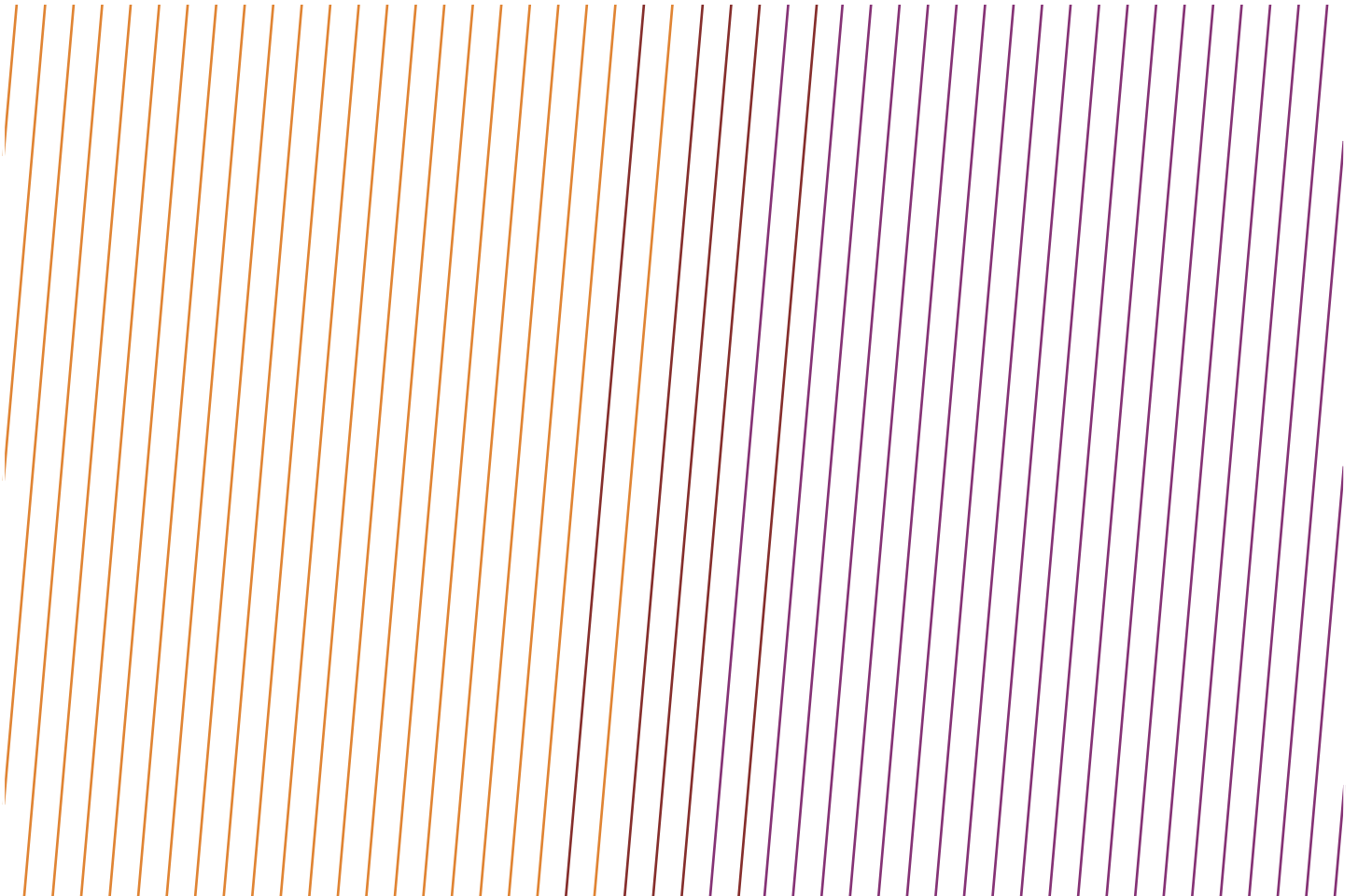


DATA SERIES

Safety performance indicators – Process safety events – 2017 data Fatal incident and high potential event reports

*Fatal incidents and high potential events that were also process safety events (PSE),
and fatal incidents and high potential events that were PSE-related – 2017*



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DATA SERIES

Safety performance indicators – Process safety events – 2017 data Fatal incident and high potential event reports

*Fatal incidents and high potential events that were also process safety events (PSE),
and fatal incidents and high potential events that were PSE-related – 2017*

Revision history

VERSION	DATE	AMENDMENTS
1.0	August 2018	First release

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Fatal incident reports classified as Tier 1 process safety events

DATE: Jun 9 2017

LOCATION: South & Central America, BRAZIL

DATA SET: Contractor Offshore

WORK FUNCTION: Drilling

INCIDENT CATEGORY: Explosions or burns

ACTIVITY: Maintenance, inspection, testing

LIFE SAVING RULE: System override

WORKFORCE DEATHS: 3 3RD PARTY DEATHS: 0

NARRATIVE: Accident with 3 fatalities on drillship. During services in the boiler room located on the stern/port main deck of a drilling vessel contracted by the Company, there was an explosion with steam release reaching four workers (3 fatalities and 1 accident with less severity).

WHAT WENT WRONG:

- Inadequate/failure of selection criteria/evaluation of contractors;
- Inexistence/failure to prepare and control operational procedures;
- Lack of prior analysis of the safety conditions for the execution of tasks and hazards/risks in the workplace;
- Unsuitable supervision: Failure to ensure the performance of activities in accordance with established requirements;
- Communication between working groups not adequate/misunderstanding - Failure to identify change / Improper change management.

LESSONS LEARNED AND RECOMMENDATIONS:

- Provide a qualified professional to monitor the operation and maintenance of boilers;
- Carry out a critical analysis of the contracting system, contemplating the technical, normative and scope criteria of the services and establishing criteria for inspection of the services;
- Check boiler ignition procedure considering the alignment check of the instruments and outlets of the control and protection system, containing checklist;
- Elaborate procedure for realization of disabling of systems of control and protection of the boilers.

