Oil Spill Contingency Plan

Rothera Research Station

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Draft V1	31/10/2023	Removal of duplication of oil storage locations from the fast facts that is already in section 2.5. Addition of Oil Spill Kit inventory as an appendix. Update to reflect increase in MGO/AVCAT mix.	Senior Environmental Manager
FINAL 9th Edition	27/10/2023		Head of Environment Office

British Antarctic Survey,

High Cross, Madingley Road,

Cambridge, UK, CB3 0ET.

British Antarctic Survey
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Responsibility

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Review Strategy

This plan is subject to a 5-yearly review by the BAS Environment Office. Additionally, review and re-issue will be undertaken as and when required. This could for instance be triggered by a significant change in layout of the station, the introduction of new technologies or technical elements to the station, changes in fuel storage on station, technical advances in the field of oil spill response or following a Tier 2 or 3 incident.

Amendment Procedures

Amendments to the Rothera Research Station Oil Spill Contingency Plan will be issued as necessary by the BAS Environmental Office. The OSCP will be updated on Iceflow, and a notification sent to those on the distribution list informing them of the update. Existing copies of the OSCP must be destroyed and replaced with the updated version. Confirmation must be provided to the Environmental Office that this has been completed.

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Station Facilities Engineer, BAS Cambridge
BAS Incident Response Group (Microsoft Teams), BAS Cambridge
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FAST FACTS ROTHERA STATION

Table 1: Fast facts Rothera Station

<table>
<tr><th colspan="2">ROTHERA RESEARCH STATION</th></tr>
<tr><td>Station Response Team</td><td>Core Station Response Teams:
<table>
<tr><th>Summer Station Response Team</th><th>Winter Station Response Team</th></tr>
<tr><td>Summer Station Leader</td><td>Winter Station Leader</td></tr>
<tr><td>Station Logistics Manager (summer only)</td><td>All winterers</td></tr>
<tr><td>Station General Assistants (summer only)</td><td></td></tr>
<tr><td>Air Unit Coordinator (summer only)</td><td></td></tr>
<tr><td>Station Facilities Engineers</td><td></td></tr>
<tr><td>Other summer staff with station management responsibilities or vehicle (including boats/aircraft) or fuel handling responsibilities</td><td></td></tr>
<tr><td>Winter Station Leader</td><td></td></tr>
<tr><td>All winterers</td><td></td></tr>
</table></td></tr>
<tr><td>Location</td><td>67°34'S, 68°08'W</td></tr>
<tr><td>Station area</td><td>Refer to Figure 4 for an overview map.</td></tr>
<tr><td>Buildings</td><td>Buildings located either side of the 920m long gravel runway (also refer to Figure 4 and Figure 5):
On the west side are the hangar, the bulk fuel storage tanks, and one fuel hut (with another fuel polishing hut and a steel platform for drummed petrol and paraffin expected to be constructed in 2023/24).
On the east side are the accommodation, storage and workshop facilities, as well as a science laboratory, a boatshed, generator shed and operations tower.
Situated at the southern end of Rothera Point is a deep-water wharf at which vessels can tie up alongside and discharge cargo and fuel.</td></tr>
<tr><td>Vehicles/ boats</td><td>Aircraft
Small boats
Vehicles and other small equipment</td></tr>
<tr><td>Number of personnel</td><td>Designed to accommodate 124 people (a station and field complement of between 60 to 124 between October and March each year, usually 22 throughout the winter)</td></tr>
<tr><td>Area covered by the OSCP</td><td>The immediate area around the station and runway. Refer to Figure 4 on page 10.</td></tr>
<tr><td>Season:</td><td>All year round</td></tr>
</table>

Resupply	Resupply between 2 -4 times each season depending on a BAS research vessel's (or vessel operated on behalf of BAS) movement. Fuel transfer is approximately 650,000 litres of marine gas oil and 350,000 litres of aviation fuel (AVCAT).
Sensitivities	Also refer to Figure 12 and Figure 13. 1. Salt water intake, wet well and reverse osmosis plant (refer to Section 4.9.1) 2. Salt water intake, wet well and aquarium in Bonner Laboratory (refer to Section 4.9.2) 3. Scientific monitoring sites (refer to Section 4.9.3) 4. ASPA No. 129 (refer to Section 4.9.4) 5. Terrestrial flora (refer to Section 4.9.5) 6. Marine ecosystems around Rothera Point (refer to Section 4.9.6) 7. Nesting birds (refer to Section 4.9.7) 8. Seals and whales (refer to Section 4.9.8)
Hazards or hazardous activities	1. Resupply of fuel by ship 2. Storage of fuel at Rothera Research Station 3. Refuelling of station day tanks 4. Refuelling of equipment, bowsers, vehicles, boats and aircraft 5. Transferring/ decanting fuel at station drum depots
Regular checks	1. Weekly visual check of the main fuel tank and pipeline 2. Annual inspection of the oil storage facilities
Oil storage facilities (refer to section 2.5)	
Oil spill response kit and PPE (refer to Appendix J)	

Section 1

INTRODUCTION

1. INTRODUCTION

1.1 AIM OF THE OIL SPILL CONTINGENCY PLAN

The aim of this Oil Spill Contingency Plan (OSCP) is to describe the procedures that will be used by the British Antarctic Survey (BAS) to enable a timely, effective, and coordinated response effort in the event of an oil spill at Rothera Research Station, Adelaide Island, Antarctica.

1.2 LEGAL REQUIREMENTS IN ANTARCTICA

The Protocol on Environmental Protection to the Antarctic Treaty (1991) contains stringent and comprehensive regulations to prevent and combat pollution. Article 15 of the Protocol requires Treaty Parties to provide for prompt and effective response action to incidents with potential adverse effects on the Antarctic environment, and to establish contingency plans for emergencies. The UK has enacted domestic legislation to enforce the provisions of the Protocol through The Antarctic Act (1994), The Antarctic Act (2013), and The Antarctic Regulations (1995/490 as amended).

The Council of Managers of National Antarctic Programmes (COMNAP) has carried out a comprehensive review of oil spill response in Antarctica. COMNAP has adopted a set of recommended guidelines for oil spill contingency planning to help national operators comply with the requirements of the Environmental Protocol. These guidelines have been used to develop the Rothera OSCP.

1.3 BAS POLICY ON OIL POLLUTION

In accordance with Article 3 (1) of Annex IV (Prevention of Marine Pollution) to the Protocol, BAS prohibits any deliberate discharge into the sea or land of oil or oily mixtures from either its research vessels or stations.

BAS makes every effort to prevent accidental oil spills through careful attention to fuel management and transfer operations, and by maintaining storage facilities and pipelines to a high standard. Nevertheless, BAS recognises that even with the best precautions, accidents can still happen, and oil spill contingency procedures are required.

BAS views an oil spill which might occur from its stations and vessels as extremely serious. **BAS' priorities are firstly, the safety of all personnel and secondly, minimising environmental impact as far as possible.** Given the severe operational and climatic restraints of operating in Antarctica, any spill response by BAS will seek to complement and make use of natural processes whenever possible.

1.4 THE SCOPE OF THE OIL SPILL CONTINGENCY PLAN

This plan describes the response procedures to be used at Rothera Research Station in the event of an oil spill resulting from:

- the grounding of a BAS vessel near to the station or loss of hydrocarbons into the marine environment from a vessel operating on behalf of BAS near to the station;
- failure of a bulk fuel tank;
- refuelling operations during ship to shore transfer;
- failure of pipes, valves, joints, small fuel tanks, vehicle fuel and oil tanks, aircraft fuel and oil tanks and fuel drums;
- refuelling of day tanks, vehicles, boats and aircraft;
- transferring/decanting fuel from 205l, 25l, and 1 litre containers

The potential impacts of releasing hazardous materials into the environment include long-term impact on aquatic organisms and the aquatic environment, wildlife injuries and fatalities, damage to BAS/ Natural Environment Research Council (NERC)/ UK Research and Innovation (UKRI)/ Foreign, Commonwealth and Development Office (FCDO) reputation and conflict with other COMNAP states.

In the event of an oil spill occurring from a BAS vessel whilst in the immediate vicinity of Rothera Research Station, the Ship's Captain is responsible for leading the vessel response in line with the relevant Shipboard Oil Pollution Emergency Plan (SOPEP) and for liaising with the Station Leader to coordinate and agree the necessary response from the station. The Station Leader will implement the shoreside response in line with the station OSCP and in liaison with the Ship's Captain.

BAS stations do not have the capability to provide oil spill response to non-BAS vessels. In the case of a spill from a non-BAS vessel, the external vessel is responsible for conducting its own response. BAS stations will only respond locally in order to protect its own resources and environmental sensitivities.

1.5 HOW TO USE THE CONTINGENCY PLAN

The plan gives an introduction to Rothera and its infrastructure and sensitivities, outlines BAS' general spill response strategies, and supports any response efforts by clarifying responsibilities and actions. It comprises six further parts:

Section 2 Local Information: This section contains a description and map of Rothera highlighting, the research station, its infrastructure, and its oil storage facilities. It gives an overview of the area covered by the contingency plan and the probability, size, type, movement and fate of oil spills at Rothera.

Section 3 BAS Oil Spill Response Strategy: Outlines BAS' classification of oil spills and the general response strategy as well as internal training requirements.

Section 4 Responsibilities and Actions on Station: This section describes the emergency procedures to be followed at Rothera when a spill occurs. It sets out the expected chronological order of events. Roles and responsibilities of personnel are defined, and action plans detailed. Advice is given on the initial rapid assessment, managing a spill site, available response techniques and equipment deployment. The sensitivities and resources, i.e., infrastructure and environmental sensitivities at risk, near station are examined and the priorities for a response including protection are established. Finally, instructions are given for reporting, waste disposal, environmental monitoring, and the termination of an oil spill response.

Section 5 Health and Safety: This section outlines risks to responders and station staff associated with spill response and applicable health and safety requirements.

Section 6 Responsibilities and Actions at BAS Cambridge: Describes the spill response structure at BAS Cambridge and outlines corresponding responsibilities and actions.

Section 7 Communications: Section 7 outlines internal and external communication requirements, including contacts as appropriate.

Appendices: These include the oil spill response form, rapid initial assessment form, risk assessment, information on how to use spill response equipment and site fuel layouts.

Section 2

LOCAL INFORMATION

2. LOCAL SITE INFORMATION

2.1 ROTHERA POINT OVERVIEW

Rothera Research Station (67°34'S, 68°08'W) is located on Rothera Point, Adelaide Island, Antarctica, as shown in Figure 1 below:

Figure 1: The Antarctic Peninsula and Rothera Research Station

Rothera Point is a low rocky promontory, situated in the southeast corner of Adelaide Island, covering an area of approximately 3.5km^2 and rising to a maximum height above sea level of 39m. A raised beach forms an isthmus between the Wormald Ice Piedmont and Rothera Point, and connects the point, via an ice ramp, to the rest of the island. Antarctic Specially Protected Area (ASPA) No. 129, is situated on the north-eastern corner of the Point (refer to Figure 3 on page 45 and Section 4.9.4) and is clearly marked by signposts placed along its boundary.

An overview of the southeast corner of Adelaide Island showing Rothera Research Station can be found in Figure 2 below.

Figure 2: Overview map of southeast Adelaide Island

The climate is relatively cold and dry. The mean wind speed is 13.4 kts. Gale force winds are expected on over 60 days per year and an extreme gust of 80 kts has been recorded. The prevailing wind direction is from the north-east with the strongest winds generally coming from this direction or from the north-north-west. The mean air temperatures in summer are

in the region of -2°C to +1°C, whilst in winter they range from -5°C to -20°C. The extreme minimum temperature has been recorded at -39.5°C.

Seawater temperatures at Rothera vary little, ranging between -1.8°C in winter to 0.5°C in summer. Sea ice conditions vary greatly through the year and from year to year. The waters around Rothera Point can remain totally locked with fast ice from July to February one year but be completely free of fast ice in another. Pack ice often drifts north from Marguerite Bay when the wind is in the south or calm and can fill South Bay in a few hours.

Rothera has no direct sunlight for a few weeks at austral mid-winter (June) and has 24 hours of sunlight possible for a similar period at austral mid-summer (December).

