



WEST PATRAIKOS LEASE AREA ENVIRONMENTAL REPORT 2018

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HSE Policies & System, Environmental Studies and Implementation

1. Introduction

The following are representing the implementation of HELPE's policies and systems related to the Patraikos Lease Area.

Hellenic Petroleum has operated during the past in the Ionian Seas as an operator and has gained a deep understanding and knowledge of the context, regulations, local communities' relations and management that could guarantee a smoother development process in the area under lease with no impact to the environment and local communities. In 2014, the Greek State awarded a Lease Agreement for Hydrocarbon Exploration and Production in the offshore deep water area of West Patraikos Gulf.

Hellenic Petroleum, acting as Operator, is fulfilling its commitments and has planned the exploration work program by implementing the most up-to-date, safe and environmentally friendly technological methods and practices.

2. HSE Studies

2.1. Design of Environmental Parameters Monitoring System

Basic Principles of Environmental Indicators

A material component for the organization and observance of the environmental status, natural and anthropogenic, and the significant environmental impacts on individual environmental parameters is the compilation of a list of environmental indicators. Environmental indicators are an arithmetic or descriptive classification of a big number of environmental parameters in order to objectively draw information that can be useful for the parties related to air quality assessment and decision making.

Various environmental indicators have been introduced at a global scale, whose use makes the evaluation of the quality of the environment in a region possible in a usually simple and easy to understand way by the public. The use of indicators facilitates the process of comparing the environmental quality in different geographical regions, at different times.

According to JMD 169896/08-08-2013 approving the SEA, the hydrocarbon exploration and exploitation program in the W. Patraikos Gulf, the observation system is set up based on the following principles:

- The observation concerns both the status of the environment in the wider area affected by the hydrocarbon exploration and production works, as well as the direct impact areas.
- For the observation purposes, wider area means at least the entire active area where exploration and exploitation rights have been granted. Natural and chemical values of the basic environmental sectors should be recorded in the area, such as:
 - sea waters, including their physical and chemical properties, as well as the currents' dynamics
 - local meteorology, in particular to the degree it affects sea dynamics
 - the surface layer of the seabed, in particular related to its role in the sea robustness.
 - In the direct area, the observation should concern all the above and also include figures and indicators related to:
 - the application of environmental terms approved for each individual project;
 - the adherence of safety procedures, related to accident prevention with environmental impact.
- The spatial and time density of recordings and the way they were carried out (i.e. permanent or portable stations, appropriate vessels etc.) should be chosen according to the scale of the phenomena that are observed, with the appropriate differentiations between direct and wider area.
- Integrated computer simulations with analytical prognostic possibilities should be developed in the wider area in order to understand and connect the figures of the individual parameters, by exploiting existing initiatives, such as the "Poseidon" system (www.poseidon.hcmr.gr). The measurements and recordings in the wider area should

be designed and carried out in a way that allows their exploitation in order to validate the computer results.

- Data must be collected and processed to observe the environmental impacts on an annual basis. During each year, data must be collected on a more regular basis so as to be possible to record the trends with short evolution.
- Environmental indicators, representing in a concise way significant aspects of the developments regarding the quality of the environment, should be key figures of the observation.

A key objective of the proposed environmental indicators is the precise and clear recording and quantification of the environmental status in the exploration area.

2.2. Environmental Parameters and Monitoring (post sightings survey)

MMO'S & PAM's

Hellenic Petroleum is considering conducting a post activity survey to verify the actual presence of mammals (dolphins and whales) and identify distribution, density and, if possible, use of habitat. The sightings surveys will cover the Area of Interest and will last for approximately 10-15 days. The contractor of the MMO'S and PAM services will undertake to design the survey, provide one MMO and proper equipment and submit a final report.

Distance sampling has become a widely used technique for estimating the size and density of populations (Buckland et al., 2001; Buckland et al., 2004). The form of distance sampling used most commonly is line transect sampling. A series of systematically spaced lines are placed in the survey area. Observers travel along a transect line and record any animals detected within a distance w of the transect line and record the distance of each detected animal or cluster of animals from the transect line. From the distribution of these distances, an estimation of the proportion of animals missed within the strip width (the area on either side of the transect within distance w) is calculated. For conventional distance sampling, this involves modelling detection probability as a function of distance from the transect line. Individuals or clusters closer to the transect line have a higher probability of detection than those further from the transect line (Buckland et al., 2001; Buckland et al., 2004). From this data, it is possible to estimate the size and density of a population.

On the basis of scientific merit, it is recommended highly that both MMC and PAM are used during this study. PAM has numerous advantages; the range of acoustic detection is often far greater than visual sightings (certainly in unfavorable sea states), many species are audible for a greater proportion of time than they are visible at the surface, deep-diving species are usually easier to detect acoustically, and monitoring can continue during hours of darkness and unfavorable weather conditions (Gordon et al., 2003). Not all marine mammals vocalize, and those species that do, may only vocalize at certain times of day or year in association with specific behavior patterns, e.g. Risso's dolphins (*Grampus griseus*) in the Southern California Bight vocalized significantly more at night than during the day due to an increase in feeding behavior (Soldevilla et al., 2010). Similarly, harbor porpoises in the North Sea have been shown to have a pronounced diel pattern in echolocation activity, with a greater number of porpoise detections at night compared to during the day (Todd et al., 2009).