CAUSAL FACTORS:

PEOPLE (ACTS): Use of Protective Methods: Inadequate use of safety systems

PEOPLE (ACTS): Inattention/Lack of Awareness: Improper decision making or lack of judgment

PROCESS (CONDITIONS): Tools, Equipment, Materials & Products: Inadequate maintenance/inspection/testing

PROCESS (CONDITIONS): Organisational: Inadequate work standards/procedures

PROCESS (CONDITIONS): Organisational: Inadequate supervision

DATE: Aug 1 2017

LOCATION: Africa, NIGERIA

DATA SET: Contractor Offshore

WORK FUNCTION: Drilling

INCIDENT CATEGORY: Explosions or burns

ACTIVITY: Drilling, workover, well services

LIFE SAVING RULE: Isolation

WORKFORCE DEATHS: 1 3RD PARTY DEATHS: 0

NARRATIVE: While a drilling rig was pumping out of hole, a pressure spike occurred on the stand pipe pressure gauge followed by a loud bang. The noise was caused by an explosion inside the rig's mud pump pulsation dampener. The explosion blew off the pressure gauge, charging valve and the valve guard on top of the pulsation dampener. A flash fire followed the explosion and two workers in the vicinity sustained burn injuries. One of the injured persons passed away a few months later.

WHAT WENT WRONG: Materials present in mud pump's pulsation dampener

LESSONS LEARNED AND RECOMMENDATIONS:

- Introduction of oxygen and hydrocarbons into closed/pressurized vessels or piping can generate an explosion (also known as diesel effect) under the right conditions. Ensure effective safeguards and assurance systems are in place to prevent the combination of these elements which could lead to a catastrophic failure of the equipment.
- Verify testing and documenting gas cylinders' contents and integrity to mitigate against contamination.
- Gas supplier's selection criteria should include quality assurance safeguards and verification.

CAUSAL FACTORS:

PROCESS (CONDITIONS): Tools, Equipment, Materials & Products: Inadequate/defective tools/equipment/materials/products

DATE: May 15 2017

LOCATION: Russia & Central Asia, KAZAKHSTAN

DATA SET: Company Onshore

WORK FUNCTION: Production

INCIDENT CATEGORY: Struck by

ACTIVITY: Production operations

LIFE SAVING RULE: Line of fire - safe area

WORKFORCE DEATHS: 1 3RD PARTY DEATHS: 0

NARRATIVE: A maintenance employee was fatally injured while removing an explosion proof gas analyzer cover. Due to a pressure build-up, the cover released and inflicted a fatal head injury.

CAUSAL FACTORS:

PROCESS (CONDITIONS): Protective Systems: Inadequate/defective guards or protective barriers

Fatal incident reports related to process safety but not classified as Tier 1 process safety events

<<No incident reports>>

High potential events classified as process safety events

DATE: Mar 25 2017

LOCATION: Africa, TUNISIA

DATA SET: Company Onshore

WORK FUNCTION: Construction

INCIDENT CATEGORY: Pressure release

ACTIVITY: Construction, commissioning, decommissioning

LIFE SAVING RULE: System override

NARRATIVE: A near miss occurred during pipeline cleaning operations when a buildup of pressure in the pipe caused a sudden blow-out, ejecting the pig (pipe cleaning device) as well as a large quantity of mud and dust from the pipe. The pig landed approximately 15m away and, had it struck someone, could have caused serious injury or a fatality.

WHAT WENT WRONG:

- Sudden and unexpected relief of pressure upstream the pig.
- Contributing Factors/Pre-conditions: Missing understanding of process/wrong evaluation of the situation by the team before the event. Failure to follow procedures/instructions. Failure to identify hazards. Lack of control and verification. Procedure interpreted in the wrong way. Lack of competency /experience/skill for the task. Poor/inadequate communication between day and night shifts. Lack of Hand over between both of team (night and day shift).

LESSONS LEARNED AND RECOMMENDATIONS:

- Reinforce the awareness of Cleaning and Gauging operations hazards.
- Reinforce the implementation of Safe working practices.
- Rise workforce awareness with regard to Company Life Saving Rules.
- Reinforce planning, supervision and management responsibilities.

CAUSAL FACTORS:

PROCESS (CONDITIONS): Protective Systems: Inadequate/defective guards or protective barriers

PROCESS (CONDITIONS): Organisational: Inadequate training/competence

PROCESS (CONDITIONS): Organisational: Inadequate hazard identification or risk assessment

PROCESS (CONDITIONS): Organisational: Inadequate communication

PROCESS (CONDITIONS): Organisational: Inadequate supervision

DATE: Mar 13 2017

LOCATION: Europe, ROMANIA

DATA SET: Company Onshore

WORK FUNCTION: Production

INCIDENT CATEGORY: Explosions or burns

ACTIVITY: Production operations

LIFE SAVING RULE: No appropriate Rule

NARRATIVE: A local reported a fire in the bathroom of his house. The fire was the result of gas leaking from a pipeline under his house, which was ignited by the man's washing machine. His wife suffered minor injuries and the house was slightly damaged. Modifications were made to the pipeline and gas monitoring devices installed in the house.

WHAT WENT WRONG: Process for identifying new buildings / new construction in close proximity to existing facilities. Inadequate hazard identification of gas pipelines near inhabited areas. No formal risk assessment documented. Lack of proper engineering design. Lack of inspection and preventive maintenance. No corrosion mitigation (internal or external).

LESSONS LEARNED AND RECOMMENDATIONS: Gas pockets are capable of migrating into confined spaces. During the appearance of a substantial leak, it is prudent to very quickly cut off gas supply in the damaged section. Request operators to perform more frequent or more rigorous pipeline inspections and testing to protect system integrity. Continuous or periodic injection of mercaptan with a focus on gas pipelines in close proximity to public areas. Ensure comprehensive reporting of all failures. Focus on pipelines with a high likelihood of failure where there could be a high consequence despite a low volume. Engage with local authorities to launch an awareness campaign over the criticality of planning permission granted for projects in close proximity to our pipelines.

CAUSAL FACTORS:

PROCESS (CONDITIONS): Protective Systems: Inadequate/defective guards or protective barriers

DATE: Nov 9 2017

LOCATION: Europe, ROMANIA

DATA SET: Contractor Onshore

WORK FUNCTION: Production

INCIDENT CATEGORY: Explosions or burns

ACTIVITY: Maintenance, inspection, testing

LIFE SAVING RULE: Confined space

NARRATIVE: A fire broke out while two employees of a maintenance contractor were inside an administrative building. Both contractor employees suffered burns and were transported to hospital for medical care.

WHAT WENT WRONG: Gas leaking in the vicinity of the barrack room and permeating into the building. Several ignition sources were present in the building. Gas accumulated in the small barrack room providing confinement and allowing the Lower flammability of the gas to be reached.

