# Advisory Circular

## Part 200 – Offshore Installations – Discharges

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# 1. General

## 1.1 Purpose of advisory circulars

Maritime New Zealand (MNZ) advisory circulars are designed to give assistance and explanations about the standards and requirements set out in the maritime rules. However, the notes contained in advisory circulars should not be treated as a substitute for the rules themselves, which are the law.

If an advisory circular sets out how a rule can be satisfied, then compliance with that advice ensures compliance with the rule. Other methods of complying with the rule may be possible, however MNZ would first need to be satisfied that those alternative methods were of an equivalent standard to the advice in the advisory circular. The advisory circular would then be amended to include those equivalents.

This advisory circular 200-2 supports Marine Protection Rule Part 200 (2010) and when a number reference like 200.7 is used, for example, it relates to that specific rule within Part 200.

## 1.2 Application of Part 200

Marine Protection Part 200 applies to offshore installations including fixed and floating platforms of all types engaged in exploration for or extraction of mineral resources from the seabed. These installations include all drilling platforms, drill ships, well head platforms, production platforms, FPSOs, and pipelines or offloading facilities that are attached to any of these installations. The rules apply to these installation types from the time that they enter the permit area until the decommissioning of the installation or the time they leave the permit area. Off-take tankers or other support vessels visiting the installation are not covered by the rules.

To avoid duplication of the requirements of the Resource Management Act 1991 (RMA), the requirements under Part 200 for installations that are operating within the territorial sea or internal waters of New Zealand are less extensive than for controlled installations operating outside the territorial sea but in New Zealand waters. The different provisions are clearly detailed in the rules. Operators may need to take account of the need for consistency between the information provided in their discharge management plans under these rules and their obligations under the RMA and the Hazardous Substances (Emergency Management) Regulations 2001.

## 1.3 Objective of Part 200

The objective of Part 200 is to prevent pollution of the marine environment from discharges of harmful substances associated with the operation of offshore installations used in mineral exploration and exploitation. The rules include requirements for operators of offshore installations to manage discharges and prepare for and respond to spills of harmful substances. In addition to holding the necessary appropriate oil pollution prevention certification for an installation or vessel of its size and record keeping of oil discharges, operators of offshore installations are required to have discharge management plans approved by the Director of MNZ (further referred to as the Director). These will detail all of the environmental protection measures relating to discharges from the installation including processes for assessing the impacts of discharges from the installation.

# 2. Supportive guidance to Part 200

## 2.1 Discharge management plans

Under Section 268 of the Maritime Transport Act 1994 and rule 200.4, all offshore installations operating in New Zealand continental waters require an approved discharge management plan (DMP). The purpose of the DMP is to establish procedures and practices to be implemented on the installation that will minimise environmental impacts from operational or accidental discharges of any harmful substances (those substances that are classified as marine pollutants), including oil.

An approved DMP demonstrates that the operator of an offshore installation has:

- identified and taken steps to control operational activities that may harm the marine environment (e.g. reducing the impacts of normal operating discharges by selection and use of low toxicity chemicals or implementing technologies to minimise the volume and toxicity of discharges to the marine environment);
- identified and taken steps to minimise activities that present a risk of accidental discharge of oil or other harmful substances (a spill); and
- prepared an approved emergency response plan that demonstrates that the operator can respond rapidly to minimise the extent and impact of a marine spill of harmful substances.

The requirements for the contents of a discharge management plan are detailed in Schedule 1(1) of Part 200. However, each plan must be customised to reflect the specific risks posed by the individual installation and/or operation.

It is important to note that the requirements are different for installations operating inside the territorial sea and those outside the territorial sea. This is to avoid duplication of the requirements of the RMA administered by regional and district councils, which apply to installations that are operating inside the territorial sea.

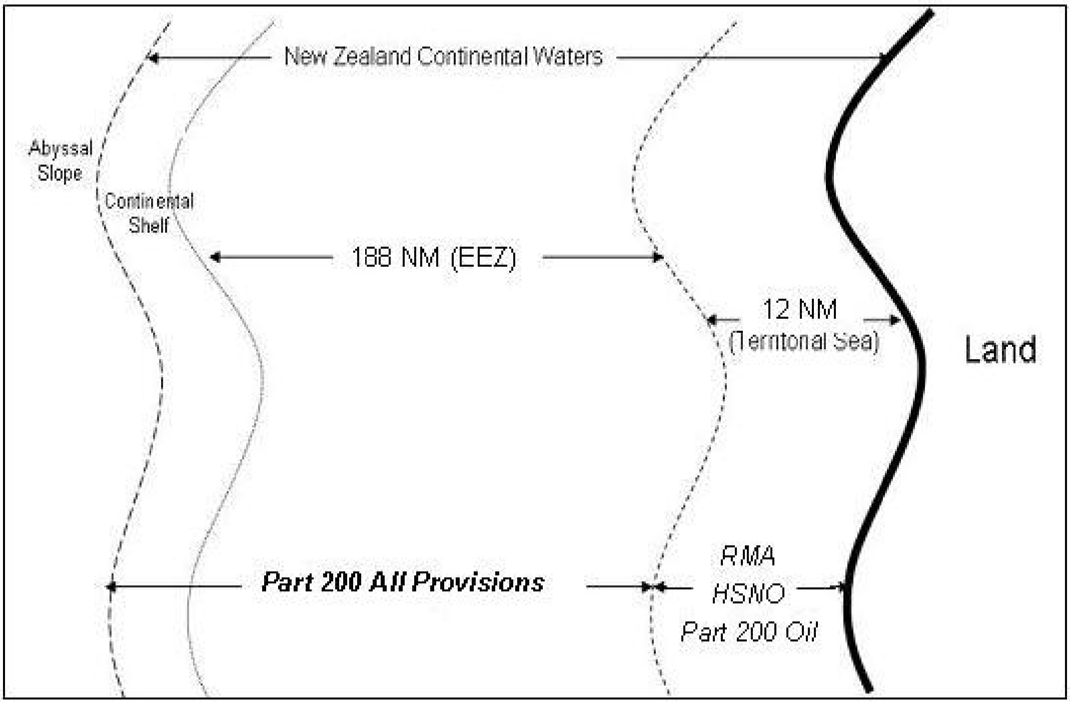


**Figure 1** Jurisdictional boundaries

### 2.1.1 Making an application

Applications must be made in writing to MNZ with both a printed copy and an electronic copy of the DMP included for review. All documents must be prepared in English.

Applications for approval of DMPs will be reviewed by MNZ staff who will assess whether the plan meets all of the requirements of Part 200 and make recommendations regarding approval to the Director. Operators will be charged an hourly rate for staff time involved in processing their application in accordance with the Shipping (Charges) Regulations 2000.

