Organization of intervention and rescue activities in toxic/explosive environments within OMV Petromar – Istria Offshore Sector

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Abstract. The activity within OMV Petromar Istria-Offshore Sector takes place across 6 marine platforms located in the Black Sea. Here, crude oil and gas are extracted, products being then transported to the Central Platform where they undergo primary processing and then are sent to the shore at the Midia Năvodari Terminal. In 2024, the procedure for organizing the intervention and rescue activity at the level of these platforms was initiated, being completed this year. This marks the first time in Romania that such an activity has been implemented in an offshore production area. Thus, five intervention and rescue stations were authorized at the level of each platform, except for the Pescăruș platform which was designated as an intervention point under the rescue station on the central platform. The paper aims to present he training methods for rescuers using the equipment available on each platform, as well as the specific intervention procedures adapted to the offshore environment—procedures that differ from those used onshore. Given that this is the first time that intervention and rescue activities are implemented at the level of marine platforms, the intervention procedures specific to toxic / explosive environments must be correlated with maritime rescue protocols in case of disasters.

1 Introduction

When, during production activities at the economic operator's level, there is a risk of toxic, flammable or explosive gases, dust or vapours release, the employer has the legal obligation to establish an Intervention and Rescue Station. Only personnel authorized in accordance with the applicable legislation can be part of this Intervention and Rescue Station, personnel from all professional categories operating within the economic operator.

OMV PETROM is the largest oil and gas group in Romania, operating in the Exploration and Production, Refining and Petrochemical Products, and Product Distribution sectors. The company carries out exploration and production activities in 9 production areas and manages approximately 15,000 oil and gas wells across Romania, as well as seven offshore platforms in the Romanian sector of the Black Sea, dedicated to the exploration of the continental oil

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platform in the Offshore Exploitation Complex, part of Petroleum Exploration Perimeter XVIII, located approximately 80–85 km from the port of Constanța. The Offshore Exploitation Complex consists of five satellite platforms connected to a central production platform, where the main phase of crude oil, gas, and water treatment is carried out before the hydrocarbons are transported to the Midia Terminal via two submarine pipelines.

Until 2024, OMV PETROM had organized intervention and rescue activities only for onshore operations, with Rescue Stations in all production areas, as well as in the refining and petroleum products storage areas. In 2024, the process of organizing intervention and rescue activities for the offshore platforms managed by OMV PETROMAR in the Black Sea was initiated. This effort marked a first for the Rescue Authorization Group within INCD-INSEMEX Petroșani, as these were the first Rescue Stations to be established and authorized in the Offshore area.

2 General overview

Hydrocarbon extraction activities within the Istria Offshore sector are conducted using one central fixed production platform (PFCP) and five satellites (Fig. 1), consisting of fixed support platforms for wells (PFSS) and platforms for accommodation and utilities (PGSU) [1,2].

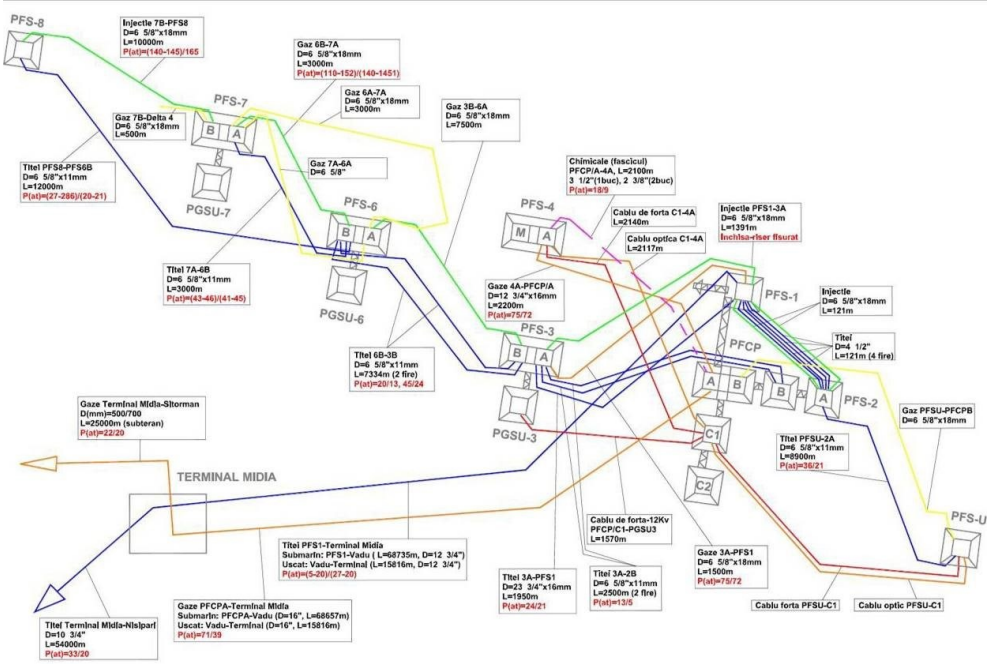

Fig. 1. Fixed Central Production Platform (PFCP) and 5 satellites

The hydrocarbons extracted through production wells are transported via a system of submarine pipelines to the Central Fixed Production Platform (PFCP) [2,3], from where they are pumped through two main submarine pipelines to the Midia Terminal.

