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Agenda item 3. Mediterranean Offshore Guidelines and Standards

b) Common Standards and Guidance on the Disposal of Oil and Oily Mixtures and the Use and Disposal of Drilling Fluids and Cuttings

Mediterranean Offshore Guidelines and Standards: Common Standards and Guidance on the Disposal of Oil and Oily Mixtures and the Use and Disposal of Drilling Fluids and Cuttings

Draft

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Note by the Secretariat

1. Article 23 of the Offshore Protocol provides for the formulation and elaboration of international rules, standards and recommended practices and procedures and the adoption of guidelines in accordance with international practices. In this context, the Mediterranean Offshore Action Plan, adopted by the Nineteenth Ordinary Meeting of the Contracting Parties (COP 19) (Athens, Greece, 9-12 February 2016), provides, in its Specific Objectives 7 and 8, for the development and adoption of regional offshore standards and guidelines.
2. In accordance with the above-mentioned provisions of the Offshore Protocol and Action Plan, REMPEC, in close cooperation with the Secretariat, developed the Common Standards and Guidance on the Disposal of Oil and Oily Mixtures and the Use and Disposal of Drilling Fluids and Cuttings, presented in this document.
3. The objective of this document is to propose to the Contracting Parties the establishment of common standards and guidelines with the view to harmonising regional practices in the Mediterranean, including through:
 - development of common standards and methods for the disposal of oil and oily mixtures, the use and disposal of drilling fluids and cuttings and associated analytical measurements;
 - recommendation of standards for seabed sampling programmes; and
 - provision of guidance on the use and disposal of drilling fluids and cutting and the disposal of oil and oily mixtures.
4. In view of developing the present guidelines and be informed about the current status of the use and disposal of drilling fluids and cuttings and the disposal of oil and oily mixtures across the region and beyond, a questionnaire was sent to all Contracting Parties for comments. The questionnaire was also sent to International Association for Oil & Gas Producers (IOGP) who, in turn, requested four international oil & gas operators to provide feedback.
5. Concurrently, a study was undertaken reviewing international and national legislation and guidance from areas and countries with a mature offshore oil and gas industry, as well as guidance from industry organisations, in order to identify best practices from around the world.
6. Descriptions of the best practices and guidance documentation reviewed and the rationale underpinning the present document is provided in the information document Rationale for the Common Standards and Guidance on the Disposal of Oil and Oily Mixtures, and the Use and Disposal of Drilling Fluids and Cuttings (UNEP/MED WG.476/Inf.5).
7. The present guidelines and standards were submitted to the Meeting of the REMPEC Focal Points (Malta, 11-13 June 2019) for review and comments. It is currently submitted to the Meeting of the Barcelona Convention Offshore Oil and Gas Group (OFOG) Sub-Group on Environmental Impact, which is the competent MAP body to decide on their approval at a technical level and further submission to the Ecosystem Approach Correspondence Group and MAP Focal Points Meetings, as appropriate.

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List of Abbreviations / Acronyms

| | |
|---------------|---|
| BEP | Best Environmental Practice |
| BTEX | Benzene, Toluene, Ethylbenzene and Xylene (ortho-xylene, meta-xylene and para-xylene) |
| CEFAS | The Centre for Environment, Fisheries and Aquaculture Science |
| FPSOs | Floating Production Storage and Offloading Facilities |
| FSUs | Floating Storage Units |
| GC-FID | Gas Chromatography and Flame Ionisation Detection |
| GC-MS | Gas Chromatography - Mass Spectrometry |
| IFC | International Finance Corporation |
| IMO | International Maritime Organisation |
| IOGP | International Association of Oil and Gas Producers |
| IR | Infra-red |
| NADF | Non-Aqueous Based Fluids |
| NORM | Naturally Occurring Radioactive Material |
| OCNS | Offshore Chemical Notification Scheme |
| OSPAR | Convention for the Protection of the Marine Environment of the North-east Atlantic |
| PAH | Polycyclic aromatic hydrocarbons |
| SPA | Specially Protected Areas |
| WBM | Water Based Drilling Fluids |

1. Use and disposal of drilling fluids and cuttings

1.1. Introduction

1. This chapter of the document provides guidance on the use and disposal of drilling fluids and cuttings from offshore oil and gas installations in the Mediterranean Sea. This guidance has been derived from international best practices as outlined by organisations and institutions such as the Secretariat of the Convention for the Protection of the Marine Environment of the North-east Atlantic (OSPAR), International Finance Corporation (IFC)/World Bank and the International Association of Oil and Gas Producers (IOGP), as well as from countries with mature oil and gas industry with well-developed regulatory frameworks, such the UK, Norway, the Netherlands and the US.