It is expected that operators will liaise with MNZ staff in advance of submitting their application. This will ensure that the operator has a good understanding of the required contents of the DMP and also allows MNZ staff to plan in advance for processing the application and any associated inspections, thus avoiding delays in processing.

The application for approval of the DMP must be submitted for approval at least 2 months prior to the planned commencement of drilling or production activities. The two month timeframe for submitting plans allows time for staff to review the plan and for the operator to provide any additional required information. In some cases, a pre-approval inspection of the installation may be required. Where such an inspection is required, the operator will be notified within 15 working days of making their application to allow for the timing of the inspection to be arranged and mutually agreed. Applicants should also note that testing and characterisation of oil (as required in Schedule 1) may take several weeks to complete – especially when samples need to be sent overseas. Adequate time for this testing should be allowed.

Where it is impossible to comply with this timeframe, operators will need to apply to the Director for an exemption to allow them to submit the plan in a shorter time. In these instances, operators should be aware that there is no guarantee that the plan will be approved by their proposed commencement date.

Approvals are given for a period of 3 years and a new approval will be required at the end of this period. Plans must also be reviewed annually for currency and MNZ should be notified of this review and any subsequent amendments to the DMP – some of which may require approval as detailed below.

### 2.1.2 Modifications to an approved discharge management plan

The Director must approve modifications to the DMP involving the use of new harmful substances or reviews of the emergency spill response procedures (e.g. proposals to alter the layout of an installation). There is no need to reapply for approval for modifications to the contact lists or the reassignment of response personnel responsibilities. Changes during the currency of the plan do not require resubmission of the entire DMP, but must clearly identify which sections of the plan are being amended and document control processes should be used to manage distribution of modifications.

Once the modifications have been approved by the Director, the operator must amend the existing discharge management plan to take account of the modifications and as soon as reasonably practicable provide a copy of the updated approved plan to the Director and any other person holding a copy of the plan.

### 2.1.3 Harmful substances

For the purposes of Part 200, a harmful substance is any substance which is ecotoxic to aquatic organisms and considered hazardous for the purposes of the Hazardous Substances (Minimum Degrees of Hazard) Regulations 2001 (HSNO Act); and oil or that are identified as marine pollutants under the IMDG Code.

There are different classes of hazardous substances under the HSNO Act, with Class 9.1 substances being those that are ecotoxic to aquatic organisms. There are four sub-classes under Class 9.1 based on the toxicity, persistence and potential of the substance to bio-accumulate. The criteria for the different classifications are summarised in the table below.

**Table 1** HNSO Classification

| HSNO CLASSIFICATION | SUMMARY OF CRITERIA |
|---|---|
| Category 9.1A<br>Substances that are very ecotoxic in the aquatic environment | Acute aquatic ecotoxicity value less than or equal to 1 mg/L |
| Category 9.1B<br>Substances that are ecotoxic in the aquatic environment | Acute aquatic ecotoxicity value greater than 1 mg/L and up to 10 mg/L, and is not readily biodegradable or is bioaccumulative |
| Category 9.1C<br>Substances that are harmful to the aquatic environment | Acute aquatic ecotoxicity value greater than 10 mg/L and up to 100 mg/L and is not readily biodegradable or is bioaccumulative |
| Category 9.1D<br>Substances that are slightly harmful to the aquatic environment or otherwise designed for biocidal action | Acute aquatic ecotoxicity value greater than 1 mg/L and up to 100 mg/L but does not meet the criteria for hazard classification 9.1B or 9.1C; or<br>Chronic aquatic exotoxicity value is less than or equal to 1mg/L but but does not meet the criteria for hazard classification 9.1A, 9.1B or 9.1C; or<br>A substance designed for biocidal action and does not meet the criteria for hazard classification 9.1A, 9.1B or 9.1C. |

It is expected that operators will make every effort to use substances that do not trigger the 9.1A or 9.1B classification. If these substances are programmed for use, the DMP will need to provide clear justification as to why they have been selected over substances that pose a lesser risk of environmental harm. Additionally, detailed risk and mitigation information must be provided for any 9.1A or 9.1B substances where the volume held on board exceeds 20 litres, compared to the 100 litre threshold where this information must be provided for 9.1C or 9.1D substances.

Section 226 of the Maritime Transport Act, 1994 (MTA) prohibits the discharge of any harmful substance from offshore installations into the sea of New Zealand's continental waters outside the Territorial Sea other than in accordance with the marine protection rules.

### 2.1.4 Audits

In most cases, installations will be audited annually by MNZ to ensure they are operating in a manner consistent with their approved DMP and otherwise complying with the requirements of the rules. The timing of audits will be coordinated with operators and all costs associated with the audit, including MNZ staff time and travel costs, will be billed to the operator in accordance with the Shipping (Charges) Regulations 2000.

### 2.1.5 Details of the site and operations

Every DMP must include drawings or plans showing the layout of the installation and maps or charts of its geographic location relative to environmental resources that may be impacted by discharges. The geographic coordinates of the facilities (latitude and longitude) must be provided. A description of the activities (e.g. drill 3 vertical exploration wells to a depth of 1500m) must also be provided.

Specific information that should be detailed in the site plans includes, but is not limited to:

- key storage and transfer areas for oil and other harmful substances;
- any primary and secondary containment devices for oil or other harmful substances;
- the location of emergency shut-off and isolation valves for oil or other harmful substances;
- the routes whereby oil or harmful substances may enter the marine environment, including the location of uncontained drainage systems.

### 2.1.6 Oil spill risk assessment and prevention measures

#### .1 Oil spill risk assessment

Every DMP requires a risk assessment to evaluate the likelihood and possible consequences of a marine oil spill.

Risk is defined as the probability and severity of impact. It follows that a relatively high-probability spill of a small volume of oil in a sensitive area may have a similar risk to a low probability, catastrophic event (e.g. a blow-out) occurring in an environmentally robust area remote from the coast. Risk determination depends upon identifying potential oil release events and their extent, the transport and fate of the oil and the presence of sensitive environments in the area.

The risk assessment will form the basis of the proposed response to an oil spill. Significantly, the risk assessment will guide the response capability that should be located at or made available to that site.

#### .2 Oil risk inventory

The DMP must include a comprehensive inventory of all oils stored or produced at the installation. This inventory should include, as a minimum, the following details:

- types of oil (e.g. diesel, crude oil, heavy fuel oil, lubricating oils);
- volumes stored on the installation and, where applicable, flow rates and volumes in pipelines of oils;
- fuel specifications sheets and full MSDS for each oil; and
- estimation of the frequency and volumes of oil transferred to or from the site.

