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Agência Nacional  
do Petróleo,  
Gás Natural e Biocombustíveis

## *Safety Alert 011 - ANP/SSM*

### *Undue storage of produced water in cargo tanks*

This Operational Safety and Environment Superintendence alerts the oil, gas industry and other stakeholders about the re-running of events with structural failure in FPSO load tanks due to the undue storage of water produced in these tanks.

### *What happened?*

In the first event of its kind, the tank in which the structural failure occurred was designated, by design, to the storage of **produced water** out of the appropriate specifications for disposal at sea, called "*offspec tank*", but its corrosion protection system was designed to meet the purpose of offspec **oil** storage tank. Due to the prolonged use of this tank for storage of offspec produced water, together with the corrosion protection system not being suitable for this purpose, it came to an structural failure.



Figure 1 - FPSO hull bottom after tank structural failure.

In the second event of this type, the tank was the secondary *offspec tank*. This water storage tank was supposed to be used only when the primary *offspec tank* was unavailable under inspection, for a limited time, since it did not have sacrificial anodes and was painted only in its lower part, while the primary *offspec tank* had sacrificial anodes and had its plates painted entirely. However, since the start of operation the failed tank has been used for water storage. The design specification documentation indicated distinct purposes for the tanks, but no differentiation between the tanks was found in the unit's operational documents. The failure occurred below the bell-mouth region of the tank, and it was not possible to determine whether this region was inspected in the tank last inspection, nor whether the region was properly cleaned before this inspection. The failure was detected during inspection, so there was no oil leakage at sea.

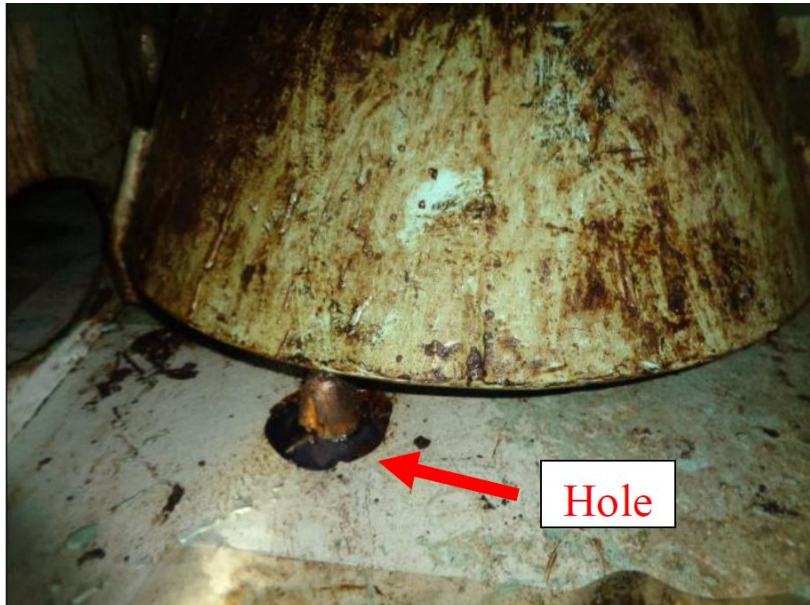


Figura 2 - Hole in tank plate under bell mouth region.

### *Potential consequences*

The first reported event resulted in the discharge of more than 25 m<sup>3</sup> of oil at sea, which led to fines and penalties to the Operator. In the second event, the unit was halted, which led to significant production losses.

The first accident could have become a catastrophic event, resulting in the sinking of the facility, considering the degree of structural damage suffered by the unit. If such an event were to take place, the environmental damage and costs of both combating pollution and in terms of loss of property and damage to the company's image would be much greater.

### *Identified causes*

- Non-compliance with inspections planning;
- Lack of corrective action related to tank inspection;
- No quality assessment of the inspection report;
- Inconsistency with the design criteria for the corrosion protection system;
- Fail in contractor management;
- Failure of equipment inspection/maintenance;
- Low team's risk perception;
- Insufficient staff;
- No FPSO decommissioning planning;
- Failure in Class Society periodic inspection;
- Failure to supervise cleaning and inspection by Operator's Supervisor;
- Third-party periodic inspection failed.

### *Lessons learned*

- Need for management tools that: increase the quality of design criteria; include adequate inspection/maintenance control of marine installations; effectively increase the degree of quality requirement for tank inspections and their reports and ensure the planning and compliance of

maintenance plans and other operational safety elements as part of the criteria for evaluating contractors.

- Need for adequate human resources for the functioning of the production unit operating systems.
- Establish appropriate indicators for efficient management of the contractor.
- Evaluate all single hull FPSO tanks that have or have stored produced water and perform analysis of their integrity, the functionality of their cathodic protection system and their coating.
- Maintain the operational safety management system properly functional throughout the installation lifecycle, including the decommissioning phase.

## ***Regulatory Framework***

As established by ANP Resolution No 43/2007, GSO Technical Regulation (RTSGSO) applies to offshore oil and natural gas drilling and production facilities. Specifically, and in its item 3.3, it is defined that this Technical Regulation is applicable to the entire life cycle of the Facilities, including decommissioning phase.

In accordance with RTSGSO item 13.2.1, facility operator shall establish plans and procedures for inspection, testing and maintenance in order to seek the mechanical integrity of its systems, structures, equipment and critical operational safety systems. Such documentation should be aligned with manufacturers' recommendations, standards and good engineering practices.

RTSGSO item 13.3.3 states that the Operator shall establish quality assurance requirements in the execution of the procedures.

In RTSGSO item 13.4 it is established that the installation operator will be responsible for monitoring and evaluating the results of inspections and tests.

RTSGSO item 5.3.1 determines that the Operator establishes the responsibilities of contractors related to Operational Safety.

RTSGSO item 10.2.2 determines the Operator to identify, during the design, construction, installation and decommissioning phases, standards and good engineering practices related to Operational Safety matters.

Finally, RTSGSO item 1.3.2 establishes that the effective participation of Facility Managers in activities related to Operational Safety is guaranteed.

## ***Contact***

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