

Learning From Incident

Awareness Alert

Alert No.	PDO-LFI AIPS-202026-AW	Patterns	Creating Error Conditions
Date	December 2020	Directorate	-----

Sulphur Storage Blocks Fire Incidents

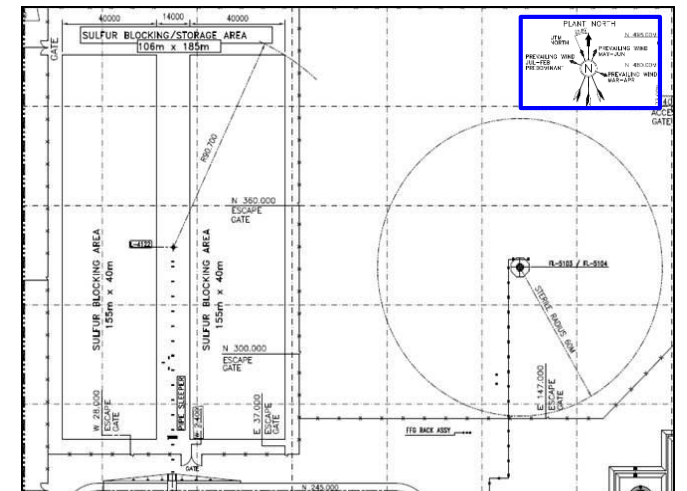
Target audience for this alert:

Operations: Asset Managers, Emergency Response Staff

Engineering: Concept Design Engineers

Description of the incident:

In the Tayseer EDF plant (a PDO DBOOM facility operated by Exterran) on two occasions a plant trip resulted in a blowdown of the facility and consequently in a high flaring rate. The excess flaring was in excess of the continuous acid gas flaring that had been going on for months as the plant's SRU had been down. During the high flaring rate the sulphur stored in the sulphur blocking/storage area, located 90 m away, (self-)ignited and was set on fire. Smoke from the sulphur storage area was observed by a field operator and the PDO fire fighting team was called in. It took several hours, amongst others because of issues in the efficiency of the emergency response, before the sulphur fire was put out and in the following days the sulphur bed was further cooled and the temperature monitored.



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Why it happened:

The source of ignition was either flare radiation or carry over of hot sintering solid metal particles from the flare header being blown out during the higher flaring rate, as the wind was blowing into the direction of the sulphur storage at the time of the events. The metal particles resulted from the long term acid gas flaring that had been going and thus resulting in H₂S reacting with the flare header material, leading to iron sulphide (FeS) deposition in the header. During the high flaring rates these deposits were picked up and exited through the flare stack. In the design, the impact on the flare header of continuous acid gas flaring, as well as the location of the sulphur storage nearby had not been considered. In the emergency response in fighting the fire several shortfalls ranging from lacking awareness of the responders towards the hazards associated with solid sulphur fires, the fire fighting medium used, the lack of available fire water, the insufficient range of the fire water canon, and various communication issues.

Lessons learned:

1. Design of a flare header shall assess impact of worst case operating conditions on the material selection [DI]
2. Sulphur blocking/storage areas shall be located away from potential ignition sources such as flares and take wind direction into account [DI]
3. In eliminating possible solid sulphur fires, the export of sulphur pastillation/granulation or molten sulphur is preferred over piling of sulphur blocks [DI]
4. Emergency response teams shall be trained, be aware of the hazards, and wear the correct PPE in handling solid sulphur fires [OI]
5. A 'pre-incident planning' (PIP) study shall determine the required fire water amount as well as its source of supply (provided/carried by the mobilized fire tender or be available at site) [DI]
6. The maximum range of the water canon for fire fighting shall be sized to cover the whole sulphur blocking/storage area [DI]
7. For sulphur fires water fogs in combination with foam pouring shall be used instead of solid water streams [OI]
8. For non-PDO operated installations that rely on PDO emergency response teams there shall be clear emergency response protocols including the necessary communication channels, as well as regular drills to be performed to familiarize with the location [OI]

For more information contact Nilesh Sonawane, OSGO222 (Nilesh.NS.Sonawane@pdo.co.om)



شركة تنمية نفط عمان
Petroleum Development Oman