LESSONS LEARNED AND RECOMMENDATIONS: Install permanent gas monitoring devices in selected habited buildings on all sites with associated gas leak and gas accumulation risk. Continuous or periodic injection of odorizant/mercaptan into a gas pipeline. Ensure that all electrical devices from hazardous areas are ex-proof. Remove any source of fire from the hazardous area. Respect the smoking designated places. Identify and add underground pipelines on production facilities layout diagrams. Update the Emergency Response plans in production facilities with measures following a gas release where the source is not known.

CAUSAL FACTORS:

PROCESS (CONDITIONS): Work Place Hazards: Hazardous atmosphere (explosive/toxic/asphyxiant)

DATE: Feb 8 2017

LOCATION: Asia/Australasia, PAPUA NEW GUINEA

DATA SET: Company Onshore

WORK FUNCTION: Production

INCIDENT CATEGORY: Pressure release

ACTIVITY: Production operations

LIFE SAVING RULE: Gas test

NARRATIVE: Personnel noticed unusual sounds coming from a high-pressure compressor. Workers determined that there was a loss of containment and controlled release at the high pressure compressor seal gas skid. The compressor was shut down and isolated for repairs.

WHAT WENT WRONG: Flange torqueing and loosening - It was identified that 17 of 51 flanges (3 of 18 flanges on the high-pressure gas service) were below recommended torque settings. Compressor seals - Third party laboratory analysis of the damaged O-rings indicated a failure in the seal was caused by uneven compression set. This resulted in a high-velocity gas release that then eroded and destroyed the O-rings. Gas detection - All 5 gas detectors in the vicinity of the High-Pressure Gas Compressor failed to shut down the plant as they hadn't reached

their LEL trip point. Two line of sight detectors were found to be at fault, of the three point gas detectors only one detected gas at low levels ~4% LEL. Operators confirmed the gas release by placing a hand in the leak path. - Improper decision making or lack of judgment. - Inadequate/defective warning systems/safety devices. - Inadequate maintenance/inspection/testing.

LESSONS LEARNED AND RECOMMENDATIONS: Flange bolt torquing and management procedures were already in place before the incident occurred. Replacement o-rings with materials with a longer cure date (fluoro silicon to fluoro carbon) will be installed in the compressor by the end of 2018. Moving the line of sight gas detectors is expected in mid-2018. It is recommended that the position of all line of sight gas detectors in the facilities are reviewed. Since the incident, a significant number of additional gas detectors have been installed around the plant, but this was not done in relation to the incident. Investigation of whether spring washers on flange bolts instead of ordinary washers will have a better chance of maintaining the seal and preventing leaks if there is any slight bolt loosening. Operator awareness sessions were conducted.

CAUSAL FACTORS:

PEOPLE (ACTS): Inattention/Lack of Awareness: Improper decision making or lack of judgment

PROCESS (CONDITIONS): Protective Systems: Inadequate/defective warning systems/safety devices

PROCESS (CONDITIONS): Tools, Equipment, Materials & Products: Inadequate maintenance/inspection/testing

DATE: May 19 2017

LOCATION: Europe, UK

DATA SET: Company Offshore

WORK FUNCTION: Production

INCIDENT CATEGORY: Exposure noise, chemical, biological, vibration

ACTIVITY: Production operations

LIFE SAVING RULE: No appropriate Rule

NARRATIVE: A low level gas leak was detected – over a very short period of time, this escalated to a high level gas leak and a full surface process blowdown.

WHAT WENT WRONG: Maintenance scheduling, process or execution of risk associated with HVAC damper prioritised as low.

LESSONS LEARNED AND RECOMMENDATIONS: Management of change process not followed. Drawings not up to date.

CAUSAL FACTORS:

PROCESS (CONDITIONS): Tools, Equipment, Materials & Products: Inadequate maintenance/inspection/testing

DATE: Feb 2 2017

LOCATION: North America, USA

DATA SET: Contractor Onshore

WORK FUNCTION: Production

INCIDENT CATEGORY: Struck by

ACTIVITY: Production operations

LIFE SAVING RULE: Line of fire - safe area

NARRATIVE: During start-up operations of compressors (located in the same building), the operator started the South compressor and after a few minutes went to the North compressor and started it. When the operator was at the North compressor the PSV on the South Unit 3rd stage scrubber bottle relieved, resulting in 2" PSV discharge piping pulling loosed from the threaded 90 fitting and high gas pressure being released inside the compressor building. The South Unit was manually stopped by the operator following the release. Leaving the South compressor down the operator observed that the North unit had shut down. After checking and resetting codes on the PLC (2100 extreme flow) the operator returned to the compressor building and started the North unit. While monitoring pressures on the Altronics Panel the PSV and discharge piping ejected from the 3rd stage scrubber bottle, resulting in a gas release and material damage to compressor piping and compressor building. The well site was shut-in immediately after the incident occurred.

WHAT WENT WRONG: There were several factors that contributed to the incident, however, it was determined that the 3rd stage scrubber PSV not relieving the pressure to the atmosphere was the root cause of the incident. It was determined by observation that there was a build-up of ice and corrosion in the PSV internally that possibly prevented it from functioning, and relieving pressure to atmosphere. The discharge piping ran outside the compressor building and did not have a boot or cap installed on the end, to prevent the elements from entering the piping to the PSV. Also the PSV discharge piping was not secured in a way that would prevent movement when the PSV relieves.

LESSONS LEARNED AND RECOMMENDATIONS:

- Clarify and/or create a documented process for formal communication between shift personnel to assure that important information is passed down sufficiently.
- Develop a risk assessed Compressor Start-Up SOP for Summer and Winter time operations.
- Perform an engineering study to address the issue of safety systems freezing on compressor units that do not have adequate building heating during sub-zero temperatures.
- Perform an engineering study to address the issue with PSV discharge piping not being properly secured from movement when a PSV relieves and also a design to cover the ends of the discharge piping to keep the weather elements and any other issues that could possibly restrict the flow from the PSV discharge piping. Review requirements to assure that proper vent piping is being utilized.
- Perform an engineering study to address the issue of compressor suction and discharge lines freezing when shut down for an extended period of time.
- Develop a program for testing PSVs, LEL, H2S and Safety Shut Down systems for all compressors and process equipment.
- Develop a Stop Work Authority (SWA) presentation and perform Safety Stand Down to reiterate the obligation to Stop Work when things do not seem right.

