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Operational and strategic protection of offshore platforms in the Black Sea

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Abstract: As a Black Sea coastal state, by joining the European Union, Romania has assumed the declared responsibility of emphasizing the security mission of the eastern border of Europe. With the discovery of massive gas deposits in the Exclusive Economic Zone and the start of the exploitation of these reserves, new valences were added to Romania's security mission, the operational and strategic protection of offshore platforms operating in the Black Sea being among the priority objectives, these representing perhaps some of the most vulnerable objectives. Some time ago, in a European Union document, it was noted that "accidents that occur at sea know no borders", and such an incident, caused intentionally or accidentally, at offshore platforms, would obviously have an catastrophic impact, with devastating consequences in the long or very long term. I therefore believe that the operational and strategic protection of offshore platforms operating in the Black Sea is an essential concern in national strategies regarding ensuring the security of operational personnel, environmental protection and, last but not least, national and European energy security.
Therefore, the need to protect these structures rewrites the approach to security strategies, now more than ever, given the complex set of military, terrorist threats, technological accidents or cyber attacks, in the current international context.
Key words: pollution, offshore platforms, protection

1. General Considerations

Against the backdrop of depleting conventional energy resources, the identification and utilization of alternative resources (geothermal, nuclear, wind, solar energy, etc.) have emerged as a priority for the contemporary community. The rising demand for energy raw materials has inevitably led to a need to identify new conventional and alternative resources—both to meet the requirements of emerging and established economies and to ensure the population's well-being. In recent decades, driven by concern for the planet, stakeholders across various sectors have focused primarily on identifying and promoting new, reliable, sustainable, and renewable resources, such as so-called "green energy."

Nevertheless, hydrocarbons and their derivatives continue to play a pivotal role in the global economy; they remain the primary sources for generating electricity and heat, as well as for fueling road, air, and maritime transport. Having dominated the global energy mix for over a century,

hydrocarbon resources (whether gas or oil) remain vital for supporting populations, industrial activities, and transportation.

However, these essential resources are non-renewable; consequently, the perpetual and growing demand for hydrocarbons (oil, natural gas, coal) remains a critical global issue, with energy crises and trends toward the monopolization of existing resources posing constant challenges for the modern world.

In this context, identifying and exploiting new hydrocarbon resources—or optimizing extraction and increasing recovery rates from resources already in production—has become a priority. Over the past few decades, following the discovery that the world's largest and most productive hydrocarbon deposits are located in marine environments (such as the North Sea or the Black Sea), the attention of major energy market players has shifted primarily toward the exploitation of subsea deposits.

Offshore drilling operations were specifically designed to explore for and extract hydrocarbons from reserves located beneath the seabed.

The first drilling platforms [1] were built on wooden pilings in the late 19th century off the coast of Summerland, California; situated in Pacific waters, they featured a fixed working platform for drilling at depths not exceeding 15 meters [2].

A pivotal moment in the evolution of marine drilling occurred when the first well was installed far out at sea—completely isolated and beyond the sight of land—marking the dawn of the global offshore drilling industry.

The first offshore oil well was completed on November 14, 1947, 16 kilometers off the coast of Louisiana in water 5.5 meters deep. Drilled by the Kerr-McGee company, this well is considered the first true offshore oil well because the platform was located out of sight of land [3].

This event decisively marked the beginning of offshore drilling operations. Over the years, the sector has seen continuous growth—both in terms of the technologies employed and the results achieved—leading to the discovery and subsequent exploitation of massive hydrocarbon reserves.

In Romania—one of the world's oldest oil-producing nations [4]—the issue of exploring for potential hydrocarbon accumulations on the Black Sea continental shelf was first addressed during the communist regime, between 1967 and 1969.

Romania carried out the first offshore drilling operation in the Black Sea on September 16, 1976, marking the commissioning of the *Gloria*—the country's first offshore platform, built at the Galați Shipyards. The initial exploratory well was drilled 72 nautical miles (approximately 133 km) offshore; the Romanian platform had been specifically designed to operate in water depths of up to 90 meters. The well reached a final depth of 5,006 meters within the Earth's crust. In the post-1989 period, the *Gloria* was utilized as a production platform. However, in the autumn of 2019, after 40 years of operation, the platform was brought back to shore. To achieve this, the platform's jacking system was reactivated; the platform was then positioned onto a transport barge (GSP Big Foot 2) and towed to shore at the port of Agigea [5].

