OIL SPILL CONTINGENCY PLAN FOR FUEL BUNKERING OPERATIONS IN THE NAMIBIA EXCLUSIVE ECONOMIC ZONE (EEZ)

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1 INTRODUCTION

1.1 Background

The proponent, VMS Investments Holdings (Pty) Ltd, intends to provide bunkering services within the Namibia Exclusive Economic Zone (EEZ). The Government of Namibia has enforced companies to develop a Marine Spill Contingency plan as part of its commitment to protecting our valuable coastal and marine resources from the threat of marine pollution incidents.

The plan has been developed to reflect the essential steps necessary to initiate, conduct and terminate an emergency spill response on, or into the navigable waters of Namibia, on the adjoining shorelines, the waters of the contiguous zone or into waters of the exclusive economic zone.

In the event of a marine pollution incident, the proponent is required to follow the procedures laid down in this plan.

1.2 Aim & Objectives

The Aim of the oil spillage contingency plan is:

- To plan and provide for an appropriate response capability to prevent/minimise damage to marine and coastal environments and resources from marine pollution events.

The Objectives of the oil spillage contingency plan are:

- Provide the basis of planning for marine pollution and other maritime emergencies.
- To provide the organisational structure and procedures for the coordinated, timely and effective response to maritime spills of oil and other noxious and hazardous substances.
- To provide systems for the detection and reporting of marine spills within the area covered by the plan, including communications networks.

- To outline the counter-measures available to restrict the spread of a spill and minimise the environmental, economic and social impacts of a spill.

1.3 Technical Scope & Tier One, Two and Three Spills

This oil spillage contingency plan covers the response to spills into the marine environment of all forms of pollutants, including oil, chemicals and other hazardous materials. However, it retains a primary focus on oil spills, as oil is the main pollutant likely to be spilled in Namibian waters.

Figure 1 Namibia's Offshore Exclusive Economic Zone Area (EEZ).

The contingency plan covers spills into the marine environment from all sources, including both shipping and shore-based facilities.

For the purposes of the contingency, spills are classified as tier one, two and three spills. Classification is dependent upon the amount of pollutant spilt, or likely to be spilt, the resources required and level of support both nationally and internationally.

Tier one

Small spills that are within the response capability and resources of an individual port or oil terminal within the project area. These spills would normally have low potential for environmental or economic harm and are usually covered by oil terminal or port specific response arrangements.

As a guide spills of this nature are in the range of less than 10,000 litres.

Tier two

These spills would have a moderate potential for environmental and/or economic harm and are **c**overed by this contingency plan.

As a guide spills of this nature are greater than 10,000 - 100,000 litres.

Tier three

Major spills that are of a magnitude and/or severity that is beyond the response capability and resources of Namibia and/or that impacts or threatens to impact within the jurisdiction of both Namibia and neighbouring country(ies) and, **t**he spill has the potential to cause extensive local or regional environmental damage and loss of resources.

As a guide spills of this nature are greater than 100,000litres

Set quantities and sizes of spills have intentionally not been used in the definition of tiers, only a guide has been given in this plan. This is because in some instances a relatively small spill of oils and hazardous chemicals may fit the tier two or even tier three category, depending on the response capabilities and resources available, the prevailing conditions at the time of the spill and the types of environments impacted or threatened.

Allocation of any one spill to a particular tier can only be done at the time of the spill, according to an assessment.

1.4 Geographical Scope

The geographical scope of contingency plan , referred to hereafter as the contingency plan area, is located along the coastline from the Walvis Bay area. The coordinates of the site are **14.509916667, -22.935733183**.

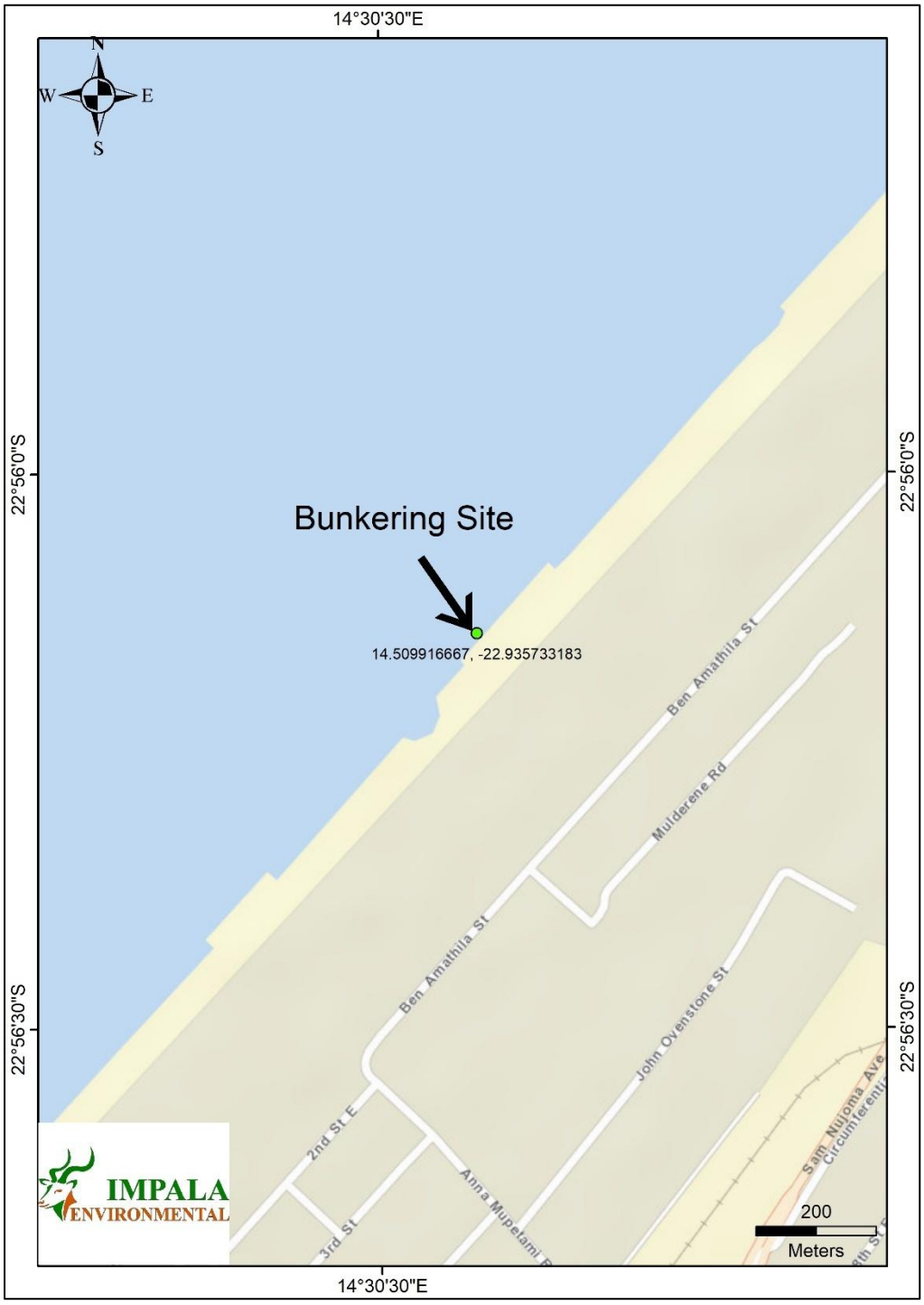

Figure 2 Locality of the bunkering site in relation to the Walvis Bay area.