The transport of the liquid mixture (hydrocarbons and formation water) and gases between platforms and to the shore is done via submarine and terrestrial pipelines, specifically from the PFCP to the Midia Terminal [3,4].

A permanent workforce of 170 personnel operates across the six platforms, organized under a 2-week offshore / 2-week home rotation, with an additional 4 weeks of annual leave. This schedule means that each crew member spends approximately 40% of the year offshore. Based on the above, the total workforce across the six platforms is estimated at around 400 personnel. Therefore, it was concluded that a minimum of 100 individuals must be trained and authorized to be part of the Rescue Stations' personnel and to intervene in case of dangerous incidents on the platforms [5,6].

As part of the analysis conducted during the initiation of the organization procedure for intervention and rescue activities on offshore platforms, an effort carried out with the participation of representatives from OMV-PETROMAR and the Rescue Authorization Group from INCD-INSEMEX Petroșani [7,8], it was concluded that five Rescue Stations need to be established, as follows:

- Rescue Station – Central Fixed Production Platform (PFCP), also serving the Pescăruș platform (PGSU), with 42 people;
- Rescue Station – Platform 3 (PFS3), with 16 people;
- Rescue Station – Platform 4 (PFS3), with 10 people;
- Rescue Station – Platform 6 (PFS3), with 16 people;
- Rescue Station – Platform 7 (PFS3), with 16 people.

Considering that the Central Fixed Production Platform hosts the most complex activities, receiving extracted products from all other platforms and performing the initial crude oil and gas processing, and also accommodates the largest number of personnel, this paper will detail the organization of the rescue activity at this central platform, which also includes the Pescăruș platform under its responsibility. All other Rescue Stations [9] on the remaining platforms are organized similarly to the one at the central platform.

3 Management of intervention and rescue activity on the central fixed platform

The general overview of the PFCP is presented in fig. 2. The PFCP consists of seven metal structures, connected by bridges, namely: tripod flare; well support platforms, which also support the J-type risers and the pipeline for the export of crude oil to Midia; two processing modules, the gas processing module, free gas separation and gas compression and the crude oil, reservoir water and associated gas processing module, including reservoir water treatment and water injection; utilities platform, including the central control room and accommodation module, with heliport.

The role of the PFCP is:

- Reception of crude oil and associated and free gases;
- Separation and primary treatment of crude oil, water and gases;
- Export of crude oil and residual water to shore, to the Midia Terminal;
- Gas export to shore, to the Midia Terminal.

Logistic of intervention and rescue activities within the marine platform was based on assessing the specifics of the activity carried out and the actual on-site conditions. During the evaluation, strict attention was paid to compliance with the legal provisions in force regarding the establishment and operation of rescue stations.

Fig. 2. General overview of the Fixed Central Production Platform (PFCP)

Following the assessment of workstations with a potential risk of generating toxic, explosive, or flammable atmospheres within OMV PETROM S.A. – Petromar Asset – Istria Offshore Sector – Central Fixed Production Platform (PFCP) and the Pescăruș Platform, and taking into account the necessity of ensuring a rapid and efficient intervention by rescue teams, a rescue and intervention station will operate on this offshore platform, serving both the PFCP and the Pescăruș platform.

To ensure that intervention and rescue operations in toxic/explosive environments are conducted with maximum efficiency and successful outcomes in the event of dangerous incidents, careful personnel selection for the rescue station is essential. For the training and authorization process, individuals from all categories of personnel working on the platform were selected: operators, electricians, maintenance staff, production coordination engineers, maintenance coordination engineers, safety officers, and platform supervisors. The inclusion of management and technical-engineering decision-makers in the rescue station's personnel underscores that this activity is a key safety factor on the platform [9].

Although initially the training for intervention and rescue personnel was to be conducted onshore, it was later decided to carry out training directly on the platform. This ensured that the training environment, especially the practical part, matched the real conditions in which personnel work daily.

The theoretical training, covering the role and importance of intervention and rescue activities, definitions, principles, applicable legislation, alert procedures, procedures for working in confined spaces, and the use of respiratory protection equipment available on the platform was delivered in the designated safety and health training areas, located within the platform’s accommodation and rest zone.