The variation in crude oils has implications in terms of the potential impacts of a spill and on the response options that would be effective. Therefore, the DMP must include information on the physical properties, weathering profiles and dispersant effectiveness for all crude oils or condensates produced on the installation in accordance with Schedule 1(1)(e) of Part 200. In the case of exploration drilling projects, it is recognised that this information will not be available until such time as the well is flowed. In this instance, information on the expected oil properties should be supplied with verification based on oil samples from the field, if and when these are obtained.

Because of the range of laboratory services available in New Zealand and internationally and ongoing development of new techniques, methodologies for weathering and dispersant testing are not prescribed in the rules. However, operators should discuss the protocols they propose to use for this testing with MNZ in advance of organising the testing to ensure that the methods used will be acceptable.

#### .3 Oil impacts and sensitive environmental resources

Oil spill trajectory modelling results must be included in the DMP to indicate the likely fate of spilled crude oil or condensate and to assist in assessing potential impacts. Trajectory modelling should be based on a realistically large spill volume from the site, including the potential for a large spill over an extended period as would occur in the event of a well blowout during exploration or production drilling, and take into account dominant seasonal current and wind patterns.

To determine the potential consequences of a spill on the receiving environment, it is also necessary to understand the resources at risk from a spill. The DMP should include a description of the surrounding environment highlighting sensitive components such as shorelines, fisheries or aquaculture operations in the area of the installation or that the trajectory model indicates are at risk from a spill. For a more complete explanation of the requirements for an environmental risk assessment, please see the section on Assessment of potential environmental impacts on page 12.

Information on specific resources and priority sites for protection within New Zealand territorial waters and coastal environments will generally be available in the relevant region’s Tier 2 Regional Marine Oil Spill Contingency Plan. While it is not expected that operators replicate this information, it should provide a useful resource for operators when identifying the potential impacts of a spill.

#### .4 Oil spill prevention

The DMP will need to identify the events, activities and processes that pose a threat of an oil spill, highlighting the activities that present the greatest risk. For each of the identified risks, the DMP must include details of preventative and mitigation measures and standard operating procedures that will be employed at the site to reduce these risks.

### 2.1.7 Harmful substances other than oil

Every DMP for a controlled offshore installation must include a risk assessment for all harmful substances other than oil that may be discharged from the installation either during operations or accidentally. No approval is required from MNZ for substances that are not marine pollutants.

Where harmful substances in addition to those in the approved DMP are needed for the project, further approval will be required for each substance as this constitutes an amendment to the DMP. For each new substance, the information listed in Schedule 2 should be submitted to MNZ for consideration and approval prior to the substance being used on the installation.

#### .1 Inventory of harmful substances

The DMP must include a comprehensive inventory of all harmful substances that are kept on the installation in quantities greater than 20 litres for category 9.1A and 9.1B substances or more than 100 litres for category 9.1C or 9.1D substances. The information that must be provided for the substances is clearly detailed in Schedule 2 of Part 200. It is recommended that the information for each substance be consolidated in a table or spreadsheet format.

The majority of the information regarding the properties of a harmful substance should generally be available from a complete MSDS for the product. However, it has been found that short or incomplete MSDS have been provided for some products. It is the operator’s responsibility to ensure that all of the information in Schedule 2 is provided, whether this information comes from the supplier, manufacturer or from commissioned testing.

#### .2 Harmful substance risk assessment

Operators of controlled installations will need to assess the risks to the environment of operational or accidental discharges of harmful substances other than oil. In general, the risk assessment should consider the same matters as described above for oil and in the section on Assessment of potential environmental impacts on page 12. However, in addition, the risk assessment process for harmful substances other than oil should separately consider the toxicity of the chemicals and products programmed for release in operational discharges. Where there is potential for environmental harm from these discharges, the risk assessment must include a reasoned argument for the use of the substances selected. This discussion may include operational or commercial requirements for product use and reference to monitoring data or specific knowledge that enables a more accurate prediction of chemical fate and effects.

For each chemical, the ecotoxic category of the substance must be specified and the concentrations at which it will be discharged determined. Where a substance has not previously received an ecotoxicity classification in New Zealand, testing of the substance in accordance with the guidelines set out by the Environmental Risk Management Authority may be necessary. Where the substance has not been classified in New Zealand but is a mixture, the operator may submit the classifications of the component parts of the mixture. Applications for the use of substances that have no data allowing the classification of ecotoxicity will not be approved.

It should be noted that while the Hazardous Substances and New Organisms (HSNO) Act 1996 does not apply within the New Zealand EEZ, operators submitting an offshore installation DMP for approval should still consult the *User Guide to HSNO Thresholds and Classifications* (ERMA 2001) for full details of the classification system and testing regime.

#### .3 Unforeseen use of chemicals

The DMP should also include those harmful substances that it is anticipated will be needed on a contingency basis (e.g. chemicals to be used in the event of problems encountered during drilling). To avoid delays, it is recommended that operators liaise with drilling and chemical companies and include information on possible contingency chemicals in their initial application.

It is acknowledged that in very rare circumstances the unforeseen use of chemicals may be required at short notice. On such occasions, the requirement for substances must be discussed with Maritime NZ and information on the substance in accordance with Schedule 2 should be provided at the earliest opportunity to allow for revision of the discharge management plan.

Applications for urgently required contingency chemicals will be processed as quickly as possible, but operators must note that, until approval is received from MNZ, the substance may not be held or used on the installation.

### 2.1.8 Emergency response procedures for marine spills

Every DMP must include emergency response procedures to address spills of oil into the marine environment. For controlled installations, the emergency response procedures must also address spills of harmful substances other than oil.

The basic aim of any response action is the effective and immediate containment and mitigation of a spill of oil or other harmful substance. A plan will guide the operator to take immediate and effective action to minimise the impact of the spill on the environment. This will include containing the spill either within the site itself or within an area beyond the immediate site boundary.

While not essential, it may be desirable to submit the emergency response procedures as a separate annex (in the form of an emergency response plan) to the DMP. This will save the user having to search through the supporting documentation in order to find critical response procedures. In any case, the emergency response procedures must be clearly identified and easily located within the DMP.

In the event of a marine oil spill (where the oil has entered the water) from an offshore installation, the response will initially be coordinated either by the local regional on-scene commander if the installation is within the territorial sea, or the national on-scene commander if the spill is from a controlled installation. Larger spills within the territorial sea may also be escalated to a national response depending on their severity. It is expected that the operator will provide assistance to the regional or national on-scene commander by providing advice regarding all known details of the spill and relevant operational information to assist with the spill and subsequent clean up. The operator of an installation from which an oil spill has occurred is liable for the costs incurred in responding to the spill.

