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First Meeting of the Barcelona Convention Offshore Oil and Gas Group (OFOG)  
Sub-Group on Environmental Impact of Offshore Monitoring Programmes

Greece, 3-4 April 2017

**Agenda item 3: Offshore Monitoring Programme**

**List of parameters**

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## List of parameters

### Introduction

In accordance with Decision IG.20/4: Implementing MAP ecosystem approach roadmap: Mediterranean Ecological and Operational Objectives, Indicators and Timetable for implementing the ecosystem approach roadmap, adopted by the Seventeenth Ordinary Meeting of the Contracting Parties to the Convention for the Protection of the Marine Environment and the Coastal Region of the Mediterranean (Barcelona Convention) and its Protocols, held in Paris, France, between 8 and 10 February 2012, eleven (11) Ecological Objectives (EOs) and respective Common Indicators (CIs) that relate to the following topics were adopted:

- Biodiversity (EO1);
- Non-indigenous species (EO2);
- Fisheries (EO3);
- Marine food webs (EO4);
- Eutrophication (EO5);
- Sea-floor integrity (EO6);
- Hydrography (EO7);
- Coast (EO8);
- Contaminants (EO9);
- Marine litter (EO10); and
- Noise (EO11). Noise has been adopted as a Candidate Common Indicator (to be further developed on the basis of pilot monitoring activities, and further scientific knowledge and expertise).

Subsequently, the Nineteenth Ordinary Meeting of the Contracting Parties to the Barcelona Convention and its Protocols, held in Athens, Greece, between 9 and 12 February 2016, adopted Decision IG.22/7 related to the Integrated Monitoring and Assessment Programme of the Mediterranean Sea and Coast and Related Assessment Criteria (IMAP), in the framework of the Ecosystem Approach (EcAp).

The objective of the IMAP is to support the assessment of the ecological status of the Mediterranean Sea, so that the management of human activities is based on the sustainable use of the ecosystems of the Mediterranean Sea.

Based on common indicators and monitoring data provided by Contracting Parties, a Quality Status Report will be developed for the region in 2017, and a State of Environment and Development and a State of Environment Report will be issued in 2019 and in 2023.

IMAP covers **Ecological Objectives** related to biodiversity (EO1), non-indigenous species (EO2), eutrophication (EO5), hydrography (EO7), coast (EO8), contaminants (EO9), and marine litter (EO10).

The Ecological Objectives encompass twenty seven (27) Indicators (both Common and Candidate). A **Common Indicator** (CI) is an indicator that summarises data into a simple, standardised, and communicable figure and is ideally applicable in the whole Mediterranean basin, or at least on the level of sub-regions, and is monitored by all Contracting Parties. A common indicator is able to give an indication of the degree of threat or change in the marine ecosystem and can deliver valuable information to decision makers. **Candidate Indicators** are indicators on which there are issues to be resolved with regard to their monitoring and assessment, as discussed in Document UNEP(DEPI)/MEDIG.22/28.

### Objective

The objective of the present document, in the context of the development of a Mediterranean Monitoring Procedures and Programmes, is to define the list of parameters to be monitored by Operators, involved in the exploration and exploitation of the Offshore Oil and Gas Activities, based on an analysis of currently available methodology for monitoring, and the data availability.

### **Operator monitoring program**

The purpose of the monitoring program, and specifically of the “Offshore Protocol Monitoring Programme” (OPMP), is to provide an overview of environmental status and trends over time as a result of offshore exploration and exploitation activities of the continental shelf and the seabed and its subsoil (here within referred to as “offshore activities”). Monitoring programmes are intended to show whether the environmental status is stable, deteriorating or improving as a result of the Operators’ activities. Environmental monitoring of offshore activities includes monitoring of the water column (including surface), of the sediments, and of benthic habitats (soft- and hard-bottom fauna). The monitoring results, presented in assessments/reports, are used by Operators and Authorities as a source of information and as basis for making decisions on new measures to be implemented offshore. The results will also be used to develop and report on national environmental indicators for the offshore industry.