1.2. Legislative Background

2. All countries around the Mediterranean Sea have signed up to the Barcelona Convention. As such, the Barcelona Convention and its supporting Protocol on the Protection of the Mediterranean Sea against Pollution Resulting from Exploration and Exploitation of the Continental Shelf and the Seabed and its Subsoil (Offshore Protocol), provide the overarching regional legal driver unpinning this guidance document.

3. Article 8 of the Offshore Protocol imposes a general obligation upon Operators to use the best available, environmentally effective and economically appropriate techniques. Operators should also observe internationally accepted standards regarding wastes, as well as for the use, storage and discharge of harmful or noxious substances and materials with a view to minimizing the risk of pollution. Articles 9 and 10 of the Protocol provide more specific requirements on the use and disposal of drilling fluids and cuttings.

4. This guidance document provides further definition/clarification to the general obligations outlined above.

1.3. Use and Disposal of Drilling Fluids

1.3.1 The Chemical Use Plan

5. A Chemical Use Plan shall be prepared for the use of all drilling fluids by the Operator. The Chemical Use Plan must quantify and assess the environmental risk of each chemical additive that may potentially be used during the drilling, cementing and completion of the well. Subsequent well operations, including well intervention, workover, suspension and abandonment operations will be subject to similar requirements. The Chemical Use Plan should include all chemicals that will be onboard the drilling unit, comprising all operational as well as contingency chemicals. Only chemical additives that are approved for use by the Competent Authority may be used. In order to be approved by the Competent Authority all chemicals must be tested for toxicity, bioaccumulation and biodegradability. If the Competent Authority does not have a defined chemical authorisation system in place, the Offshore Chemical Notification Scheme (OCNS) chemical list used by the UK and the Netherlands should be used as a proxy. The Centre for Environment, Fisheries and Aquaculture Science (CEFAS) list of chemical additives is updated regularly and is available at: <https://www.cefas.co.uk/cefas-data-hub/offshore-chemical-notification-scheme/>.

6. The Chemical Plan shall be submitted to the Competent Authority for review and approval. Operations may only commence once the Competent Authority has issued a permit, specifying usage and discharge, and monitoring and reporting conditions.

7. The disposal of the drill cuttings shall either be made on land or into the sea at an appropriate location as specified by the Competent Authority. Further detail on disposal options at sea are provided below.

1.3.2. Water Based Drilling Fluids

8. Water based drilling fluids (WBM) are the most commonly used drilling fluids. WBMs consist of water mixed with bentonite clay and barium sulphate (barite) to control mud density and thus, hydrostatic head. Other substances are added to gain the desired drilling properties (OGP, 2003¹; IOGP, 2016²).

9. Effective solids control equipment shall be used to remove formation solids from the drilling fluid and to recover the used drilling fluid, so that it can be reused. Under most circumstances, used WBM and associated drill cuttings may be disposed of by discharging into the sea. A permit from the Competent Authority must be obtained for the usage and discharge of WBM offshore, as described in section 1.3.1 above.

1.3.3. Non-Aqueous Based Fluids

10. Non-aqueous based fluids (NADF) are regularly used to drill the deeper sections of wells when using NADF is considered advantageous over drilling with WBM as it can provide faster drilling rates, increased stability in water-sensitive rock formations and is more effective for drilling deviated, deep, high temperature wells. NADFs comprise all non-water and non-water dispersible base fluids, including mineral and synthetic oil base fluids (OGP, 2003; IOGP, 2016).

11. The use of NADF of sufficiently low toxicity (i.e. with a total aromatic hydrocarbon content < 5% and PAH content < 0.35%) is permitted for use in the deeper well sections (i.e. from the 12¼" section onwards). The use of diesel-based drilling fluids is prohibited.

12. The discharge of NADF to the sea is prohibited. Any unused or recovered NADF from the drilling operations shall be shipped back to shore, where it may either be reconditioned for re-use, or can be treated for appropriate disposal onshore. Alternatively, used NADF and NADF contaminated cuttings may be disposed of by re-injection into a suitable porous rock formation, if it can be proven this represents Best Environmental Practice (BEP) and if permitted to do so by the Competent Authority.

13. Drill cuttings contaminated with NADF may only be discharged if they are (thermally) treated and contain less than 1% oil content (i.e. less than 10 grams of oil per kg of dry cuttings). The discharge point of the cuttings should be well below the surface of the water (i.e. at least 15 m below sea surface). The discharge of any drill cuttings contaminated with NADF in specially protected areas (SPA) is prohibited under all circumstances.