It is accepted that the general response provisions for a spill of oil and for other harmful substances will be very similar in that they will contain the following elements:

- ensure the safety of personnel;
- stop the discharge and prevent further discharges;
- contain and prevent this spill from entering the sea if possible;
- notify relevant parties and authorities of the spill as quickly as possible;
- evaluate the extent of the spill and appropriate response options;
- cleanup spilled oil or other substances where possible;
- dispose of waste responsibly; and
- review plan and restock response equipment.

It is therefore expected that operators may prepare contingency plans that address response activities to both oil and other harmful substances. Where response activities are specific to a particular substance, this should be highlighted and described in the contingency plan.

Spill contingency plans must also provide details of the training to be provided to personnel involved in spill response, an inventory of the spill response equipment held on the installation, and identify the positions or personnel responsible for the implementation and periodic review of the spill plan and the maintenance of spill equipment.

Contingency plan arrangements applying to offshore installations also apply to all pipelines permanently attached to those installations. The risks of pipeline leakage should be addressed and the spill contingency plan should focus on the potential for oil leaks reaching the coastline where this may occur.

### .1 Spill reporting

In the event of a spill, it is vital to know who to call and who is responsible for specific functions. The contact list in the DMP should address this requirement and must be kept up to date.

Immediately after any spill or where a spill is suspected even if it has not been confirmed, the operator must use procedures documented in the DMP to report the spill to the regional council within whose region the spill occurred or to the Director where the spill is beyond the territorial sea.

Appendix 1 of this advisory circular contains a template of the notification form to be completed and forwarded to the relevant authority.

### .2 Chemical dispersants

The use of dispersant is one of the most effective means of dealing with an oil spill in an open water environment. Effectiveness will depend on the type of oil and speed of response, including availability of suitable dispersants. It is therefore required that any oil or condensate produced on the installation be tested against a range of approved dispersants in accordance with the requirements in Schedule 1(1)(e). This testing must be undertaken as soon as a sample of the oil or condensate is available from test wells in the field or the production well. Further advice on acceptable dispersant testing protocols is contained in Appendix 2 of this circular.

All dispersants used in New Zealand continental waters must be approved by the Director, subject to the provisions of Part 132. Operators proposing the use of a specific dispersant type within New Zealand should check with MNZ that the product is approved.

During a spill, incident dispersants may not be used in New Zealand continental waters without approval from the On-Scene Commander.

### .3 Response to spills of harmful substances other than oil

Generally speaking, it will not be possible to physically respond to most spills of harmful substances other than oil once the substance has escaped from the installation into the sea. Many chemicals are water-miscible and oil spill equipment will not be effective. In cases where the harmful substance does not remain on the water surface, recovery and cleanup will often be unfeasible. In such circumstances, the response to such an incident will most likely be restricted to predicting and monitoring the effects of the spill.

Operators should have ready access to the chemical inventory and data as per Schedule 2 for all harmful substances held on the installation. Computer plume modelling of dispersed chemical spills can assist in predicting the likely impacts of such an incident and assist in designing appropriate monitoring programmes.

In many other respects, such as protection of personnel safety, stopping and minimising the spill, etc, a spill of a harmful substance other than oil should be responded to as if it were oil, and the provisions of Schedule 1 applied.

### .4 Personnel responsibilities and contact lists

Every DMP must clearly indicate the roles and responsibilities of key response personnel. New Zealand has adopted a modified version of the Coordinated Incident Management System (CIMS) which clearly sets out the different functional groups within an incident command structure (Figure 2). Operators are encouraged to adopt the same or a similar structure in order to provide for seamless transition in the event of escalation of a spill response situation. However, it is recognised that individual companies may have established emergency response structures consistent with internal company policy.

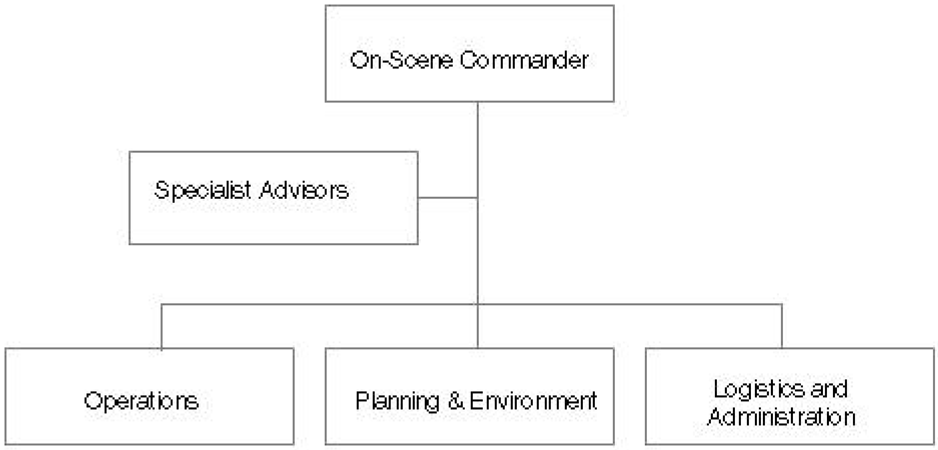


**Figure 2** Standard Incident Command Structure

The list of contacts will depend to a large extent on the size of the response team required to implement the plan. However, as a minimum the contact list should include:

- site supervisor or operations manager;
- MNZ;
- Rescue Coordination Centre New Zealand;
- emergency services; and
- the Regional Council – Regional On-Scene Commander or 24-hour pollution hotline;

## .5 Training of personnel

For emergency response procedures to be effective, it is essential that the personnel involved receive training appropriate to their responsibilities under the response plan. Sufficient suitably trained staff should be available to respond to a spill at all times despite staff turnover or shift changes. The specific requirement for training is consistent with the general obligation, under section 268 of the Maritime Transport Act, on all holders of marine protection documents to provide appropriate training for employees. The level of training required will vary depending on the operations of the installation, the response equipment carried and the expected duties of individual staff in a spill response.

A record must be kept of all spill response training carried out by the operator and this may be requested at any time by the Director.

Maritime New Zealand conducts oil spill response courses for regional and national spill response staff at the authority's Marine Pollution Response Service Centre in Auckland and limited places on these courses are available to industry employees. Details of upcoming courses are available by contacting MNZ

Operators are encouraged to liaise and coordinate training and exercises with other operators and regional response teams. Information on planned exercises is also available from MNZ.