### **Parameters to be monitored by Operator**

Based on the Draft Integrated Monitoring and Assessment Guidance document (UNEP(DEPI)/MED IG.22/Inf.7), which was prepared in the context of a long consultation process including several Meetings of the Correspondence Groups on Monitoring (CORMONs) and was ultimately submitted as information document to Nineteenth Ordinary Meeting of the Contracting Parties to the Barcelona Convention and its Protocols, to provide to Contracting Parties with guidance on methodologies, monitoring and assessment techniques, specifics, for each common indicator and analyses key outstanding issues also in an integrated manner, the following parameters are proposed to be monitored for exploration and exploitation of the continental shelf and the seabed and its subsoil:

- **Common Indicator 1:** Habitat distributional range, to also consider habitat extent as a relevant attribute (EO1);
- **Common Indicator 2:** Condition of the habitat’s typical species and communities (EO1);
- **Common Indicator 3:** Species distributional range (related to marine mammals, seabirds, marine reptiles) (EO1);
- **Common Indicator 4:** Population abundance of selected species (related to marine mammals, seabirds, marine reptiles) (EO1);
- **Common Indicator 5:** Population demographic characteristics (e.g. body size or age class structure, sex ratio, fecundity rates, survival/mortality rates related to marine mammals, seabirds, marine reptiles) (EO1);
- **Common Indicator 6:** Trends in abundance, temporal occurrence, and spatial distribution of non-indigenous species, particularly invasive, non-indigenous species, notably in risk areas (EO2, in relation to the main vectors and pathways of spreading of such species);
- **Common Indicator 7:** Spawning stock Biomass (EO3);
- **Common Indicator 9:** Fishing Mortality (EO3);
- **Common Indicator 12:** Bycatch of vulnerable and non-target species (EO1 and EO3);
- **Common Indicator 13:** Concentration of key nutrients in water column (EO5);
- **Common Indicator 14:** Chlorophyll-a concentration in water column (EO5);
- **Common Indicator 15:** Location and extent of the habitats impacted directly by hydrographic alterations (EO7);
- **Common Indicator 17:** Concentration of key harmful contaminants measured in the relevant matrix (EO9, related to biota, sediment, seawater);
- **Common Indicator 18:** Level of pollution effects of key contaminants where a cause and effect relationship has been established (EO9);

- **Common Indicator 19:** Occurrence, origin (where possible), and extent of acute pollution events (e.g. slicks from oil, oil products and hazardous substances) and their impact on biota affected by this pollution (EO9);
- **Common Indicator 20:** Actual levels of contaminants that have been detected and number of contaminants which have exceeded maximum regulatory levels in commonly consumed seafood (EO9);
- **Common Indicator 23:** Trends in the amount of litter in the water column including microplastics and on the seafloor (EO10);
- **Candidate Indicator 26:** Proportion of days and geographical distribution where loud, low, and mid-frequency impulsive sounds exceed levels that are likely to entail significant impact on marine animals (EO11);
- **Candidate Indicator 27:** Levels of continuous low frequency sounds with the use of models as appropriate (EO11);

In terms of pressures, the common typology of pressures on the natural environment resulting from anthropogenic activities and their interlinking impacts, as indicated within IMAP (UNEP(DEPI)/MED IG.22/Inf.7) as shown in **Annex**, should be taken into account as appropriate.

### **Methodological guidance for monitoring**

Consistent methods for monitoring across a region/sub-region are required. Some methods are described by international standard guidelines, such as the International Standards Organisation (ISO) and the European Committee for Standardization (CEN). Where suitable guidelines exist (i.e., UNEP(DEPI)/MED IG.22/Inf.7, Norway TA2849/2011, NPDES GMG290000, OGP Report. 457), these should be followed, provided they are appropriate for the objective of the monitoring (i.e. to assess the criteria in relation to the targets and reference conditions). Where these are not available, the operating procedures used should be compatible with methods described in the scientific literature for the relevant indicators or components.