1.3.4. Discharge of Cuttings Contaminated with Reservoir Fluids

14. When drilling through reservoir sections of the well, cuttings from the payzone (oil-bearing formation) returned to the surface along with their associated drilling fluids may be contaminated with (small amounts of) liquid reservoir hydrocarbons (i.e. crude oil or condensate). Any cuttings and/or WBM contaminated with reservoir fluids should be contained and sent back to shore for appropriate treatment and disposal. Alternatively, these cuttings may be re-injected into a suitable formation, if possible to do so.

¹ OGP, 2003. Environmental aspects of the use and disposal of non-aqueous drilling fluids associated with offshore oil & gas operations. International Association of Oil & Gas Producers. Report No. 342, May 2003.

² IOGP, 2016. Environmental fate and effects of ocean discharge of drill cuttings and associated drilling fluids from offshore oil and gas operations. International Association of Oil and Gas Producers. Report No. 543, March 2016.

15. Under certain circumstances it may be possible to clean the contaminated cuttings and/or drilling fluid, so that they can be discharged to sea, if allowed to do so by the Competent Authority. If this option is available, a permit should be obtained from the Competent Authority. Individual discharge conditions should be set for each permit, and any discharges should be monitored accordingly.

2. Disposal of oil and oily mixtures

2.1. Introduction

16. This chapter of the document provides guidance on the disposal of oil and oily mixtures from offshore oil and gas installations in the Mediterranean Sea. This guidance has been derived from international best practices as outlined by organisations and institutions such as OSPAR, IFC/World Bank and IOGP, as well as from countries with mature oil and gas industry with well-developed regulatory frameworks, such as the U.K., Norway, the Netherlands and the U.S.

17. Oil and oily mixtures are generated throughout various stages and processes onboard offshore oil and gas installations and will need to be managed and disposed of in a responsible manner. For example, drilling operations generating oil contaminated fluids include well clean-up, cementing, mud pit cleaning and operations where well bore fluids become contaminated with oil-based mud, crude oil or condensate. In addition, fluids from rig floor drains and other tank cleaning operations are also included. During the production phase, the main sources of oil and oily mixtures will be produced water, produced reservoir sands and scales, and machinery space drainage.

2.2. Legal Background

18. The Barcelona Convention for the Protection of the Marine Environment and the Coastal Region of the Mediterranean (“the Barcelona Convention”) and its Protocols provide the overarching environmental legal framework in the Mediterranean Sea Region.

19. The 22 Contracting Parties to the Barcelona Convention are: Albania, Algeria, Bosnia and Herzegovina, Croatia, Cyprus, Egypt, France, Greece, Israel, Italy, Lebanon, Libya, Malta, Monaco, Montenegro, Morocco, Slovenia, Spain, Syria, Tunisia, Turkey, and the European Union.

20. The Protocol for the Protection of the Mediterranean Sea against Pollution Resulting from Exploration and Exploitation of the Continental Shelf and the Seabed and its Subsoil (adopted in 1994), entered into force in 2011. The Protocol, known as “The Offshore Protocol”, sets out specific commitments for the Contracting Parties to “take appropriate measures to prevent, abate, combat and control pollution in the Protocol Area resulting from activities, inter alia by ensuring that the best available techniques, environmentally effective and economically appropriate, are used for this purpose”.

21. One of the commitments in the Offshore Protocol is for the Contracting Parties to formulate and adopt common standards for the disposal of oil and oily mixtures from installations into the Protocol Area.

22. In addition to the specific requirements for the Contracting Parties set out in the Offshore Protocol, MARPOL Annex I, provides the worldwide standard for oil content of machinery space drainage from ships, as well as for fixed or floating platforms including drilling rigs, floating production, storage and offloading facilities (FPSOs) used for the offshore production and storage of oil, and floating storage units (FSUs) used for the offshore storage of produced oil. These fixed or floating platforms must comply with the same requirements applicable to ships having a gross tonnage of 400 or greater.

23. The Mediterranean Sea is designated as a “Special Area” under Annex I and is therefore subject to more stringent requirements than those that apply outside Special Areas.

2.3. Produced Water Discharges

24. The term “produced water” is used for formation water that is produced along with the oil from the reservoir, as well as for water that is condensed during the production process. Produced water is separated from the produced hydrocarbon fraction onboard the offshore installation.