CAUSAL FACTORS:

PEOPLE (ACTS): Inattention/Lack of Awareness: Lack of attention/distracted by other concerns/stress

PROCESS (CONDITIONS): Tools, Equipment, Materials & Products: Inadequate/defective tools/equipment/materials/products

PROCESS (CONDITIONS): Tools, Equipment, Materials & Products: Inadequate maintenance/inspection/testing

PROCESS (CONDITIONS): Organisational: Inadequate work standards/procedures

PROCESS (CONDITIONS): Organisational: Inadequate hazard identification or risk assessment

PROCESS (CONDITIONS): Organisational: Inadequate communication

DATE: Apr 1 2017

LOCATION: South & Central America, BOLIVIA

DATA SET: Company Onshore

WORK FUNCTION: Production

INCIDENT CATEGORY: Pressure release

ACTIVITY: Production operations

LIFE SAVING RULE: Insufficient information to assign a Rule

NARRATIVE: Spill inline of the pipeline because the duct was broken in one sector and the other with the detached union. As a control measure the valve of the pipeline that is located near the affected section was closed and barrages to control the spill were made, also a turril for the collection of oil was placed.

WHAT WENT WRONG: Design Maintenance Organization Incompatible goals.

LESSONS LEARNED AND RECOMMENDATIONS: Educate the standards for the design of the pipeline to Company's standards. Develop an inspection and maintenance program of the pipeline. Verify the integrity of the rest of the pipeline.

<<No Causal Factors Allocated>>

DATE: Jun 13 2017

LOCATION: South & Central America, BOLIVIA

DATA SET: Company Onshore

WORK FUNCTION: Production

INCIDENT CATEGORY: Pressure release

ACTIVITY: Production operations

LIFE SAVING RULE: No appropriate Rule

NARRATIVE: Hydrocarbon was detected in a river with a spill of about 6km long. Since 5 containment barriers were installed in the stream, only a part of the spill reached a bigger river, leaving a hydrocarbon trace of one kilometre by one metre wide. A breach on the primary containment was detected in a pipeline between facilities.

WHAT WENT WRONG: Design Procedures. Organization. Incompatible goals.

<<No Causal Factors Allocated>>

DATE: Apr 16 2017

LOCATION: North America, CANADA

DATA SET: Company Onshore

WORK FUNCTION: Production

INCIDENT CATEGORY: Pressure release

ACTIVITY: Production operations

LIFE SAVING RULE: No appropriate Rule

NARRATIVE: An operator, while inspecting the terminal, found oil spraying from some pumps. He called his supervisor (time was approximately 12:45am). Approximately 19.8 cubic meters of sales oil was on the ground, and was dispersed some distance from the pumps due to wind. Pumps were shut down for repairs and clean up crews were called. Initial investigation points to failed O-rings.

WHAT WENT WRONG: Procedures - No procedure. Management systems. Training.

LESSONS LEARNED AND RECOMMENDATIONS: Develop procedure to change O-rings.
Improve Management of Change.

<<No Causal Factors Allocated>>

DATE: Apr 29 2017

LOCATION: North America, CANADA

DATA SET: Company Onshore

WORK FUNCTION: Production

INCIDENT CATEGORY: Pressure release

ACTIVITY: Production operations

LIFE SAVING RULE: Line of fire - safe area

NARRATIVE: An operator was working to dissolve a hydrated pipeline. As he was depressurising the pipeline, it appears a piece of the hydrate caused a small explosion and a piece of valve struck the operator in the hand. He was brought to a hospital for treatment.

WHAT WENT WRONG: Procedures. Training.

LESSONS LEARNED AND RECOMMENDATIONS: Improve the training by developing a detailed lesson plan for this Critical Practice. Consider centralizing the delivery of training with one or two specialized trainers.

<<No Causal Factors Allocated>>

DATE: Jan 22 2017

LOCATION: Africa, LIBYA

DATA SET: Company Onshore

WORK FUNCTION: Production

INCIDENT CATEGORY: Pressure release

ACTIVITY: Production operations

LIFE SAVING RULE: No appropriate Rule

NARRATIVE: A gas leak was detected at a glued joint connection on a 16" glass fibre-reinforced Epoxy (GRE) pipe, delivering wet feed gas from gas/liquid separators to compression trains. The decision was made to shut-down the running compressor train to allow detailed investigation of the leak. During the shut-down sequence, the GRE pipe ruptured, with several sections and parts being dislocated. One employee was hit by debris and suffered a lower leg fracture.

WHAT WENT WRONG: The GRE line is made up of sections, connected together via glued male/female connections. After the incident, the joint where the leak occurred and also other still intact joints were investigated. Two joints were found where the applied glue in the male/female connection was not evenly distributed and showed voids within the glue. The GRE system was pressure tested prior to commissioning 2003, but not complete pressure tested periodically afterwards. Small leaks at joints were observed before. They were repaired but not systematically investigated.

LESSONS LEARNED AND RECOMMENDATIONS:

- Consider replacement of the 16" GRE pipe or redesign by changing material.
- Conduct an integrity study on other existing GRE pipelines.
- Review hydrostatic/leak test reports (random checks, e.g. 20%) of GRE Lines.
- Review existing operating procedures and focus on comprehensive shut-down instructions for displacement compressors and pumps.

CAUSAL FACTORS:

PROCESS (CONDITIONS): Tools, Equipment, Materials & Products: Inadequate design/specification/management of change

PROCESS (CONDITIONS): Tools, Equipment, Materials & Products: Inadequate maintenance/inspection/testing

PROCESS (CONDITIONS): Organisational: Inadequate hazard identification or risk assessment

DATE: Mar 16 2017

LOCATION: North America, USA

DATA SET: Company Onshore

WORK FUNCTION: Production

INCIDENT CATEGORY: Pressure release

ACTIVITY: Production operations

LIFE SAVING RULE: Insufficient information to assign a Rule

NARRATIVE: A subcontracted chemical company was performing an acid flush on a well. The lease operator began by opening the 2" casing valve on the flowline closest to the wellhead. While he was opening the second downstream 2" casing valve on the flowline, a pressure release occurred at the pumping tee and the treating casing valve. The pressure release caused the treating casing valve and pumping tee flow line valves to separate from the wellhead. An employee was struck with well fluids and fragments of sub pump cable. In an attempt to evacuate the location, an off-site flowback contractor alleged being struck on the top of the foot by an approximately 14" remnant of sub pump cable.