In the recent history of the Black Sea, February 3, 2009, stands as a landmark date; on that day, the International Court of Justice in The Hague—at the request of the states involved—established the maritime boundary between Romania and Ukraine in the Black Sea. The ruling awarded Romania 9,700 square kilometers (approximately 80%) of the disputed Exclusive Economic Zone.

The strategic importance of this territory lies not so much in its marine life or the size of the area, but rather in its rich hydrocarbon resource potential. At the time the verdict was announced, Bogdan Aurescu highlighted that the area secured for Romania was estimated to hold reserves of approximately 70 billion cubic meters of gas and 12 million tonnes of oil.

The diplomatic success of 2009 thus bolstered Romania's energy security, creating opportunities to explore and exploit massive hydrocarbon reserves in the Black Sea. Without this clear demarcation of maritime borders with Ukraine, oil companies would have been unable to invest securely in offshore blocks due to legal uncertainty regarding the territory.

The Neptun Deep project, developed by OMV Petrom and Romgaz, is the largest natural gas project in the Romanian sector of the Black Sea and the first in deep waters. The Neptun Deep block is located in deep waters—approximately 160 km from the shore—within the maritime area whose status as Romanian territory was confirmed and clarified by the aforementioned ruling. Drilling operations began in 2025, targeting 10 production wells within the block. With an investment of 4 billion euros,

annual extraction of approximately 8 billion cubic meters is projected to commence in 2027, thereby confirming the immense economic stakes of the Hague ruling.

According to official data released by the investor, the development of the Neptun Deep project will include 10 (ten) wells across the Pelican Sud and Domino fields, 3 (three) subsea production systems, associated gathering pipelines, an offshore platform, a natural gas pipeline to Tuzla, and a gas metering station. The shallow-water platform is fully automated and adheres to the highest safety and environmental protection standards. Operations will be managed remotely via a digital twin, optimizing processes, reducing emissions, and improving energy efficiency for enhanced environmental performance.

Neptun Deep is among the first projects in the industry to utilize continuously electrically heated flowlines, ensuring reliable gas flow and reducing operational costs through an advanced thermal control system; furthermore, its innovative design and technological processes enable gas delivery with direct carbon emissions significantly lower than the industry average. At plateau production, the carbon footprint of Neptun Deep operations is estimated at approximately 2.2 kilograms of CO_2 per barrel of oil equivalent—nearly 8 (eight) times lower than the industry average.

According to a study by the Consilium Policy Advisors Group [6], the projected economic impact of the Neptun Deep project on GDP for the 2023–2044 period is estimated at €42 billion—representing an average annual increase equivalent to 0.67% of Romania's 2022 GDP. Furthermore, over the study period, the Neptun
Deep project could create or sustain 9,100 jobs across Romania.

However, beyond the optimistic forecasts of economic analysts, the discovery of these massive gas reserves in Romania's Exclusive Economic Zone and the commencement of their exploitation bring new challenges, adding new dimensions to Romania's security mission. Consequently, the operational and strategic protection of offshore platforms operating in the Black Sea has become a priority objective, as their perimeter now represents perhaps one of the most vulnerable security zones.

2. High-incidence vulnerabilities associated with offshore platform operations

Offshore drilling operations often span multiple jurisdictions and involve collaboration between companies and governments from different countries.

By adopting and implementing comprehensive common regulations regarding safety, technological innovations, and environmental protection measures, the risk of future disasters can be minimized, thereby protecting oceans and coastal communities.

Strengthening preparedness and improving global response capabilities for emergencies arising from offshore activities can only be achieved through the systematic promotion of collaboration and information sharing—not only regarding best practices but also lessons learned from past experiences.