Figure 3 Satellite image of the bunkering site area.

1.5 Underlying Principles, Protection Priorities & Environmental Sensitivities

The main four underlying principles of an environmental pollution emergency plan are:

Prevention: Regulatory and physical measures to prevent incidents or mitigate the effects of the pollutant.
Preparedness: Arrangements to mobilise and deploy all necessary resources and services.
Response: Actions taken during and immediately after a pollution emergency to minimise effects.
Recovery: Arrangements to restore the affected environment to normal.

Contingency plan is founded on the following general principles:

- Every effort must be made by the proponent to **prevent** spills of oil and other hazardous materials from occurring, as the highest priority.

- Despite such efforts, for various reasons, spills will continue to occur from time to time, and it is necessary to have competent **contingency plan s** in place to deal effectively with such spills, at the local and national level.

- The primary purpose of contingency plan is to provide a mechanism for the **prevention/minimisation of damage** to marine and coastal **environments and resources** from marine spills, and to hasten the **recovery** of any environments and resources damaged by marine spills.

- The response to marine spills under contingency plan will always seek to maximise co-operation, co-ordination and integration **between government and industry**, and to adopt the most **cost-effective, efficient** and **practicable** response options available.

In the event of a marine spill requiring a response, the following protection priorities should be adhered to (in order of priority accepted internationally):

- Human life, health and safety.
- Biological habitat.
- Rare and endangered species.
- Cultural resources.
- Commercial resources.
- Non-commercial property and amenity.

Within these protection priorities, various marine and coastal environments and resources have different environmental sensitivities, requiring further prioritisation of spill response efforts.

Tropical coastal foreshores can be classified into a number of broad scaling of sensitivity to oil pollution as follows.

1	**Exposed rocky headlands and platforms with high wave energy**	Wave swept, most oil removed by natural processes within days according to wave energy.
2	**Exposed sand beaches**	Oil may sink and/or buried according to sand sub-Strata. Generally oil will be removed naturally within weeks. Can be removed by mechanical means.
3	**Exposed tidal flats and gravel beaches**	Oil may penetrate and be buried. Depending on energy conditions. Oil may persist for some time.

4	**Sheltered rock coasts and high amenity Areas**	If not protected oil may persist for some time. Amenity areas most likely to cause public and tourist operator concern.
5	**Sheltered tidal flats, mangroves and biologically sensitive areas**	Most productive of coastal environments. Oil may persist for many years. Difficult to clean, protection of these environments should receive first priority.

The clean-up options used must be tailored to suit the needs and sensitivities of the foreshore contaminated. Response authorities must ensure that expert environmental opinion is sought on the correct methods to use in the different coastal environments to ensure further damage is not done to sensitive ecosystems.

These cleanup options can be summarised as follows:

1.5.1 Rocky Foreshore

If clean up action is required, the use of low-pressure sea water to disperse the oil back into the water should be considered where booms deployed in the near shore can concentrate the oil for recovery. Dispersant may be used by should only be used in the absence of significant biological activity. Physical cleaning techniques are also widely used.

1.5.2 Sandy Beaches:

Preferred method is physical removal and disposal of oiled material.

1.5.3 Marshlands and Mud Flats.

Expert opinion should be sought in these situations. Water flushing techniques can be used but sometimes no clean up action may be preferable. These environments are very sensitive to physical damage from the impacts of responders disturbing the roots systems of marsh plants and mangroves and trampling oil into the soft sediments.

1.6 Risk Assessment

International data suggests that 80% of marine oil spills occur within port or harbour areas. These spills are usually small in nature resulting from normal operations such as loading/unloading and bunkering of fuels.

Factors that need to be considered are:

- Risk of collision
- Risk of groundings
- Hazard to navigation
- Records of seaworthiness of vessels (Port/State Control inspections)
- Negligence and competence of crews
- Size/type of vessels
- Type/amount of oil/chemicals carried
- Traffic density
- Environmental factors (weather, tides, severe weather events e.g. cyclone frequency)
- Environmental resources under threat
- Petroleum facilities
- Tank farms
- Offloading mechanisms e.g. wharf/fixed pipeline/floating pipeline

1.7 Types of Oils and Chemicals Transported in Region

The oil and petroleum products transported and handled in Namibia are:

- Diesel
- Jet A1/Kerosene
- Unleaded Petrol
- Lubricating Oils

2 ROLES & RESPONSIBILITIES

2.1 Collaborative Stakeholders:

Namport: Provides operational support, monitors port activities, and ensures compliance with port safety regulations.

Ministry of Environment, Forestry, and Tourism: Oversees environmental compliance and provides guidance on ecological impact mitigation.

Ministry of Mines and Energy: Approves bunkering licenses and ensures adherence to national energy policies.

2.2 Coordinating Committee Composition:

- **Chairperson**: Appointed representative from VMS Investments Holdings (Pty) Ltd.
- **Members**: Environmental Officer (VMS), Representative from Namport, Legal Advisor specializing in maritime and environmental law, Spill Response Manager (third-party contractor or internal lead) and Community Liaison Officer to coordinate with local stakeholders and coastal communities.

2.3 Statutory Requirements and Relevant Agreements

2.3.1 Namibian Legislation:

- **Environmental Management Act No. 7 of 2007**: Governs environmental impact assessments and incident reporting requirements.
- **Marine Resources Act No. 27 of 2000:** Ensures sustainable use of Namibia's marine resources.

2.3.2 International Conventions:

- **MARPOL 73/78 Annex I:** Regulates pollution by oil and mandates emergency plans for vessels.
- **OPRC Convention (1990):** Establishes frameworks for oil pollution preparedness and international cooperation.
- **Convention on Wetlands of International Importance (Ramsar Convention)**
- **United Nations Educational, Scientific and Cultural Organization (UNESCO) World Heritage Convention**
- **Convention on the Conservation of Migratory Species of Wild Animals (CMS or Bonn Convention)**

2.3.3 Industry Guidelines:

- IPIECA and ITOPF best practices for oil spill management.