WHAT WENT WRONG: Following a well treatment (acid flush), lease operator returned 4 hours later to open the well up to the tank battery. While opening up the second valve there was a pressure release as a result of a down-hole chemical reaction.

LESSONS LEARNED AND RECOMMENDATIONS: Selection of well treatment process to reduce the potential for downhole chemical reaction.

CAUSAL FACTORS:

PROCESS (CONDITIONS): Organisational: Inadequate hazard identification or risk assessment

DATE: Jan 2 2017

LOCATION: North America, USA

DATA SET: Contractor Onshore

WORK FUNCTION: Production

INCIDENT CATEGORY: Pressure release

ACTIVITY: Production operations

LIFE SAVING RULE: No appropriate Rule

NARRATIVE: A blow down valve on a pig receiver was plugged with ice. It was left in the open position. When the ice in the blow down valve thawed, natural gas was released to the atmosphere.

WHAT WENT WRONG: Blow down valve was left open.

LESSONS LEARNED AND RECOMMENDATIONS: There was a pigging procedure but no checklist to assist personnel in conducting pigging operations. No pigging procedure training records could be found showing that personnel involved in pigging operations had been trained. Training and review of the pigging procedure and the new checklist was conducted and documented for all pigging team members.

CAUSAL FACTORS:

PEOPLE (ACTS): Following Procedures: Violation unintentional (by individual or group)

PROCESS (CONDITIONS): Organisational: Inadequate training/competence

PROCESS (CONDITIONS): Organisational: Inadequate work standards/procedures

DATE: Jan 2 2017

LOCATION: Middle East, UAE

DATA SET: Company Offshore

WORK FUNCTION: Production

INCIDENT CATEGORY: Explosions or burns

ACTIVITY: Production operations

LIFE SAVING RULE: No appropriate Rule

NARRATIVE: Intermittent sounds were heard from an LNG flaring area. A flashing light was also seen in the same area. The area was shut down for inspection, which revealed cracks in Flare Knock Out drums and associated piping.

WHAT WENT WRONG: Insufficient design safeguards to detect and provide warning for purge gas restriction orifices blockage.

LESSONS LEARNED AND RECOMMENDATIONS:

Post shutdown, full inspection of Plant 18 systems was done. Inspection revealed:

- Cracking of the external weld attachments, inlet & nozzles of the Flare KO drums and on associated pipe works.
- The two restriction orifices of both purge gas lines feeding the two KO Drums were found blocked with scale/corrosion products.

Actions: An RCA exercise was launched. Actions & Recommendations implementation in progress.

CAUSAL FACTORS:

PROCESS (CONDITIONS): Protective Systems: Inadequate/defective warning systems/safety devices

PROCESS (CONDITIONS): Tools, Equipment, Materials & Products: Inadequate design/specification/management of change

PROCESS (CONDITIONS): Tools, Equipment, Materials & Products: Inadequate maintenance/inspection/testing

PROCESS (CONDITIONS): Organisational: Inadequate hazard identification or risk assessment

High potential events related to process safety but not classified as process safety events

DATE: Apr 19 2017

LOCATION: South & Central America, BOLIVIA

DATA SET: Company Onshore

WORK FUNCTION: Production

INCIDENT CATEGORY: Pressure release

ACTIVITY: Maintenance, inspection, testing

LIFE SAVING RULE: No appropriate Rule

NARRATIVE: While repairing a pipeline, workers noticed that the freshwater pumps were not operating and there was no water. Workers went to inspect the pipes and the source and notice a thin film of oil on the ground in areas along the pipeline. A containment crew was immediately dispatched. Approximately 1km from their initial location, they found a tree had fallen on the pipeline. 80 meters past that, they found a break in a “T” connection on the pipeline.

WHAT WENT WRONG: Lack of Warning. Trees were not identified as critical points in the whole pipeline, trees near and inclined towards the pipeline. Failure to ensure. The route of the pipeline was not made prior to the start of the pumping after the repairs. Defective Tool, Equipment or Material. The pipeline exceeds 50 years, a history of punctures and minor leaks for which repairs are made punctually. Dangerous Environmental Conditions. The pipeline is installed on a path of rugged topography and 1.5 m wide with high-density shrub vegetation.

LESSONS LEARNED AND RECOMMENDATIONS: Review and consolidate the Matrix in the Area with all company operations staff and support staff. Perform a reinforcement at all levels of the Company Stop the Job Standard. Strengthen in the management of work permits and risk analysis. Reinforce the criteria of the patrol route procedure to DDV. Review / Update / Implement documents and operational instructions. Make a complete check of the pipeline trace and identify environmental risks derived from landslides, falls from nearby trees, etc., and take immediate action to avoid the recurrence of a similar event.

CAUSAL FACTORS:

PROCESS (CONDITIONS): Tools, Equipment, Materials & Products: Inadequate maintenance/ inspection/testing

PROCESS (CONDITIONS): Organisational: Inadequate training/competence

PROCESS (CONDITIONS): Organisational: Inadequate work standards/procedures

DATE: Jun 4 2017

LOCATION: South & Central America, ARGENTINA

DATA SET: Company Onshore

WORK FUNCTION: Production

INCIDENT CATEGORY: Pressure release

ACTIVITY: Production operations

LIFE SAVING RULE: Isolation

NARRATIVE: During maintenance operations, tests were carried out on the gas regulating plant. Abrupt decompression occurred due to the opening of the gas filter cover, causing damage to the gas platform.

WHAT WENT WRONG:

- Use of defective equipment. The valve for entering the filter had a fault / loss and a bad stop. Filter in maintenance unfinished (Partial / incomplete).
- Defective tool, equipment or material. The filter inlet valve had a loss and a bad cap Filter in maintenance unfinished (Partial / incomplete).

LESSONS LEARNED AND RECOMMENDATIONS: Verify that the designs of new facilities are aligned to the documents. Detail in the LOTO procedure the alternatives for Insulation of potential pressure energy and specify the risk analysis of the insulation from the point of view of the selected LOTO quality. In the pre-use inspections of new equipment include the functional test Verify that the schedule includes: Tasks to be carried out, not only teams to intervene. Breakdown by specialty vs. available manpower and staff rest time. Responsible for execution with verification of communication between work teams. To include in the work orders associated with the maintenance of critical ball valves, the check for mechanical stop and work pressure. Establish awareness action with each operator in the LOTO process, which includes knowledge and verification in the field.