Workplace accidents

Accidents involving offshore platform operations are critical events that can have major consequences for personnel safety, the marine environment, and the economy. These generally include explosions, fires, oil or gas leaks, collisions, and groundings.

The oil and gas industry is recognized as one of the riskiest sectors in the world. Offshore platform workers face daily threats; the risk of explosions, fires, and extreme weather conditions—combined with isolation and the operation of heavy machinery for hours on end—can take a significant physical and mental toll. According to the U.S. Bureau of Labor Statistics (BLS) [7], the fatality rate in this sector is 14.3 per 100,000 workers, well above the average for other professions. A report by the International Association of Oil & Gas Producers (IOGP) shows that, between 2014 and 2023, over 100 major accidents occurred on offshore platforms, some resulting in dozens of casualties.

Offshore platform workers are most frequently exposed to risks during maintenance and offshore construction activities; this is where the majority of accidents and personal injuries occur. Slips, trips, and falls from a short height account for most accidents on offshore oil and gas platforms.

The consequences of these accidents can be quite severe, as they result in spinal cord injuries, brain damage, severe burns, limb amputations, bone fractures, or the inhalation of toxic chemicals.

Operational Accidents

The explosion and sinking of the *Deepwater Horizon* oil rig—owned by British Petroleum and operating in the Gulf of Mexico—is considered one of the most serious accidents in the recent history of offshore exploration. The incident, which occurred on April 20, 2010, had devastating

consequences: it caused the deaths of 11 people, seriously injured 17 others out of the approximately 150 on board, and resulted in a daily spill of 5,000 barrels of oil into the Gulf's waters. Crude oil leaked continuously into the Atlantic Ocean for 85 days.

Although the accident was described as a preventable disaster, it remains the largest in U.S. history and one of the greatest man-made disasters in terms of negative environmental impact. BP paid over $42 billion for cleanup, fines, and compensation, yet the incident fundamentally changed the oil extraction industry.

The loss of human life is obviously immeasurable, as are the physical and psychological traumas that persist after such accidents. Efforts were made to quantify the consequences of the massive oil spill—which severely damaged coastal ecosystems, including marshes and beaches in Louisiana, Mississippi, Alabama, and Florida—but traces of the pollution remained visible and continued to affect biodiversity even a decade later. Attacks (physical or cyber) on offshore platforms

As previously mentioned, offshore drilling platforms are generally highly vulnerable targets—even more so in conflict zones or amidst heightened geopolitical tensions. Attacks on offshore platforms—whether physical or cyber—pose a critical threat to energy security and maritime infrastructure.

One such significant incident involved the offshore drilling platforms in the Black Sea—known as the "Boyko Towers" [8]—which had been acquired by the Ukrainian government between 2010 and 2012. Following the illegal annexation of Crimea in 2014, Russia seized the platforms and converted them into military installations. Russia utilized them to deploy radar equipment and helipads, as well as to direct drones and missile systems.

It was not until June 2022—after Ukraine launched a missile strike against Russian forces—that three of the drilling platforms were returned to Ukrainian control. During the operation to retake the platforms, intelligence officers from the "Artan" Special Forces unit of the Defence Intelligence of Ukraine dismantled the radar system, thereby preventing the Russian Navy from effectively monitoring the situation in the surrounding Black Sea area [8]

Meanwhile, the explosion of the Nord Stream 1 and 2 pipelines in September 2022 marked the first documented instance of the deliberate destruction of subsea energy infrastructure of continental importance. The attack on the Nord Stream 1 and 2 gas pipelines drew the attention and raised the concerns of the international community. Prior to Russia's invasion of Ukraine, Nord Stream 1 supplied "approximately half of Germany's annual natural gas needs," while Nord Stream 2 was not yet operational at the time.

Although official investigations have not publicly identified the perpetrator, the majority of strategic analyses have concluded that the operation required advanced state-level capabilities, thereby ruling out autonomous non-state actors. In September 2022, German prosecutors stated in a press release that a Ukrainian citizen, "together with other military personnel, devised a plan—at the request of Ukrainian authorities—to destroy the Nord Stream 1 and Nord Stream 2 gas pipelines" with the aim of permanently halting gas supplies through the pipelines and thereby preventing Russia from using revenues generated from natural gas trade to finance its war efforts.