2.4 Responsible Party (Polluter)

The party responsible for causing the spill has the following responsibilities:

- Reporting the spill immediately to the Responsible Authority.
- Taking immediate action to control or stem the source of the spill.
- Taking immediate action to contain the spill and prevent it from spreading.
- Co-operating fully with the Proponent in the response to the spill under the direction of the Incident Controller (IC).
- Any legal obligations and responsibilities not covered above as required by relevant legislation, including those relating to meeting the costs of the spill response and clean up and mitigation of any environmental and economic damage.

2.5 Oil Industry

All oil companies operating in Namibia have the following roles and responsibilities under contingency plan:

- Giving highest priority to preventing spills from tankers, pipelines, terminals, depots and other facilities owned and/or operated by them.
- Immediately reporting all marine spills from their facilities to the Responsible Authority or Proponent.
- Developing and maintaining local marine spill contingency plan s for all facilities that they own, manage and/or operate as well as ensuring that these plans are compatible and integrated with contingency plan.

- Establishing and maintaining stockpiles of marine spill response equipment for all facilities that own, manage and/or operate, with the types and amounts of equipment being appropriate to the level of risk at each facility.
- Ensuring that personnel are appropriately trained in marine spill prevention and response.
- Actively participating in the National Marine Pollution Committee and in planning, exercises and training activities.

3 POLLUTION REPORTS & COMMUNICATIONS

3.1 Surveillance & Spill Detection

All maritime oil and chemical spills should be reported to the Responsible Authority and recorded systematically. Vessel incidents such as groundings, collisions, fires, explosions or other accidents or incidents should also be reported as these can often lead to the release of cargoes or vessel fuels and oils.

Under the ***International Convention for the Prevention of Pollution from Ships (MARPOL* 73/78)** there is an obligation on the master of a vessel to report any marine pollution incidents without delay, and to the fullest extent possible, to the coastal State in order to facilitate necessary counter-pollution actions. Mandatory reporting requirements for incidents involving harmful substances are contained in article 8 and Protocol 1 to MARPOL 73/78.

All personnel in industry, government agencies, members of the general public, as well as crews of civil and military aircraft, should be required to, and be able to, report a spill to the Responsible Authority or Proponent 24 hours a day.

3.2 Initial Pollution Reports (POLREPS)

Recognising the importance of rapid dissemination of information in the event of a marine spill, any ship's master or crew, aircraft crew, oil company employee, port personnel or any other person observing a marine spill should immediately report the spill to the Responsible Authority or after hours to Namibian Police Emergencies.

The Responsible Authority should assess the implications of the situation and make a decision on whether any response is likely to be required. The Authorities should

also consider whether other parties need to be made aware of a potential pollution situation if operational personnel need to be placed on standby. The authority should immediately complete a POLREP, using the standard format.

3.3 Post-Incident Reports (POSTREPS)

After a pollution incident, the proponent should prepare a brief report including:

- Assessment of the response operation, including reference to equipment used, its effectiveness, additional equipment, and training needs.
- Documentation of clean-up costs.
- Assessment of environmental and economic damage.
- Details of problems encountered.
- Recommendations regarding amendment or revision of contingency plan.

When the proponent has compiled this report, the Incident Controller and other personnel should meet with the National Marine Pollution Committee to review their collective experiences and compile an overall Post-incident Report (POSTREP), including, if necessary, any recommendations for amending or revising contingency plan.

3.4 Media and Public Reporting

When an incident occurs, it is imperative to give the public prompt, accurate information on the nature of the incident and actions underway to mitigate the damage. Media and community relations personnel should ensure that all appropriate public and private interests be kept informed and their concerns are considered throughout a response.

4 INCIDENT COMMAND & CONTROL

4.1 Elements of Effective Control of Spill Response

Establishing effective control and initiating a spill response requires a number of actions, these include:

- Appointment of an Incident Controller,
- Mobilising the Marine Spill Response Team,

- Establishing a suitable incident control centre,
- Establishment of effective communications,
- Effective collation, transfer, display and storage of information,
- Effective management of public and community relations (media and consultative processes).

4.2 Incident Control System and Marine Spill Response Team

Response operations cannot be effectively carried out unless there is a clear organisational structure to command and control the response and trained individuals to carry out the response plans.

The overall structure of incident command and control system (IC) is depicted in the figure below. In the event of a marine spill within Namibia waters, a Marine Spill Response Team based on this structure should be immediately established by the designated Proponent.

The number and nature of the individual sections and units should be flexible and tailored to suit the size and nature of the spill. Several functions may be combined under a single coordinator for small spills.

The IC directs response efforts and co-ordinates all efforts at the scene and is the primary decision-making authority in relation to spill response activities. This is achieved through the Incident Control System especially modified to support oil spill response called the Oil Spill Response Incident Control System or OSRICS.