CAUSAL FACTORS:

PEOPLE (ACTS): Use of Tools, Equipment, Materials and Products: Servicing of energized equipment/inadequate energy isolation

PEOPLE (ACTS): Use of Protective Methods: Equipment or materials not secured

PEOPLE (ACTS): Inattention/Lack of Awareness: Lack of attention/distracted by other concerns/stress

PEOPLE (ACTS): Inattention/Lack of Awareness: Fatigue

PROCESS (CONDITIONS): Tools, Equipment, Materials & Products: Inadequate design/specification/management of change

DATE: Mar 7 2017

LOCATION: Asia/Australasia, PHILIPPINES

DATA SET: Company Offshore

WORK FUNCTION: Production

INCIDENT CATEGORY: Other

ACTIVITY: Production operations

LIFE SAVING RULE: No appropriate Rule

NARRATIVE: Due to a Mass Gravity Flow (Turbidity Current) event loss of rock protection occurred over a 170 m section of an offshore pipeline, leaving 3 spans of pipeline exposed to fatigue damage. Temporary supports have been placed and further action is being undertaken.

WHAT WENT WRONG: Rock Berm damaged creating free-spans.

LESSONS LEARNED AND RECOMMENDATIONS: Periodic maintenance and inspection to be scheduled.

CAUSAL FACTORS:

PROCESS (CONDITIONS): Work Place Hazards: Storms or acts of nature

DATE: May 15 2017

LOCATION: Asia/Australasia, AUSTRALIA

DATA SET: Company Onshore

WORK FUNCTION: Production

INCIDENT CATEGORY: Other

ACTIVITY: Maintenance, inspection, testing

LIFE SAVING RULE: System override

NARRATIVE: An offline compressor was found filled with liquid by an operator while the upstream stabiliser column operated in recycle mode for non-intrusive maintenance work. The stabiliser unit was subsequently shut down and liquids were drained from the compressor. In this operating mode, the installed safety instrument function was not available such that restart of the compressor had the potential for a significant process safety event. There were no injuries or damage associated with this incident.

WHAT WENT WRONG: The design relied upon the compressor discharge non-return valve as the sole means of backflow prevention when the compressor is offline and unit emergency shutdown not activated.

LESSONS LEARNED AND RECOMMENDATIONS: The initial observation demonstrates the importance of monitoring units running in different operating modes and mindfulness on how the mode may present a new safety threat. Design standards and best practice at the time of construction need to be re-evaluated continually during the life of the asset. Formalised risk assessment studies such as HAZOP and Layers of Protection Analysis (LOPA) need to capture all operating modes in the assessment and share learnings.

CAUSAL FACTORS:

PROCESS (CONDITIONS): Tools, Equipment, Materials & Products: Inadequate design/specification/management of change

PROCESS (CONDITIONS): Organisational: Inadequate hazard identification or risk assessment

DATE: Sep 22 2017

LOCATION: Asia/Australasia, MYANMAR

DATA SET: Company Offshore

WORK FUNCTION: Production

INCIDENT CATEGORY: Struck by

ACTIVITY: Production operations

LIFE SAVING RULE: System override

NARRATIVE: During production, an operator forced open two emergency shutdown valves (ESDV) in order to lock a valve opening for sea line depressurisation. After he completed the first ESDV, the operator continued to force open the other ESDV. The operator's repeated attempts to open the valves by force resulted in the actuator cover being blown away.

WHAT WENT WRONG: Procedure. The procedure is not adequate. It does not describe this work, the pressures required, connection needed or hazards of high pressure. Competency. In some areas the technician/Operators are not familiar with the equipment. Any new assignment must have a system to evaluate that technician/Operator is capable to perform the job, or by having a senior technician to supervise them at the job site. Supervision/communication. Lack of adequate communication between working groups to ensure technicians understood the job. This is from both site technician and supervisor. Technicians shall be informed how they shall control pressure and be fully trained on all aspects of the equipment and procedure. Risk Assessment. Due to less experience, the technicians did not recognize the hazard of working with high pressure and regulating that pressure. Stop Work Authority (SWA): There was a number of times that SWA could have been exercised, but it was not due to lack of awareness of the risk.

LESSONS LEARNED AND RECOMMENDATIONS: To conduct a risk assessment for all activity/ areas either routine and non-routine activity. To develop specific instruction for a specific job to cover all routine and non-routine jobs. Conduct procedural audits to all high risks and key non-routine activities to ensure the effectiveness of safety barriers and implementation. Review all routine activities. Activities with no proper procedures/JSA/mitigations must be identified as non-routine and be controlled under PTW system. Conduct Hazards Recognition (incl. position in safe zone/line of fire) Training to operational personnel.

CAUSAL FACTORS:

PROCESS (CONDITIONS): Organisational: Inadequate training/competence

PROCESS (CONDITIONS): Organisational: Inadequate work standards/procedures

PROCESS (CONDITIONS): Organisational: Inadequate hazard identification or risk assessment

DATE: Oct 29 2017

LOCATION: Asia/Australasia, VIETNAM

DATA SET: Contractor Offshore

WORK FUNCTION: Production

INCIDENT CATEGORY: Water related, drowning

ACTIVITY: Production operations

LIFE SAVING RULE: No appropriate Rule

NARRATIVE: A production tanker, approximately 97m x 16m and gross tonnage of 3811, was reported to have lost power and was drifting uncontrollably towards the field. As the vessel drifted into the platform Marine Exclusion Zone (MEZ), the Standby Boat recorded the tanker at 0.24 nautical miles from the WHP and drilling rig. The drilling rig radio operator was notified by the Standby boat of an errant vessel situation within the MEZ. The vessel passed through the MEZ without serious incident.

WHAT WENT WRONG: The approach of the vessel was undetected until it had already passed the FPSO (by 638m) and 20 minutes before its closest approach (447m) to the drilling rig, giving little time to assess the collision threat and take any emergency action. The primary responsibility for detection and then response lies with the Emergency Response and Rescue Vessel (ERRV). For various reasons, the ERRV had systematically overcome each of the safeguards that should have been in place for keeping an effective navigational watch. In addition, secondary systems and opportunities for detection on the FPSO were also defeated, rendering the field 'blind' until minutes before the vessel passed. Even if the vessel had been detected, the ERRV may not have been able to respond effectively because it was not in an up-weather location for rough seas which has been determined to be optimal for interception in such weather conditions. The Errant Vessel procedure needs a clearer definition for when these conditions are applicable and the means to ensure it is followed.