2.2 THE ROLE OF ROTHERA RESEARCH STATION

Rothera Research Station is the main air facility for BAS and its centre for airborne and deep-field science programmes in the Antarctic. Since 1996/97, it has also been the centre for BAS terrestrial biology and inshore marine biology. Field parties operate within a large area around Rothera. The vast majority of the scientific work is carried out between October and March each year, with a station and field complement of between 60 to 124 people. The station is staffed by 22 people (on average) over the intervening winter seasons during which ongoing scientific research is carried out and essential maintenance and preparations are made for the forthcoming summer.

2.3 PHYSICAL LAYOUT OF THE STATION

Rothera Research Station is operated all year round and can accommodate a maximum of 124 personnel. The station was built on the relatively flat raised beach area of Rothera Point between the rock outcrops on the east side and the ice ramp to the west. The station complex is divided by the 920m long gravel runway. On the west side of the runway are the hangar and the bulk fuel storage tanks, and on the east side are the accommodation, storage and workshop facilities, as well as a science laboratory, a boat house, power plant and operations tower. Situated at the southern end of the Point is a deep water wharf at which vessels can tie up alongside and discharge cargo and fuel.

A local overview map of Rothera Point is shown in Figure 3 overleaf.

Environmental and station sensitivities (such as wildlife and freshwater source) at Rothera Research Station are discussed in more detail in Section 4.9.

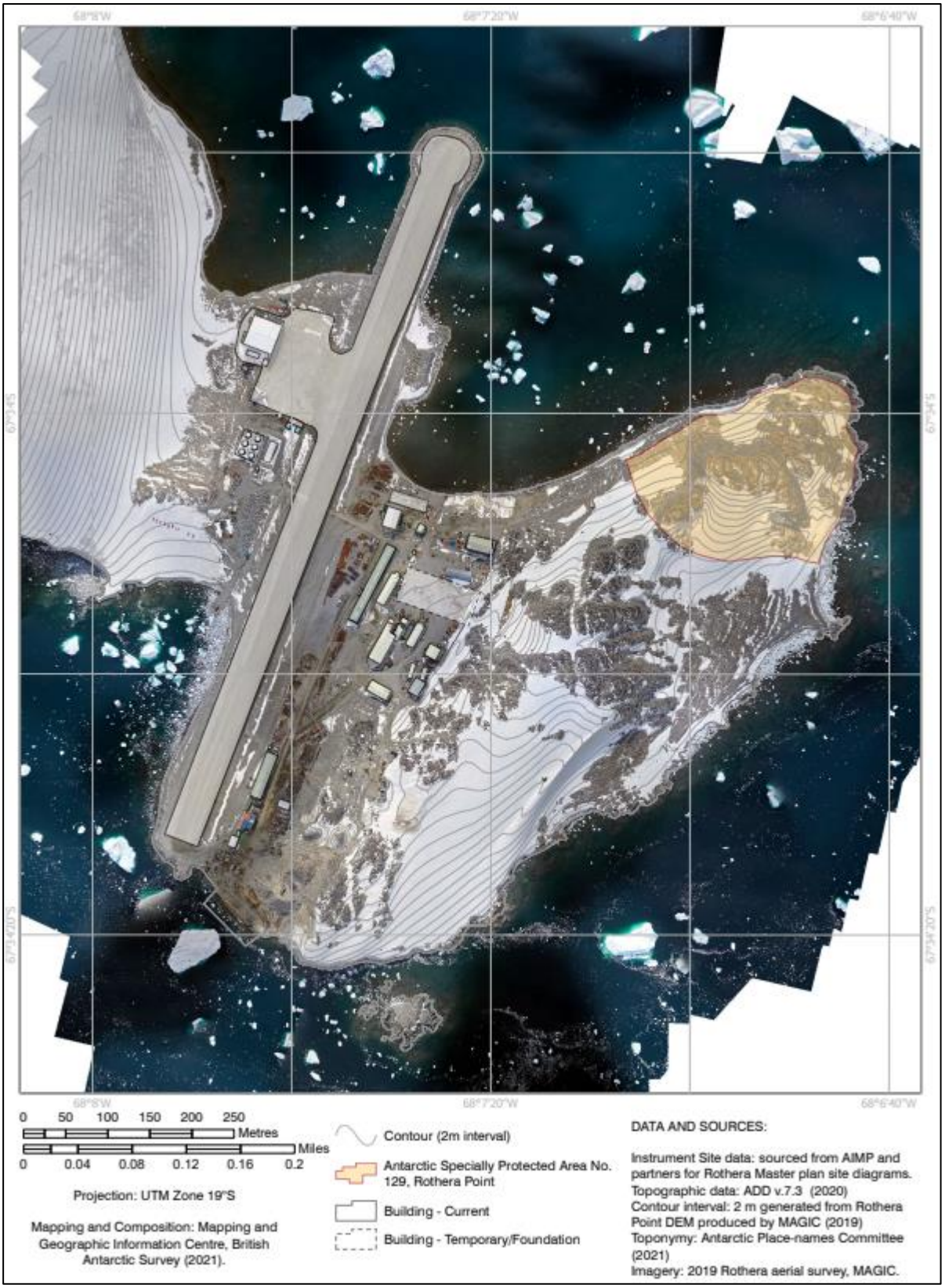


Figure 3: Overview of Rothera Point

2.4 THE AREA COVERED BY THE OIL SPILL CONTINGENCY PLAN

The OSCP covers the immediate area surrounding the station and the runway as shown in the aerial overview of the station complex in Figure 4 below.

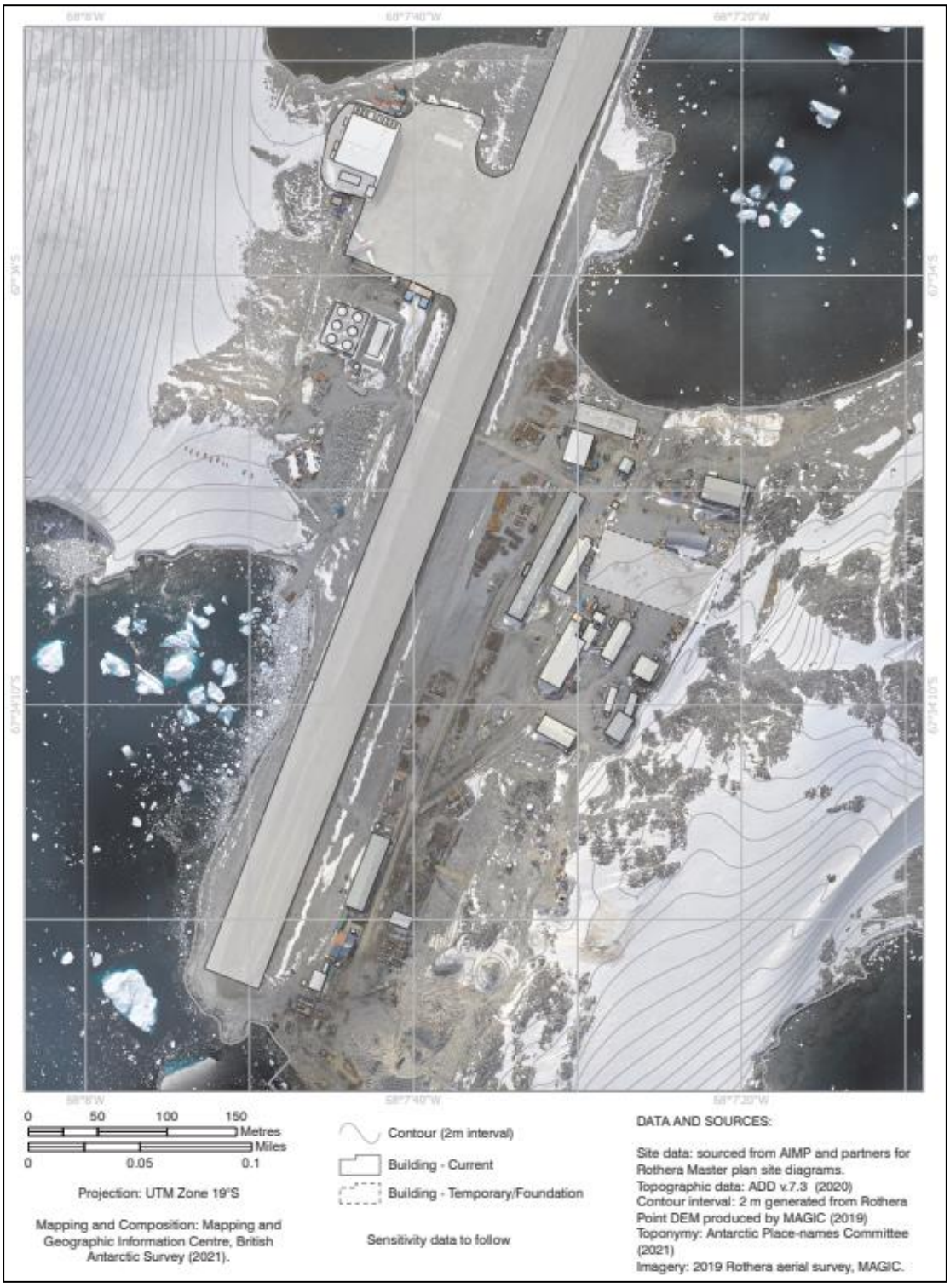


Figure 4: Aerial overview of Rothera Station Complex

2.5 OIL STORAGE FACILITIES

The following oil storage facilities are located at Rothera Station six main bulk fuel tanks, fuel drum depots, two day holding tanks, a boiler fuel tank and several other small bulk fuel tanks. In addition, there is temporary fuel storage for the Antarctic Infrastructure Modernisation Programme (AIMP) construction work. All oil storage facilities are described under Section 2.5, and maximum fuel quantities are shown in Table 2 below. The fuel network layout can be found in Figure 6 on page 15. Due to the ongoing construction work at Rothera Station, the location and type of fuel lines/ connections are expected to change. However, there are currently no updated services plans available apart from the services connections to the Bonner Lab (Figure 7 on page 16).

Estates conduct annual fuel tank inspection surveys. Bulk storage and associated pipework are checked before each fuel delivery.

Table 2: Oil storage facilities on Rothera Island

Location	Type of fuel	Type of storage	Secondary containment	Maximum quantity (litres)
Rothera Station – Bulk fuel MGO and aviation fuel storage tanks (refer to Section 0)				
Main fuel tank 1 Rothera station – west of runway	MGO or AVCAT/AVTUR	Bulk tank	Contained within a bund	240,000 litres each
Main fuel tank 2 Rothera station – west of runway	MGO or AVCAT/AVTUR	Bulk tank	Contained within a bund	240,000 litres each
Main fuel tank 3 Rothera station – west of runway	MGO or AVCAT/AVTUR	Bulk tank	Contained within a bund	240,000 litres each
Main fuel tank 4 Rothera station – west of runway	AVCAT or AVTUR	Bulk tank	Contained within a bund	240,000 litres each
Main fuel tank 5 Rothera station – west of runway	AVCAT or AVTUR	Bulk tank	Contained within a bund	240,000 litres each
Main fuel tank 6 Rothera station – west of runway	AVCAT or AVTUR	Bulk tank	Contained within a bund	240,000 litres each
Rothera Station – Day holding tanks (refer to Section 2.5.2)				
Day holding tank 1 Rothera Station – Generator shed	MGO/AVCAT/AVTUR	Bulk tank	Single skinned and bunded	5,500 litres each
Day holding tank 2 Rothera Station – Generator shed	MGO/AVTUR/AVCAT	Bulk tank	Single skinned and bunded	5,500 litres each
Rothera Station – Boiler fuel tank (refer to Section 2.5.3)				
Boiler fuel tank – Old Bransfield House	MGO/AVCAT/AVTUR	Bulk tank	Double skinned tank	3,400 litres
Rothera Station – Other small fuel storage tanks (refer to 2.5.4)				
New Bransfield House	MGO	Bulk tank	Double skinned tank	12,500
Admirals	MGO	Bulk tank	Bunded	6,800
Giants	MGO	Bulk tank	Bunded	3,800
Bonner Lab	MGO	Bulk tank	Bunded	5,300
Vikings	MGO	Bulk tank	Bunded	2,600