25. Where possible, produced water should be re-injected back into the reservoir. If re-injection is not possible, then the produced water may be discharged under the permitting and reporting conditions described below.

2.3.1. Discharge Limits

26. The discharge of produced water is allowed if the oil and grease content does not exceed 30 mg/l, as an average in any calendar month. The discharge concentration of oil in produced water shall not exceed 100 mg/l at any time.

27. The dilution of treated or untreated produced water for the purpose of lowering the average concentration of oil or achieving compliance with the performance standard is prohibited. If produced water is mixed with other waters after the treatment process, the Operator must be able to demonstrate that the original concentration of the oil content in the produced water can be measured, and the quantity of oil discharged can be calculated.

28. Batch discharges of produced water are permitted. A batch discharge is an intermittent discharge where treatment of produced water to remove oil takes place between batches, for example settlement/slops tanks with capability for oil removal.

29. In addition to the dispersed oil content, produced water may also contain dissolved hydrocarbons (PAH and phenols), heavy metals, inorganic compounds from the formation (both dissolved salts and precipitates) and Naturally Occurring Radioactive Material (NORM). Therefore, the concentration of heavy metals and PAH compounds, BTEX, phenols, alkyl phenols and carboxylic acids in discharges should also be determined as part of the analysis of produced water.

2.3.2. Sampling

30. The sampling strategy for dispersed oil in produced water depends on the volume of produced water discharged, and the type of installation. For manned offshore installations which discharge continuously, the determination of the quantity of dispersed oil discharged should be based on the results of at least 16 samples per month. Samples should be taken at equal time intervals. The first sample should be taken within 4 hours of the start of the discharge, after which the minimum sample frequency shall be as detailed in the table, below.

31. The sampling point must be immediately after the last item of treatment equipment in, or downstream of, a turbulent region, and in any case before any subsequent dilution.

Table 1. Oily Mixtures Discharged Per Discharge Point for Manned Installations

| Type of Discharge | Discharge Amount Per Annum | Sample Frequency and Analysis |
|-------------------|----------------------------|-------------------------------|
| Dispersed oil | < 2000 kg | Once a week |
| | ≥ 2000 kg | Every second day |

| | | |
|--|-------------------|--|
| BTEX | < 200 kg | Twice a year |
| | 200 kg to 2000 kg | Once every quarter (i.e. 4 times per year) |
| | ≥ 2000 kg | Once per week |
| BTEX = Benzene, toluene, ethylbenzene and xylene (ortho-xylene, meta-xylene and para-xylene) | | |

2.3.3. Analysis of Dispersed Oil Content and BTEX

32. The dispersed oil content in produced water should be determined by means of gas chromatography and flame ionisation detection (GC-FID), as described in OSPAR Agreement 2005/15. This method is designed for produced water and other types of waste water discharged from gas, condensate and oil platforms and allows the determination of the dispersed oil content in concentrations above 0.1 mg/l.

33. The OSPAR produced water analysis reference method is a modified version of the ISO 9377-2 method. This method is to be used only for the determination of dispersed oil in produced water. This method is not to be used for the determination of oil in other discharges for oil on sand, drains discharges, etc. Details of this sample analysis method are published in: 'Oil in Produced Water Analysis – Revised Guideline on Criteria for Alternative Methods Acceptance and General Guidelines on Sample Taking and Handling – OSPAR Agreement 2006-6'.

34. For certain instances, there may be scope to use a simpler analysis method offshore if that has been correlated against the OSPAR Reference Method in an onshore laboratory. Therefore, a suitable Infra-red (IR) analysis method (or other analysis methods) may be accepted as an 'alternative' analysis method, but only if it is correlated against the OSPAR Reference Method.

35. Additional guidance on alternative sampling methods can be found in a guidance document published by the UK Department of Energy and Climate Change: Methodology for the Sampling and Analysis of Produced Water and Other Hydrocarbon Discharges (DECC, 2014).

36. The 'BTEX content' should be determined by taking the sum of the levels of BTEX obtained by the application of the static headspace method described in ISO 11423-1, using gas chromatography - mass spectrometry (GC-MS) or another method that produces equivalent results. The amount of BTEX should be calculated on the basis of the quantity of water per year (m³) and the yearly flow-weighted average values of BTEX analysed in the produced water discharged into the sea.

2.4. Drainage System Discharges

37. Discharges from drainage systems (open/closed, hazardous/non-hazardous discharge to a 40 mg/l monthly average oil concentration limit as set by the Paris Commission (PARCOM)).

