

Executive Summary

P-48 Loss of containment and fire



anp
Agência Nacional
do Petróleo,
Gás Natural e Biocombustíveis

Operational Safety and Environment Department
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Executive Summary

On the March 17th 2016, ANP received an initial communication about a significant fire onboard P-48 platform. P-48 is a floating, production, storage and offloading unit (FPSO) located in a Petrobras concession area, at the Campos Basin in Caratinga field, about 100 km offshore and in a 1040 m water depth. At the time of the accident, there were 194 people onboard and the average production was 40,000 bpd of oil and 400,000 Nm³/d of gas.

Since June 2015, the platform was facing a scheduled maintenance campaign supported by the floating maintenance unit (UMS) Praia de Itaipu with 500 people on board and connected to P-48 by a mobile gangway. Although part of the maintenance campaign was carried out with P-48 production stopped, the platform was producing at the date of the accident.

The fire started and developed on the platform main deck, just below the production deck and close to two closed drain vessels (slop vessels), which are responsible for accumulate liquid from the process plant, mainly water with some hydrocarbon content. The fire spread along the FPSO in the longitudinal direction (bow-aft direction), reaching about 100 m of the installation.

The significant fire was caused by loss of primary containment in an unusual pipeline connection between the slop vessels and the cargo tanks, followed by an ignition, probably caused by a spark from one of the hot works performed in the area. The fluid leaked from the piping migrated from the half-ship towards the stern, and ignited near to the fenders position.

ANP established an independent investigation team, which used as method the fault tree attached to a root causes map after a sustained data analysis process.

Accident causes

It was discovered that a high level in the slop vessel A associated to a considerable gas flow could drag liquid to the low pressure flare vessel and cause a shutdown. The unavailability of the other slop vessel, associated to the low efficiency of the drainage pump made the problem worsen. Thus, the lack in manage the change in operational conditions were pointed as root cause.

To avoid shutdown, the platform staff drained the liquid from the slop vessel A to the cargo tanks. That operation was not part of the procedure for high level in the slop vessels, only in case of a long term stop. It was possible due a spool connection, which was permanently installed in the system, connecting the slop vessels to the cargo tanks. Contributed to this fact the adoption of an alternative action to a HazOp study recommendation that demanded the spool removal. Thus, three causes were correlated to this causal factor, as the design criteria was not followed, the change in risk study recommendation was not managed and the operational procedure was not followed.

The loss of containment was caused by a local corrosion. It was found that a change in the support format, as well as a filling material used in the support, which in contact with the pipe, hindered the inspection of the line in the support region. As a result, previous inspections in the line could not identify the corrosion process. Once more, a change not properly managed was pointed, this time as loss of containment root cause.

Finally, the most likely ignition source may be related to the hot work performed nearby and identified as the initial site of the fire.

As a result of the investigation carried out by ANP, one recommendation was issued for the industry, applicable for FPSOs, with mandatory implementation:

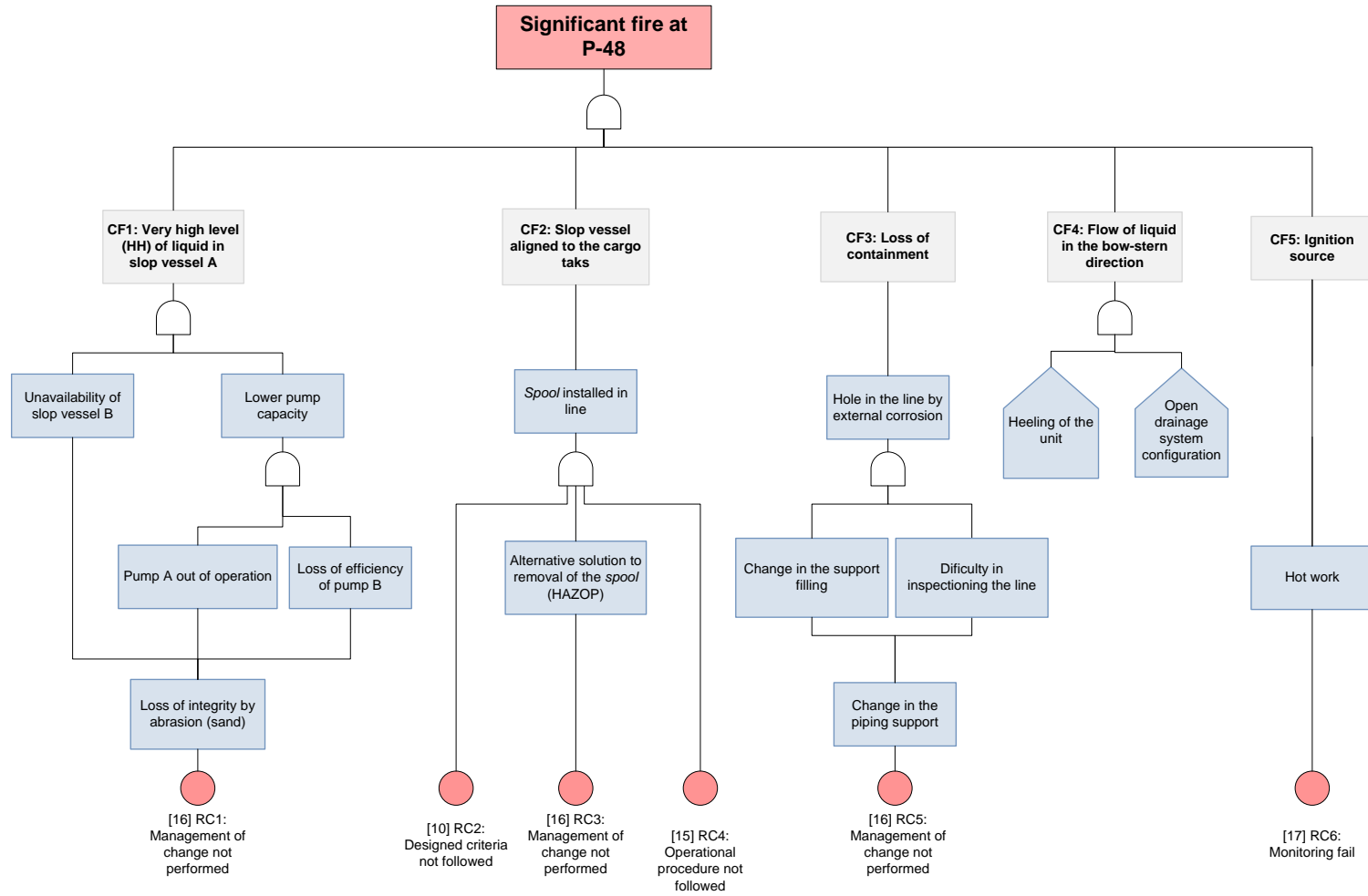
R1) Perform a survey about the existence of spools interconnecting lines between production and marine systems, assessing its conformity with design requirements. It shall be kept a record of this survey.


Additional actions to support and enforce company improvement in organizational level are already in development, some of them specifically related to the listed accident causes. In addition, an internal recommendation has been proposed to ANP, directed to audit teams to cover during offshore installations audits, as follows:

RANP1) Follow the implementation or alternative solution given to Petrobras' recommendation no. 4 (R4), namely:

“R04) Propose including in E&P Safety Manual (MS) explicit requirements for the preparation of containment for hot works in order to facilitate verification of their effectiveness. ”

ANNEX - Incident Causal Tree




External event – Events which are expected to occur and do not stand out as deviations but rather as characteristics or inherent conditions