Falkland Islands Government

Department of Mineral Resources

Petroleum Operations Notice 10

Application to Use and Discharge Non-Aqueous Drilling Fluids and Associated Cuttings and Chemicals

Revised 2016

Background and approval process

This Petroleum Operations Notice (PON) establishes conditions for the use of non-aqueous drilling fluids (NADF) in drilling operations and acts as an application form for the discharge of NADF and their associated cuttings. It covers the use of cementing and completion chemicals (sections F and G) and includes application tables and required information.

While the use of NADF will be sanctioned as part of the PON 4 Basis-of-Well-Design application, operators will be required to engage with the Department of Mineral Resources as soon as they have identified possible drill targets in order to present their case for the use of NADF.

NADF use will only be permitted in complex production wells or exploration wells whose surrounding geology, water depth, or design is likely to incur severe delays or safety issues if drilled with Water-Based Muds (WBM). Situations where NADF use could be permitted include (but are not limited to): hydratable shales; extended reach or deep, hot wells where water-based muds may become unstable; ultra deep water wells; or wells penetrating formations with high carbon dioxide and hydrogen sulphide content. Permission for NADF use will not be given solely on drilling time advantages except for very extraordinary circumstances (e.g. relief wells).

Operators will be required to present evidence from known WBM issues in offset wells if available, or, if not available, a solid argument demonstrating that not using NADF would compromise the safety of the well and/or the ability to reach the planned well target; and how that conclusion has been reached in the absence of offset data or homologous wells. Initial options on how to treat and discharge NADF and associated cuttings should also be presented at this stage. Treatment and discharge options should include redundancy plans as discharge of untreated NADF cuttings will not be permitted except for exceptional cases that would otherwise pose safety risks.

In deciding whether to allow the use of NADF the Department will seek advice from consultants on safety, geological, and technical matters relating to the application. Each request to use NADF will be judged on the specific well's merits and while it is the aim to the Department to make the system as flexible as possible, NADF use should be considered as exceptional and permission for any well should not be pre-empted. Approaching the Department at the earliest possible opportunity would therefore avoid a final decision impacting negatively upon campaign planning.

It is also advised that the relevant members of the Offshore Hydrocarbons Environmental Forum (or Environmental Planning Department if onshore discharge is being planned) are engaged as early as possible to ensure that the discharge risk assessment is as well-informed and comprehensive as possible.

This PON may be submitted as a stand-alone document or as an Annex to an EIA addendum. If a statutory EIA contains enough information on the specifics of an operation (drilling unit, timings, etc.) so as to not require an addendum, then it may be submitted as an Annex to that EIA. The timings for approval will be similar to those of an EIA addendum and therefore this PON should be submitted no later than any EIA addendum.

Approval for use of NADF

Permission to use NADF will only normally be given on a well by well basis. "Campaign" approval may be considered if the wells meet both of the following conditions:

1. The wells have a similar technical requirement for the use of NADF, such as:

- They are all penetrating the same reservoir and the same overlying geological structures posing the same potential geological drilling challenges;

- They are all highly deviated/ directional production wells;

- They are all being drilled in ultra-deep water AND are likely to pose drilling challenges that require NADF

AND

2. They fall within the same EIA and addendum and are geographically close enough so that the baseline environment for each well faces the same level of risk from NADF discharge. (Not applicable to onshore discharge options)

NADF use will not be permitted during the open part of a well where cuttings are discharged straight to the sea bed.

Permitted fluids

Only group II and III NADFs with a low or negligible poly-cyclic aromatic hydrocarbon (PAH) content will be permitted. Operators will be required to demonstrate that their choice of fluid will not have an unacceptable impact on the local environment, with particular emphasis on the direct or indirect risk (if any) to fishing stocks.

Discharge

The offshore discharge of whole NADF fluids will not be permitted at any stage of the well.

Offshore discharge of NADF-associated cuttings will only be permitted if the cuttings have been treated to 1% or less Oil On Cuttings (OOC) content (dry weight) and if the risk or impact to the environment is deemed acceptable. If permission for offshore discharge is granted, operators will be required to submit section-by-section reports of treatment performance and levels of NADF, PAH, and cuttings discharged to the Department of Mineral Resources. Regular monitoring of at-risk elements of the environment will also be expected and should form an integral part of statutory 5-year EIA revisions.

Onshore discharge or re-use of cuttings will only be permitted if the cuttings do not pose an unacceptable environmental or public health risk. If cuttings are to be processed, handled, and/or accepted by third-party contractors onshore, operators should demonstrate a clear chain of liability agreed upon by all parties.