## .6 Testing and reviewing spill contingency procedures

Spill contingency plans must be subject to regular exercises with the full plan tested at least once every 12 months. This will ensure that all personnel are familiar with the procedures and also that those procedures are still current and appropriate for the installation. Operators must notify MNZ at least 14 days in advance of tests of the emergency spill response plan. In some cases, MNZ may wish to participate in response exercises so early contact regarding planned exercises is welcomed.

Following each exercise or where the plan has been used in an incident, the operator must review the spill contingency plan to ensure that they are still adequate and effective. A record must be kept of this review and provided to MNZ. Any resulting changes to the contingency plan will need to be approved by the Director.

## 2.2 Operational discharges during exploration and production

### 2.2.1 Drilling fluids

Rule 200.16 specifies that only water based or synthetic based drilling fluids may be used on controlled offshore installations. Although water based drilling fluids are the more environmentally favourable option, it is recognised that synthetic based fluids may be required in exceptional situations where drilling operations are more complex (e.g. in the lower sections of the well, in specific formations, in high pressure/high temperature wells and in non-vertical drilling operations). Where synthetic based drilling fluids are required for the project, their use will need to be clearly justified.

It is expected that operators will take all possible measures to reduce the environmental impacts of drilling wastes including using best international practice to reduce the volume of the solid waste and drilling fluid. Recovery of drill cuttings and disposal of these to land as opposed to overboard discharge should be considered.

### 2.2.2 Production water discharges and record keeping

The objective of environmental management of production water, displacement water and offshore processing drainage is to reduce the quantity and to improve the quality of the discharge. The DMP must clearly identify how the operator intends to implement strategies to minimise the overall impact of production water discharges. Studies demonstrate that the toxicity of production water is only partly related to the hydrocarbon content of the water, which may also contain other substances from the formation and chemicals used in the production process. Care should be given in selecting biocides and chemicals based on surfactants that will be discharged with production water.

In all cases reinjection of production water into geological formations is preferred to overboard discharge. Where overboard discharge of production water is planned the environmental monitoring programme will need to be designed to assess the potential long-term impacts of this discharge.

Where overboard discharge of production water is planned the concentration of oil-in-water must be continuously monitored prior to dilution or discharge and that this data is recorded and available to the Director immediately on request. Additionally there must be a means for immediately stopping overboard discharge at any time that the oil concentration in the production water exceeds 100ppm. Any production water discharge where the oil content exceeds 100ppm must be immediately reported to Maritime NZ as an oil spill and recorded as a spill in the Oil Record Book.

The monthly average of dispersed oil-in-water content must not exceed 30ppm. At any one time the limit is 50 ppm and and discharges in excess of this amount are to be reported to Maritime New Zealand as soon as practicable.

Where the monthly mean concentration exceeds 30ppm this must be notified to Maritime NZ on a monthly basis along with a written explanation of the reason for the non-compliance and any measures taken to address this.

The oil-in-water concentration of production water that is discharged must be recorded and documented at least twice in every 24 hour period, generally every 12 hours. This information may be downloaded from the continuous monitoring referred to above. A daily and monthly record of the total volume of the production water, displacement water or offshore processing drainage must be kept and this record must also contain an estimation of the total volume of oil that was contained in that discharge. These records must be submitted to the Director on a monthly basis as well as being kept by the owner of the installation for at least 3 years and be made available to the Director immediately on request.

## 2.3 Assessment of potential environmental impacts

Part 200 requires that the DMP include a detailed description of all identified potential environmental impacts that may result from any operational discharges or spill of oil or other substances from the installation. These should include ecological, social, cultural and economic impacts.

This means that operators must undertake a process of environmental impact assessment associated with the installation which should take account of programmed discharges from the installation, including –

- oil-in-water from machinery spaces or production water;
- sewage;
- food waste;
- chemical discharges in production water, domestic grey water or from other activities (e.g. deck cleaning or fire fighting exercises); and
- drilling wastes including drill cuttings and residual drilling mud.

The environmental impact assessment must also take into account the duration and anticipated maximum concentrations of any such discharges.

Additionally, the environmental impact assessment should consider the potential impacts of accidental discharges oil or other harmful substances based on the volumes of these substances held on the installation that may be spilled in a single incident.

The potential impacts of either programmed or accidental discharges will greatly depend on the receiving environment. The risk assessment will therefore need to consider the -

- water depth;
- distance from shore;
- coastal environments that trajectory modelling indicate may be vulnerable to oiling; and
- nearby commercial fisheries or aquaculture operations.

The results of the environmental impact assessment must be incorporated into the DMP and will form the basis for identifying mitigation measures to minimise impacts. It is expected that elements of the operation, such as the selection of chemicals, the level of wastewater treatment and the discharge of production water and other wastes from the installation, will take account of the potential for impacts and that options will be selected to minimise or eliminate environmental impacts as far as possible.

The results of the environmental impact assessment will also form a useful basis for consultation with potentially affected parties.

## 2.4 Environmental monitoring

Environmental impacts from offshore installations may occur as a result of programmed operational discharges or accidental spills of oil or other harmful substances. In some cases, such as where a large volume of drill cuttings are dumped on the seabed, some environmental impacts are inevitable as even uncontaminated cuttings will have a temporary smothering effect on seabed life.

To determine whether significant environmental impacts are resulting from offshore installation discharges Part 200 requires that environmental monitoring must be undertaken in accordance with a programme approved in the DMP. Environmental monitoring will provide reassurance for both the Director, as regulator of the industry, and operators within the industry. Independent monitoring is a prudent measure that enables the industry to demonstrate to other stakeholders that it is mindful of the need to identify and address environmental impacts from the operations.

Due to variation in the nature and scale of offshore oil and gas operations, it is not possible to prescribe a single monitoring regime that will be appropriate for all installations. In all cases there are certain basic standards of environmental monitoring that operators are expected to fulfil. This section details those minimum standards and describes some examples of monitoring programmes that would be considered appropriate for a range of operation types.

### 2.4.1 Basic standards of environmental monitoring

In developing monitoring programmes there must first be a testable hypothesis, eg. is there a difference in x-parameter (physical or biological) that can be attributed to the activity. From this hypothesis the next step is to develop measurements to text the hypothesis, followed by data management and interpretation. The proposal for the monitoring programme must be adequately detailed with respect to the above elements to allow evaluation and approval by the Director.

A detailed explanation of sampling methodologies, laboratory practice, analytical techniques or statistical approaches to data analysis is beyond the scope of this Advisory Circular. It is expected that the programme will be implemented by suitably qualified and experienced people to ensure quality control and best practice.