Location	Type of fuel	Type of storage	Secondary containment	Maximum quantity (litres)
Incinerator tank - outside behind the incinerator	AVCAT or MGO	Bulk tank	Unknown	500
Mobile bowser 1	Petrol	Bulk tank	Bunded	1,005
Mobile bowser 2	Petrol	Bulk tank	Bunded	1,005
Mobile bowser 3	MGO/AVCAT/AVTUR (minimal cut)	Bulk tank	Bunded	8,000
Rothera Station – Garage and Hangar tanks (refer to 2.5.5)				
Garage fuel tank	MGO / AVTUR/AVCAT	Bulk tank	Double skinned tank	2,100
Garage waste oil tank	Lube oils	Bulk tank	Unknown	1,800
Hangar generator emergency tank	MGO/ AVTUR/AVCAT	Bulk tank	Unknown	12,480
Rothera Station – Station drum depots (refer to Section 2.5.6)				
Rothera station – at wharf in ISO containers (generally a temporary location after ship relief before being moved to the apron)	AVTUR	320 x 205 litre drums	ISO container	65,600
Rothera station - ISO containers adjacent to the apron	AVTUR	1000 x 205 litre drums	ISO container	205,000
Rothera station - flattened area to the south of the bulk fuel tanks (installation of an elevated drum platform is planned for 2023/24)	Petrol	100 x 205 litre drums	No containment	20,500
	Paraffin	15 x 205 litre drums	No containment	3,075
Rothera station – Yellow metal cupboard inside the hangar	In-use Lubricating Oil / 2 Stroke Oil / Antifreeze / Degreaser	400 x 205 / 100 / 25 litre	Unknown	11,750
Rothera station - storage container outside the hangar, 25m to the north	Spare Lubricating Oil / Two-stroke Oil / Antifreeze / Degreaser		Sumped (bunded base) storage container	
Rothera station – Vehicle lube store, west side of the vehicle workshop	Lubricating Oil / Two-stroke Oil / Antifreeze / Degreaser		Sumped (bunded base) storage container	
Rothera Station – Temporary fuel tanks for AIMP Rothera Modernisation Project (refer to Section 2.5.7)				
Construction works fuel bowser	MGO/AVCAT/AVTUR	Bowser	Bunded steel bowser	5,000
Rothera Station - adjacent to Generator Shed	MGO	Steel bulk tank	Bunded (110%)	50,000
Construction works generator tank	MGO	Bulk tank	Bunded	2,250

Location	Type of fuel	Type of storage	Secondary containment	Maximum quantity (litres)
Western Global transcube tank no. 1 (located at the vehicle workshop)	HVO	Bulk tank	Bunded steel tank	2000
Western Global transcube tank no. 2 (located at the fuel farm)	HVO	Bulk tank	Bunded steel tank	2000
Western Global transcube bowser located south of the Bonner Lab	HVO	Bowser	Bunded steel tank	950

2.5.1 Station bulk fuel tanks

The bulk fuel storage facility contains aviation fuel (AVCAT or AVTUR), and Marine Gas Oil (MGO). Fuel is stored in six 240,000 litre tanks, which are contained within a bund, thus ensuring containment should a spill or leak occur.

The AVCAT and AVTUR dispenser is located at the south end of the aircraft apron and the MGO pump is located at the south-east corner of the tank containment area. An overview of the fuel network layout from 2007 can be found in figure 6.

A visual check of the tanks and pipeline is carried out each week by the station facilities engineer.

Rothera fuel farm infrastructure is being upgraded (works due to be completed in 2023/24) with the installation of a new fuel farm hut that will house fixed fuel polishing units capable of filtering the fuel in all three MGO bulk storage tanks independently of the main fuel circulation. This is expected to reduce waxing and reduce fuel wastage.

The new fuel farm hut (similarly to the existing fuel hut and sitewide flow and return pipes) will sit outside of the bulk tank bund (see Figure 5). However, the new hut and associated plant will be fitted with individual bunds on each polishing unit with bund alarms, increasing our capacity to catch leaks in the system. The station ring main pumps will be surrounded by a small concrete coffer dam which will contain any small leaks or spillages.

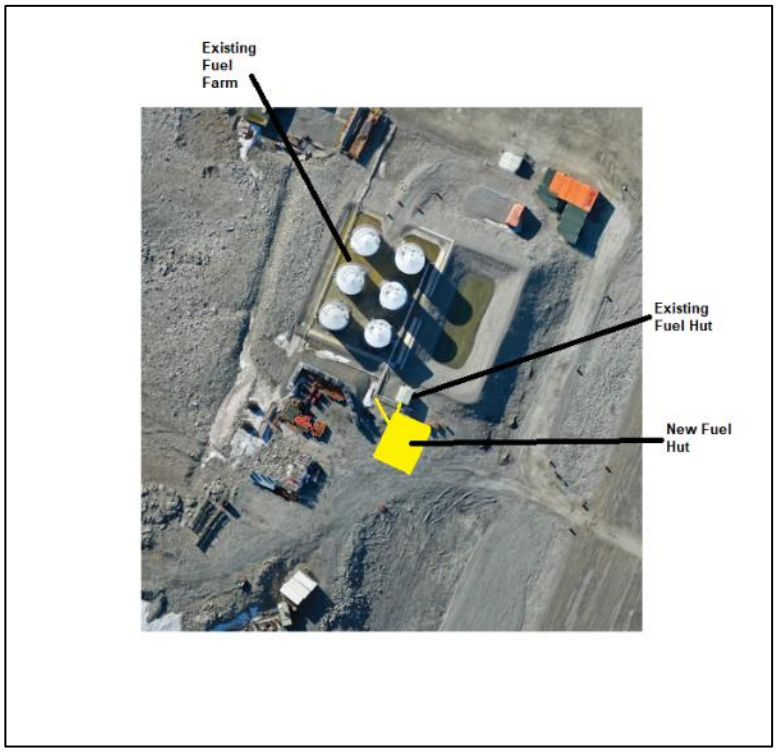


Figure 5: Proposed layout of new structures

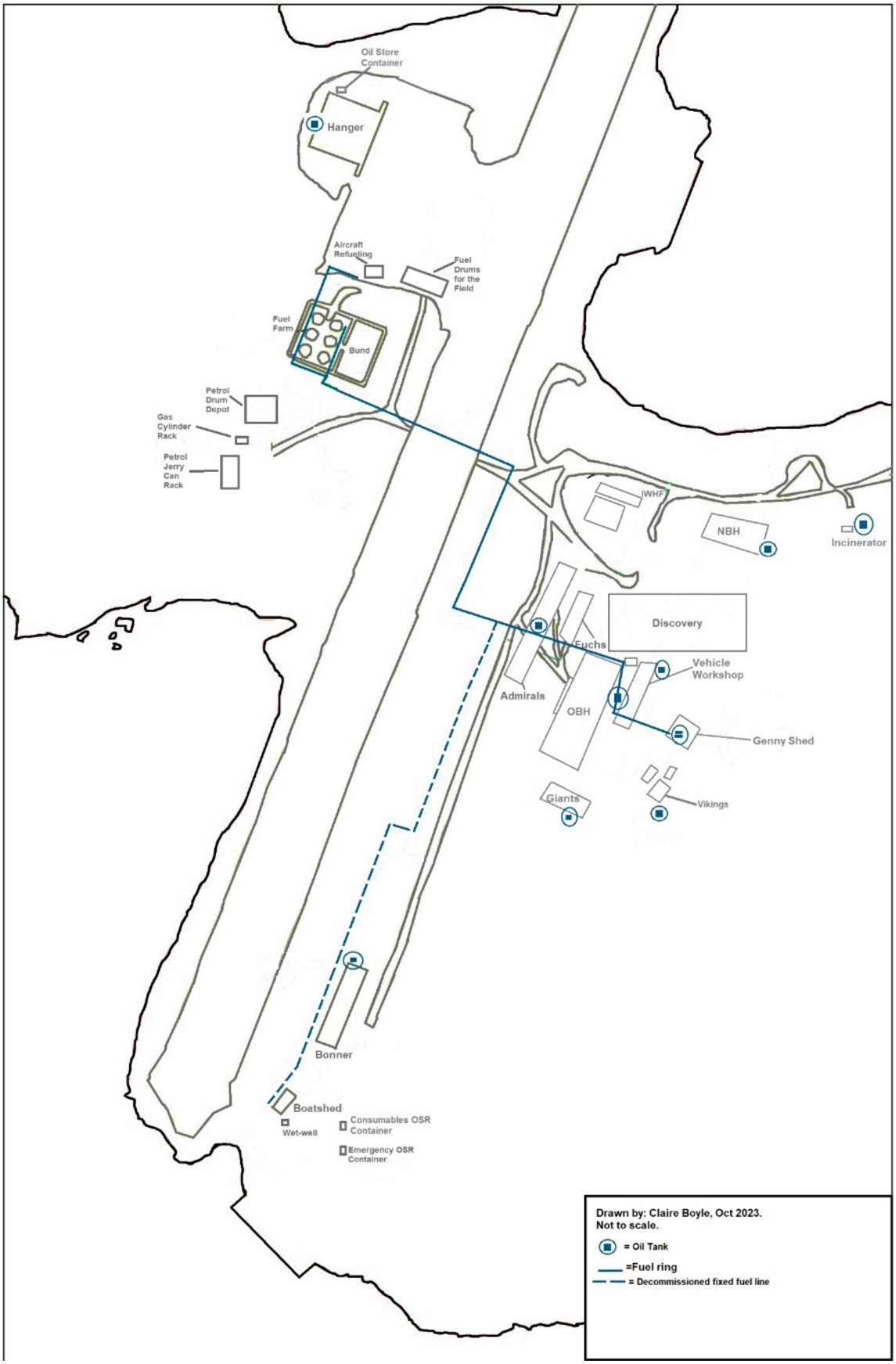


Figure 6: Overview of fuel network layout- not shown are temporary tanks and bowsers

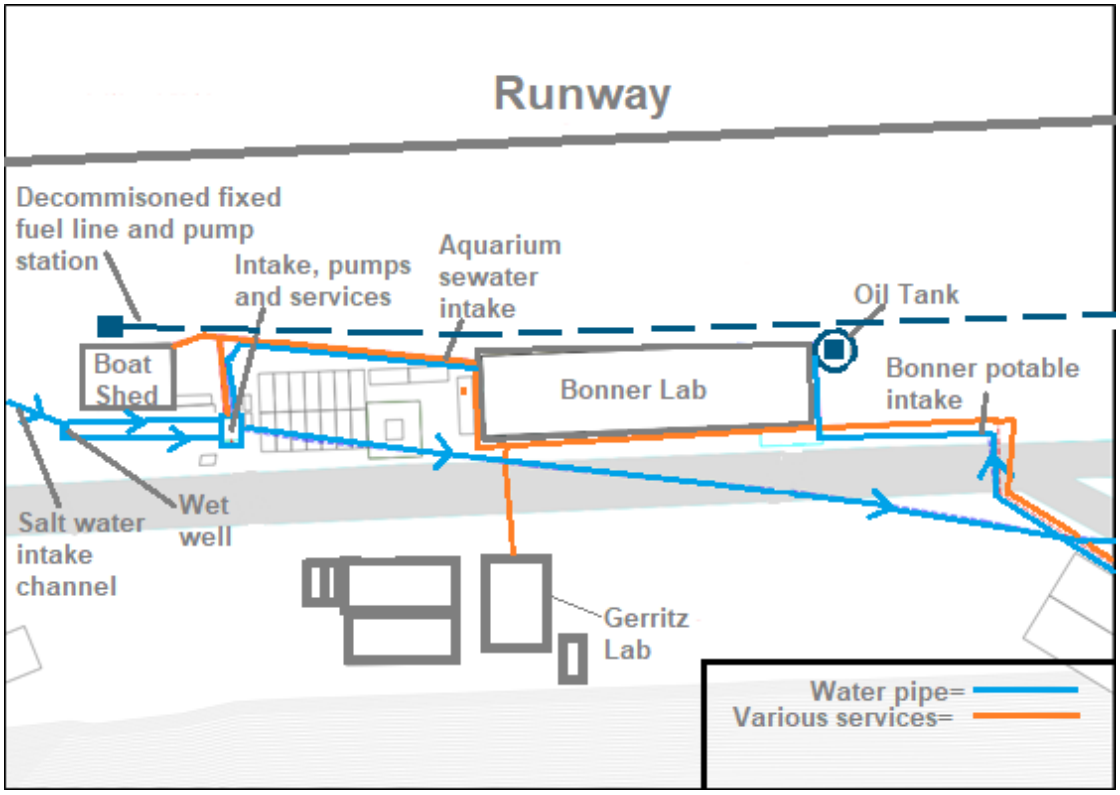


Figure 7: Bonner Lab updated services plan (2023)

2.5.2 Day holding tanks

The day holding tanks (2 x 5,500 litres) located in the generator shed are fed from the station bulk tanks on a daily basis. Bulk fuel is delivered to the generator shed through two plastic coated steel pipes (100 mm) buried underground. The fuel is circulated, and heat traced to prevent it from waxing. Each tank is fitted with control valves and a re-circulating pump is situated in an enclosed housing to the southeast of the fuel farm.