In any cases it is suggested that the Operator develops a Monitoring Plan based on the following 4 steps:

**Step 1:** Undertake an evaluation of the baseline marine environmental conditions of the area of potential impact from the planned activities, conducted via a desktop review and supplemented by field based studies if required, based on lifecycle stage of the planned activity and the availability of existing information.

**Step 2:** Prepare an Environmental Impact Assessment (EIA) and Environmental Management Plan (EMP), Oil Spill Contingency Plan (OSCP), and other documentation required to be submitted to relevant regulatory authority for environmental approvals/permits (such as chemical use, drilling mud use, allowable discharges, etc.) as required per the proposed activity and addressing requirements per relevant sections of the Offshore Protocol.

**Step 3:** Submit the above documentation to the relevant Competent Authority(s) for appropriate Authorisation(s) and overall Environmental License prior to commencing the activity, addressing the requirements per relevant sections of the Offshore Protocol.

**Step 4:** Design, undertake and assess the performance of an Operator Environmental Monitoring Program throughout the lifecycle of the project activity per requirements of the Environmental License, which is to include a structured approach for the assessment and reporting of the Operator's environmental performance in meeting the monitoring requirements. These requirements will be determined based on location-specific and activity-specific information as submitted by the operator to the Competent Authority.

To carry out the specified assessments and tasks, the Operator must ensure that appropriate procedures and techniques are developed (or adopted from other sources) for collecting information, implementing Quality Assurance (QA), and interpretation and assessment of data. Where there are existing international regulatory assessment criteria and procedures in place, the Operator will take them into account so as to avoid the Competent Authorities receiving potentially conflicting assessment information. Where new assessment criteria are required, there is a prioritisation required such that appropriate time can be devoted to develop these assessment criteria, the development to include testing and the implementation of quality assurance procedures.

The Operator should be required to design an environmental monitoring program covering the full project activity per requirements of the Environmental License and associated permits, which is to include a structured approach for the assessment and reporting of the Operator's environmental performance in meeting the monitoring requirements. These requirements will be determined based on location-specific and activity-specific information as documented within the EIA/EMP, OSCP and other permitting submittals that may be required by the Competent Authority.

The key objective of the Operator Environmental Monitoring Program will be to provide details with regard to the environmental mitigation and monitoring requirements stated within the approved EIA / EMP and OSCP, together with the associated conditions of the Environmental License. The Monitoring Programme activities will be implemented over the full duration of the project, including pre- and post-monitoring (if required dependent on project activity).

The Operator Environmental Monitoring Program should comprise of three key components (described in further detail below), as follows:

- Operator Field Environmental Monitoring, including Baseline Environmental Evaluation;
- Operator Facility Environmental Monitoring; and
- Operator Environmental Performance Assessment.

Each component should follow the analytical methodology provided in the relevant IMAP Guidance Fact Sheets.

#### **Operator Field Environmental Monitoring (including Baseline Environmental Evaluation)**

It is proposed that the Operator field environmental monitoring activities should include the following types of desktop assessments and field surveys, depending on project activity and potential area of impact (e.g., a desktop evaluation only is required for seismic survey or scientific research activities), to assess marine environmental conditions and seabed features:

- **Desktop evaluation of the baseline conditions of the marine environment** - To be conducted prior to commencing project activities, documenting the condition of the marine environment for the area of potential impact from project activities. Environmental baseline data to be collected should be sufficient to characterize the area of potential impact, including regional and local biodiversity, locations of sensitive habitat and resources, and impact from other users of the resource (e.g., fishermen), so that potential impacts from project activities on all components of the marine environment can be adequately assessed within the EIA and monitored by the Operator over the duration of the project's activities.
- **Field marine environment and seafloor surveys** are required to be undertaken to supplement the desktop-sourced baseline data where there are gaps found within desktop-sourced information and/or where the project activity warrants such further evaluation (e.g. where project activities are expected to impact the seabed or where project activities involve discharges to the marine environment, other than those typical of vessel discharges).