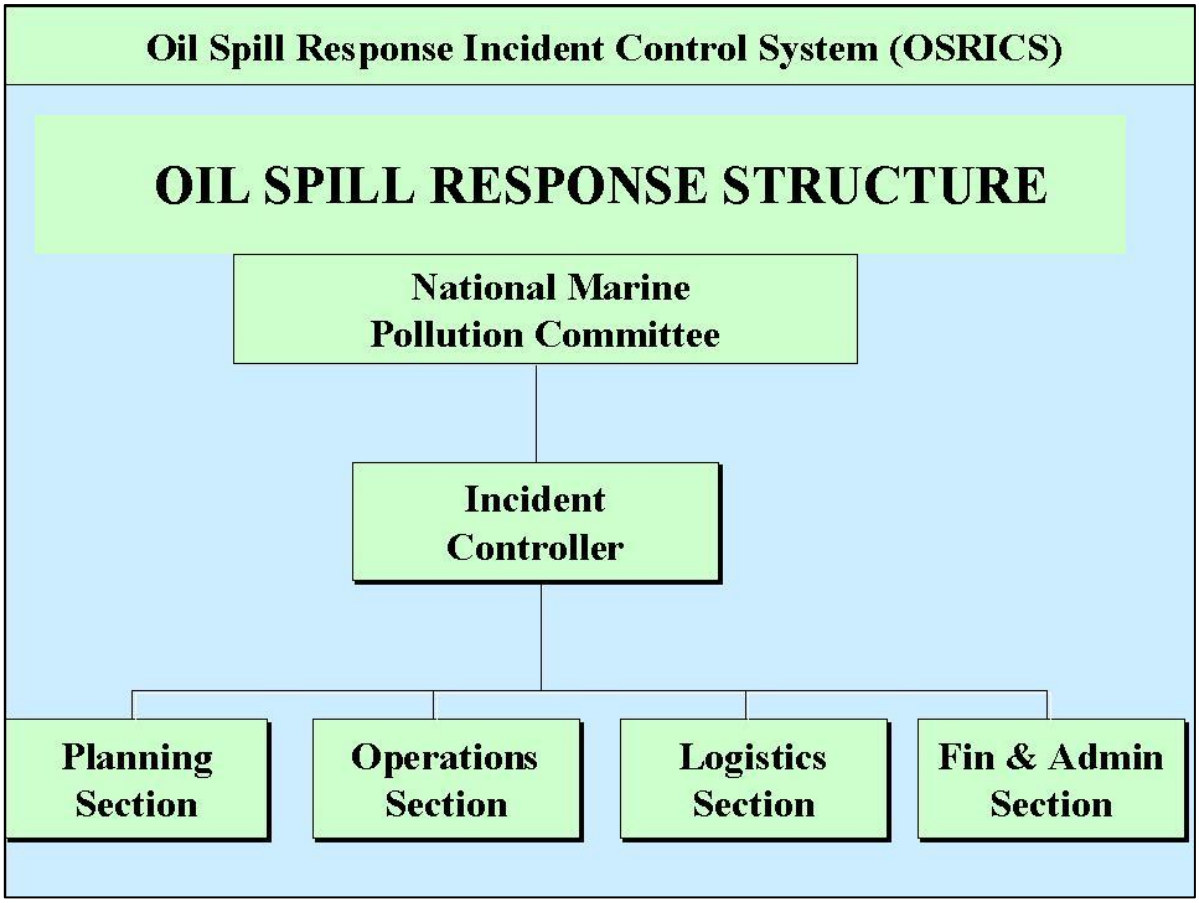

Figure 4 Incident Control System and Marine Spill Response Team.

The responsibilities of the various roles within the Marine Spill Response Team can be summarised as follows:

- **Planning Section**: responsible for the provision of scientific and environmental information, the maintenance of incident information services, and the development of the Incident Action Plan. The Environment and Conservation Division is responsible for planning.
- **Operations Section**: responsible for undertaking all response operations in the field. The Marine Division is responsible for operations.
- **Logistics Section**: responsible for the provision of resources to sustain the response. The Disaster Management Section is responsible for logistics.
- **Finance & Administration Section**: responsible for maintaining financial and administrative records of the response activities.

5 RESPONSE ACTIONS & OPERATIONS

The ecological impact of oil, fuel, chemical or hazardous substance spill can be minimised by good management and planning as well as the response actions put into effect by the Responsible Authority and Proponent. Such actions will largely depend on several factors;

- The type of oil, fuel or chemical(s) involved;
- The size of the spill;
- The location of the spill;
- Prevailing sea and weather conditions at the spill site;
- The environmental sensitivity of the coastline/site impacted.

In commanding the response to the spill, the IC should ensure that defensive actions should begin as soon as possible to prevent, minimise or mitigate the threat to the environment or public health from the pollution.

Depending on the nature of the spill, some of the actions listed below may not be applicable or may be carried out in parallel rather than in sequence, as determined by the IC.

5.1 Phases of a Response

There are five main phases to the overall process of responding to oil or hazardous chemical spills which can be summarised as follows in the figure below:

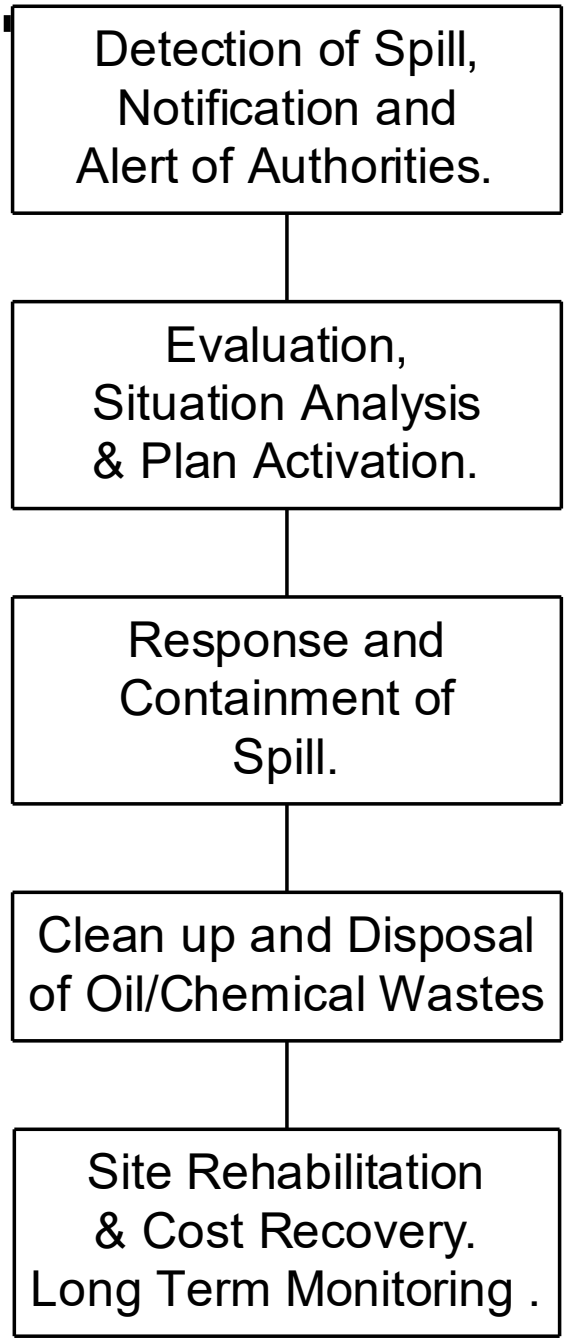

Figure 5 Phases of a Response

5.2 Secure Human Life, Health and Safety

The highest priority when a spill has occurred is to take action to ensure that there is no threat to human life, health and safety. This protection of public health and safety as well response personnel should take precedence over all other actions to minimise environmental damage.

Each oil, fuel or chemical spill incident has its own unique dangers to which response personnel may be exposed. The protection of the public and response personnel

should always be of prime importance in the decision-making. In marine spill response situations, equipment or personnel should not be deployed:

- If the identity of the fuel oil or chemical(s) spilled and hazards are unknown;
- If weather or sea conditions pose an undue risk to personnel safety;
- If there is a threat of fire or explosion;
- If required personnel protective equipment is not available.

Operations should be suspended or terminated if an unsafe condition arises during a response operation.

Major vessel incidents such as fires, explosions, groundings etc can result in the need for the search and rescue of mariners. First priority should always be to the health and safety of personnel.

5.3 Stabilising Spill Source & Intervention at Sea

The second priority action is to attempt to stop the flow of oil (or other pollutant in the case of spills other than oil), in order to minimise the potential size, extent and severity of the spill.

All efforts must be focused on saving a vessel so that the problem is not compounded. Stabilising the situation includes securing the source of the spill and/or removing the remaining oil from the vessel, tank or pipeline to prevent additional pollutant entering the sea.