Discharge Application Form

A. WELL INFORMATION

Well Number		
Type of well	Exploration/ Appraisal/ Development/ Injection / Other (specify)	
If an injection well, what type?	Water/ Cuttings/ Produced Water	
Estimated Spud date		
Estimated time to reach target reservoir		Days
Estimated total drilling period		Days
Anticipated vertical depth of well		Metres
Anticipated total length of well		Metres
Estimated total weight of cuttings		Tonnes

Complete only for production wells

Name of prospect or development		
Is the well to be drilled from an existing facility		Yes/No
If yes, how many wells have been drilled from this facility?		
Please state rig type and and name		
Is it a platform or satellite well?		Platform/ Satellite
Are hydrocarbons expected?		Yes/No
If yes, what is the estimated flow rate?	Oil	Tonnes/day
	Condensate	Tonnes/day
	Gas	m^3/day
If a workover of well-test may occur, What quantities of materials will be flared?	Oil/Condensate	Tonnes/day
	Gas	m^3/day
Is an extended well test planned?		Yes/No

If so, what disposal route will be used for the hydrocarbons?

B. ENVIRONMENTAL INFORMATION

Is the proposed well in a fish or cephalopod spawning area? Yes/No

If yes, what species and at what time of year?

Species	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec

S: Spawning, N: Nursery, J: Juveniles, NS: No documented sensitivity, Blank: No data
(more than one code can be entered)

Are there times of the year when seabirds in the vicinity of the well location are more vulnerable than other times of the year? Yes/No

Please detail seabird vulnerability at the well location and adjacent blocks

Quad/ Block	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec

1: Very High, 2: High, 3: Moderate, 4: Low, Blank: No data

Are there times of the year when sea mammals in the vicinity of the well location are more vulnerable than other times of the year? Yes/No

If yes, what species and at what time of year?

Species	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec

1: High density, 2: Moderate Density, 3: Low Density, Blank= No data

Sources of information

Fish/cephalopods	Seabirds	Mammals

Please provide details of any other outstanding or unusual environmental features in the vicinity of the well location (e.g. seasonal algal blooms, sessile benthic species or geological or archaeological features) in an attachment to this application.

C. METOCEAN DATA

Residual current

Please provide residual current data for the development location (if relevant data is not available please insert “Not Measured”)

Surface Speed	metres/second	Direction
Seabed speed	metres/second	Direction

Source of data

Measurement location

Wind Rose

Please provide wind roses for the area in an attachment to this application

Source of data

Measurement location

D. DRILLING FLUID USAGE

Sections E1 and E2 are required for every well covered by the application, section E3 is required for every well section of each well. Sections F and G cover cementing and completion chemicals.

Guidance in relation to the completion of sections E1, E2, and E3 is detailed below

Water depth: The water depth should be confirmed. This can be obtained from surveys, or from Admiralty Charts.

Mean residual current: The mean residual current (u) is required to calculate the refreshment rate. Residual current data can be obtained from surveys. Where data are available for the entire water column, the average surface and seabed value should be entered. Where data are only available for the sea surface, this value should be entered. If data are not available, CHARM uses a default value of 0.24 for the refreshment rate.

Platform density: The number of discharging installations within a 10 km^2 area centred at the drilling location should be confirmed, and used to calculate the platform density per km^2. If data is not available, the CHARM default value of 0.1 (one discharging installation within the 10 km^2 area) should be entered.

Organic fraction in sediment: The percentage organic carbon in the surface seabed sediments can be obtained from surveys. If the organic carbon level is 2.6%, the decimal value would be 0.026. If data is not available, the CHARM default value of 0.04 (organic carbon level of 4%) should be entered.

Well section diameter: All well sections should be detailed, including proposed and contingency sidetracks. Separate copies of section E3 should be completed for each well section identified.

Estimated weight of cuttings: The weight of cuttings should be calculated by multiplying the volume of the well section by the estimated density of the formation sediment. Standard density values can be used for typical sediments. Corrections for predicted washout should also be included.

Batch dilution factor: The dilution factor for batch discharges can be determined using the tables provided in the CHARM manual. Two tables are provided, one for drilling fluids and one for cementing, completion, work-over etc chemicals. Using the appropriate table, you should select the nearest example density (in the case of cementing, completion, work-over etc chemicals, it is appropriate to select the nearest example to the estimated density of the carrier fluid or, if known, the discharge stream); the nearest example discharge rate; and the nearest example discharge volume. You can then derive the dilution factor. The batch dilution factor entered on the form should be the reciprocal of the figure derived from the table. If density, discharge rate and discharge volume estimates do not fit the table, dilution factors can be interpolated using a calculator that is available on the EOSCA website, at www.eosca.com.

