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Agência Nacional  
do Petróleo,  
Gás Natural e Biocombustíveis

## Safety Alert 002 - ANP/SSM

### *Integrity Management of Passive Fire Protection*

The Superintendence of Operational Safety and Environment is issuing this safety alert to notify the petroleum and gas industry and other stakeholders about the repeated failing in passive fire protection (PFP) availability management in offshore production facilities.

This safety alert emerges from diagnostics obtained in conformity audits, which are based on ANP Resolution n. 43/2007. More than 50% of the identified deviations about PFP relate to failures in implementing the safety studies recommendations, including fire and explosion assessments and other risks analyses.

### *Passive Fire Protection*



Passive fire protection – PFP is defined by API RP 2218 (Fireproofing Practices in Petroleum and Petrochemical Processing Plants) as a barrier, coating or other safeguard which provides protection against the heat from a fire without additional intervention.

PFP aims to improve the capability of maintaining the structural integrity of an equipment and its structure during a fire scenario. Thus, this barrier acts in a passive way, unlike an active protection, such as fixed and portable firefighting systems, which demands further intervention after the incident occurs.

According to API RP 2218, the core value of fireproofing is critical during the early stages of a fire, when efforts are initially directed at shutting down the unit, interrupting fuel supply to the fire and

actuating fixed firefighting equipment. If non-fireproofed piping and equipment supporting structures lose their strength due to fire-related heat exposure, they can collapse, escalating the scenario, which consequently may lead to increased hydrocarbon leaks, victims and environmental and property damages.

The International Organization for Standardization states in ISO standard 13702:2015 requirements and guidelines to control and mitigate fire and explosion on offshore production facilities. This document indicates PFP typical applications in critical areas of these units, based on experience in offshore E&P activities. It also emphasizes the necessity of a specific evaluation for each individual unit, considering the fire and explosion studies as well as the emergency response strategy.



According to results from consequence studies elaborated by operators, and considering that passive fire protection aims to reduce human exposure to occasional failures, **PFP** is regarded as a critical element in operational safety.

## *Potential consequences*

The degradation, absence or non-conformity to the specifications of a PFP may enable the escalation of the accidental scenario, due to failure in critical elements, causing a reduction in available time for personnel evacuation and interfering emergency control actions to prevent a massive environmental and financial impact.

## *Identified deviations*

The following evidences of PFP integrity management failures were observed in 13 offshore production units, whether new or aged, categorized as fixed platforms, semi-submersibles and FPSOs, from 2015 to 2018:

- Incomplete inspection and maintenance plans:
  - Plans without a detailed list of tasks to be accomplished during inspection.
  - Plans that do not comprise the entire PFP of the unit.
  - Lack of PFP observation during execution of the maintenance plan for a SDV (shutdown valve) located on the risers.
- Implementation of alternative solutions without technical background:
  - Substitute PFP class J-60 on deck floor along the riser porch for encapsulation of the riser flanges, without technical evaluation of the protection level assured by the alternative solution on the identified critical scenarios.
  - Substitute PFP for deluge system (active protection), without technical evaluation of the protection level assured by the alternative solution on the identified critical scenarios.
- Partial implementation of safety study recommendations without technical background:
  - Lack of installation of PFP recommended by quantitative study for critical parts (e.g. blow down and ESD valves), without quantitative verification to justify the decision of not installing.
- Partial installation or lack of PFP:
  - Lack of installation of PFP in the production and exportation risers' connections, riser balcony piping, lower part of the communication tower structure and communication cables tray system.
  - Incomplete installation of PFP in well piping in the riser balcony area, limiting its application to the SDVs that shut the well lines and to the piping segment between flanges, excluding the flanges upstream the SDVs.
- Degradation of installed PFP:
  - Highly damaged conditions of PFP installed in the pipe rack columns and the columns next to the oil transfer pumps.
- Lack of equivalent alternative controls to compensate the lack or degradation of a critical element:
  - Removal of PFP from vertical and diagonal columns of the cellar deck, from the pig launcher and receiver area, from the slug catcher and gas exportation, without taking any further contingency measures.
  - PFP in degraded condition, without proper contingency measures.
- Prioritization not compatible with the risk level of the structures:
  - PFP installed in many areas, but critical elements without protection.
  - Extended schedule for recomposing degraded PFP that did not consider risk criteria for prioritization.

## Regulatory Framework

According to the ANP Resolution n. 43/2007, Operational Safety Management System (SGSO):

Item 1.5 (*Resources Planning and Assessment*) requires that “the rig operator shall plan and provide the necessary resources for the implementation and operation of the SGSO and to attend to further requirements”.

Item 10.2.1 (*Management and Organization*) states that “the rig operator shall comply with project criteria, industry standards and good engineering practices, regarding project planning, construction, installation and deactivation of the unit”.

Item 11.3.1 states: “the rig operator shall establish contingency procedures and define approval and control system for these procedures, to be used when Operational Safety Critical Equipment or Systems are in poor conditions or out of operation”. In addition, in agreement with this item, the item 11.3.2 states “such procedures will establish temporary measures that might make up for the absence of Operational Safety Critical Equipment or Systems, due to failure, degradation or deactivation. Such measures shall include, when applicable: Implementation of equivalent alternative controls; Reduction and limitation of the production; and Isolation and stoppage of equipment, systems, and units.”

Item 12.6.1 states: “the rig operator will be responsible for the implementation of corrective actions regarding the recommendations made during the risk analysis”. Additionally, item 12.6.3 establishes that “the rig operator will be responsible for the documentation and implementation of the corrective actions. Regarding modifications or rejection of this implementation, the decisions must be justified”.

Item 13.2.1 states: “the rig operator shall establish plans and procedures for inspection, test and maintenance, in order to seek mechanical integrity of its systems, structures and Operational Safety Critical Equipment and Systems. Such documentation shall comply with manufacturer’s recommendations, standards and engineering practices”. Moreover, in agreement with this item, the item 13.3.4 from SGSO complements that “the rig operator shall assure that Operational Safety Critical Equipment and Systems are fully covered by inspection plans, tests and maintenance”.

## Lessons learned

Aiming the continuous improvement of the Operational Safety Management, ANP/SSM identifies the opportunity for enhancing passive fire protection availability and integrity management in offshore production units.

Based on the identified deviations, operators shall take actions to verify the recommendations of safety studies regarding the need for PFP installation and to establish and implement inspection and maintenance plans for the installed PFP. Finally, in case of degraded, absent or out of specification PFPs, operators shall implement temporary additional mitigating measures and recover the protections, in order to restore design conditions.

## Contact

For additional information regarding this safety alert, please contact ANP’s Superintendence of Operational Safety and Environment at [sgso@anp.gov.br](mailto:sgso@anp.gov.br).