2.5.3 Boiler fuel tank

The double-skinned boiler fuel tank in Old Bransfield House (3,400 litres) is fed from the station bulk tanks on a daily basis. Bulk fuel is delivered to Old Bransfield House through two plastic coated steel pipes (100 mm) buried underground. The fuel is circulated, and heat traced to prevent it from waxing. Each tank is fitted with control valves and a re-circulating pump is situated in an enclosed housing to the southeast of the fuel farm.

2.5.4 Other Small fuel storage tanks

There are several small fuel storage tanks at Rothera station as detailed in Table 2 on page 11. All tanks are fitted with ‘dead-mans’ shut-off handles and fuel quantity gauges (except for the in the Bonner Laboratory and Vikings).

The incinerator fuel tank is of 500 litre capacity (MGO or AVCAT) and is located outside behind the incinerator.

The petrol bowsers are sited outside the Geritz Lab and on the ramp. The MGO/AVTUR/AVCAT bowser is located outside New Bransfield House.

Estates are currently preparing an updated map showing where bowsers and other mobile plant can be safely stored away from the station's sensitivities. Refuelling of the petrol bowsers is completed by the Vehicle Mechanics. Refuelling of the MGO/AVCAT/AVTUR bowser is completed by the Estates team.

A drawing of the services that connect the wet well to station water source and the Bonner Laboratory and other buildings to fuel lines can be found in Figure 7 on page 16.

2.5.5 Garage and Hangar tanks

The double-skinned garage tank (2,100 litres) is filled on a daily basis. Bulk fuel is delivered to the garage through two plastic coated steel pipes (100 mm) buried underground. The fuel is circulated, and heat traced to prevent it from waxing. The garage waste oil bulk tank holds 1,800 litres. The type of secondary containment is unknown but is being investigated to confirm. Both tanks are fitted with 'dead man's handles and control valves. A re-circulating pump is situated in an enclosed housing to the southeast of the fuel farm.

The Hangar generator emergency tank situated outside the hangar holds 12,480 litres of AVTUR. The type of secondary containment is unknown but is being investigated to confirm.

2.5.6 Station drum depots

Drummed AVTUR is delivered to station in 205 litre drums, in 20ft shipping containers. These are offloaded onto the wharf, where they are stored temporarily until they are moved to the main depot on the hanger either, in their containers by vehicle, or they are unpacked from the container and towed on a sled, when there is sufficient snow cover. The Vehicles department's SOPs apply. AVTUR drums can be stored at the hangar apron for up to 18 months before either being flown into the field or transferred to the aircraft fuel tanks. The risk of a spill occurring is low as drums are visually inspected when they arrive at Rothera.

The main petrol and paraffin drum depot is located on a flattened area to the south of the station bulk fuel tanks. Drums are stored here for up to 2 years without secondary containment. A large steel platform will be constructed in 2023/24 as shown in Figure 8 below in order to house the drummed petrol and paraffin. .

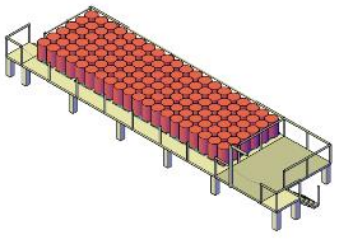


Figure 8: Concept drawing of drum platform

Drums and bottles (205, 100, 25 litres) of lubricating oils, antifreeze, degreaser and two-stroke oil are stored at Rothera station at the following locations:

- Inside a sumped storage container, which is located on the west side of the vehicle workshop. The vehicle workshop and lube store have absorbents to deal with small spills. The generator shed contains dustbins full of oil spill absorbents.
- Inside the aircraft hangar, a stock of in-use Paints, Oils and Lubes (POLs) is stored in a yellow metal cupboard.
- Spare POLs are stored inside a sumped storage container outside the hangar, 25m to the north. The quantities held here are small and absorbents stored in the hanger are available to deal with spills.

2.5.7 Temporary fuel tank for AIMP construction at Rothera

During the construction work under the AIMP, various projects will require additional temporary fuel storage as agreed and detailed in the Environmental Impact Assessments (EIA) for the Rothera Modernisation project and Rothera Runway Resurfacing project. Including:

- A 5,000 litre bunded steel bowser for refuelling vehicles, temporary tanks, and mobile generators.
- A temporary 50,000 litre bunded steel bulk tank was installed on the north side of the generator shed in the 2021/22 season. The additional fuel powers generators that support MEP systems in the Discovery Building and serves heated containers. The tank will be removed at the end of the project in the 2024-25 season.
- A temporary 2,250 litre bunded tank was installed in 2019-2020 adjacent to the AIMP generators. This tank will provide fuel for the mechanical plant and the generator tank used during construction and will be refuelled using the towable bowser.
- In 2022/23, 4,950 litres of Green D+ fuel, an enhanced type of Hydrogenated Vegetable Oil (HVO) was imported to Rothera as part of an AIMP trial managed by BAM. The HVO was stored in two Western Global 2,000 litre transcube bunded bulk tanks at either the fuel farm or the generator shed. In addition, a 950 litre smaller refuelling and transport bowser tank was delivered and located south of the Bonner Lab in order to feed HVO to the BAM 65 kVA generator as part of the trial. No additional HVO is being delivered in the 23/24 season but the trial is expected to continue with the remainder of the fuel. In 2022/23, BAM used 1000 litres of the HVO and the vehicles team used 595 litres, leaving a total of 3355 litres remaining at the start of the 2023/24 season.

During construction works at station the Station Leader will continue to have overall responsibility for oil spill response, but BAM will lead on response to Tier 1 spills as detailed in the EIA. Please also refer to section 4.2.1.1 BAM (Construction Partner) Individual Staff Member Action Plan.

In the event of a HVO fuel spill, the existing Oil Spill Response Measures for MGO can be followed. A 1,100-litre spill kit will be supplied by BAM in a wheeled bin adjacent to the 2 x 2000 litre HVOs tanks.

Additionally, all mechanical plant will carry oil spill kits. Refuelling of plant and equipment will be carried out by nominated refuellers and comply with the BAM refuelling procedures. The Standard Operation Procedure (SOP) for refuelling at Rothera applies.

2.6 FUEL STORAGE AND HANDLING PROCEDURES

For Rothera, the Standard Operation Procedure (SOP) for Re-fuelling at Rothera applies. This procedure is reviewed annually. The refuelling of vehicles falls under the Vehicles Departments' SOPs.

2.6.1 Refuelling of the station bulk fuel tanks

Refuelling of the station bulk fuel tanks is undertaken in accordance with the SOP for Re-fuelling at Rothera. This sets out how to re-supply Rothera bulk tanks using the lay flat hose and equipment (during the Rothera Wharf construction works the original 4" fixed fuel pipes from the wharf to Admirals house were removed and they are planned to be re-instated upon completion of Rothera AIMP works) direct from the ship to the fuel farm and the bulk tank containers positioned on the wharf.

There are separate resupply hoses and pipelines for the MGO (refer to Appendix D and Appendix E Marine Gas Oil System) and AVCAT/AVTUR (refer to Appendix F). During refuelling, continual inspections are made of the fuel hoses, the fuel tanks and level gauges, and on-board ship. Drip trays are placed under the hose joints as a precaution during refuelling. Contact between personnel is maintained using VHF radio.

2.6.2 Refuelling of the day tanks

The MGO pump shown in Appendix D is capable of continuous operation and delivers fuel via a sub-surface pipeline to the generator shed where it can be used to top up the day tank.

2.6.3 Refuelling of the vehicles, equipment, boats and aircraft

Refuelling of the station vehicles, equipment, boats and aircraft is carried out around Rothera under station refuelling procedures. SOPs for refuelling vehicles are owned by the Vehicles team.

The AVCAT/AVTUR dispenser shown in Appendix F is fed via a surface pipeline from the bulk AVCAT/AVTUR tanks. Aircraft may then be refuelled directly from the dispenser.

2.6.4 Refuelling of mechanical plant and generators during construction

Mechanical plant and the generator tank used during AIMP construction are refuelled using a towable 5,000 litre bunded steel bowser. This is towed by a tractor or similar item of plant. Refuelling is manged by the construction partner BAM and oil spill equipment is located adjacent to the fuel tank and accompanies the bowser at all times. All mechanical plant carries spill kits.

2.6.5 Refuelling of station drum depot

Drums are moved around station by vehicle from the wharf to the apron either containerised by machine or towed by a bulldozer on a sled. Locally they are moved by drum trolly. Vehicles SOPs apply.

2.7 SPILL SCENARIOS AND RISKS

A range of spill scenarios have been generated for Rothera Research Station. Generally, these range from the very low probability of a large oil spill if a vessel were to run aground, to the high probability of small spills during refuelling operations and the handling of fuel drums.

2.7.1 The expected probability, size and type of oil spills

Table 3 summarises the expected probability, maximum spill size and fuel type for certain scenarios.

Table 3: Expected probability, maximum spill size and fuel type for a range of possible scenarios at Rothera Research Station.

Spill scenario	Probability	Maximum spill size (l)	Fuel type
BAS Ship collision with iceberg or grounding	Very low	690,000 2,200	Diesel fuel (MGO) / AVTUR/ AVCAT Other petroleum products
Catastrophic failure of a station bulk fuel tank	Low	240,000	Diesel fuel (MGO)
Leak during refuelling ship to shore	Medium	1,000	Diesel fuel (MGO)
Break in MGO circulation line	Medium	24,000	Diesel fuel (MGO)
Rupture / overflow of New Bransfield House day tank	Low	12,500	Diesel fuel (MGO)
Rupture or overflow of day tank in generator shed	Medium	5,500	Diesel fuel (MGO)
Rupture or overflow of boiler tank	Low	3,400	Diesel fuel (MGO)
Rupture / overflow of Admiral House tank	Medium	6,800	Diesel fuel (MGO)
Rupture / overflow of Old Bransfield House tank	Medium	3,400	Diesel fuel (MGO)
Rupture / overflow of Emergency Generator tank	Medium	12,480	Diesel fuel (MGO)/ AVCAT
Spill scenario	**Probability**	**Maximum spill size (l)**	**Fuel type**
Rupture / overflow of Generator Shed tank	Medium	2,600	Waste oil / lubricants
Rupture / overflow of Giants House tank	Medium	3,800	Diesel fuel (MGO)
Rupture / overflow of Bonner Laboratory tank	Medium	5,300	Diesel fuel (MGO)
Rupture / overflow of garage tank	Medium	2,100	Diesel fuel (MGO)
Rupture / overflow of garage tank	Medium	1,800	Waste oil / lubricants
Rupture of mobile petrol fuel bowser	Medium	1,005	Petrol
*Rupture of temporary fuel tanks	Medium	5,500	Diesel fuel (MGO)
*Rupture of construction works generator fuel tanks	Medium	2,250	Diesel fuel (MGO)

*Rupture of construction works mobile fuel bowser	Medium	5,000	Diesel fuel (MGO)
*Rupture of HVO bulk fuel tank	Medium	2000	Hydrogenated vegetable oil (HVO)
*Rupture of smaller HVO bulk fuel bowser	Medium	950	Hydrogenated vegetable oil (HVO)
Damaged drum at a fuel depot	High	205	Diesel fuel (MGO) Petrol Paraffin
Overflow of vehicle / aircraft tank while refuelling	High	Traces	AVTUR / Avtur-oil mix / Petrol / Petrol-oil mix / AVCAT
Failure of pipes, valves or joints	Medium	1,000	Diesel fuel (MGO)

* Temporary fuel storage facilities for AIMP construction work

2.7.2 The likely movement of oil spills at Rothera

Spills on Rothera are most likely to occur either from the station itself or during refuelling from ship to shore and will be of AVCAT, AVTUR, petrol or MGO.

A spill of diesel fuel during refuelling from ship to shore will enter the sea in South Cove and spread very quickly unless it occurs on sea-ice or within an ice lead. A fuel spill which enters South Bay will spread out quickly into Ryder Bay and then potentially beyond.