2.4.1. Machinery Space Drainage Discharges

38. Because the MARPOL Annex I standards for machinery space drainage (such as slops and bilges) are already implemented worldwide, no additional requirements are required for with regard to drainage of drilling rigs and platforms.

39. The following MARPOL requirements should be met:

- The drilling rig or platform must be equipped "as far as practicable" with the oil filtration equipment and the discharge of oil or oily mixtures from machinery drainage spaces is prohibited unless the oil content does not exceed 15 ppm;

- All facilities are required to keep a record of all operations involving oil or oily mixture discharges;
- Oil filtering equipment must be of an approved design by the Administration, must be provided with an alarm arrangement to indicate when the 15-ppm level cannot be maintained, and must ensure that any discharge of oily mixtures is automatically stopped when the oil content exceeds 15 ppm.

40. For further information, the Revised Guidelines and Specifications for Pollution Prevention Equipment for Machinery Space Bilges of Ships are contained in resolution MEPC.107(49). The IMO maintains a list of approved oil filtering equipment.

2.5. Produced Sand and Scale Discharges

41. Annex V (A.2) of the Offshore Protocol states that all “Oily waste and sludges from separation processes shall be transported to shore”.

42. Therefore, any reservoir sand and production scales contaminated with oil (e.g. sludges or slurries removed from processing vessels) should be transported to shore for appropriate treatment and disposal.

2.6. Other Operational Discharges

43. Most discharges of oil will normally be routed to the production process, produced water treatment system, or to the drainage systems, and will be treated to minimise the discharge of oil. Therefore, such discharges will be subject to the same discharge limits for produced water and drainage systems, as discussed in Sections 2.3 and 2.4 above. For example, displacement water (ballast water) from storage facilities for oil is subject to the same discharge requirements as produced water.

44. Notwithstanding the above, it is accepted that certain operations may result in a separate discharge of oil into the marine environment, for example during certain types of maintenance or sub-sea pipeline operations e.g. installation tie-in, commissioning and decommissioning operations. In all cases where such a discharge of oil is planned, the Operator must obtain a permit/consent from the Competent Authority. Each permit application should contain sufficient information to allow an assessment of the potential environmental impacts and to justify the proposed discharge.

Bibliography

DECC, 2011. *Guidance Notes Decommissioning of Offshore Oil and Gas Installations and Pipelines under the Petroleum Act 1998*. Produced by Offshore Decommissioning Unit Department of Energy and Climate Change. Version 6, March 2011.

DECC. 2014. *Methodology for the Sampling and Analysis of Produced Water and Other Hydrocarbon Discharges*. UK Department of Energy and Climate Change, February 2014.

EPA, 2000. *Analytical Method Guidance for EPA Method 1664A Implementation and Use (40 CFR part 136)*. EPA/821-R-00-003. February 2000.

ISO 5667-3:2012. *Water Quality - Sampling – Part 3: Preservation and handling of water samples*.

ISO 5667-12:2017. *Water Quality - Sampling – Part 12: Guidance on sampling of bottom sediments from rivers, lakes and estuarine areas*.

ISO 5667-19:2004. *Water Quality - Sampling – Part 19: Guidance on sampling in marine sediments*.

ISO 9377-2:2000. *Water quality - Determination of hydrocarbon oil index - Part 2: Method using solvent extraction and gas chromatography*

ISO 14423-1:1997. *Water quality - Determination of benzene and some derivatives - Part 1: Head-space gas chromatographic method*.

ISO 16665:2013. *Water Quality - Guidelines for quantitative sampling and sample processing of marine soft-bottom macrofaunal*.

Mijnbouwregeling, 2017. *Hoofdstuk 9. Gebruik en lozen van oliehoudende mengsels en chemicaliën – Mining Regulations of the Netherlands, Chapter 9 – The use and discharge of oily mixtures and chemicals*. <http://wetten.overheid.nl/BWBR0014468/2017-08-29#Hoofdstuk9>.

NOROG, 2016. *Guidance document for characterization of offshore drill cuttings piles*. Norsk Olje & Gas. Version 4, 21 October 2016.

OSPAR Agreement 2005-15 (As amended in 2011). *OSPAR Reference Method of Analysis for the Determination of the Dispersed Oil Content in Produced Water*. Amendments to this Agreement were adopted by OIC 2011. See OIC 11/13/1, paragraph 2.10

OSPAR Agreement 2006-6. *Oil in produced water analysis - Guideline on criteria for alternative method acceptance and general guidelines on sample taking and handling*.

OSPAR Agreement 2017-03. *Guidelines for the Sampling and Analysis of Cuttings Piles*.