#### .1 Establish Baseline Data

Information on the characteristics of the site, including physiochemical data and biodiversity and abundance, should be obtained prior to the commencement of activities wherever possible and would be expected for all new projects. Baseline data is invaluable in identifying temporal changes and the potential relationship with the activity.

In some cases this information may be available for existing studies or be gathered during the initial evaluation of potential for environmental impacts.

#### .2 Sample Site Selection

A monitoring programme must include samples from control locations as well as those that may potentially be impacted. The control sites should be close to the potential impact sites and have similar characteristics such as sediment type and water depth. The use of well chosen control sites will enable operators to determine if the effects seen at one site are likely to be the result of natural variations or a result of the activity being monitored.

For those sites that are potentially going to be impacted by an activity it is standard practice to select sites at varying distances from the activity. How extensive the area is to be included in the sampling programme will need to be scaled according to the operation and location. This will allow for any gradient in impacts to be observed as well as the distances over which the operation is having and effect.

Sampling over varying distances from the installation will also help to determine with more certainty if effects are a result of natural variation or from the activity.

### .3 Sample type and techniques

The environmental parameter that is sampled and techniques used will depend on what impacts are being looked for and this will relate directly to the scale of the operation and the types of discharges it is likely to produce.

It is common for samples to include seawater, sediments, sessile organisms in the water column and benthic fauna and infauna to look for evidence of contamination by heavy metals or hydrocarbons.

Sediment cores or grabs may be taken to measure the abundance and diversity of small burrowing organisms (infauna) that will act as indicators of sediment or water contamination. Larger-scale measurement of biodiversity may be undertaken by video or photographic surveys of the seabed.

### .4 Replication

Any environmental monitoring programme must include adequate replication of sites and samples from each site and this will vary depending on the degree of natural variation in the area of interest. Where existing data is not available, pilot studies may be needed to determine the degree of natural variation to guide the final design of the study. This replication will allow for meaningful statistical analysis of the results, as well as making it clear that any observed effect, or lack of effect, is real and not the result of a single, anomalous sample. Replication must be applied to the sample site (eg. control sites outside the likely impact area, under the platform and at a set distance from the installation along the prevailing current direction) and also the samples from each site.

At a minimum, 3 samples from each sample location are required, although more is preferable to ensure statistical robustness of the results. It must also be kept in mind that the volume of samples required for analysis will vary depending on the sample type and what is being tested for. The replication would then have to ensure that at least 3 times the minimum sample volume was collected. For example, the tissue from 6 mussels may be needed for accurate testing of hydrocarbon contamination. Therefore, for a triplicate sample, 18 mussels would need to be collected.

### .5 Frequency and extent of monitoring

The nature and scale of the monitoring programme should reflect the scale, longevity, and planned and potential discharges from the installation all of which may vary substantially. Clearly, one-off monitoring of sediment hydrocarbon concentrations would be inadequate for an installation that was producing over a 20 year period. Similarly it would be unreasonable and unnecessary to require many years of monitoring of biological communities from a single exploration well.

### .6 Examples of monitoring regimes

There is no pre-determined standard for environmental monitoring from offshore installations in New Zealand. The following examples will not be suited for all installation types and operations, but are intended to provide an indication of the types of sampling that may be included when developing and proposing a monitoring programme.

**Drilling projects:**

- Analysis of drill cuttings' concentrations of metals and hydrocarbons and reporting of volumes of drill cuttings discharge.
- Before and between 6 and 12 months following drilling –
  - infaunal survey to determine diversity and abundance by grab sample

- underwater video footage of the site

**For producing wells where there is no produced water discharge:**

- Infaunal survey to determine diversity and abundance by grab sample to be conducted within 3 years of production commencing and thereafter every 5 years.
- Sampling of seabed sediments to analyse concentrations of oil and metals downstream (based on prevailing current conditions at the site) from the installation within 3 years of production commencing and thereafter every 5 years.

**For producing wells where there is a production water discharge:**

- Regular sampling of production water at the point of discharge to measure concentrations of hydrocarbons and metals and other physiochemical parameters such as salinity, temperature and pH. This analysis will provide a cross-check for the in-line analysers as well as measure the presence of other contaminants that may be residual from the chemical treatment during processing.
- Infaunal survey to determine diversity and abundance by grab sample to be conducted within 3 years of production commencing and thereafter every 5 years.
- Sampling of seabed sediments and sediment pore waters to analyse concentrations of oil and metals within 3 years of production commencing and thereafter every 3 years.
- Sampling hydrocarbon concentrations in bivalve molluscs or other infaunal species.

# 3. General Enquiries

If you have a general enquiry concerning the requirements for approval of a Discharge Management Plan, or ongoing obligations under Part 200, please contact our Te Atatu office on:

Phone: +64 9 834 3908

Fax: +64 9 834 3907

Email: enquiries@maritimenz.govt.nz

All of MNZ’s current rules and advisory circulars can be downloaded for free at www.maritimenz.govt.nz/Rules/Rules.asp.

# Appendix 1: Offshore installation oil spill reporting form

FILL IN THIS FORM WITH A BLACK PEN AND FAX OR EMAIL IT TO:

**Rescue Coordination Centre**
**Maritime New Zealand**

**Fax: 04 577 8038**
**Phone: 04 577 8030**
**Email: rccnz@maritimenz.govt.nz**

Number of pages:

Urgent ○ Non-Urgent ○

**THIS REPORT MADE BY:** ……………………………………………………………………………………………

Installation…………………………………………………………Organisation……………………………………………

Date Time Phone Fax Mobile

**ESTIMATED TIER OF RESPONSE**

Tier 1 (Local) ○ Tier 2 (Regional) ○ Tier 3 (National) ○

**SITUATION REPORT**

Spill location

Date of spill Time of spill

LAT º 'S LONG º 'E

**IS THIS A PRODUCTION WATER DISCHARGE?** Y/N **If yes complete details immediately below.**

Hydrocarbon parts per million

Total volume of contaminated production water released

Time period release occurred over

**TYPE OF OIL SPILT**

Crude/Condensate ○ HFO ○ LFO ○ Lubrication Oil ○ Marine Diesel ○ Hydraulic Oil ○

Kerosene/Av. Gas ○ Petrol/Gasoline ○ Bilge ○ Unknown ○ Other (details)○

ESTIMATED QUANTITY OF OIL SPILT

IS THE SPILL CONTINUING? Y/N

If yes, estimated rate of release:

**SOURCE OF OIL SPILT**

Vessel ○ Offshore Installation ○ Pipeline ○ Unknown ○

**ACTIVITY**

Vessel Loading/Unloading ○ Refuelling ○ Bilge Pumping ○ Collision ○ Production water ○

Unknown ○

Other (details)○

**CAUSE**

Equipment/Mechanical Failure ○ Human Error ○ Vandalism ○ Negligence ○ Unknown ○

Other (details)○

**ENVIRONMENTAL EFFECTS/DAMAGE**

**RESPONSE/ACTION TAKEN**

**COULD SPILL ESCALATE?** Y/N if yes provide details below

**Please ensure that MNZ is notified immediately by phone and then fax or email the form through as soon as practical. Include all available information. Indicate information still to be obtained, and fax information updates when available.**

# Appendix 2: Guidelines for information on the nature and effectiveness of dispersants on individual oils

## 1. General

Operators are required to provide information to assist with deciding whether or not dispersant use is considered an appropriate response option to a spill of the oil produced from their operation. If dispersant use is to be included as a response option, dispersant effectiveness should be assessed on fresh and weathered oil under conditions relevant to any potential spill site.