The incident had a multifaceted impact, specifically:

- economically, it eliminated a priority energy supply route for Europe;
- ecologically, it resulted in one of the largest accidental methane emissions into the atmosphere;
- strategically, it demonstrated that subsea energy infrastructure could be neutralized through clandestine operations without automatically triggering an open conflict.

Consequently, Norway—currently Europe's largest gas supplier and a major global oil supplier, with 97 offshore oil fields—has bolstered security at its oil platforms following sightings of mysterious drones near its infrastructure, amid fears of sabotage within the context of the "gas war." In an article published on the Maritime Security Forum platform, the authors highlighted the risks associated with the advanced digitalization of offshore platforms; this trend has increased the vulnerability of SCADA [9] and industrial control systems to cyberattacks—which can disrupt operations or cause physical damage—thereby heightening the overall vulnerability of offshore infrastructure to such threats [10].

Furthermore, expert analysis has brought to the fore the scenario of a potential attack on an offshore asset operating within the Exclusive Economic Zone and the possibility of classifying it as an "armed attack against Romania" under the UN Charter and the North Atlantic Treaty. Such a classification could trigger NATO's collective defense mechanisms—pursuant to Article 5 of the North Atlantic

Treaty, which stipulates that an attack on one member state is considered an attack on all—potentially leading to deliberations regarding a military response.

In this regard, I consider it essential to clarify the type of platforms involved—specifically whether they are mobile or fixed—in order to clearly distinguish between the applicable jurisdictions, namely that of the flag state versus that of the coastal state.

Although platforms located within the Exclusive Economic Zone fall under the exclusive jurisdiction of the coastal state—being effectively treated as part of its territory—a legal distinction must be drawn: technically, they are not considered sovereign territory (like land), yet they are assimilated to the territory solely for the purpose of the application of laws. Thus, offshore platforms belong to the State where they are registered but are subject to the jurisdiction of the coastal State within whose Exclusive Economic Zone they are drilling.

Article 23, Section 2 ("Vessels") of Government Ordinance no. 42/1997 specifies that the following are considered vessels for the purposes of the ordinance: (...) c) floating structures not normally intended for navigation, such as: floating docks, floating piers, pontoons, floating ship hangars, drilling platforms, lightships, and the like.

However, the jurisdiction applicable to them within the Exclusive Economic Zone is established by Article 7(2)(d) of Law no. 36/2002 [11], which stipulates that Romania exercises jurisdiction regarding: the placement and use of artificial islands, installations, and structures; marine scientific research; and the protection and conservation of the marine environment and marine fauna.

Consequently, the legal boundary between a "vessel" and an "offshore installation" is marked by specific physical actions. For instance, in the case of jack-up rigs, the point of demarcation occurs when the structure's legs touch the seabed and the platform begins to elevate above the water; for FPSOs or semi-submersible platforms, it occurs when the first anchor is secured to the seabed or when the dynamic positioning system is officially activated to commence well-connection operations. Consequently, regarding self-elevating drilling platforms, a distinction is made between two situations: while the platforms are navigating from one point to another without being anchored or fixed to the seabed, these mobile platforms are treated as vessels, with the jurisdiction of the flag state applying; however, once they are fixed in position for drilling or production, the jurisdiction of the flag state becomes subordinate to that of the coastal state regarding all activities related to resource exploitation.

3. Conclusions

Today, from an economic perspective, the Neptun Deep project represents a major strategic investment for Romania, ensuring energy security; at the same time, however, it necessitates a re-evaluation of strategic and operational security strategies.

The need to protect these structures is reshaping the approach to security strategies—now more than ever—given the complex array of military and terrorist threats, technological accidents, and cyberattacks characterizing the current international landscape.

The Deepwater Horizon oil spill, the seizure of the Boyko Towers, and the attacks on the Nord Stream pipelines served as a global wake-up call, highlighting the catastrophic consequences of offshore drilling accidents and the urgent need for more robust preventive measures. Yet, preventing such incidents cannot be viewed as an isolated action or the sole responsibility of the coastal state; rather, it requires a collective effort involving government agencies, industry stakeholders, environmental organizations, and the public, all acting with genuine interest and a sense of responsibility.