LESSONS LEARNED AND RECOMMENDATIONS: Marine Supervisor to reinforce existing requirements for ERRV in the errant vessel procedure and reinstate the requirement for contacting the FPSO to agree position of ERRV. Establish log on ERRV and FPSO recording the conversation and position decision audit quarterly. Add this requirement to EV procedure. Update ERRV procedure, contracts, etc. from outputs of above. Conduct EV procedure training for all marine personnel, ERRV deck crew and conduct exercises. Amend EV Procedure to assist in the decision making for ERRV position keeping.

CAUSAL FACTORS:

PEOPLE (ACTS): Following Procedures: Violation unintentional (by individual or group)

PEOPLE (ACTS): Use of Protective Methods: Inadequate use of safety systems

PEOPLE (ACTS): Use of Protective Methods: Disabled or removed guards, warning systems or safety devices

PEOPLE (ACTS): Inattention/Lack of Awareness: Improper decision making or lack of judgment

PEOPLE (ACTS): Inattention/Lack of Awareness: Lack of attention/distracted by other concerns/stress

PROCESS (CONDITIONS): Protective Systems: Inadequate/defective warning systems/safety devices

DATE: Jun 21 2017

LOCATION: South & Central America, BOLIVIA

DATA SET: Company Onshore

WORK FUNCTION: Production

INCIDENT CATEGORY: Pressure release

ACTIVITY: Production operations

LIFE SAVING RULE: No appropriate Rule

NARRATIVE: During the scheduled closure of the well in coordination with the control room, due to the antecedents in the annular section, the operator of the field was agreed to control the pressure by means of drainage/depressurized in place, although the operator could not control the rapid increase of the same pressure that registered 2577 psig in the section of the annular space during 3 minutes, exceeding the value of 2521psig, after the purge the pressure begins to lower until stabilizing in 1428psig, no material damages were registered, neither personal nor the environment.

WHAT WENT WRONG: Procedures Hardware: Equipment and tools. Design. Communication.

LESSONS LEARNED AND RECOMMENDATIONS: Develop a procedure to operate the well with pressure in the annular section. Build final installations for purging the annular sections.

<<No Causal Factors Allocated>>

DATE: Feb 19 2017

LOCATION: South & Central America, ECUADOR

DATA SET: Company Onshore

WORK FUNCTION: Production

INCIDENT CATEGORY: Pressure release

ACTIVITY: Maintenance, inspection, testing

LIFE SAVING RULE: No appropriate Rule

NARRATIVE: After operator works at gas generation system, a gas leak was observed.

WHAT WENT WRONG: Maintenance Design Procedures.

LESSONS LEARNED AND RECOMMENDATIONS: Modify the procedure to include the frequency to check the drain on the affected line.

<<No Causal Factors Allocated>>

DATE: Mar 9 2017

LOCATION: South & Central America, ECUADOR

DATA SET: Company Onshore

WORK FUNCTION: Production

INCIDENT CATEGORY: Pressure release

ACTIVITY: Production operations

LIFE SAVING RULE: No appropriate Rule

NARRATIVE: A gas leak (mainly methane) was detected by an operator.

WHAT WENT WRONG: Maintenance. Design. Procedures.

LESSONS LEARNED AND RECOMMENDATIONS: Change pipe. Modify the procedure to include the frequency to check the drain on the affected line.

<<No Causal Factors Allocated>>

DATE: Nov 24 2017

LOCATION: South & Central America, ECUADOR

DATA SET: Company Onshore

WORK FUNCTION: Production

INCIDENT CATEGORY: Pressure release

ACTIVITY: Production operations

LIFE SAVING RULE: No appropriate Rule

NARRATIVE: LOPC through the plug of the housing in the crude production output meter in the Plant. A worker was affected by crude.

WHAT WENT WRONG: Communication. Training. Missing or failed safeguard/barriers.

LESSONS LEARNED AND RECOMMENDATIONS: Define and implement a checklist on pre-startup for equipment that has been manipulated.

<<No Causal Factors Allocated>>

DATE: Nov 21 2017

LOCATION: South & Central America, ECUADOR

DATA SET: Company Onshore

WORK FUNCTION: Production

INCIDENT CATEGORY: Exposure noise, chemical, biological, vibration

ACTIVITY: Production operations

LIFE SAVING RULE: No appropriate Rule

NARRATIVE: Due to heavy rain, an overflow occurred in secondary containment system that contained production fluid, contaminating the peripheral area of the containment system and extending to the nearby estuary where containment barriers and adsorbents were installed to contain the advance of the spill.

WHAT WENT WRONG: Design Hardware: Materials, equipment and tools. Maintenance management. Procedures and control of operations.

LESSONS LEARNED AND RECOMMENDATIONS: Standardize the criteria to maintain the secondary containment and its levels of fluid. Review the procedure and check the conditions under heavy rain. Define a procedure for maintenance and cleaning of the drains. Acquire meteorological equipment for the plant. Modify the dike and liner of the secondary equipment. Train personnel.

<<No Causal Factors Allocated>>

DATE: Feb 9 2017

LOCATION: Asia/Australasia, THAILAND

DATA SET: Company Offshore

WORK FUNCTION: Production

INCIDENT CATEGORY: Other

ACTIVITY: Production operations

LIFE SAVING RULE: Line of fire - safe area

NARRATIVE: A high-pressure fuel line broke at the pump, spraying fuel around the immediate vicinity; the fuel ignited. The rig safety device detected the fire and shut down the process. The motorman was nearby and pulled the emergency fuel shut off and then went to the main power system to shut off all generators. Workers used fire extinguishers to put out the fire. Shortly after, the fire crew arrived to ensure no further fire. Crew muster was completed in 3 minutes. Total elapsed time for the event was approximately 10 minutes.

WHAT WENT WRONG: One fuel line (Cyl. 14) broke on Gen4 releasing a jet of high-pressure (2000psi) fuel.

LESSONS LEARNED AND RECOMMENDATIONS:

1. Preventive maintenance is an important measure to prevent machine, instrument, & equipment malfunctions. Apart from extending of their life, PM's will reduce the hazard & risk from long-term use.
2. Monitoring and inspecting must be done more frequently, especially old equipment that is to be kept to industry standard. The latest regulations must be reviewed, understood, and complied with.
3. Crews must be trained in advanced firefighting.