- **Pre-activity Marine Environment Baseline Survey (MEBS)** - To be conducted prior to commencing project activities, gathering data regarding the marine environment within the area of potential impact from project activities. Water and sediment compartment data collection will involve sampling the water column (water quality; chlorophyll; potential metal/organic contaminants; biota numbers, species and tissue concentrations) and sediments (grain size, colour and texture; potential metal/organic contaminants; redox potential / oxygen content; biota numbers and species for community structure analysis) from sufficient sampling locations over the full area of potential zone of impact in order to provide a statistical representation of the baseline conditions in the area, as well as from sampling locations further afield for use as points of regional reference.
- **Pre-activity Seafloor Survey** (such as High Resolution Side Scan Sonar Survey, 3D Shallow Hazards Assessment, ROV Video Survey. etc.) - To be conducted prior to commencing project activities, documenting near-field and far-field seafloor conditions. The survey results will provide a reference for potential spatial and temporal changes in environmental conditions on the seafloor which may result from project activities. Results of survey required to provide documentation of the extent and types of substrate and associated biological communities in proximity to the proposed activity (e.g., benthic habitats, areas of potential shallow water flows or gas anomalies, etc.).
- **Post-activity Seafloor Survey** - To be conducted after completing project activities, gathering data to document that the proposed activity did not affect any sensitive seafloor habitats. Survey should gather comparable datasets to the pre-activity seafloor survey in order to determine if there is an observable difference in the features following project activities. Features should include visually discernible epifauna and fish communities, substrate types, anthropogenic debris, and deposition extent of any solid discharges from the project.
- **Post-activity / Post-incident Marine Environment Conditions Survey (MECS)** - Further environmental field surveys are required to be undertaken post-incident or post-activity in the case where seafloor survey shows impact, or if any non-compliant discharge activities occurred during the project activity in order to determine the resultant impacts on marine environment from the discharges. The data to be collected during the ECS will be dependent on the type of non-compliant situation or discharge and the resulting potentially impacted environmental receptor.

### **Operator Facility Environmental Monitoring**

Operator facility environmental monitoring activities should include assessments and documentation of the environmental performance on the facility throughout project operations. Monitoring of the facility's environmental performance will include measurement or calculation, documentation, and reporting of the following:

- Chemical Use - Quantities of chemicals consumed and management of Material Safety Data Sheet (MSDS) records
- Discharges – Volumes, rates and characteristics (including any additive) of all solid and liquid effluent streams discharged to the marine environment including compliance with applicable standards (e.g. Environmental License, MARPOL, etc.).
- Critical effluent control equipment - Verification documentation showing certification, verification, maintenance, etc. for all equipment controlling planned or unplanned effluent discharges to the marine environment, e.g., Blowout Preventer (BOP), well-heads, hazardous materials containment, oil-water separator, food macerator, sewage system, facility drainage systems, etc.

- Waste – Quantities, characteristics and disposal documentation of hazardous and non-hazardous wastes generated, used, and disposed throughout project activities.
- Incident / Non-Compliance Reporting and Corrective Actions - Volumes and characteristics of any products released to the marine environment via accidental spills or unplanned operations, and corrective actions undertaken in addressing any incidents of non-compliance.

The above facility environmental monitoring performance data listed above should be collected by the Operator via monthly and end-of-activity reports.

### **Operator Environmental Performance Assessment**

Operator Environmental Performance assessment comprises the independent/third-party assessment and evaluation of the operator's environmental performance throughout the operations. The Environmental Performance Assessment should be conducted on a regular basis, covering the following phases of the project activity, at a minimum:

- Pre-Activity Environmental Performance Assessment
- Quarterly Environmental Performance Assessment (throughout project operations)
- End-of-Activity Environmental Performance Assessment
- Post-Activity Environmental Performance Assessment (if required, dependent on type of operation and/or as required per Environmental License conditions)
- Post-Incident or Non-Compliance Environmental Performance Assessment (if required in the event of any incident, or of non-compliance of Environmental License conditions)

Environmental performance assessments are to be conducted by independent assessors or specialist personnel familiar with the environmental requirements of the specific project activity, as set out in the EIA/EMP, OSCP, Environmental License conditions, and other environmental permits as applicable. Components to be addressed and reported within the performance assessment include Chemical Use Management, Discharges Management, Control of Critical Effluent Equipment, Waste Management, and Incident / Non-Compliance Reporting and Corrective Action Implementation.