If a spill enters the sea in North Bay, onshore north-easterly winds would help to contain the spill to the local shoreline. However, in such wind conditions the bay regularly fills up with pack ice and bergy bits which would hamper any clean-up. Fuel that enters the sea will initially float but will then evaporate at a speed determined by the prevailing temperature, and, particularly in rough weather, will be naturally dispersed by wave action.

At the station, a spill not contained within bunds will follow the topography of Rothera Point, generally running down slope towards North or South Bay. It will pool in hollows, in particular under buildings. It will seep through the rocky subsurface until it reaches the layer of permafrost. Any significant vertical migration will probably be stopped by permafrost which is thought to be found near the surface even at sites such as Rothera with altitudes close to sea level.

Oil will also be absorbed by snowdrifts. Snow absorbs oil through capillary action and reduces how far it spreads. It is easier to recover oil whilst on the ice before thawing occurs. On ice, oil will pool in cavities and will behave as it would on impermeable ground, following the path of least resistance. Due to the type of oil and additives used by BAS, oil is not expected to solidify on ice.

2.7.3 The likely fate of spilt oils

BAS use diesel fuel (MGO), aviation fuel, petrol, paraffin, and lubricating oil on and around Rothera Research Station. Oil can potentially be spilled on ice-free ground, man-made ground, snow, ice or in the water (sea).

The majority of potential spills at Rothera will be of MGO or aviation fuel. On land, MGO and aviation fuel generally evaporate readily, even in cold temperatures and calm conditions where the evaporation rate is expected to be lower than in a temperate environment. In the sea, MGO and aviation fuel normally evaporate and disperse into the water column readily at ambient temperatures although at extreme low temperatures these processes are likely to be slower.

In cold climates, small spills of refined products, such as petrol and paraffin, on land will typically evaporate over two days. If the products enter the water, they will typically evaporate and disperse naturally to a large degree in turbulent waters. When spilled, paraffin will spread rapidly into a thin sheen and as with petrol, it will rapidly evaporate and naturally disperse. Refer to Section 3.2 for further details on BAS'BAS response strategy to petrol spills.

Lubricating oil used at BAS stations is expected to remain fluid in cold temperatures and to not evaporate, which should allow for containment and recovery (Section 4.10.2).

Section 3

BAS OIL SPILL RESPONSE STRATEGY

3. BAS OIL SPILL RESPONSE STRATEGY

When considering general oil spill response strategies, there are three primary options:

- **containment and recovery;**
- in situ-burning;
- use of dispersants.

A decision as to what particular response strategy will be utilised depends on the available response capabilities, the spill condition at the time, the risks to responders and the impact on the environment. As described in Section 3.1 BAS response strategy to spilt oils (not petrol) below, **the general BAS response strategy is 'containment and recovery',** and the use of dispersants and in-situ burning are not practised on BAS stations.

3.1 BAS RESPONSE STRATEGY TO SPILT OILS (NOT PETROL)

The general strategy of BAS is to contain and recover oil spills (except petrol) with emphasis on recovering as much oil as possible in the first few days after a spill with as little impact on the environment as possible. The response techniques used by BAS to contain and recover oil are described in more detail in Section 4.10.

Before employing any response technique, the risk of damage to the environment caused by each technique must also be considered and be minimised in as much is as possible.

Each spill is different, and the general strategy of containment and recovery of spilt oil may not always be appropriate. Under certain conditions, BAS would allow natural recovery to take place or may seek expert external advice on alternative response strategies should the need arise for a Tier 2 or 3 incident (please refer Section 3.6 BAS classification of oil spills).

The use of dispersants and in-situ burning are not practised on BAS stations as described in Section 3.5.

3.2 BAS RESPONSE STRATEGY TO PETROL SPILLS

Petrol is a lighter oil and is generally volatile in nature and will usually evaporate readily and naturally disperse. In cold climates, it will typically take two days to evaporate.

If spilled offshore, petrol rarely requires an active response beyond monitoring[1] as the right amount of wave action effectively aids natural dispersion, and oil will break down in the water column naturally.

If spilled on land, particularly in confined areas, petrol has the potential to ignite causing fires and/or explosions. Even in ventilated areas the evaporated fuel fumes from the spilt petrol can affect breathing and cause nausea.

Therefore, BAS generally do not actively respond to petrol spills but allow them to evaporate naturally. Should large amounts of petrol be spilled or should the spill occur in an area of site sensitivity (Section 4.9), it should be re-evaluated whether this approach is appropriate or

[1] ITOPF Handbook - ITOPF: Page 30

whether an active response may be required by contacting BAS Cambridge for advice (Section 4.10.1).

3.3 ENVIRONMENTAL MONITORING

The initial response to any oil spill is undertaking surveillance to detect, monitor and track any spills. In the Antarctic, this option is limited due to the lack of airborne and boat surveillance available. Where possible, BAS personnel will undertake inland, shore or ice-based surveys as the first step of the monitoring programme. Monitoring may not always be necessary, especially if a spill is small and resources are not at risk.

The initial monitoring by BAS personnel is undertaken through a 'Rapid Initial Assessment' (see Section 4.3) and aims to obtain information regarding:

- Confirmation and location of the oil spill
- Origin of oil and status of the source
- Quantification of the volume of oil (if on water) using the Bonn Agreement Oil Appearance Code (BAOAC)[2]
- Weather conditions, such as prevailing winds and currents, to calculate trajectory of an oil slick on water[3].

Post-incident monitoring is covered in Section 4.18.

3.4 SAMPLING OF OIL

BAS does not have suitable laboratory equipment on station that could be used to analyse spilt oil and characterise its type or degree of weathering. However, in some instances, BAS Environment Office will advise on the need to collect samples, provide information on the sampling method and equipment to be used, and arrange for its subsequent analysis.

3.5 RESPONSE STRATEGIES NOT USED BY BAS

3.5.1 In-situ burning (ISB)

ISB is a response technique that removes spilled oil from land, snow, ice, or water surfaces through controlled burning of the surface oil. The application of ISB removes relatively large amounts of oil from the surface but generates large amounts of black smoke and contributes to atmospheric pollution. A small percentage of unburned oil may remain from the spill and residual by-products (such as dioxin, a persistent chemical) may be released into the environment after ISB. The potential effects of these residues, combustion by-products and the smoke plume on humans, wildlife and the environment need to be carefully considered particularly on sensitive Antarctic terrestrial and water communities[4].

This is also supported by the Protocol on Environmental Protection to the Antarctic Treaty (1991) which contains stringent and comprehensive regulations to prevent and combat

[2] Bonn Agreement Oil Appearance Code (BAOAC) entered into effect on 1 January 2004.
[3] As a rule, oil will move on water with 3% of the wind's energy and 100% of the current.
[4] (FACTSHEET I No.3 I ISB Human Health And Environmental Effects): Response Library - Oil Spill Prevention and Response - API

pollution. Article 3 of the Protocol requires Treaty Parties to protect the Antarctic environment and avoid activities that have significant adverse effects on air and water quality.

In addition to the environmental impacts of ISB, the safety concerns and weather conditions also need to be considered. The risk of managing a controlled fire in a remote location and in proximity to BAS stations is considered too high and too difficult to safely mitigate. The weather conditions in the Antarctic are generally not suitable to support the safe application of ISB.

Overall, the overriding factor in the Antarctic Treaty area is considered to be the avoidance of adverse effects on air and water quality as well as the protection of human life and wildlife. Therefore, BAS does not practice ISB.

3.5.2 Dispersants

Chemical dispersants aim to enhance natural microbial degradation, a naturally occurring process where microorganisms remove oil from the environment. Dispersants break up the surface oil slick from the sea surface into tiny oil droplets and thereby remove oil from the water surface by transferring it into the water column where it is broken down by natural microbial degradation.

Dispersants can be applied by aircraft or watercraft. The use of dispersants should always be based on a net environmental benefit analysis. The toxicity of the oil, the dispersed oil, and the dispersant itself must be considered as mixing these into the water column could potentially expose an array of resources and habitats that normally would not be exposed if the oil were left on the surface.

Due to the remoteness and the lack of suitable aircrafts and watercrafts in Antarctica, the application of dispersants is not a realistic option for BAS. Dispersants are also generally used on spills in open water whereas spills at BAS stations are likely to occur near the coastline. Dispersants also have a limited shelf life and will add to the station storage requirements, if unused they will create additional hazardous waste to be shipped back to the UK.

Overall, the use of dispersants is not considered viable by BAS.

3.6 BAS CLASSIFICATION OF OIL SPILLS

Oil spill incidents within BAS are classed in Tiers 1, 2, 3. The classification is based on the *International Association of Oil & Gas Producers (IOGP) Tiered preparedness and response framework*[5]. This classification into tiers identifies the oil spill response capabilities required to mitigate any potential oil spill scenario. There are three categories of response capabilities: Response personnel, response equipment and additional support. The tiers should only be used to define the required response capabilities to respond to the incident, not the scale of the incident itself. A number of factors influence the response capabilities: location, oil type, season and volume spilled.

[5] Tiered preparedness and response | IPIECA

Within BAS, three tiers have been defined as outlined in Section 3.6.1 to Section 3.6.3 below and shown in Table 4 below:

Table 4: BAS Classification of incidents

Tier 1	Incident can be dealt with by one or two station personnel or a small subset of the station response team using local response equipment.
Tier 2	Incident requires the full response capability of the station and assistance from BAS Cambridge.
Tier 3	Incidents which exceed the response capability of the station and BAS Cambridge. Outside assistance is required.

3.6.1 Tier 1

Response capabilities utilised include one to two adequately trained station staff (refer to Section 3.7 Training) and local response equipment. The incident can be managed by the station alone and does not affect local infrastructure or environmental sensitivities. No additional support is required.

This could for instance include spills from a leaking fuel drum with immediate containment (by using putty and/ or decanting into intact, leak-proof drum) as well as immediate recovery and clean-up of the contaminated area such as bagging of waste snow and fuel and disposal in accordance with the BAS Waste Management Handbook. Tier 1 can be described as a reactive initial response, where activities are driven by resources available and immediate priorities.

Due to the limited quantity of fuel and type of containers present and their remoteness, incidents occurring in or near the field huts are generally expected to be classed as Tier 1.

3.6.2 Tier 2

Response capabilities employed include, the station's full response team coordinated by the Station Leader, and local equipment. The incident affects local infrastructure, resources and/or environmental sensitivities. Additional support i.e., technical advice is provided by BAS Cambridge.

This would include spills requiring more complex containment as well as protection of vulnerable areas (refer to Section 4.9). Tier 2 can be described as proactive 'project' phase, where spill response activities are driven by objectives and strategies and resources identified depending on demand. A more detailed assessment is required to ascertain the most appropriate response technique and it may take longer to employ relevant equipment.

3.6.3 Tier 3

Response capabilities utilised encompass the station's full response team coordinated by the Station Leader, local equipment, and BAS Cambridge support. These capabilities are limited practically, and further support would be required. However, due to the remoteness and often limited accessibility of Antarctica, it is not realistic to expect further, possibly international capabilities, to be available to be called upon. For the same reason, there is no further contractual assistance that could be called on.

Section 4.10 provides details on the response capabilities held at Rothera Research Station i.e., response techniques and equipment available.

It is important to remember that resources held in the three tiers complement and enhance the overall capability, e.g., the elements of a Tier 1 response are supplemented by higher Tier capability and not superseded or replaced by it. This approach enables a seamless escalation according to the requirements of the incident.

3.7 TRAINING

BAS recognise the importance of training in oil spill response and are committed to providing and facilitating appropriate training opportunities.

3.7.1 Cambridge Staff Training

BAS Environment Office and other key operational staff e.g., Station Operations Managers, Station Leaders, and Station Facilities Engineers, where appropriate, maintain accreditation to internationally recognised International Maritime Organisation (IMO) oil pollution preparedness and response training at IMO Level 2 or IMO Level 3 with refresher training offered every three years.

In the event of an oil pollution incident on station, BAS Environment Office staff will participate in the BAS Incident Response as the Environmental & Pollution Incident Representative and offer advice on:

- Mitigating risks of pollution and/or environmental impact
- Clean-up measures
- Waste Management
- Environmental Monitoring

3.7.2 Station Leader Pre-deployment Training

All Station Leaders (SLs) receive Station Management Oil Spill Response Training in Cambridge and by Oil Spill Response Ltd in Southampton prior to deployment South. The training detail is summarised in Appendix I.

