



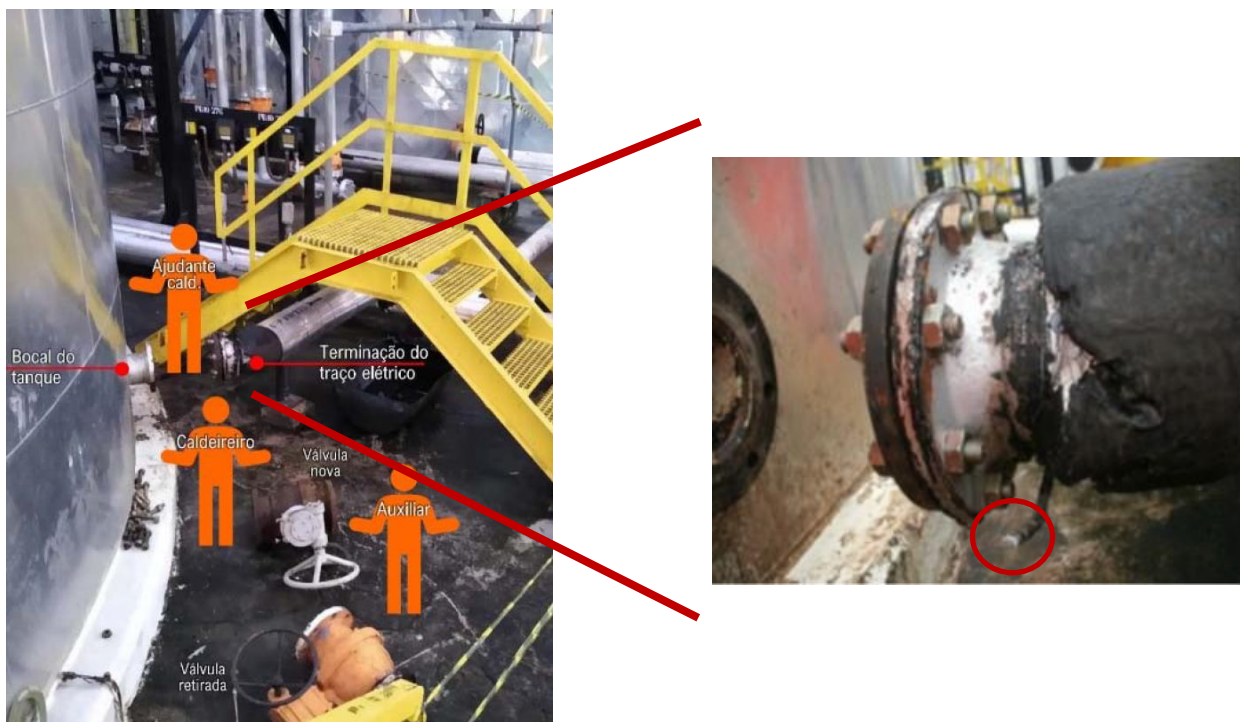
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Agência Nacional  
do Petróleo,  
Gás Natural e Biocombustíveis

## *Safety Alert 013 - ANP/SSM Significant fire in onshore field*

This Operational Safety and Environment Superintendence alerts the oil, gas industry and other stakeholders about the occurrence of significant fire in an onshore field.

### *What happened?*

During the execution of cold service for the replacement of the oil inlet and outlet valves in a production tank of the collecting station there was a flash in the nozzle where the oil outlet valve was being replaced. With this, there was release of inflammable vapors that after contact with an ignition source led to a fire, hitting the worker and his helper. Figure 1 shows the diagram of the accident site during the service execution.



**Figure 1 - Layout of the location and highlight for the electrical trace.**

The fuel that fed the flash came from inside the tank, which has been drained, but at a temperature of 40°C and with oil residual content. After valve removal, the vapor phase leaked to the atmosphere through the nozzle, generating an explosive atmosphere, even in an open area.

The ignition source identified as most likely was the electrical energy from the electrical trace installed in the pipe, highlighted on the right in Figure 1. After inspection and comparison with the design, it

was identified that the electrical trace assembly was incomplete, without the termination indicated by the manufacturer, most probably generating the necessary spark for igniting the flammable mixture formed by the fuel flowing from the tank. According to reports, the electrical tracing system was functioning during the intervention.

### *Potential consequences*

Workers were using the PPE indicated in the work permit and this was determinant for the 1<sup>st</sup> and 2<sup>nd</sup> degree burns to have been located on the hands. They were wearing mixed leather and leather scrapings gloves, which are unsuitable for temperature services. Therefore, the burns were the result of conducting heat from the gloves to the workers skin, generating more the 3 lost workdays cases.

Considering the possibility of neglecting the formation of explosive atmosphere in an open area together with the presence of a spark in a classified area with cold work, one or more fatalities could have occurred during the accident due to the explosion.

### *Identified causes*

The causes identified during the investigation of the incident by the operator were:

#### **Root causes:**

- Risk management: failure to execute the procedure related to the work permit (inadequate answer to a specific item) and not observation of item in procedure for preparation and release of equipment for intervention;
- Procedures: failure in the contents of the tank release for maintenance procedure, that does not include the valve replacement services for oil tanks;
- Installation and technology: standards and good engineering practices in planning, construction, installation and decommissioning were not considered. The end of the electrical tape of the tracing was inadequate due to the design assembly in disagreement with that recommended by the manufacturer;
- Maintenance and reliability plan: planning did not consider the need to eliminate the remaining hydrocarbon gases from the tank after drainage to perform the activity.

#### **Contributory cause:**

- Training: ineffective or not performed in the procedures related to work permit and preparation and release of equipment for intervention.

Additionally, it can be considered was a failure in the operator's risks management. The possibility of generating explosive atmosphere in an open area and spark formation in cold work was neglected. Explosive atmosphere is not exclusive to confined areas as well as spark formation is not hot work exclusivity.

### *Lessons learned*

- Reassess risks related to cold work in open areas;
- Improve the systematics of work permits and release of equipment for intervention;
- Follow engineering standards and good practices.

## ***Regulatory Framework***

The following items of the Technical Regulation of Management of Integrity System for Onshore Fields (RTSGI), annexed to ANP Resolution No. 02/2010, are related to the incident:

Item 8.2.1 of Management Practice 8 (IDENTIFICATION AND RISK ANALYSIS): *The Facility Operator shall promote the identification and qualitative or quantitative analysis of risks, as applicable, with the purpose of recommending actions to control and reduce Incidents that compromise Structural Integrity and Operational Safety.*

Item 13.1.1 of Management Practice 13 (CONSTRUCTION AND ASSEMBLY OF THE INSTALLATION): *The Concessionaire shall build and assemble static, dynamic equipment, pipes and all systems that compose the Installation complying with the standards specified in these Technical Regulations, other legal regulations and considering the recommendations contained in the construction standards and codes appropriate and internationally recognized.*

Item 17.4.4 of Management Practice 17 (OPERATION AND PROCESS): *The Work Permit should analyze in advance the safety conditions for the execution of tasks, as well as the hazards existing in the work environment.*

## ***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).