### **Monitoring frequency**

It is recommended that the Operator monitor at a specified frequency identified by the Contracting Parties/Competent Authorities which should not exceed a period of **3 months**. Such frequency must take into account the spatial and temporal range of scales on which relevant phenomena need to be studied (from single indicators to integrated assessment of the state of the marine environment).

After the operation has been concluded, the Operator should be required to monitor at semi-annual intervals for a minimum of **2 years** (if there were no upset conditions reported during operations) and up to a maximum of **5 years post-operation**, or as otherwise required by the Competent Authority.

## Location of monitoring

The Operator must also establish a Field Sampling Station Network. The locations of regional reference stations must be coordinated with the locations of the field-specific stations in the same region. The positioning of both types of stations must be based on information about:

- depth and topography;
- currents and dispersal patterns in the area in question;
- sediment conditions and sedimentation patterns;
- discharge history of the fields;
- pipelines and other installations on the fields.

It should be the Operators' responsibility to make use of this information to revise a station network or establish a new one. Data on currents must cover a range of depths and the different seasons of the year as relevant to the project activities. It is particularly important to obtain data for the full water column depths, including at the seabed where discharges are planned/expected, if applicable for the project activities.

A representative selection of **at least 3 regional reference stations** should be established to provide a general picture of background conditions in the region. The regional reference stations should be established within a minimum distance of 4 kilometres (~2.16 nautical miles) from the offshore platform and extend to any other distance specified by the Competent Authority. The regional stations should therefore be located in areas that are not expected to be affected by discharges from the project activity, either at the time or later (they should be as representative as possible of background conditions on the field). If a regional reference station proves to be affected by a later field development, a new regional reference station must be established. The following elements must be considered when positioning regional stations:

- they should cover all the main types of seabed (sand, clay, etc.), with main emphasis on seabed areas impacted from project activities;
- if the water depth in the region varies, the stations should be located in such a way that typical depth intervals can be described;
- the stations should cover all parts of the region where there are project activities or where potential zones of impact from the project activities could be expected.

The same regional reference stations must be used in subsequent field surveys. Results from the regional stations are to be used as reference values for assessing possible effects observed at nearby field-specific stations.

**At least 12 field-specific stations** should preferably be established using a radial transect design that is expected to be permanent for the monitoring surveys of the field. The stations are to be placed at increasing distances from the discharge point (according to the geometric series 250 m, 500 m, 1000 m, 2000 m, etc) and within a distance of 4 kilometres (~2.16 nautical miles) from the offshore platform, or extend to any other distance specified by the Competent Authority. Stations less than 250 m from the installations should be established if practicable and acceptable in terms of safety during operations. The orientation and surface of the station network should be determined on the basis of the expected area of impact from project activities estimated with the help of likely discharge quantity and dispersal modelling.

The Operator must be able to document the grounds for the selected station positioning, based for example on water current patterns, depth intervals etc. The stations must be located so that it is possible to determine the degree to which the marine environment is affected by discharges from the project activity. During a baseline survey of a field, samples should be taken from a minimum of three regional



stations, which are expected to become the regional stations associated with the field (see the paragraph above on Regional Reference Stations). It can be difficult to maintain a radial transect or grid design of the stations when carrying out baseline surveys in deep water (>600 metres). In such cases, the stations should be positioned as optimally as possible in relation to the discharge pattern, expected dispersal patterns and seafloor conditions.