With accession to the ***United Nations Convention on the Law of the Sea (UNCLOS)***, Namibia's jurisdiction extends to the Exclusive Economic Zone and the Territorial Sea extends to 12 miles from the coastline. This permits Namibia to intervene on the high seas against the wishes of the ship and cargo interests. This is only to the extent necessary to prevent, mitigate or eliminate grave and imminent danger to the coastline or related interests from pollution or threat of pollution of the sea, following a maritime casualty, which may be reasonably expected to result in major harmful consequences.

The measures taken must be proportionate to the damage, whether actual or threatened, and must not go beyond what is reasonably necessary to achieve the ends of protection and must cease when those ends have been achieved.

Such measures may include:

- Move the ship or part of the ship to another place;
- Remove cargo from the ship;
- Salvage the ship, part of the ship or any of the ship's cargo;
- Sink or destroy the ship or any part of the ship;
- Sink, destroy or discharge into the sea any of the ship's cargo, or
- Take over control of the ship or any part of the ship.

5.4 Salvage of Casualty

In the event of an incident involving a damaged or disabled ship, it is paramount that the salvage industry be involved in the response as soon as possible. Salvage activities may need to be arranged for taking the vessel in tow, refloating a grounded vessel, or reducing or stopping a discharge of pollutant to minimise environmental damage resulting from the casualty. It is essential that these operations be undertaken as soon as possible

In accordance with Namibia legislation Marine Division has responsibility for safety issues relating to vessels on coastal or foreign voyages and will be responsible for ship operational matters. These functions include alerting and liaising with salvors, taking measures to minimise pollution release or outflow and other salvage activity.

The vessel's owner or master will normally appoint a salvor by signing a Lloyds Open Form Agreement. However, in cases where this does not occur, Marine Division may use its powers under the ***International Convention relating to Intervention on the High Seas in Cases of Oil Pollution Damage 1969 (although Namibia is not a party to this convention)***, to either direct the Master/Owner to engage a Salvor or alternatively contract a salvor to undertake necessary work, with costs recoverable from the owner.

5.5 Spill Assessment & Reporting

Once attempts have been made to stem the flow of oil (or other pollutant), the nature, size, extent, severity and likely movement of the spill should be assessed, and a POLREP completed and transmitted urgently to all members of the National Marine Pollution Committee, other affected/interested parties.

The IC is responsible for the assessment of the spill to attempt to classify it as Tier One, Two or Three (refer section 1.3), and determine whether or not external assistance is required. The assessment of Tier levels may change over time and should be periodically reviewed during the spill.

The Namibia Police Service will assist the IC in spill forensic sampling and evidence collection to assist in ensuring that the polluter is held responsible for the marine spill.

5.6 Spill Surveillance and Forecasting

It is vital that the likely movement of the spill is assessed, in order to identify possible impact areas and determine the most operate response options. There are three main ways a spill trajectory can be determined;

- Direct observation (surveillance),
- Manual calculation using currents & winds,
- Computer modelling.

Visual observation of any spill is essential and the IC, through his support personnel, should arrange for charter, military or commercial aircraft to assess and monitor the movement of the spill.

Meteorological and hydrographic data should be obtained by the IC, through his support personnel, and analysed to obtain predictions of expected spill movement. Local knowledge from people such as fishermen and mariners should be used as a valuable source of expertise on likely spill movement.

It is essential that the results of such observations and predictions be transmitted to other parties likely to be affected by the spill (e.g. neighbouring islands).

In some areas, sophisticated spill trajectory prediction systems may be available, such as computer models. Information on the availability of such systems for various areas can be requested.

5.7 Response Option Assessment Criteria

Alternative control and protection options shall be assessed to determine whether they can adequately protect human health and the environment in both the short term and long term from the unacceptable risks posed by the oil or hazardous substance spill.

When assessing the appropriate response options the criteria the Planning Unit and IC should use are;

- Overall protection of human health and the environment,
- Short- and long-term effectiveness on reducing flow, mobility or toxicity of pollutant,
- Implement ability of option and availability of equipment and materials,
- Government/community acceptance of option,
- Relative cost compared to other options.

It is the responsibility of the Planning Section to develop a Response Action Plan (RAP) that must include;

- Clear environmental objectives for the plan (e.g. protection / clean-up).
- A strategy for the response and necessary action to be undertaken by the Operations Section.
- Clear time-lines for actions to phases of the plan and,
- Concise statements of responsibilities for the set actions/tasks.

5.8 Leave Alone and Monitor

Should surveillance and forecasting indicate that the spill is unlikely to impact on coastlines and is likely to remain in open water, then the best option maybe to leave the spill alone, allowing natural physical and biological degradation to occur at sea.

The response to marine spills under contingency plan should always seek to complement and make use of **natural forces** to the fullest extent possible.

However, it is vital that the movement of the spill is closely monitored, through continuing surveillance and forecasting. The next stage of response operations should be activated if even the slightest possibility of coastal impact arises.

5.9 Containment & Recovery at Sea

Should surveillance and forecasting indicate that the spill might impact on coastlines, the possibility of containing and recovering the oil at sea to prevent such impact should be pursued.

The ability to conduct effective containment and recovery operations at sea will be limited by the nature of the spill, available equipment, physical conditions and logistical considerations. In many instances, especially in open water, containment and recovery at sea may not be possible.

5.10 Use of Oil Spill Dispersants

In the event that containment and recovery is not possible, or is only partially effective, another possible option to prevent or minimise the spill from impacting on the coast is to disperse it at sea, using chemical dispersants. Dispersants can be applied to the spill from vessels or aircraft.

The techniques and equipment available for the application of dispersants will be in accordance with the international guidelines as further mentioned below.

As with containment and recovery at sea, the effective use of dispersants will be limited by the nature of the spill (including the type of oil and its dispersibility), the availability of dispersant stocks and application equipment, physical conditions and logistical considerations. In many instances, effective dispersal of oil at sea may not be possible.

In addition, the inappropriate use of dispersants can cause worse environmental impacts than undispersed oil. Dispersants are pollutants themselves, and their use can temporarily increase the toxicity of the oil, by increasing its surface area to volume ratio and thereby increasing the release of the toxic components of the oil into the marine environment. If used in very shallow water and on shorelines, they can cause the oil to penetrate into sediments, creating potential long-term pollution problems.

The use of dispersants should therefore only occur under strict supervision by competent environmental and scientific authorities and in accordance to the Environmental Guidelines on the Use of Oil Spill.

If dispersants are used in accordance with the international guidelines, they represent a very useful oil spill response tool and it is advised that the nominated environmental unit of the response team be involved in the planning and use of dispersants.

To ensure only approved dispersants are used in Namibia waters the National Marine Pollution Committee shall maintain a schedule of dispersants and other response chemicals that may be authorised for use on oil spills at sea or on shorelines.