Chemical and formulation names: Chemical and formulation names are detailed in the ranked lists of approved chemicals on the CEFAS website at www.cefas.co.uk. All chemicals and formulations must be on these lists. For NADF it will only be necessary to enter details for the complete formulation, and will be unnecessary to enter details for the components of that formulation. However, it will be necessary to enter full details of all chemicals that are not part of the approved NADF formulation.

Chemical function group: The chemical function groups are detailed in the ranked lists of approved chemicals on the CEFAS website at www.cefas.co.uk. You must enter the group name detailed in the lists, and should not enter a numeric function code. If you are uncertain about the correct function group, please contact CEFAS for clarification.

Chemical label codes: The chemical label codes include whether a substance is on the OSPAR PLONOR list; whether it is a candidate for substitution; and detail any relevant product warnings The following chemical label codes should be used to summarise relevant properties (more than one code may be necessary).

PLO	PLONOR (Automatic OCNS Group E)
SUB	Candidate for substitution
As	Arsenic warning
Cd	Cadmium warning
Cr	Chromium warning
Cu	Copper warning
Pb	Lead warning
Hg	Mercury warning
Ni	Nickel warning
O-VII	Organo-halogen warning
O-P	Organo-phosphorous warning
O-Sn	Organo-tin warning
P	Phosphorus warning
Zn	Zinc warning
ED	Endocrine disrupter warning
Taint	Taint warning

Estimated use and discharge: Estimated total use and discharge should be confirmed.

Dosage: For chemicals added to the drilling fluids, the application dosage rate should be stated as lb/bbl drilling fluid. For chemicals used during cementing, completion, work-over etc operations, the dosage should be as stated as mg/l carrier fluid. Where chemicals are diluted by a waste stream prior to discharge (e.g. added to the produced water waste stream), the dosage can be re-calculated and stated as mg/l discharge stream, to generate a more realistic Risk Quotient (RQ).

HQ values: Hazard Quotient (HQ) values are generated using the latest version of CHARM, and can be obtained from the chemical supplier. Although the HQ values are not required to complete the application forms, they provide a useful indication of the potential hazard. Drilling chemicals will usually be ascribed three HQ values, for different sections of the well. The lowest value will usually relate to the 17.5" section, as CHARM assumes that drilling this section will not involve a batch discharge. Chemicals are ranked according to their worst-case HQ, and the ranking group (as below) should be entered in the tables. CHARM algorithms cannot be used for all chemicals. Where HQ values cannot be generated using CHARM, chemicals continue to be ranked according to their revised OCNS group, and this ranking group (as below which also includes temporary and provisional categories, etc) should be entered in the tables.

HQ Colour Band
Gold
Silver
White
Blue
Orange
Purple

OCNS Category
A
B
C
D
E
Provisional A-E
Temporary A-E

If you are uncertain about the HQ or OCNS ranking group, please contact CEFAS for clarification.

RQ values: CHARM uses different algorithms for each use and discharge process, and Risk Quotient (RQ) values must be generated using the appropriate CHARM algorithms. Where RQ values are

generated using the latest version of CHARM (available from the OGP website at www.ogp.org.uk), it is acceptable to use the CHARM default values or installation-specific data. If installation-specific data are used for any parameters that are not included in the tables, the data must be detailed in Section C. Similarly, if data not included in the product templates provided by the chemical suppliers are used to generate the RQ values, e.g. NOEC data held by the suppliers, the data must be detailed in Section C. Where RQ values have not been generated using the latest version of CHARM, any additional parameters required to run the modelling software that are not included in the tables, e.g. product density, discharge stream density, product concentration in discharge, discharge rate etc, must be detailed in Section C., together with supporting information justifying use of the selected modelling software. Where chemicals are still assigned to a revised OCNS group (because the CHARM algorithms are not applicable), it will not be possible to generate RQ values, and the risk assessment should be based on the physical, chemical and toxicological properties of the chemical, and the proposed method of use and/or discharge.

CHARM algorithm code: The following codes should be used to confirm which CHARM algorithms were employed when completing the tables.

DR	value based on drilling algorithms
CWS	value based on completion/workover algorithms, usage as a surface / rig wash
CWO	value based on completion/workover algorithms, usage as a standard completion / workover product
CS	value based on cementing algorithms, dosage as spacer
CM	value based on cementing algorithms, dosage into the mixwater
CNA	CHARM algorithms not applicable
OTH	Other

Discharge code: The following codes should be used to confirm the method of disposal:

CTN	Continuous discharge into the sea
BAT	Batch discharge into the sea
CT/BT	Continuous and batch discharges into the sea
ZDH	Zero discharge, retained downhole
ZSS	Zero discharge, skip and ship
ZCR	Zero discharge, cuttings re-injection
OOC	$\leq$ 1% oil in cuttings discharge into the sea
PRO	Discharged through production facilities
OTH	Other discharge method (details must be provided in Section C)

Using the combined continuous and batch discharge code will simplify completion of the tables. However, some combined continuous and batch discharge RQs may be significantly greater than 1. If combined assessment generates an acceptable RQ, this will usually be sufficient to support the risk assessment. If combined assessment generates an unacceptable RQ, it may be useful to differentiate between the continuous and batch components, and to generate separate RQs to support the risk assessment. For example, it may be easier to justify chemical use if it can be demonstrated that continuous discharge of the vast majority of the chemical has a low RQ.