3.7.3 Station Response Team Pre-Deployment Training

A representative group of station staff will receive the Station Oil Spill Response Team Training in Cambridge prior to deployment South and will form the core station response team. At Rothera Research Station, the core station response team will be made up of station management and staff as below:

- Summer Station Leader
- Winter Station Leader
- Station Facilities Engineer
- Station Deputy Facilities Engineer
- Majority of the wintering team
- Key summer personnel including, Station Logistics Manager, Station General Assistants and the Air Unit Ground Coordinator.

The training is a half day classroom and practical session coordinated by the BAS Environment Office and delivered by BAS and Oil Spill Response Ltd. The training is intended to give an overview of station oil management, OSCPs, environmental and H&S impacts of a spill and highlight BAS' spill response strategies. The training detail is summarised in Appendix I.

BAS Environment Office holds all records of UK oil spill response training delivered within the BAS Environmental Management System (EMS).

3.7.4 On-Site Station Response Team Training

The Station Leader, assisted by the Station Facilities Engineer where available, are responsible for providing on-site spill response training to a subset of station staff that will form the spill response team on site.

The training should be delivered in the summer to the incoming station personnel consisting of the 'core' spill response team as detailed above (trained in the UK) and to all remaining winterers that didn't receive training in the UK and key summer staff with station management responsibilities or vehicle (including boats/aircraft) or fuel handling responsibilities. Wherever possible, training should be delivered prior to ship to station bulk refuelling and prior to the spill response exercise. The Station Leader must keep local records of all training delivered in Maximo under the Safety, Health, Environment and Quality (SHEQ) Reporting Module. The training detail is summarised in Appendix I.

3.7.5 On-Site Station Spill Response Exercises

The Station Leader is responsible for undertaking spill response exercises with the station response team. A spill response exercise should be planned and executed twice annually for wintering stations or once annually for summer only stations. Staff must be trained (as detailed above) prior to undertaking an exercise.

At wintering stations, two exercises are required per year: the first exercise is to take place at the start of the season once the majority of all summer staff and incoming winterers have arrived and then once more at the end of the season with all wintering staff. The exercises should be specific to the station and should test scenarios that have the potential of occurring and that the station may therefore need to respond to. A selection of scenarios should be developed that cover a variety of potential real-life incidents where an oil spill may occur specific to each station. Both exercises must involve full set up, deployment, operation, and recovery of all spill response equipment. This should include deployment at sea of booms and staking on the shoreline, setting up of Fastanks and operation and testing of skimmers. Equipment should be deployed in locations relevant to the spill scenario. The purpose of the exercise is to:

- maintain the spill response team's training and competency
- test the OSCP procedures
- test the suitability and performance of PPE and spill response equipment; and
- identify weaknesses and learning points.

The Environment Office can support and provide advice and guidance prior to an exercise – please get in touch if further guidance is required.

Following each exercise, the Station Leader will complete an exercise report and submit this to BAS Cambridge via the Maximo SHEQ Reporting Module.

Section 4

RESPONSIBILITIES AND ACTIONS AT STATION

4. RESPONSIBILITIES AND ACTIONS AT STATION

4.1 INTRODUCTION

The general BAS Oil Spill Response strategy is 'containment and recovery' for all oil spills **except petrol** and is defined in greater detail in section 3**.** The emphasis is on recovering as much oil as possible in the first few days after a spill with as little impact on the environment as possible. Further detail on the types of response techniques that can be applied to respond to an oil spill at Rothera Research Station are discussed in section 4.10. of this chapter.

BAS Response Strategy to Petrol Spills
BAS does not actively respond to petrol spills. Petrol is a light and volatile oil with potential to ignite causing fire/explosion. Petrol spills are generally allowed to evaporate naturally. Always report petrol spills as soon as possible so that appropriate and case specific advice can be provided. See section 3.2. for further advice on BAS' response strategy to petrol spills.

Within BAS, oil spills are classified into three tiers. The tiers are used to define the response capabilities (e.g., response staff, spill response equipment, additional Cambridge support) required to respond to an oil spill and do not define the scale of the spill itself. The Tier classification is summarised in the table below and further detail is provided in section 3.6.

BAS Oil Spill Tier Classification	
Tier 1	Incident can be dealt with by one or two station personnel or a small subset of the station response team using local response equipment.
Tier 2	Incident requires the full response capability of the station and assistance from BAS Cambridge.
Tier 3	Incidents which exceed the response capability of the station and BAS Cambridge. Outside assistance is required.

Section 2.5 of this OSCP provides a summary of the oil storage facilities on station. It also summarises the scenarios on station that could lead to an oil spill and provides guidance on the likely movement of oil spills at Rothera Research Station based on the local geography, land structure and features of the station.

The following headings in this Section set out the steps and actions to be followed at Rothera Research Station when a spill occurs, in the expected chronological order of events. Roles and responsibilities of station staff are defined, and action plans are provided. Advice is given on several actions including:

- Initial rapid assessment of the spill
- emergency shut down measures
- managing the site and spill responders safely
- how and when to notify Cambridge
- Station sensitivities (including wildlife) and priority for protection
- Spill response techniques to be applied

4.2 STATION OIL SPILL RESPONSE STRUCTURE

The oil spill response structure for Rothera Research Station comprises the Station Leader and Station Response Team or individual staff depending on classification of the spill, as well as the BAS Cambridge (Operations on Call) as required (Figure 9).

The core Station Response Team of 40 staff will be led by the Summer Station Leader in summer and the response team of 20 staff will be led by the Winter Station Leader (refer to Section 4.6).

Summer Station Response Team	**Winter Station Response Team**
Summer Station Leader	Winter Station Leader
Station Facilities Engineer	All winterers
Station Deputy Facilities Engineer	
Station Logistics Manager (summer only)	
Station General Assistants (summer only)	
Air Unit Coordinator (summer only)	
Other summer staff with station management responsibilities or vehicle (including boats/aircraft) or fuel handling responsibilities	
Winter Station Leader	
Winterers	

Their respective training requirements are detailed in Section 3.7. Contact between station staff will be established by VHF.

On station, the Station Leader will co-ordinate the spill response and report into Cambridge as required (refer to 4.2.2 and Figure 9 overleaf).

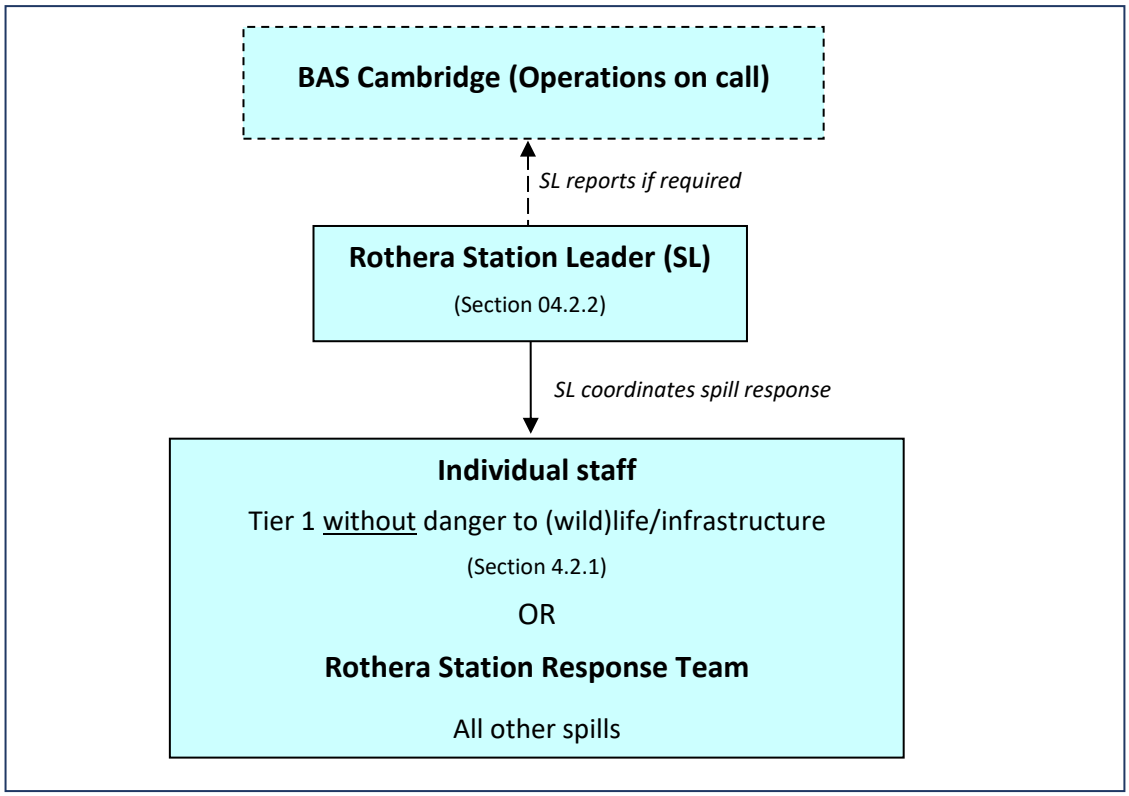


Figure 9: Oil spill response structure Rothera Research Station and reporting requirements to BAS Cambridge

4.2.1 Individual Staff Member Action Plan

Responding to an oil spill incident is the responsibility of everyone, i.e. all individual staff members on station regardless of their assigned role. In accordance with Figure 10 on page 36 the individuals must either:

- Respond to the spill if within their capabilities (e.g. Tier 1) and report to the Station Leader. Appropriate containment and recovery actions using absorbents, putty or decanting into good condition oil containers (see Section 4.10.2.1);
- Immediately report to the Station Leader if beyond their capability (e.g. Tier 2 or 3). Once a spill is reported to the Station Leader it becomes their responsibility to coordinate the response.

Incidents occurring in or near any field hut are generally expected to be classed as Tier 1 due to the limited quantities of fuel and type of containers presents. Individual staff members stationed in the huts are expected to respond to minor spills as described above.

4.2.1.1 *BAM (Construction Partner) Individual Staff Member Action Plan*

During the AIMP construction works at station undertaken by BAM, the Station Leader will continue to have overall responsibility for all Tier 2 or 3 incidents on station, irrespective of how they happened or who caused the spill. BAM staff are responsible for dealing with any

Tier 1 spill they have but have to report them to the SL as soon as possible for inclusion on Maximo.