5.11 Foreshore Protection

In most circumstances, despite best efforts to contain and recover and/or disperse a spill at sea, a weather-driven spill is highly likely to impact on coastal environments and resources.

Efforts will therefore have to be made to protect foreshores. Options include the use of oil spill booms to physically prevent oil from impacting on the foreshore, or to direct it to preferred collection points (such as a sandy beach), where it can be recovered.

The ability to conduct effective foreshore protection operations will be limited by the nature of the spill, available equipment and personnel, physical conditions and logistical considerations. In virtually every situation, it will only be possible to protect a relatively small area of foreshore. It is therefore absolutely necessary to clearly establish protection priorities, in accordance with the relative environmental sensitivities and resource values of the threatened coastal environments and resources.

5.12 Foreshore Clean-up

In the likely event that a spill does impact on coastal resources and environments, it may be necessary to conduct foreshore clean-up operations. However, before proceeding with clean-up, the option of leaving the oil (or other pollutant) alone and allowing natural physical and biological degradation to occur, should be considered However, this option is only likely to be acceptable in very remote, unpopulated areas or with high-energy wave environments.

Where oil does come ashore, the extent of clean-up of oiled coastal areas is to be carefully planned with the view of minimising further environmental damage that may result from the clean-up operation.

Sometimes, oil on shorelines may best be left to weather and degrade naturally. This is particularly true where oil impacts a sensitive area such as mangroves, salt marshes or mud flats. In these areas the clean-up operations can result in more environmental damage than the oil itself due to physical disturbance and substrate erosion.

The selection of shoreline clean-up techniques depends on many different factors, which include:

Type of substrate;

- Amount of oil on the shoreline;
- Depth of oil in the sediments;
- Type of oil (tar balls, pooled oil, etc);
- Presence of Marinelife;
- Prevailing oceanographic and meteorological conditions;
- Environmental or culturally significant sites; and
- Access and mobilisation of equipment.

Shoreline clean-up methods may consist of one or more of the following methods, depending on the extent of oiling and the shoreline environment:

- Removal of floating or pooled oil;
- Removal of oiled material and vegetation;
- Use of sorbent materials;
- Low pressure flushing;
- Mechanical collection and removal of oiled material;
- Manual collection and removal of oiled material;
- Use of Bioremediation agents; and
- Dispersant application.

An important consideration during foreshore clean-up is to ensure that clean-up operations do not cause greater environmental damage than the spill itself (for

example heavy machinery damaging sand-dunes, etc). Also, that wastes collected are kept to a minimum to avoid costly waste disposal and loss of foreshore materials and biota.

Equipment such as the following can be used on foreshore cleanup operations if available.

- Rope mops
- Sorbents materials and booms
- Skimmers
- Direct suction equipment (vacuum trucks)
- Water flushing equipment
- Other mechanical equipment etc. such as excavators, bulldozers, backhoes etc.

5.13 Coastal Swamps and Mangroves

Coastal swamps and mangroves are very fragile and important ecosystems and a high level of protection should be placed on these coastal environments.

- Oil should be prevented from entering coastal swamps by using dispersant on marine spills well off-shore;
- Booms should be deployed so as to restrict flow of oil into the mangrove area;
- Oiled swamps should not be cleaned unless:
  - Access is readily available and sediment is firm;
  - The mangroves do not have aerial roots (pneumatmophores)
- Seek expert environmental advice before using dispersant on or near mangroves;
- Manually clean up mangrove areas must be strictly supervised.

5.14 Bioremediation

Bioremediation is the artificial enhancement of hydrocarbon degrading organisms designed to consume and break down oil. By accelerating the natural biological processes of biodegradation, bioremediation aims to increase the rate of degradation, by either stimulating microorganisms existing naturally in the area, or by seeding more microorganisms. However, the immediate environment is quickly depleted of available nutrients, especially nitrogen, which is necessary to support this increased population. Thus, most uses of bioremediation will require the application of fertiliser to the affected area. In some cases, it may be beneficial to start fertiliser application before an area is affected.

Whilst bioremediation has not been a primary response strategy to an oil spill historically, it is now receiving renewed attention and can be used successfully to assist an area to recover oil foreshores from the effects of an oil spill.

Bioremediation of oil spills can incorporate three general techniques to artificially enhance the biological degradation of oil:

- Addition of nutrients to the environment (fertilisation);
- Culture and inoculation of in-situ or exotic organisms;
- Culture and inoculation of genetically enhanced organisms.

The most effective bioremediation strategies for oiled foreshores have utilised the **fertilisation technique.**

5.15 In-situ Burning

Burning of the spilt oil or fuels at sea has the potential of removing large quantities of spilt oil or fuels but has not been used extensively in oil spill response in the region.

The application of in-situ burning could prevent oil coming ashore into populated areas or preventing oil contamination of environmentally sensitive habitats and Marinelife. The technique offers the advantage of a quick removal process minimising shoreline contamination and reducing the quantity of oily waste products requiring treatment or disposal, as well as removing the oil before it spreads or moves to other areas under the action of wind and currents.

The disadvantage of in-situ burning is the inefficient combustion of the oil resulting in a visible black smoke plume. It has been perceived that atmospheric fallout of

combustion by-products; soot, combustion gases and volatilised hydrocarbons could pose a health risk down wind. Recent research has shown that these emissions and their toxicity were lower than expected. Residues after in-situ combustion tests varied between 1-10% of the original oil.

The combustion behaviour of the oil spilled must be known prior to this option being considered for use. The field monitoring or plume dispersion modelling of the combustion cloud and fumes is a high priority in the decision to use this option. Great caution must be exercised with the in-situ burning of petrol spills as this must be carried out well away from population centres and can emit large quantities of radiant heat and fumes in the vicinity of the burn.

For in-situ combustion to be sustained the heat generated by the burning of the oil must overcome the cooling effect of the sea. Thin slicks do not burn and a minimum thickness of oil is required for combustion. To enable in-situ combustion to work the oil must have sufficient volatility and light oils must have 2-3 mm thickness and for heavy oils 8-10 mm thickness. Because oil spreads rapidly, especially low viscosity oils, the use of containment systems such as fire-resistant booms, are sometimes required to maintain this minimum thickness. These booms are very expensive and not readily available within African region or even Namibia and often require full replacement after one use.

In-situ burning of oil spills in open waters is receiving greater attention by response agencies world-wide as it offers a very viable and cheap option to stop oil spreading, especially in remote areas where the lack of equipment or weather conditions limits conventional open water containment and clean-up.

5.16 Oiled Marinelife Operations

It is highly likely that Marinelife will become contaminated in the event of a spill, including sea birds and shorebirds, marine reptiles (e.g. nesting turtles) and marine mammals.