E. DRILLING FLUID AND CUTTING INFORMATION

1. Well site information

Water depth (metres)	
Mean residual current (Metres per second)	
Platform Density (platforms per km^2)	
Organic fraction in sediment (0 – 1)	

2. Well section, General information

Please complete for all well sections, including proposed or contingency sidetracks. The tables in section E3 must be completed for each well section identified.

Well section diameter (inches)	WBF Use	WBF Discharge	NADF Use	NADF Discharge	Length of section (m)	Volume of Section (m^3)	Estimated weight of cuttings (Tonnes)
	Yes/No	Yes/No	Yes/No	Yes/No			
	Yes/No	Yes/No	Yes/No	Yes/No			
	Yes/No	Yes/No	Yes/No	Yes/No			
	Yes/No	Yes/No	Yes/No	Yes/No			
	Yes/No	Yes/No	Yes/No	Yes/No			
	Yes/No	Yes/No	Yes/No	Yes/No			
	Yes/No	Yes/No	Yes/No	Yes/No			

3. Well section, specific information (copy and fill out page for each well section)

Mud/ Fluid data

Mud/fluid name	
Mud/fluid supplier	
Mud/ fluid density (g/cm^3)	
Drilling time (days)	
Volume of mud/fluid discharged on a continuous basis (m^3)	
Continuous discharge rate (m^3/hr)	
Volume of mud/fluid discharged on a batch basis (m3)	
Batch discharge rate (m^3/hr)	
Dilution factor for batch discharge	

Mud/fluid formulation and chemical data

Chemical & formulation names	Chemical function group	Chemical label code	Estimated use (tonnes)	Estimated discharge (tonnes)	Dosage (lb/bbl)	HQ*	RQ	CHARM algorithm	Discharge code

*Enter the HQ ranking (Gold, silver, white, etc) or, if not appropriate, the revised OCNS group

F. Cementing Chemicals

Primary chemicals (name)	Chemical function group	Chemical label code	Estimated use (tonnes)	Estimated discharge (tonnes)	Dosage (mg/l)	HQ*	RQ	CHARM algorithm	Discharge code	Batch dilution factor

*Enter the HQ ranking (Gold, silver, white, etc) or, if not appropriate, the revised OCNS group

G. Completion Chemicals and Other Categories of Chemicals (including brines, well clean-up, intervention, work-over, servicing and testing chemicals, hydraulic fluids discharged during valve actuation, rig-wash and turbine-wash chemicals and other general purpose chemicals)

Primary chemicals (name)	Chemical function group	Chemical label code	Estimated use (tonnes)	Estimated discharge (tonnes)	Dosage (mg/l)	HQ*	RQ	CHARM algorithm	Discharge code	Batch dilution factor

*Enter the HQ ranking (Gold, silver, white, etc) or, if not appropriate, the revised OCNS group

F. RISK ASSESSMENT

Attach a risk assessment for the discharge of the chosen mud/fluid. This should take into account information gathered through baseline surveys; the risk quotient/ OCNS category of the chemical; PEC:PNEC[1] ratios; bioaccumulation, eco-toxicity, and biodegradation data; and predicted dispersion and dilution rates in order to present an argument for the discharge of the fluid and associated cuttings weighed up against the possible impacts on the local environment. Future or ongoing monitoring plans of the at-risk environment should be included in this section. CEFAS templates for chemicals or formulations can be annexed here also.

G. DISCHARGE AND TREATMENT

Attach a document outlining the chosen discharge and treatment options, including redundancy plans should treatment plant become unserviceable. Details and plans for measuring treatment performance and quality assurance systems should also be included in this section.

This should also include a thoroughly researched discussion and balanced argument of why other discharge options have been sidelined. Onshore disposal options/ re-use should include a risk-assessment of the onshore impact and must have been sanctioned by FIG's Environmental Planning Department.

H. CONTACT DETAILS AND FURTHER INFORMATION

Completed application forms, reports, or requests for information related to this PON should be submitted to:

Department of Mineral Resources
Ross Road
Stanley

Tel: +(500) 27322
Fax: +(500) 27321

reporting@mineralresources.gov.fk

[1] Predicted Environmental concentration : Predicted No Effect Concentration