To ensure that disasters like the Deepwater Horizon incident remain merely a tragic memory of the devastating consequences of offshore drilling accidents, the implementation of effective, unified preventive measures is essential—not only for protecting marine ecosystems and the global environment at large but also for safeguarding coastal communities in particular.

Demonstrating a responsible attitude toward its mandate, the European Parliament adopted a Resolution on September 13, 2011, addressing the challenge of safety in offshore oil and gas activities [12]. This Resolution emphasizes that Member States' legislative and regulatory frameworks should adopt a robust regime—aligned with current best practices—requiring all drilling proposals to be accompanied by a safety dossier that must be approved before operations can commence; this regime

includes verification procedures by independent third parties and reviews conducted by independent experts at appropriate, regular intervals.

It further highlights that establishing "threshold points" prior to drilling would provide an additional guarantee that all risks have been analyzed and eliminated and that independent expert reviews have been carried out for each installation at appropriate intervals.

By strengthening safety regulations, investing in advanced technologies and equipment, improving emergency response preparedness, optimizing environmental monitoring and restoration efforts, and promoting public engagement and transparency, we can help prevent potential incidents while also protecting the planet.

Only by working together and prioritizing safety, environmental sustainability, and corporate responsibility can the world's nations build a safer and more sustainable future for generations to come [13].

Establishing international standards and protocols for offshore drilling safety and environmental protection can help ensure consistent regulations and practices across borders.

References

[1] The term "offshore" originates from English (composed of *off* – "away from" and *shore*) and translates literally as "out at sea" or "off the coast." According to Law No. 256, Art. 2, letter g, the term "offshore" means situated in internal maritime waters, the territorial sea, the contiguous zone, and the exclusive economic zone or on the continental shelf of the Black Sea, within the meaning of the provisions of the United Nations Convention on the Law of the Sea, concluded at Montego Bay (Jamaica) on December 10, 1982, and ratified by Law No. 110/1996;

[2] American Oil & Gas Historical Society (AOGHS): Data on the first wooden piers in Summerland, California (1896) (Offshore Petroleum History).

[3] T. Murphy, *A Brief History of Offshore Drilling Rigs and Vessels,,* https://armoda.com , 2022.

[4] The world's first oil well was built in Romania, in the village of Lucăcești, Bacău County, in 1840.

[5] Roșu (Mitrea) Ioana Cornelia, *Contributions to Improving the Exploitation Processes of Hydrocarbon Deposits Located on the Black Sea Continental Shelf.,* Ploiești: Petroleum-Gas University of Ploiești, 2024.

[6] CPAG conducts in-depth research to transform emerging ideas and issues into economic policy matters and to support high-quality debates on economic policy in Romania. The analyses they conduct aim to serve as a bridge of trust between decision-makers, the business community, and society, facilitating public understanding of domestic and international economic policy issues and helping to shape policies that address today's most pressing economic challenges.

[7] U.S. Bureau of Labor Statistics (part of the U.S. Department of Labor)

[8] The "Boyko Towers" are offshore drilling platforms used for oil and gas extraction in the Black Sea. Known as the Boyko Towers, these platforms came under Russian control after Moscow illegally annexed the Crimean Peninsula in 2014. According to British intelligence, the Boyko Towers in the Black Sea—located 100 km from Odesa and 150 km from Crimea—are strategic assets.

[9] *DA (Supervisory Control and Data Acquisition) systems represent an industrial automation solution that ›les monitoring, real-time data collection, and remote control of equipment across the entire production '..*

[10] Ret. Adm. Dr. Aurel Popa, Prof. Dr. Cristina Elena Popa Tache *The attack on offshore targets in the exclusive economic zone and implications for NATO collective defense.*

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[12] E. Parliament, *2013/C 51 E/06,* 2013.

[13] T. Fatima, *Unveiling the multifaceted impact of the Deepwater Horizon oil spill and the solution for it,* 2024.

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