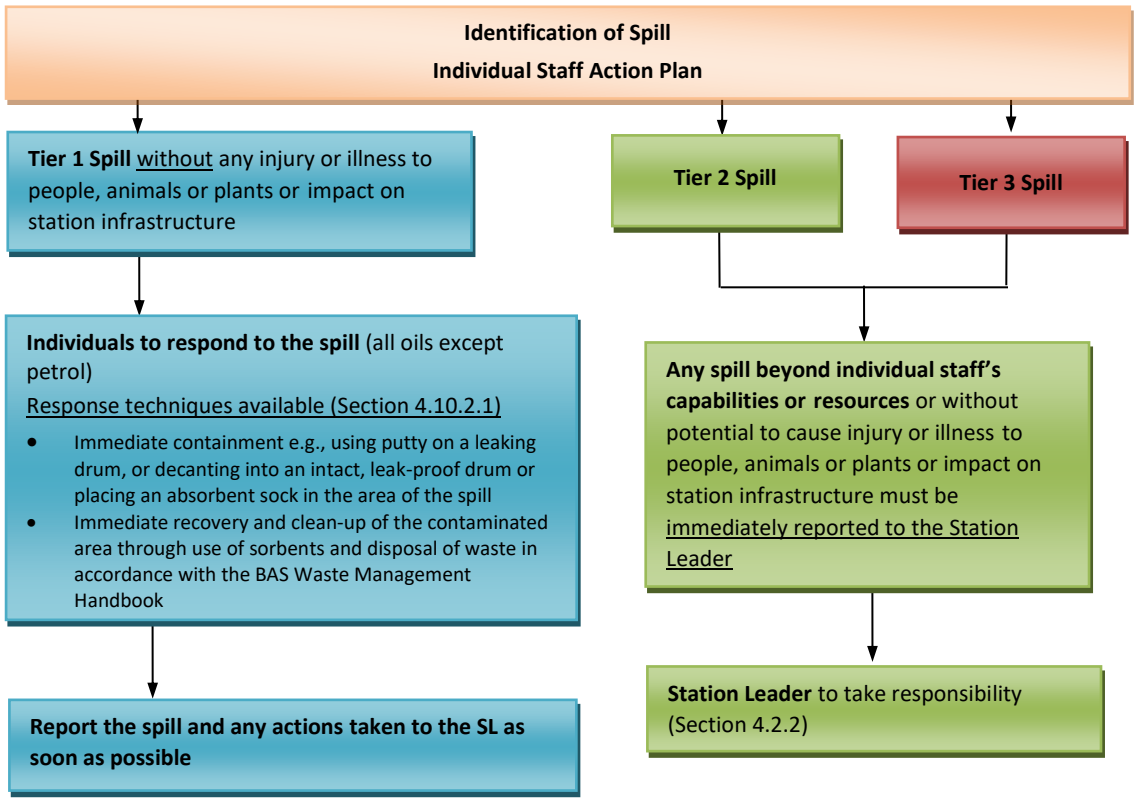


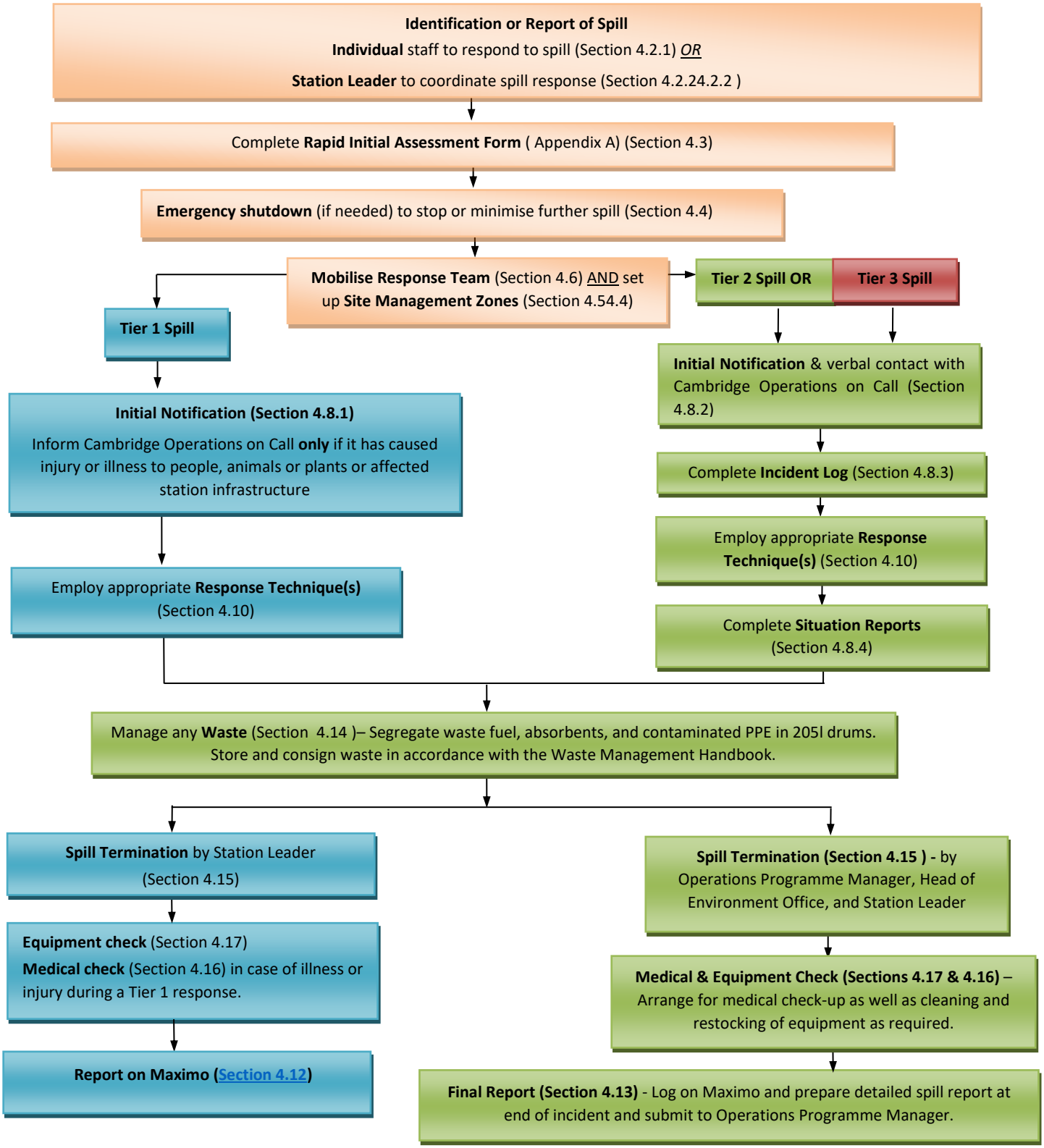
Figure 10: Action Plan Individual staff member

4.2.2 Station Leader (SL) Action Plan

Once a spill has been discovered and reported to the Station Leader, spill response becomes the Station Leader's responsibility. Their responsibilities during an incident, including the requirement to notify BAS Cambridge, are outlined in the Station Leader's Action Plan in Figure 11 overleaf. All tasks and actions are explained in more detail in Sections 4.3 to 4.18.

During the AIMP construction works at station undertaken by BAM, the Station Leader will continue to have overall responsibility for spill response for all spills at Tier 2 or 3 level on station, irrespective of how they happened or who caused the spill. BAM staff are responsible for dealing with any Tier 1 spill they have but have to report them to the SL as soon as possible for inclusion on Maximo (refer to Section 4.2.1.1).

Figure 11: Action Plan – Rothera Station Leader



4.3 RAPID INITIAL ASSESSMENT (RIA)

The health and safety of station personnel is paramount during an oil spill. The Station Leader must carry out a rapid initial assessment of the situation. This will provide them with on overview of the spill scenario and determine if the spill area can be declared safe and the spill response can proceed.

As outlined below, the Station Leader shall undertake the following tasks and record actions required in the RIA Form (see Appendix A):

- Confirm the time and location of the spill;
- Confirm the type of oil and assess probable quantity of oil spilled and probable source and cause;
- Assess the risk of fire or harm to human health (Section 5);
- Assess site sensitivities at risk and priority for protection;
- Assess weather conditions;
- Assess capabilities to respond (spill response team and spill response equipment).

In a potentially hazardous or explosive spill the Station Leader may need to: muster the team and undertake a head count to ensure everyone present on station (or in/ near the field hut) is accounted for: follow the station muster procedure as necessary and review agreed mustering location based on the location of the spill incident.

Emergency spill response actions should not be undertaken in periods of extreme weather conditions or darkness unless the situation has been fully assessed by the Station Leader and deemed safe.

When extremely volatile fuels, such as petrol, are spilled in a confined area, there may be a risk of fire or explosion. In unventilated areas petrol fuel fumes can also affect breathing and cause nausea. In such circumstances, explosion and fire prevention are the top priority. No clean-up is to be attempted of spilt petrol and the spill area should not be accessed by staff until it is declared safe by the Station Leader.

If there is any risk of fire or explosion, the mobile fire unit should be brought immediately to the scene if safe to do so. The Air Unit are responsible for its deployment on scene and use if necessary.

4.4 EMERGENCY SHUTDOWN

Once the Station Leader has deemed the situation to be safe, they must order any emergency shutdown measures needed to stop or minimize further spillage (in consultation with the Station Facilities Engineer) or shutdown measures needed to protect station sensitivities (see section 4.9).

A Tier 1 incident as defined in Section 3.6.1 is unlikely to require an emergency shutdown. However, the incident may develop into a Tier 2 incident during the monitoring phase (refer to Section 3.3), where an emergency shutdown may be required.

4.4.1 Shut down of Oil Spill Source

Possible shutdown measures at Rothera Research Station include the following:

- Any emergency shutdown measures of fuel systems/refuelling activities;
- Any emergency shutdown of station generators that may be affected by a spill.

4.4.2 Shutdown of Reverse Osmosis Plant

If a spill threatens to contaminate the water supply in the wet well (refer to Section 4.9.1), the saltwater pumps must be shut down immediately. This is undertaken by the Facilities Engineer/ Fixed Plant Mechanic (Section 4.6.1). This will stop any water/fuel mix from reaching the reverse osmosis plant or being pumped right through the system (including the aquarium) and into North Bay via the waste pipes. Water for use on station will be supplied in accordance with the most recent version of the Rothera Incident Response Plan).

4.4.3 Shutdown of Aquarium/ Bonner circulation pump

Seawater from the wet well also feeds the Aquarium in the Bonner Lab (refer to Figure 7 on page 16 and Section 4.9.12). The water intake from the wet well into the Bonner system is located less than 1 m below the surface, which is significantly shallower than the intake for the rest of station. Depending on the location of a spill this may cause higher levels of contamination in the aquarium system than elsewhere.

Should the wet well be at risk of being impacted by an oil spill, the aquarium recirculation system should be activated and saltwater pumps to the aquarium from the wet well should be shut down. These actions must be taken in consultation with the Facilities Engineer/Fixed Plant Mechanic and Rothera Bonner Lab Manager. However, this can only be used as a preventative measure rather than a reactive one.

4.5 SITE MANAGEMENT

Managing the spill site appropriately will help minimise the extent of pollution and keep staff safe during the response. Demarcating a cold, warm and hot zone will help to contain oil in one area and avoid spreading contaminants around the station. Hazardous tape can be used to help mark off different zones where appropriate.

4.5.1 Hot Zone

This is the contaminated area around the spill where people wearing PPE will be working and deploying equipment. This may be a controlled access area.

It may be necessary to keep wildlife away from the spill area to allow clean-up work to proceed safely. Please also refer to Section 5.5 Working near wildlife.

4.5.2 Warm Zone

This is a transition area, clear of the spill itself and above the tide line which is designated to ensure that secondary contamination (from people, equipment, vehicles) does not spread further. A decontamination area can be created where staff can take off contaminated clothing. A boot washer should be located at the exit of the hot zone into the warm zone to avoid cross-contamination.

Waste packaging should be located here ready to receive segregated waste oil, contaminated clothing and used absorbents. The Fastank (Section 4.10.2.5) can also be set up here to store contaminated water.

4.5.3 Cold zone

The cold zone should be a clean area away from the spill. No one in this area should be wearing contaminated PPE. This is the area from which the spill response should be planned and co-ordinated, and where responders can rest, eat and receive medical assistance.

4.6 MOBILISATION OF STATION RESPONSE TEAM

Once it has been established that it is safe to proceed with the oil spill response and site management zones have been established (Section 4.5), the Station Leader must mobilise the Station Response Team.

All spill response staff will have received training during pre-deployment training and/or during station on-site training (see Section 3.6).

Station Response Team:

Summer Station Response Team	**Winter Station Response Team**
Summer Station Leader	Winter Station Leader
Station Facilities Engineers	All winterers
Station Logistics Manager (summer only)	
Station General Assistants (summer only)	
Air Unit Coordinator (summer only)	
Other summer staff with station management responsibilities or vehicle (including boats/aircraft) or fuel handling responsibilities	
Winter Station Leader	
All winterers	

The station response team will operate under the direct supervision of the Station Leader. The specific duties of the Facilities Engineer are detailed in Section 4.6.1 below. Other staff will be delegated roles and tasks by the Station Leader as required. It is the duty of the response team to protect:

- Health and safety (Section 5);

- Station facilities (Section 2.5);
- Threatened resources and sensitivities (Figure 13 on page 47 and Section 4.9).

4.6.1 Facilities Engineer/ Deputy Facilities Engineer

The Facilities Engineer / Deputy Facilities Engineer is a vital member of the Station Response Team and responsible for the following actions:

- Undertaking any emergency shutdown measures of fuel systems/refuelling activities;
- Shutting off the saltwater pumps and reverse osmosis plant if necessary;
- Checking generators to ensure that the spill will not cause disruption of fuel supply to the engines online (e.g. spill from day tank in generator shed);
- If the spill directly affects engines online, they must be shut off and an emergency supply organised immediately;
- If the spill does not affect engines online then the Engineer/ Mechanic will proceed to the spill site and assist with pumping operations. These may include:
  - pumping of fuel from a damaged tank to secondary tank;
  - pumping from a containment bund into oil recovery drums;
  - pumping from the sea into fast tank containment.
- Post incident – review the condition and service as necessary all spill response equipment.