5.16.1 Interim Procedures

Immediately contact the Environment Unit and Fisheries Department if Marinelife is oiled, or at risk of being oiled by a spill.

- Consult with the Environment Unit and Fisheries Department and other advisory groups such as the Working Group on Scientific studies established under the National Biodiversity Strategy Action Plan on the effects of spilled oil on threatened or contaminated biota in Namibia, and how to best handle the problem.
- Advise the IC of the wild life response priorities.
- Coordinate their activities within the allocated priorities set by the IC.
- Attempt to prevent further Marinelife becoming oiled
- Recover oiled Marinelife and decide how best it will be handled (humane destruction or rehabilitation).
- Humanely destroy and dispose of Marinelife unsuitable for rehabilitation.
- Arrange appropriate rehabilitation and subsequent release into a safe environment.
- Advise the IC of any issues that may affect the health and safety of volunteers or other personnel in the clean-up of the affected Marinelife.

Any costs associated with this work will be recovered from the polluter. The Marine Division as lead incident controller will ensure that funds are recovered from the polluter.

5.17 Oily Waste Management

5.17.1 Waste Disposal

An often-difficult problem created by oiled foreshore clean-up is the generation of quantities of recovered oil and oily waste, which needs to be treated, recycled and/or disposed. The problems of oily waste management are exasperated on small islands such as those of the region, due to severe limits on management options.

The Proponent in close collaboration with the Walvis Bay Municipality and all other local provincial authorities shall identify suitable temporary and/or permanent sites for the receipt and disposal of oiled debris. All necessary approval for the disposal of oiled debris shall be obtained, where possible, prior to the event, in accordance with local legislation and by-laws. **The proponent shall work in close consultation with the National Waste Strategy to use these as a basis for waste disposal from Marine Spills.**

The need for temporary storage sites should be determined when the site of the spill is known but should be located close to the spill site. Temporary storage sites should only be used when permanent sites are unavailable, or are too far from the site of the spill to be practicable.

Temporary oily waste storage sites must be selected taking into account;

- Accessibility of the storage site (good road access)
- Distance from where oily wastes is collected
- Oil type
- Relatively impervious ground (e.g. clay)
- Composition of contamination e.g. vegetation, sand, sorbents
- Volume of oil/contaminants
- Potential for groundwater pollution (low water table)
- Potential for flooding from tidal movement
- Compatibility with on-site and adjacent land use
- Proximity to environmentally sensitive areas
- Marinelife access to site e.g. birds.
- ability to monitor ground and surface water for contamination

Impervious tanks or containers should be used for the pumpable wastes while open pits should be used for unpumpable wastes. Open pit areas should be saturated with water prior to being sealed (e.g. with plastic or compacted clay). This is to prevent leaking oil penetrating into the ground. To prevent damage to the seal the area should be underlaid with fine sand and covered with a protective layer of wet sand and or soil.

Pits should not exceed 2 meters in depth, should have rainfall diversion trenches around the edges, and should never be filled to capacity because of the risk of overflow in times of heavy rain. A drainpipe and valve at the bottom of the pit to allow rain and seawater to be drained from beneath floating oils should be included.

Due considerations should be made to keep the different types of waste oils in separate pits.

5.17.2 Waste Transportation

Preferred routes to disposal areas, which minimise the risk of spreading oil contamination, minimise traffic disruptions, or interference with response activities, should be identified by the local authorities and the local Police.

The location and availability of suitable transport vehicles should be determined and drivers briefed of their responsibilities. It will be necessary to develop an MOU for Namibia in particular Walvis Bay port in regards to Oily Waste Management Arrangements.

5.18 Chemical Spills/HAZMAT Response

As outlined under section 1.3, the contingency plan is designed to cover the response to spills into the marine environment of all types of pollutants, including oil, chemicals and hazardous materials (HAZMAT).

However, technical details within the contingency plan relate primarily to marine oil spills. This reflects the fact that oil is the main pollutant likely to be spilled in the region, and the fact that the discipline of oil spill response is far more developed and advanced than that of chemical spill/hazmat response.

in the event of a chemical/hazmat spill within the contingency plan area, the general procedures and arrangements of contingency plan should be followed.

6 EXTERNAL ASSISTANCE

Should the Proponent assess a spill to be a Tier Three spill, it should activate a Request for Assistance.

When requesting assistance, as much information as possible about the nature of the spill should be provided and the request should be as specific as possible about the type of assistance required.

The Pollution Protocol requires Parties to:

- Take initial action at the national level to respond to pollution incidents (marine spills).
- Co-operate with other Parties in the response to pollution incidents.

- Establish and maintain, within their respective capabilities, the means of preventing and responding to pollution incidents, including;
    - Enacting relevant legislation.
    - Developing and maintaining contingency plan s.
    - Designating a Responsible Authority.
- Exchange information with each other and report all pollution incidents to relevant authorities and other parties likely to be affected.
- Provide assistance, within their capabilities, to other Parties who request such assistance.
- Facilitate the movement of personnel and materials needed for the response to a pollution incident into, out of and through its territory.
- Develop and maintain, where appropriate sub-regional and bilateral arrangements for preventing and responding to pollution incidents.

A framework exists for co-operative regional responses to major marine spills, including broad aims and objectives, underlying spill response philosophies and priorities, roles and responsibilities of relevant organisations, regional and international linkages and mechanisms for accessing regional and international assistance.

7 RESPONSE TERMINATION & POST-SPILL ACTIVITIES

7.1 Response Termination

In any marine spill response operation, a point is reached where the cost and effort involved in continuing clean-up operations outweigh the benefits to be gained or there is no Net Environmental Benefit (NEB) to be gained. The IC, in consultation with his/her support personnel under the Marine Spill Response Team and the members of the National Marine Pollution Committee, should determine the point when further effort and expenditure become unreasonable and can no longer be supported on grounds of environmental effectiveness and cost.

The advice of the nominated scientific/environmental expertise, including any provided through external assistance, will be of paramount importance in

determining when the environmental effectiveness of continued spill clean-up efforts does not justify continued expenditure.

7.2 Equipment Cleaning/Restoration and Return

Oiled equipment should be cleaned as soon as possible after use. Cleaning should be carried out in a controlled situation where run-off can be contained without causing further pollution of the environment.

Equipment cleaning methods include:

- High pressure hosing.
- Steam cleaning (do not use on booms made of PVC, or plasticity of the boom will be lost).
- Apply dispersants and brush (especially heavily oiled booms).
- Flushing pumps that have been used to apply dispersants with fresh-water, immediately after use.

All oil collected from cleaning operations must be disposed of in accordance with the oily waste management procedures outlined in the contingency plan.

Once cleaning is completed, all equipment that has been provided through external assistance should be inspected and checked-off, and arrangements made in consultation with the assistance provider for returning/replacing the equipment.

