

Safety Alert

BSEE

U. S. Department of the Interior
Bureau of Safety and
Environmental Enforcement
Pacific OCS Region

Safety Alert No. 21
January 13, 2014

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Pollution from Production Operations Due to Improper Diversion of Production Flow and Rupture Disc Failure

During the night shift, the platform operator discovered that the fire deluge system had been activated, the platform had shut in, the platform flare was no longer burning, and there was oil on the flare boom and the side of the platform. The operator, who was the only person on board at the time, began responding to the situation, called to shore for assistance, and notified oil spill response and cleanup personnel. As a result of the incident, more than 35 barrels of oil was released into the ocean, most of which was recovered. No oil reached the nearby shoreline and there were no reported impacts to wildlife.

The Bureau of Safety and Environmental Enforcement (BSEE) has completed a panel investigation into the incident. The investigation concluded that the platform shut-in resulted in the shutdown of the shipping pumps and activation of the platform deluge system. Because the sump and surge tank pumps continued to run, the rupture of the pressure safety element (PSE) in the piping from the surge tank combined with improper routing of piping from the flare header allowed water and hydrocarbons to be released from flare boom.

Although the initial cause of the process upset that led to the platform shut-in was unable to be conclusively determined, the findings of the investigation identified the following causes of the spill:

- Flow from the flare header, which was normally routed to a settling tank that served as the flare scrubber, had been diverted to the disposal tube because the settling tank was out of service for repair. No alternate scrubbing vessel was provided as required by the regulations and BSEE approvals related to the settling tank repair. This allowed flow from the sump and surge tanks to migrate from the flare header to the disposal tube, then out of the flare boom into the ocean.
- The rupture of the PSE in the piping from the surge tank allowed the release of liquid hydrocarbons into the flare header. Based on the production volumes and normal operating pressure, it is believed that the PSE failed at a pressure well below its rated pressure. A laboratory analysis of the ruptured PSE (pictured below) indicated corrosion pitting, fatigue, and brittle cracking. There was no documentation indicating when the

PSE was installed or when, if ever, it had been replaced. It is possible that the PSE had been in service for more than 20 years.



Rupture Disc Recovered from Platform's Surge Tank (BSEE Photo)

The panel investigation also identified the following causes that contributed to the severity of the incident:

- The audible alarm designed to alert platform personnel of process upset conditions failed to sound. In addition, the alarm panel providing a visual alert to the situation was located in a room separate from the production office. As a result, the platform shut-in and the release of fluids overboard was not discovered until the operator left the production office to make a routine check of the platform -- approximately 2 hours after the platform shut-in.
- The platform operator was not aware that the surge and sump pumps needed to be shut down manually after a platform shut-in. As a result, these pumps continued to run for approximately 5 hours after the initial platform shut-in, circulating the influx of deluge water and existing production fluids to the surge tank, until additional personnel arrived on the platform to assist with the response.

Based on the investigation findings, BSEE recommends that operators review their Safety and Environmental Management System plans to ensure that:

- Platform piping, safety devices, and shutdown systems are designed and maintained to handle anticipated process upset conditions.
- Management of Change procedures are adequate to identify and implement new or

modified measures needed to ensure the integrity of the production process when equipment is removed for repair.

- Maintenance, testing, and documentation procedures of PSEs and other safety devices are adequate to ensure those devices will perform as intended. Operators should check the status and condition of any PSEs or similar devices in use in their production systems. Operators should be especially aware of the age of such discs as well as the working conditions that the discs are subjected to, which may result in fatiguing or failure. The rupture disc marking identification tags should be attached and legible. Operators should inspect rupture discs for damage or pre-existing flaws before installing replacements.
- Maintenance and testing procedures are adequate to ensure that audible alarms will function as intended.
- Visual alarms are designed and installed so that platform personnel are alerted to process upset conditions in a timely manner.
- Training programs are adequate to ensure that personnel can respond effectively to anticipated process upset conditions.

Safety Alerts can be found on the following BSEE webpage:

<http://www.bsee.gov/Regulations-and-Guidance/Safety-Alerts/Safety-Alerts/>

Panel Investigation Reports can be found on the following BSEE webpage:

<http://www.bsee.gov/Inspection-and-Enforcement/Accidents-and-Incidents/Panel-Investigation-Reports/Panel-Investigation-Reports/>

Note:

A **Safety Alert** is a tool used by BSEE to inform the offshore oil and gas industry of the circumstances surrounding an accident or a near miss. It also contains recommendations that should help prevent the recurrence of such an incident on the Outer Continental Shelf.