The following provides a brief guide to the information needed to assess if and when dispersants provide a feasible response option to a spill. The approach should sequentially address oil characteristics, weathering, and then dispersant effectiveness. At a minimum, it should describe the following:

**2.** **The physical properties of fresh oil** (e.g. pour point, viscosity, density, API gravity, wax content and asphaltine content). These properties should be used to assess potential dispersant effectiveness using properties such as viscosity and pour point limits. Guides are included in Tables 5.1 and 5.2 of the MNZ (2006) Guidelines for the Use of Oil Spill Dispersants. Testing dispersants on oil may not be necessary if dispersants are considered an unfeasible response option at this initial stage.

**3.** **Oil weathering** (particularly evaporation rates, emulsion-forming tendencies, and changes in oil properties). The Mackay (MNS) chamber is well recognised as an effective way of weathering samples under controlled conditions. Measures of the oil properties should be provided for the weathering period in which dispersants are most likely to be effectively applied (usually the first 24-48 hours). A minimum of three weathering stages should be reported (e.g. 8, 24 and 48 hours), although a fuller sequence (e.g. 4, 8, 24, 48, 72, and 96 hours) will provide a better understanding of oil behaviour over time. This information should be used to predict likely changes in the physical properties of the oil should a spill occur, and how this will influence both natural dispersion and possible dispersant use. If weathered oil forms water-in-oil emulsions, information on the physical properties and stability of the emulsion should be provided.

**4.** **Dispersant effectiveness on fresh and weathered oil**. If the oil properties indicate chemical dispersion may be a feasible response option, MNZ dispersants should be tested for effectiveness on fresh oil at seawater temperatures representative of the likely spill site (e.g. average summer and winter temperatures). Different dispersant dose rates should also be tested (e.g. 1:10, 1:25) based on manufacturers recommendations. Effective dispersants should then be tested on increasingly weathered oil (e.g. 12, 24, 48 hours) until dispersant is no longer considered effective. To minimise costs, simple “jam jar” testing may be used to screen samples prior to formal laboratory testing.

A range of tests is available which can be used to rank the relative effectiveness of dispersants, and to determine effectiveness changes across different temperatures and dose rates (e.g. Warren Springs/Labofina rotating flask (WSL LR448), Swirling Flask test, Mackay test, EPA Baffled Flask test, Exxon Dispersant Effectiveness Test (EXDET)). Laboratory tests correlated to actual field effectiveness trials are preferred (e.g. the WSL LR448), and guidance should be sought from the testing laboratory regarding whether they consider the testing to show effective dispersion, and the types of conditions that they believe their testing method is representative of. Test methods and any assessment criteria used should be fully described. The testing should be sufficient to identify which dispersants are considered most effective and what the optimal dose rates are for both fresh and weathered oil.

Assessment of likely dispersant effectiveness during a spill. Laboratory test results alone do not address likely effectiveness during a spill. An evaluation is needed that relates oil properties and laboratory test results to the expected environmental conditions at a possible spill location (e.g. sea temperature, prevailing wind and wave conditions).

There is no specific format for reporting the information outlined above. However, the final output should identify whether or not dispersants provide a practicable response option and identify which dispersants are considered most appropriate for use. Decisions should be supported by relevant technical data or expert judgment as appropriate.

Because there are many site-specific considerations in any assessment, operators are encouraged to discuss their proposed testing and evaluation with MNZ.

An example Dispersibility Effectiveness report is provided below.

# 5. Example Dispersibility Testing Report

## Dispersibility Testing On Te Henga Crude Oil Using Six Dispersants

### Executive Summary

This study is designed to rank the effectiveness of six dispersants under different environmental conditions on Te Henga Crude Oil. This study provides an understanding of the effect of the six dispersants on the crude at different temperatures and provides information that is vital for contingency planning and determining the most appropriate response actions in the event of a spill.

Stage one involved carrying out dispersant tests on Te Henga Crude Oil at 15oC using Six dispersants; Gamlen OSD LT, Corexit 9527, Corexit 9500, Slickgone LTSW, Slickgone NS and Tergo 200-5, and included a Blank test with no dispersant. All dispersant tests in this study were type 3 and each test was carried out in triplicate. Laboratory investigations suggest that Corexit 9527 proved to be the most effective at dispersing Te Henga Crude Oil at 15oC. This dispersant gave a mean efficacy result of 23%. Slickgone LTSW was the second most effective dispersant which gave an efficacy result of 17%.

Stage two of the study used Corexit 9527,which was the most effective dispersant from stage one, on Te Henga Crude oil at a lower temperature of 10oC. These tests were also carried out in triplicate. Te Henga Crude has a pour point of approximately 21oC, which presents a relatively high viscosity at 10oC. This made the tests more difficult as the oil became more solid. The results from these tests suggest that Te Henga Crude is not dispersible at 10oC using Corexit 9527. The mean efficacy result for these conditions was only 3%.

In summary, Corexit 9527 was the most effective dispersant on Te Henga Crude Oil at 15oC, but was not effective at 10oC.

The threshold for the LR 448 efficacy test is based upon previous work where laboratory tests have

been correlated against field data to set the threshold value at 15%. When compared to this threshold limit it can be seen that Te Henga Crude at 15oC is dispersible using two of the dispersants tested, Corexit 9527 and Slickgone LTSW. Testing at the lower temperature shows that Corexit 9527 in no longer an effective dispersant for this particular oil.

## Introduction

Crude oils spilt on the sea surface undergo evaporation and emulsification processes that change their physical properties. Understanding these changes is important, as the physical properties of the oil determine the long-term persistence of the oil and the choice of clean-up techniques. Some oils, particularly those that do not form stable water-in-oil emulsions, are relatively non-persistent and, in the event of spillage, might be expected to disperse naturally within a short period of time as a result of wind and wave action. Other oils, that form viscous emulsions, are likely to be very persistent and may also be resistant to treatment by dispersants (unless treated rapidly before emulsions can form).