CAUSAL FACTORS:

PROCESS (CONDITIONS): Tools, Equipment, Materials & Products: Inadequate maintenance/ inspection/testing

DATE: Dec 19 2017

LOCATION: South & Central America, COLOMBIA

DATA SET: Contractor Onshore

WORK FUNCTION: Construction

INCIDENT CATEGORY: Explosions or burns

ACTIVITY: Construction, commissioning, decommissioning

LIFE SAVING RULE: Insufficient information to assign a Rule

NARRATIVE: A fire broke out while workers were welding a drainage line. The line had been emptied but hydrocarbon waste remained.

WHAT WENT WRONG: Inadequate identification of hazards and risks. Combustible gases, vapours and liquids identified in the pipe. No work planning has been carried out.

LESSONS LEARNED AND RECOMMENDATIONS: Materials should be examined and verified before their use, in the building stage. Pipes with hydrocarbon wastes should be fully and adequately cleaned to be re-used. (Welding works) The planning and correct identification of hazards and risks assessment in welding activities minimize the occurrence of these events.

CAUSAL FACTORS:

PEOPLE (ACTS): Use of Tools, Equipment, Materials and Products: Improper use/position of tools/equipment/materials/products

PEOPLE (ACTS): Use of Protective Methods: Failure to warn of hazard

PROCESS (CONDITIONS): Tools, Equipment, Materials & Products: Inadequate/defective tools/equipment/materials/products

DATE: Nov 30 2017

LOCATION: North America, USA

DATA SET: Contractor Onshore

WORK FUNCTION: Production

INCIDENT CATEGORY: Explosions or burns

ACTIVITY: Production operations

LIFE SAVING RULE: Line of fire - safe area

NARRATIVE: During fracking operations, a worker was fueling a diesel tank when a transmission line on a nearby pump failed, spraying him with transmission oil and causing minor chemical burns to the back of his neck and hands. He was wearing all appropriate PPE and received first aid. The oil spray caused a small fire which was quickly extinguished by crew members.

WHAT WENT WRONG: Short Service Employee – 1 Day in the field. Frac Contractor IP was hot fuelling with another contractor from a different company being his spotter. Contractor's hot fuelling and mentorship programs were not being followed. Also, approval from company supervisor not obtained. Turbo runs at approximately 1400 degrees. Damage to both frac pumps. Failure was at hose crimp, the hose was rated at 1000 psi, equipment only ran at max 500 psi.

LESSONS LEARNED AND RECOMMENDATIONS: Evaluate the need for adding hot fuelling to pre-frac checklist. Look at hot fuelling options on stages over 4 hours. Action Items: Stand down with Day and Night shift. Meeting with Contractor Management.

CAUSAL FACTORS:

PEOPLE (ACTS): Following Procedures: Violation unintentional (by individual or group)

PEOPLE (ACTS): Use of Tools, Equipment, Materials and Products: Servicing of energized equipment/inadequate energy isolation

PEOPLE (ACTS): Inattention/Lack of Awareness: Improper decision making or lack of judgment

PROCESS (CONDITIONS): Tools, Equipment, Materials & Products: Inadequate/defective tools/equipment/materials/products

PROCESS (CONDITIONS): Organisational: Inadequate training/competence

PROCESS (CONDITIONS): Organisational: Inadequate hazard identification or risk assessment

PROCESS (CONDITIONS): Organisational: Poor leadership/organisational culture

DATE: Feb 16 2017

LOCATION: Middle East, QATAR

DATA SET: Company Onshore

WORK FUNCTION: Production

INCIDENT CATEGORY: Other

ACTIVITY: Production operations

LIFE SAVING RULE: System override

NARRATIVE: Manual local Emergency Shut Down (ESD) switch latched fault activated and stopped all running instrument air compressors, TCW pumps and all other equipment.

WHAT WENT WRONG: Failure of the ESD hardware which caused invalid alarm activation. Wrong configuration of invalid alarm in ESD logic. Design not to specs.

LESSONS LEARNED AND RECOMMENDATIONS: Replace the ESD PB. ESD logic correction. Check the logic in all ESD push buttons.

CAUSAL FACTORS:

PROCESS (CONDITIONS): Tools, Equipment, Materials & Products: Inadequate design/specification/management of change

PROCESS (CONDITIONS): Tools, Equipment, Materials & Products: Inadequate/defective tools/equipment/materials/products

PROCESS (CONDITIONS): Organisational: Inadequate hazard identification or risk assessment

DATE: Jan 23 2017

LOCATION: North America, USA

DATA SET: Contractor Onshore

WORK FUNCTION: Drilling

INCIDENT CATEGORY: Pressure release

ACTIVITY: Drilling, workover, well services

LIFE SAVING RULE: No appropriate Rule

NARRATIVE: After pulling the slickline out of the hole and securing the well, the test operator began bleeding off lubricator pressure by opening needle valves going to the aluminium return tank on the test unit trailer. The tank over pressured and as a result was blown apart. Two poly tanks and a radiator were damaged during the event leaking 210gals of a 50/50 methanol blend and an unknown quantity of antifreeze onto the pad.

WHAT WENT WRONG: The test trailer was modified (poly tank changed to an aluminium tank) without inquiry to the original equipment manufacturer, engineering design or industry specifications for the intended service. Procedures and instructions to the contractor and the field operations manual did not clearly describe the expected bleed off method (i.e. into the process and not the test trailer unit).

LESSONS LEARNED AND RECOMMENDATIONS: Work method expectations for safety-critical tasks must be clearly defined, communicated and verified to reinforce understanding. When requesting a contractor to make equipment design changes, ensure they have adequate processes and systems to manage the change and if not, assist them with the change management analysis.

CAUSAL FACTORS:

PROCESS (CONDITIONS): Tools, Equipment, Materials & Products: Inadequate design/specification/management of change

PROCESS (CONDITIONS): Tools, Equipment, Materials & Products: Inadequate/defective tools/equipment/materials/products

PROCESS (CONDITIONS): Organisational: Inadequate work standards/procedures

PROCESS (CONDITIONS): Organisational: Inadequate communication

PROCESS (CONDITIONS): Organisational: Poor leadership/organisational culture

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Fatal incidents and high potential events that were also PSE, and fatal incidents and high potential events that were PSE-related – 2017