### **Operator qualifications**

In line with specific objective 7 of the Mediterranean Offshore Action Plan, it is recommended to develop common minimum standards of qualification for professionals and crews and possibly the associated training program for Operators. Considering the number of installations in each Mediterranean countries, it is recommended that a shared/pooled set of Monitors/Inspectors from all Contracting Parties be established. Monitors/Inspectors from this set could undergo trainings including training on monitoring of indicators, so that a common understanding is developed that would ensure the reliability of inspections across the region. It is also proposed that the Monitors/Inspectors from this group will be selected/assigned to inspect offshore installations located in countries other than their country of origin, and platforms not owned/operated by companies headquartered in their native countries.

Moreover, it is recommended that all suppliers of services to Operators for monitoring programmes (analyses, field work) should use laboratories that have ISO 17025 accreditation for the methods they use. The certification should be awarded by the certified accreditation body in their country or region, as applicable. If no official accreditation scheme is available in a particular area, depending on the type of analyses involved, Operators should document their own quality assurance routines for undertaking laboratory analysis testing. The operating companies' reports to the Competent Authorities must confirm that the requirements above are fulfilled, with reference to the qualification system, certificates and approval date. It is also understood that accreditations and certifications must be kept up-to-date by Operators.

### **Actions requested by the Meeting**

#### **The Meeting is invited to:**

- .1 **take note** of the information provided in the present document; and
- .2 **to review and provide input** on the proposed list of parameters.

## **ANNEX**

**Common typology of pressures on the natural environment  
resulting from anthropogenic activities and their interlinking impacts,  
as indicated within IMAF**

<b>Pressures</b>		<b>Impacts on marine environment</b>			
		<b>Physical</b>	<b>Hydrological</b>	<b>Chemical</b>	<b>Biological</b>
<b>Physical</b>	Alteration of sea-floor/water body morphology	Seabed, substrate, topography	Water movement changes (waves, currents, river flows), turbidity	Salinity changes	Habitat for species (mobile) and communities (seabed); barriers to species movements
	Change of sea-floor substrate	Seabed substrate, topography	Water movement changes (waves, currents, river flows), turbidity		Habitat for species (mobile) and communities (seabed); barriers to species movements
	Disturbance/damage to sea-floor	Seabed habitat structure	Water clarity, turbidity		Community changes
	Extraction of sea-floor and subsoil minerals (e.g. sand, gravel, rock, oil, gas)	Seabed habitat structure	Water clarity, turbidity		Community changes
<b>Hydrological</b>	Water discharges (with/without) contaminants		Sea temperature	Chemical balance	
	Water movement changes				Species movements
	Water extraction		Turbidity, water volume	Salinity changes	
<b>Energy</b>	Input of sound				Displacement of species
	Input of electromagnetic & seismic waves				Behavioural changes
	Input of heat			Sea temperature	Species distributional changes
	Input of light				Behavioural changes
<b>Chemicals and other pollutants</b>	Nutrient enrichment (N, P, organic matter)		Water clarity	Deoxygenation, nutrient balance	Plankton blooms
	Input of contaminants (synthetic substances, non-synthetic)			Chemical balance	Sub-lethal effects

	substances, radionuclides) – diffuse sources, point sources, acute events				Death/injury to species, health of species
<b>Pressures</b>		<b>Impacts on marine environment</b>			
		<b>Physical</b>	<b>Hydrological</b>	<b>Chemical</b>	<b>Biological</b>
	Input of CO <sub>2</sub> and other greenhouse gases		Sea temperature, wave action, currents, sea level	pCO <sub>2</sub> /acidification	Species distribution, behaviour, reproductive capacity
	Input of litter (solid waste matter)	Smothering of habitat			
<b>Biological</b>	Removal of species (targeted, non-targeted)				Population changes, community changes
	Injury/death to species				Population changes
	Disturbance of species				Behavioural changes
	Translocation of (native) species				Genetic changes
	Introduction of genetically modified species				Genetic changes
	Introduction or spread of non-indigenous species				Community changes
	Introduction of microbial pathogens				Shellfish health, human health
	Cultivation/artificialisation of natural habitat				Community changes