/19/2015, identifies employee activities in participating in their Process Safety Program (PSM) program (OSHA 29 CFR 1910.119) also called the Risk Management Program (RMP) program (40 CFR Part 68). The Process Safety Manager, Steve Williams, is responsible for the implementation of the EMP. Managers and supervisors are responsible for promoting employee involvement and supporting employee access to the PSM/RMP documentation.

The EMP addresses employee consultation and participation in PSM/RMP elements as follows:

- Process Hazard Analysis (PHA): Employee who has experience and knowledge specific to a process such as operator and engineer, including a person knowledgeable of the PHA methodology to participate in the PHA process. Results of the PHA are shared with affected employees by the Production Specialist.
- Draft PSR Standing Instructions (SI) are sent to the Joint Health & Safety Committee (JHSC, cross-functional group of managers and labors) for review and comment.
- PSM Training: Employees are responsible for participating in the development, review and revision of training materials/documents. Training is done in the following combinations: Computer Based Training (CBT), Subject Matter Expert (SME) instruction, Unit Trainer (UT) instruction and Interactive Discussion method (provided to small groups such as operators) for refresher training.
- Contractors: Contractors receive training and orientation before beginning work at the refinery. Periodic safety performance evaluations are done that include safety walks or field safety audits. Contractors participate in audits and incident investigations.

The EMP provides employee access to the following PSM/RMP information:

- Employees access the PSM/RMP information through the intranet using ESP Portal-Universal Tag Locator, Edocs, KMS, ProSteward, etc.
- Process Safety Manager is responsible in addressing employee questions on accessing requested PSM/RMP information.
- PSR Representative provide access to contractors who request the PSM/RMP information to conduct their assigned work.

The following documentation was reviewed on the implementation of the EMP:

1. New Employee Orientation (NEO): Training materials for Operator, Edward Castleberry (2008), including the 1 Hour PSM Overview Presentation.
2. Joint Health & Safety Committee (JHSC) Meeting Minutes dated 7/7/2015 to provide a PMS report out on 7/17/2015.
3. FST Meeting Minutes, Alky 2 SRU: OpOrders Alky 2 – SRU dated 6/8/2015, dayshift, Operator Michael Osborne.
4. 1/8/2015 Training Sign In Sheet for PSM//MOC Training – NEO: Trained five operators and one maintenance manager.

[13] Shell PSR's Plant Standing Instructions, PSIA061, A.120.3, Incident Investigation, Step 5 states Learning Sessions will be provided by the investigation team to refinery personnel to understand what happened and the causes. Refinery personnel are given access to FIM to view completed incident investigation reports.

5. Demonstration on accessing PSM/RMP information by Adam Filby on August 12, 2015 using the PSR intranet homepage such as Edocs for employee procedures and P&ID drawings and Process Safety link for PHAs.

**EMPLOYEE INTERVIEWS**:
The EPA inspection team members conducted interviews with a number of the Shell PSR staff. Shell PSR management requested that EPA submit the names of the employees EPA requested to interview, and that interviews be scheduled ahead of time in order to allow Shell PSR to make arrangements. This section provides the names of interviewees interviewed August 12, 2015 by EPA Region 10 inspector (See Attachment F for interview notes.).

**8/12/2015, 8:00 AM:**
Shell PSR personnel, Brian Rick, Process Safety Representative, and Carlos Alonso, Health & Safety Representative were interviewed by Javier Morales about the incident investigation process, Fountain Tracking System, and employee participation.

**8/12/2015, 9:00 AM:**
Shell PSR personnel, Adam Filby, Business Improvement Plan Coordinator was interviewed by Javier Morales on demonstrating employee access to the RMP documentation.

**8/12/2015, 1:00 PM:**
Shell PSR personnel, Steve Williams, Process Safety Manager, and Tone Martin, Data Manager Coordinator were interviewed by Javier Morales on demonstrating the Fountain Tracking System used to track incident investigation reports and action items.

**CLOSING CONFERENCE:**
At 4:15 PM on August 14, 2015 the EPA inspection team met with Shell PSR representatives for the closing conference. Trent Rainey thanked the Shell PSR representatives for their cooperation during the inspection, and informed them that the EPA inspection team will continue to evaluate the information obtained during the inspection, and potentially additional information, before completing the evaluation of the facility's compliance with RMP requirements.

**CONCLUSIONS:**
During the RMP inspection, the following findings were identified (See Attachment F for inspector checklists.):

1. **Incident Investigation**: Shell PSR did not initiate all incident investigations as promptly as possible, but no later than 48 hours following an incident as required by 40 CFR 68.81(b). Shell PSR investigation of an Alky2 iso-butane release that occurred on 3/9/2014 began on 5/12/2014.

2. **Incident Investigation**: Shell PSR did not review the report with all affected personnel whose job tasks are relevant to the incident findings as required by 40 CFR 68.81(f). Shell PSR investigation reports on the 11/24/2010, 12/1/2010 and 3/9/2014 incidents do not document if the affected Shell PSR personnel reviewed the report findings.

**FOLLOW-UP ITEMS:**
On August 18, 2015 additional follow-up information was requested from Mr. Adam Filby, Business Improvement Plan Coordinator. On August 28 and 31, 2015, Mr. Filby provided a letter with attachments in response to the request (See Attachment E).

1. Corporate policy on conducting RMP/PSM compliance audits – Shell PSR does not have a corporate policy for conducting RMP/PSM compliance audits.
2. Certification of RMP/PSM Compliance Audit completed in 2014 – Request 100, Signed Certification of RMP/PSM Compliance Audit in 2014, dated 7/09/2014 (PSR06192-PSR06193).
3. Terms of Reference for RMP/PSM Compliance Audit completed in 2014 - Request 101, Terms of Reference for RMP/PSM Compliance Audit 2014, Audit No. 2014-8, 5/12/-16/2014, pgs. 1-4 (PSR06194-PSR06197).
4. TOP/CL Investigation Report 329541 – Request 102, FCCU PRV LOTO, File Name: 2013 1-31 PRV LOTO, pgs. 1-5 (PSR06214-PSR06218).
5. TOP/CL Investigation Report 330733 – Request 103, Investigation Report East Flare Detonation, pgs. 1-30 (PSR06219-PSR06248).
6. Process flow diagram for Spent Sulfuric Acid Tanks, Tk 402/403, that supply sulfuric acid to Alky #1 and #2 Units – Request 104, Process flow diagram for Spent Sulfuric Acid Tanks, dated 8/25/2015 (PSR06201).
7. 2008 Shell Puget Sound Refinery, Process Safety Management, pgs. 14 to 37 (PSR05924-PSR05947).
8. Request 49, Tuesday 6/2/15 JH&SC Meeting Minutes – DRAFT (PSR06213).

**INSPECTION REPORT CERTIFICATION:**
This is to certify that Javier Morales, as inspector at this facility and has verified the accuracy and completeness of this inspection report:

Javier Morales 8/18/2016
Signature Date

Kelly McFadden 8/18/16
Supervisor Review/Approval Date