Since the behaviour of the oil is so important in determining a response strategy, it is essential that oil contingency plans should take account of the particular properties of the oil and how these might change with time. Thus, any understanding of the environmental behaviour of oil requires not only information on the physical properties of the fresh crude oil, but also information about the physical properties of the weathered oils and emulsions. Maxwell Laboratories has undertaken studies on the weathering and emulsification behaviour of numerous crude oils. The work entails measurement of changes in properties of the oil in simulated weathering experiments and the effects of dispersant treatment on the oils.

Maxwell Laboratories has been commissioned to carry out an initial dispersant test study on fresh Te Henga Crude without weathering at this stage, as part of a multi stage study. The dispersant testing on Te Henga Crude Oil will rank the effectiveness of six dispersants under different environmental conditions.

## Objectives of Study

The objectives of this work programme were to:

1. Obtain dispersant efficacy data using six dispersants on Te Henga Crude Oil at 15oC, to rank the dispersants in order of effectiveness. The six dispersants chosen for the study are; Gamlen OSD LT, Corexit 9527, Corexit 9500, Slickgone LTSW, Slickgone NS and Tergo 200-5. This stage also includes a blank test where no dispersant is used.

2. Obtain dispersant efficacy data for Te Henga Crude Oil at 10oC using the most effective dispersant determined in stage one of the study.

## Work Programme

The work programme consisted of two stages. Stage one was to carry out the Warren Spring Laboratory WSL LR 448 protocol (Morris & Martinelli, 1983) on Te Henga Crude Oil using six dispersants at 15oC. These tests were carried out in triplicate and are outlined below. Stage two was to use the most effective dispersant from stage one and use it on the oil at a lower temperature of 10oC.

## Dispersibility testing

The effectiveness of the dispersants on the Te Henga Crude Oil was measured against six dispersants using the Warren Spring Laboratory LR 448 protocol (Morris & Martinelli, 1983). The test consisted of adding a known quantity (5g approximately) of oil to 250 ml of artificial seawater with a salt concentration of 35 g l-1 contained in a 250 ml separating funnel. Dispersant (200 µl) was added dropwise to the oil from a syringe. The funnel was stoppered, left to stand for 1 minute then rotated at 33 rpm in a motor driven rack for 2 minutes. The rotation was stopped; the funnel unstoppered and allowed to stand for 1 minute before 50 ml of oily water was run-off. The oil was extracted from the sample with chloroform, dried with sodium sulphate and diluted with chloroform to 100 ml in a volumetric flask. The UV absorbance of the solution was measured at 580 nm, and by comparison to a calibration curve the amount of oil dispersed was determined.

The degree of dispersibility (%) was calculated as:

$$\% \text{ Dispersibility} = \frac{\text{Mass of Oil Dispersed into Water} \times 100}{\text{Mass of Oil Used in Test}}$$

Dispersibility tests were carried out at temperatures of 15oC in stage one and 10oC in stage two. The dispersants tested were Gamlen OSD LT, Corexit 9527, Corexit 9500, Slickgone LTSW, Slickgone NS and Tergo 200-5.It should be noted that laboratory dispersant tests were designed to rank the relative effectiveness of different dispersants and not to provide quantitative estimates of how effective they might be at sea. Only field trials can provide a truly quantitative estimate of dispersant effectiveness at sea (Lunel, 1995).

**Results**

The results of the dispersibility tests on Te Henga Crude Oil are detailed as follows.

Table 4.1: Dispersant Testing at 15oC (Stage One)

| | Dispersant Efficiency (%) | | | | | | |
|---|---|---|---|---|---|---|---|
| Product | Gamlen OSD LT | Corexit 9527 | Corexit 9500 | Slickgone LTSW | Slickgone NS | Tergo 200-5 | Control |
| Efficacy Results | 15<br>15<br>15 | 9<br>9<br>8 | 14<br>16<br>15 | 22<br>23<br>26 | 18<br>17<br>18 | 23<br>23<br>24 | 0<br>0<br>0 |
| Mean result | 15 | 9 | 15 | 24 | 18 | 23 | 0 |

The results in Table 4.1 suggest that Slickgone LTSW is the most effective dispersant for use on Te Henga Crude at this temperature giving a mean result of 24%. This dispersant was chosen for stage two of this study. See appendix 2 for the plot of dispersant test data. This dispersant demonstrated effective dispersion into the water column and more importantly that the oil remained in the water column during the “waiting period” of the test. The results can be seen in the photographs in appendix 4.

**Table 4.2: Dispersant Testing at 10oC (Stage Two)**

. The photo shows the oil forming a round blob on the surface of the water.

| | Dispersant Efficiency (%) |
|---|---|
| Product | Slickgone LTSW |
| Efficacy Results | 4<br>4<br>5 |
| Mean Result | 4 |

The results in Table 4.2 suggest that Slickgone LTSW was not effective at dispersing Te Henga Crude at 10oC. The results of this test can be seen in the photographs in appendix 5. At this temperature the oil rolled on the surface and was unaffected by the application of dispersants

**Conclusions**

Laboratory investigations on Te Henga fresh crude oil suggest that it is dispersible and passes AEA’s threshold value of 15% with Slickgone LTSW and Tergo 200-5 at 15oC.

The threshold value for the LR 448 efficacy test is based upon previous work where laboratory tests

have been correlated against field data. The threshold value does not provide quantitative estimates of dispersant effectiveness at sea. (Lunel,1995).

The other dispersants in the study, Gamlen OSD LT, Corexit 9500, Slickgone NS and Tergo 200-5, were all tested using the LR 448 protocol but were found to be ineffective on this oil at this temperature (15oC). The Blank dispersant test demonstrated no dispersion of the oil at all. The efficacy result from this test was zero.

The best performing dispersant was carried forward onto stage two of this study. This dispersant was Slickgone LTSW. The laboratory investigations suggest that this dispersant was ineffective at the colder temperature of 10oC. The ineffectiveness of the dispersant tests on the fresh oil at the lower temperatures of 10oC suggests that further research, including weathering may prove futile. However the oil displays a much more fluid behaviour at the higher temperature15oC and consequently is more amenable to dispersants.

**Appendices would include**

Appendix 1. Summary of work program

Appendix 2. Plot of dispersant test data

Appendix 3. Raw data extracted from dispersant tests

Appendix 4. Photograph of Te Henga oil during testing at 15oC

Appendix 5. Photograph of Te Henga oil during testing at 10oC