2.3. Environmental Baseline Report Phase B

The purpose of Stage Two of the Basic Environmental Study is the collection of data, the survey and evaluation of the environmental condition in the research area in order to:

- ✓ Survey the condition of the environment within the research area before starting any drilling operations.
- ✓ Be part of an integrated system for monitoring the condition of the environment in the research area, to allow the monitoring of any impact of the individual stages of the research program

According to Article 12 «**Environmental Protection**» paragraph 14, HELPE shall not be liable for any environmental condition or damage existing in the Contract Area prior to the commencement of the HELPE'S operation therein and nothing in this Agreement shall be construed to hold HELPE liable in relation to any such pre-existing environmental condition or damage. For this purpose, a baseline report, covering the whole extent of the boundaries of the Lease Area was prepared by HELPE, to detail the condition of the environmental parameters and resources at the time prior to operation commencement. The baseline report was submitted and approved by the Ministry of Environment and Energy.

Prior to entering the second exploration phase and before the drilling of the exploration well, HELPE is committed to prepare and submit a baseline report (Stage Two) which will an area limited around drillable targets. The Report shall address the existing physical, biological and socioeconomic environment and sensitivities of West Patraikos gulf area and provide any updated information or newly published data might not covered in the baseline report Stage One. This report will focus in the area around the drillable targets and will involve detailed sampling and evaluation.

Furthermore, according to the provisions of the Joint Ministerial Decision JMD 169896/8.08.2013 by the Ministry of Environment and Energy which has approved the Strategic Environmental Impact Assessment of West Patraikos Gulf Area, detailed geo-hazard studies should be prepared for the area of influence of each exploration well, at least:

- Environmental Assessment of the ecology and the extent of important benthic communities, including Poseidonia, coral and chemosynthetic societies.
- Mapping the ecological processes of the Special Area of Conservation (SAC) GR 2220003 «Inland Ionian Archipelagos (Meganissi, Arkoudi, Attokos, Vromona) »
- Study of Geohazard, with emphasis on slope stability and the possibility of landslides, the existence of pockets and craters with gases that could escape, mud flow volcanoes, mud flowing holes in the sea bottom or unstable hydrates, also the study of the existence of seismic activity fractures in the area.
- Measurements of the quality of the sediments (surface and deeper layers), the suspended material and the rate of sedimentation.
- The Concentration of hydrocarbons and of heavy metals in marine bed sediments should be measured in the concession area so that the environmental impacts and

alterations of the exploration and exploitation activities of the hydrocarbons in the area, to be estimated. Similarly, measurements of the characteristics of such substances (hydrocarbons and heavy metals) are required prior to the commencement of the activities in the indicator organisms (bivalves, fish) of the area to supplement the relatively poor data available and to set up an analytical basis for the environmental monitoring of the program, in the future.

- Extending or increasing the analysis of existing ocean forecasting flow models to improve the accuracy and reliability of oil spill dispersion simulations, especially in sensitive areas of the Ionian Sea.
- Collection of additional data in relation to meteorological data, sub-surface currents, temperature and salinity in the concession area.
- Mapping of archaeological finds and wrecks, as well as cables for Telecommunication purposes.

2.4. Environmental and Social Impact Assessment (ESIA) for exploration well.

According to the provisions of Article 12 of the Lease Agreement for the «**Environmental Protection**», HELPE shall conduct all Petroleum Operations in a manner, which will assure the protection of environment in accordance with Good Oilfield Practices. Furthermore, HELPE shall prepare and submit to the competent governmental authority, an Environmental Impact Study (EIS) for the relevant Petroleum Operations in respect of which an Environmental Impact Assessment (EIA) procedure is required. The EIS shall, as a minimum:

- (a) fully comply with the requirements of the EIA legislation in force;
- (b) meet the requirements and guidelines set out by SEA; and
- (c) be prepared by a third party with adequate expertise in the field of environmental studies, which will be appointed by the Lessee to work on its behalf.

Each project, work, activity or any other part of the Petroleum Operations that is subject to an EIA, shall commence only after the Terms of Environment (ToE) have been approved.

Regarding Environmental Licensing and more specific according to the provisions of Law 4014/2011 «**on Environmental licensing of projects and activities, regulation of illegally constructed buildings, with the aim to promoting a better environmental stability**», HELPE is obliged to apply for Approval of Environmental Impact Assessment (category A projects subcategories: A1 and A2). Category A includes works and activities, which may cause severe environmental impact because of their nature, size or location. Category A is divided into groups 1 and 2. Exploration and Exploitation Projects are under Category A1. For activities of both groups of Category A, an EIA is needed in the form an overall scientific assessment.

An Environmental and Social Impact Assessment (ESIA) shall include at least the following minimum matters, that is:

- (a) a description of the proposed activities;
- (b) a description of the potential affected environment, including specific information necessary to identify and assess the environmental effect of the proposed activities;
- (c) an assessment of the likely or potential environmental impacts of the proposed activity and the alternatives, including the direct or indirect cumulative, short-term and long-term effects;
- (d) an identification and description of measures available to mitigate adverse environmental impacts of proposed activity and assessment of those measures;
- (e) an indication of gaps in knowledge and uncertainty which may be encountered in computing the required information;
- (f) a brief and non-technical summary of the information provided under paragraphs (a) to (e) of this section.