In intervention and rescue activities in toxic/explosive environments, the key success factor is the optimal design of the practical training program. Accordingly, the practical

training, which included demonstrating the operation of self-contained breathing apparatus (SCBA), procedures for fitting and inspecting the equipment, and recording parameters in the station's documentation, was conducted directly in the installations, in the areas where respiratory protection equipment is deployed. A practical exercise using the SCBA was held in the operational facilities. The rescuers moved from one production level to another via stairways connecting the levels and entered the actual production areas, which include various confined spaces, involving horizontal and vertical movement. This was done to simulate intense physical effort in order to monitor the correct use of the breathing apparatus, assess the physical endurance of trained personnel, and determine each individual's effective usage time of the SCBA unit (fig. 3).

Fig. 3. Practical training Production Platform (PFCP)on the Central

Although legislation requires that the Rescue Station be allocated a space that allows for the theoretical training of rescuers, provides appropriate storage conditions for the station's equipment, and is located in an area with minimal risk of incidents, the specific nature of operations on an offshore platform, with limited space and high inherent risks, necessitated an alternative approach. In this case, the breathing protection devices and other rescue equipment were distributed across several areas of the platform. This setup ensures that rescue personnel can access the equipment as quickly and easily as possible in the event of a real intervention, while also maintaining optimal storage conditions and appropriate temperatures, particularly for the compressed air cylinders that are part of the breathing apparatus (fig. 4).

Fig. 4. Location of insulating devices on the Central Production Platform (PFCP)

The procedures for alerting intervention and rescue personnel in the event of an incident are significantly different from those used in land-based rescue stations, due to the isolated nature of offshore platform operations and the fact that only the personnel present on the platform at the time, those trained and authorized, can intervene in critical situations. However, alerting the members of the rescue station is much easier, and response times are significantly shorter compared to onshore scenarios, given that all personnel are already on-site and the small surface area of the platform allows for rapid mobilization.

A critical aspect is the coordination of the Rescue Station's interventions with the established procedures of OMV Petromar – Istria Offshore Sector for emergency response and rescue, as well as with the personnel trained and authorized for marine rescue operations. It is essential that interventions in toxic/explosive environments complement, not interfere with, marine rescue efforts, especially in exceptional cases, to ensure the overall success of the operation. Information flow and decision-making are crucial factors during incidents, and in this regard, it is important to note that the heads of platform, those holding the highest decision-making authority, have been appointed as Rescue Station Chiefs on each platform.

The breathing protection devices available at the Central Platform's Rescue Station are compressed-air-based systems such as DRÄGER and PROSALV-Buzău, which provide sufficient autonomy for surface-level interventions.

For the monthly theoretical training sessions, structured training programs are developed covering platform-specific topics and intervention procedures in case of disasters. Monthly practical training exercises are carried out in designated areas of the installation, chosen to avoid disrupting the ongoing production process, given the continuous nature of platform operations. For these exercises, predefined routes and expected workloads for each rescuer have been documented as part of the official procedures used during the setup and authorization of the Rescue Station.

In light of all aspects discussed above, regarding the organization and authorization of intervention and rescue activities on the central platform, the active involvement of all decision-makers and the full engagement of trained and authorized personnel is particularly noteworthy. This level of commitment clearly reflects the awareness and recognition of the importance of this activity for the health and safety of everyone working on the platform.

4 Conclusions

Organizing intervention and rescue activities in accordance with order 1637-391 / 2007 on the offshore platforms in the Black Sea, owned by OMV-PETROMAR, represents a national premiere, marking the first implementation of such activities in the offshore sector.

The authorization and operation of Rescue Stations on each individual platform will lead to an increased capacity for intervention in the event of hazardous incidents, effective protection of assets that could be damaged or destroyed during such incidents, and an overall improvement in occupational safety and health.

The training and certification of personnel for intervention in toxic/explosive environments under the protection of self-contained breathing apparatuses can also support technological interventions on the platform when, because of technical malfunctions, gas concentrations may exceed the maximum allowable limits.

Given the isolated nature of the activities carried out on offshore platforms, the certified personnel forming the Rescue Station are essentially the only ones who can intervene during events, accidents, or hazardous incidents, as all other state emergency structures (e.g., Firefighters, ISU, SPSU, etc.) are not accessible in the same way as they are for onshore operations.

Joint drills with personnel trained for sea rescue can be conducted, and common action procedures can be developed for disaster scenarios.

Ongoing monitoring of the future activity of the Rescue Stations on the offshore platforms through annual audits conducted by members of the Rescue Authorization Group from INCD-INSEMEX Petroșani, as required by current legislation, will allow the development of research studies. These studies will aim to create intervention procedures and organize such activities at other economic operators working in offshore production environments.

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