7.3 Response Evaluation & Debriefing

As soon as possible after termination of clean up, a full de-brief session should be held. The aim of the debrief session is not to assess the performance of individuals, but to evaluate the response and to translate any lessons learned into improvements to the contingency plan, so as to improve the effectiveness of any future spill responses.

It is preferred a concise report of lessons learnt and any operational deficiencies be compiled for submission to the National Marine Pollution Committee for action.

7.4 Damage Assessment & Monitoring

Following a marine spill, it is necessary to conduct post-spill damage assessment and monitoring activities, in order to scientifically and quantitatively assess:

- Ecological damage.
- Impacts on commercial resources and activities such as fisheries, aquaculture and tourism.

It will also provide a baseline against which to measure recovery from the spill. The information gathered will assist with:

- Determination of compensation claims.
- Better understanding of the effects of spills and the ability of the environment to recover from such effects.
- Better understanding of the effects and effectiveness of the various clean-up techniques used.
- Identification of any necessary ongoing restoration and rehabilitation requirements for damaged environments and resources.

Responsibility for initiating and coordinating post-spill damage assessment and monitoring should generally rest with the Director of Environment and Conservation Division [add name of national environment administration], which provides the Environmental Scientific Coordinator (ESC) on the spill response team. The following general principles should apply to post-spill damage assessment and monitoring.

- The Environment and Conservation Division should organise joint government/industry monitoring teams, to undertake coordinated, integrated studies. This will avoid duplication of effort and the possibility of conflicting results that may be used for compensation claims.
- Assessment and monitoring should aim to be as quantitative as possible, and the basis of any qualitative assessments stated.
- Monitoring must be designed so as to be statistically valid and rigorous, with the levels of confidence clearly stated.
- Data collection should commence as soon as possible after the spill.
- The use of sound pre-spill baseline data is essential to the success of post-spill damage assessment and monitoring. The Environment and Conservation Division should rapidly identify all such data, including that held by government environment and fisheries agencies, universities and research institutions.

- The monitoring design should include the identification and monitoring of control sites.
- The monitoring design should include areas impacted by the spill, areas disturbed by clean-up activities and areas used for the storage of oily waste.
- All organisations involved in post-spill damage assessment and monitoring should keep detailed records of all costs and expenses associated with these activities.
- The results obtained should be published in the scientific literature, to assist the development of the spill response discipline in general.

7.5 Environmental Restoration & Rehabilitation

Following a spill, it may be necessary to undertake activities to restore and rehabilitate damaged ecosystems and resources, for example replanting mangroves killed by a spill, rehabilitating beaches damaged by clean-up activities or transplanting coral to a high-use tourist area impacted by a spill.

The following general principles should apply to post-spill restoration & rehabilitation.

- Areas requiring restoration and rehabilitation should be identified during post spill damage assessment.
- In determining the best options for the restoration and rehabilitation, techniques that seek to complement and make use of **natural forces** to the fullest extent possible should be selected, including the option of allowing natural recovery without active intervention.
- The effects and effectiveness of restoration and rehabilitation efforts should be assessed through rigorous monitoring, as part of post-spill damage assessment and monitoring activities.
- All organisations involved in restoration and rehabilitation should keep detailed records of all costs and expenses associated with these activities.
- The results obtained should be published in the scientific literature, to assist the development of the spill response discipline in general.

8 COST RECOVERY & REIMBURSEMENT

It is the responsibility of the Responsible Authority to initiate cost recovery actions direct with the polluter's representative. If required to negotiate or to take legal action to achieve full settlement of amounts incurred in the response. In most cases the identity of the spiller is known and a representative will be aware of the Authorities intervention.

The reimbursement of the costs of a marine spill response should be attempted from the polluter, under existing legal regimes.

To assist in the recovery of costs, detailed records of action taken and equipment and other resources used to respond to the incident, including detailed and complete records of all costs incurred must be kept by all parties. These records can be utilised both to support cost recovery, claims for compensation and for subsequent analysis of actions taken during the pollution incident, in order to upgrade the contingency plan.

The IC through the Marine Spill Response team shall ensure the necessary collection and safeguarding of oil and environmental samples, information, accounts, receipts and reports for the recovery of costs through the spillers' insurer.

9 EQUIPMENT

Currently there is limited oil spill equipment locally. The government needs to acquire some national oil spill equipment based on an equipment strategy. In general, the oil industry provides the equipment necessary to respond to Tier One spills from its facilities, and government provides the balance of the stockpile necessary to bring the capability up to Tier Two level. Additional equipment may be available through external assistance.

10 TRAINING & EXERCISES

10.1 Training of spill responders

Training of key personnel is an essential component of contingency planning and preparedness. All personnel involved in spill response should have as a minimum health and safety training. Ideally, they should have sufficient training to fully

understand their responsibilities during a spill response, be capable of operating all equipment and performing all duties allocated to them in a safe, timely, efficient and environmentally safe manner.

Individual members of the team will be given training tailored to their specific responsibilities in the team, from management level to equipment operator level. The following topics are a guide to the types of training that are available to spill responders.

- Basic safety, fire and health precautions to be taken in the vicinity of a spill;
- Overview of incident Command System (ICS) organization structure and position responsibilities
- Incident Action Plans and the planning process cycle;
- Tactical operations planning
- Actions to be taken to minimise the effects of a spill;
- Basic fate and effects of spilled oil in the environment;
- Introduction to the National Oil Marine Spill Contingency plan;
- General oil spill response strategy;
- Emergency response organization structure and duties;
- Reporting procedures, requirements and responsibilities;
- Communications procedures during spill response;
- Safe, proper and efficient use of spill response equipment;
- Equipment, materials, supplies, contractors, services etc available from outside sources
- Safe & effective use of oil spill dispersants;
- Transfer, storage and recovery/disposal of oily wastes;
- Safe helicopter operation including personnel safety, internal loading and slinging operations, hand signals and radio communication;
- Safe working practices on small boats;
- First aid;
- General spill response techniques and skills; and
- Confidentially of information and discussion with media.

10.2 Exercises and Response Drills

Exercises and response drills serve to evaluate the thoroughness and effectiveness of the response component of the Contingency plan under simulated conditions. Important elements of response capability to be tested are;

- Practicality (structure and organization);
- Communications;
- Equipment capability and response times;
- Adequacy of action plan; and
- Public, industry and media relations.

Drills will be conducted at sea or on-site using the resources that would be used in an actual spill. Hands-on experience with clean up equipment and techniques will be used where practical.

Types of exercises to be considered include:

- Deployment of selected equipment (as in a training exercises);
- Call-out of personnel who would be involved or contacted during a spill event (including other government department officers, port and harbour personnel, oil industry company personnel, etc.); and
- Full scale exercises.