Once the Facilities Engineer has completed their assessment, they report back to the Station Leader.

4.6.2 Mobile Plant Technician

The Mobile Plant Technician is responsible for the following actions:

- Bring to readiness the appropriate vehicles and trailers and move the oil spill response equipment to the spill site under the Station Leader's direction;
- Responsible for running the peristaltic pump at site of spill.

4.6.3 General Assistants (GAs)

The GAs are responsible for the following actions:

- Distribute the spill response clothing, which is held in the Oil Spill Response Container, to the team;
- Responsible for cordoning off spill area if practical;
- Responsible for erecting Fastank on level ground as close as possible to the spill;
- Set up the inflatable boom, if weather and ice conditions permit.

4.6.4 Air unit

The Air unit are responsible for the following actions:

- Responsible for deploying mobile fire unit if necessary.

4.6.5 Bonner Lab Manager and Ocean Scientist

The Bonner Lab Manager or Ocean Scientist is responsible for the following actions:

- Responsible for any sampling which may be required as part of an environmental monitoring programme under the supervision of the Head of Environment.
- Responsible for the protection of the Aquarium and decision making on shutting off saltwater intake and activating the recirculation system in consultation with the Facilities Engineer/Fixed Plant Mechanic.

4.6.6 Chef

The Chef is responsible for the following actions:

- Responsible for field messing, if necessary;
- Provision of beverages to response team to prevent de-hydration.

4.7 PERSONAL PROTECTIVE EQUIPMENT (PPE)

PPE should be issued before any of the response team is involved in the clean-up of a spill. At Rothera Research Station, PPE is stored in a designated spill response container at the wharf and is inventoried by station staff annually and restocked each summer season during station resupply. If replenishment of PPE is required during the season (as a result of a spill) then the Station Leader should contact the BAS Environment Office so options can be investigated. See Appendix J for detail of oil spill response PPE stored on station.

4.8 NOTIFICATION AND COMMUNICATION WITH CAMBRIDGE

4.8.1 Tier 1 Initial notification

All Tier 1 spills should be reported on Maximo (Incidents (HSE) (BAS)).

Tier 1 spills do NOT generally need to be notified to Cambridge via the Operations on Call unless the spill has, or could have:

- caused injury or illness to staff or visitors;
- affected station facilities (e.g. water or electrical supply);
- impacted the local environment (e.g. killed or injured animals or plants);
- or the spill has provided lessons that can be learned, which can be shared with other stations or BAS Cambridge.

4.8.2 Tier 2 & Tier 3 Initial Notification

In case of a Tier 2 or Tier 3 spill, the Station Leader is required to notify the 'Operations on call' at BAS Cambridge **as soon as possible**. This includes the completion of the oil spill report form (Appendix B) and emailing this to the Operations on Call email. Notification **must not** be delayed, even if some of the information required is not available.

Once notification by email has been sent, verbal communication by telephone **must** be made between the Station Leader and the Operations on Call staff member. If the Operations on Call are not available, the Station Leader should contact the Head of Environment Office. In

Cambridge, any Operations staff who receive an initial notification of a spill on station must ensure that verbal communications with the Station Leader is made as soon as possible.

4.8.3 Incident Log

Once the initial notification to BAS Cambridge has been made and the Station Response Team has been mobilised, the Station Leader should keep a record of all actions undertaken on station and all communications with Cambridge. This needs to be kept up to date throughout the incident until the response is terminated. The incident log, initial notification and situation reports will be used as the basis of the final incident report (see section 4.13).

4.8.4 Situation reports – Tier 2 and Tier 3 only

After the initial notification of the spill, situation reports should then be submitted at 3, 6, 12, and 24 hrs after the initial notification, using the oil spill response form (see Appendix A). After 24 hrs, situation reports are to be sent every 24 hrs until otherwise agreed by BAS Cambridge and the Station Leader. All communications are to be recorded in the incident log maintained on station (Section 4.8.3).

Digital photos of the spill and its subsequent clean-up are to be kept if available and should be submitted by the Station Leader to the Operations on Call at BAS Cambridge at the first opportunity. The record should be as comprehensive as possible. Photos can also be included in the final report if appropriate and logged on Maximo.

4.9 SENSITIVITIES AT RISK AND PRIORITY FOR PROTECTION

As outlined in Section 1.3, the overall aim of a spill response is to **minimise the damage to the environment and ensure the health and safety of station personnel**. There is the risk that the spill response operation is more damaging to the environment than the oil itself. It is therefore important that any infrastructure and biological resources at risk are identified, noted as sensitivities and prioritised for protection.

The sensitivities most at risk from a major oil spill on Rothera are shown in Figure 13 on page 47 and described in Section 4.9.1 to 4.9.8. These include:

- Saltwater intake, wet well and reverse osmosis plant
- Aquarium in Bonner Laboratory
- Scientific monitoring sites
- Antarctic Specially Protected Area (ASPA) No. 129
- Terrestrial flora
- Marine ecosystems around Rothera Point
- Nesting birds
- Seals and whales

4.9.1 Saltwater intake, wet well and reverse osmosis plant

A seabed trench from South Bay feeds saltwater into a wet well which is positioned about 50m north of the wharf. The salt water is drawn from the well, through pipes to the pump house and is pumped along a 200m pipeline to the station boiler house. Here the salt water is converted to fresh water by a reverse osmosis plant. Although the wet well is fed by bottom

water, via the trench, it is possible that fuel could find its way into the well by following pipes, ducts, or spillages directly above the wet well. Figure 7 on page 16 shows the saltwater intake and section 4.4.2 details the shutdown of the reverse osmosis plant.

The health and safety of station personnel is paramount during an oil spill. The fresh water supply to the station is considered life-supporting and has therefore been assigned the **highest priority** for protection.

4.9.2 Saltwater intake, wet well and aquarium in Bonner Laboratory

As above, salt water from South Bay via the saltwater intake and wet well also feeds the salt-water aquarium in the Bonner Laboratory. Figure 7 on page 16 shows the saltwater intake and section 4.4.2 details the shutdown of the aquarium/ Bonner circulation pump.

The saltwater supply to the aquarium is considered vital to preserve the life of organisms in the aquarium and has therefore been assigned **highest priority** for protection.

4.9.3 Scientific monitoring sites

There are a number of terrestrial scientific monitoring sites on Rothera Point which need protection from oil pollution. These include two research sites used periodically to monitor moss vegetation which are marked as Area A and B in figure 12. In addition, there are various monitoring sites within the ASPA. In the marine environment there are various inshore monitoring sites located around Rothera Point. In particular in South Cove there is a long-term monitoring site focussed on the impact of iceberg scouring on marine benthos (Area C in figure 12). In addition, North Cove and Hangar Cove are regular diving sites where long-term monitoring of benthic communities is undertaken. All monitoring sites should be protected where possible in the event of a spill.

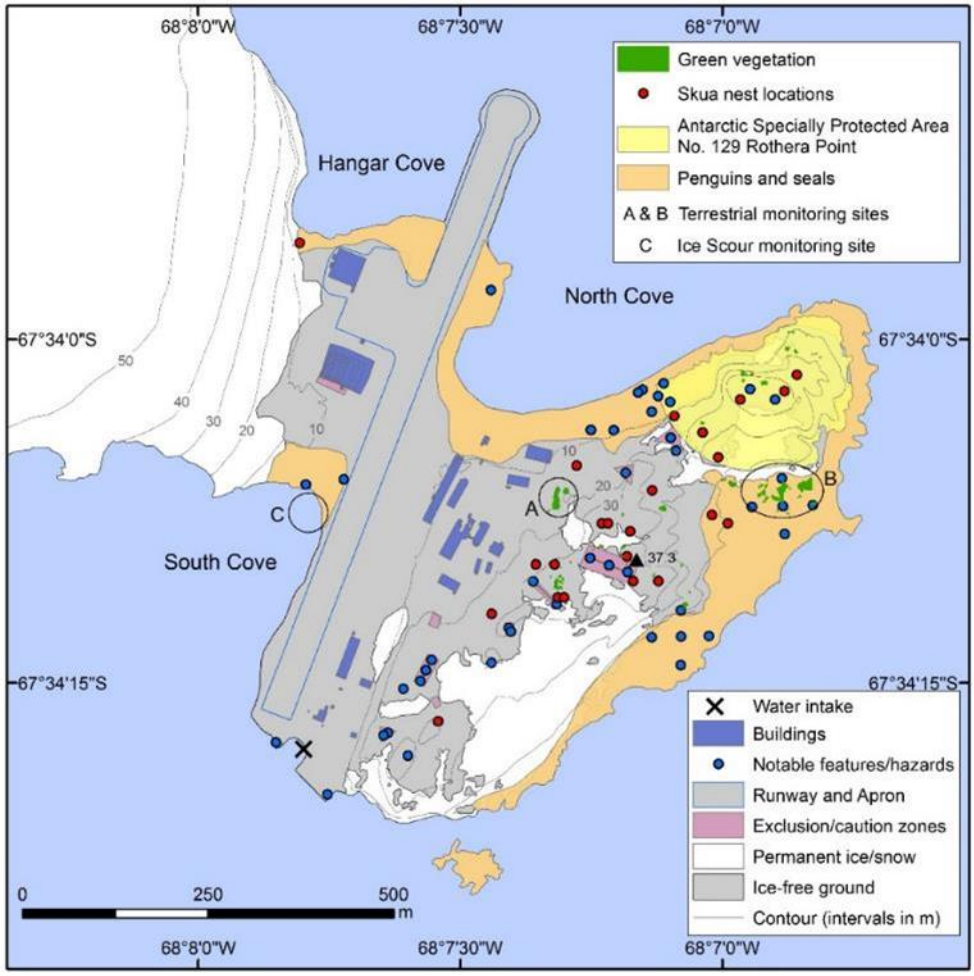


Figure 12: Rothera Point Coastal Sensitivity Map

4.9.4 Antarctic Specially Protected Area (ASPA) No. 129

ASPA No. 129 Rothera Point, Adelaide Island serves to monitor the impact of humans on an Antarctic fellfield ecosystem and covers an area of approximately 0.05 km^2 of Rothera Point (refer to figure 12).

Vehicles and helicopters are prohibited from entering the ASPA. Pedestrians are allowed to walk around the outside of the area, keeping to the shoreline. Scientific research or other activities within the ASPA are only allowed if a permit has been issued under the *Antarctic Act*.

4.9.5 Terrestrial flora

Rothera Point contains no large areas of vegetation, with substantial continuous moss and liverwort patches limited to a single area of c. 100 m^2 adjacent to a transient melt stream in a gully marked as Area A in figure 12.

4.9.6 Marine ecosystems around Rothera Point

The intertidal zone is subject to ice scour but unusually has a comparatively rich fauna. As well as rocks supporting seasonal macroalgal growth, which is exploited by mobile animals such

as the Antarctic limpet, representatives of seven major animal groups are present. Limpets are the most obvious of these, particularly at the low tide mark, but other gastropod, copepods, amphipods and nemaerteans and sea urchins can occur in the tide pools, at the southern end of the Point.

4.9.7 Nesting birds

Between eight and fifteen breeding pairs of birds nest on the rocky high zone of Rothera Point. The birds are predominantly south polar skuas but also usually include one or two pairs of Dominican gulls. Please refer to figure 12 for approximate locations of nests (red circles) as recorded between 2005 and 2016. Note, the red circles mark the general areas in which nests are located, as the precise location may vary by a few metres year on year. On nearby Killingbeck Island there are colonies of nesting blue-eyed shags and Antarctic terns.

4.9.8 Seals and whales

Since the construction of the runway the beaches around North and South Bays have become inaccessible to seals in all but a few short stretches. Small numbers of Weddell seals haul out mainly on East beach. Many crabeater seals are also found in the area but restrict themselves to ice floes or swimming in the bays. Large numbers of fur seals and elephant seals and occasional leopard seals, come ashore at Rothera and very occasionally a Ross seal has been recorded.

Minke whales and humpback whales are seen in Ryder Bay each austral summer. During some years minke whales can be observed frequently and may be year-round residents, including within the ice pack if present. Observational data suggest that local waters around Rothera Point are summertime foraging habitat for humpback whales. Killer whales inhabit the larger Marguerite Bay area and are usually seen from the station several times each austral summer.

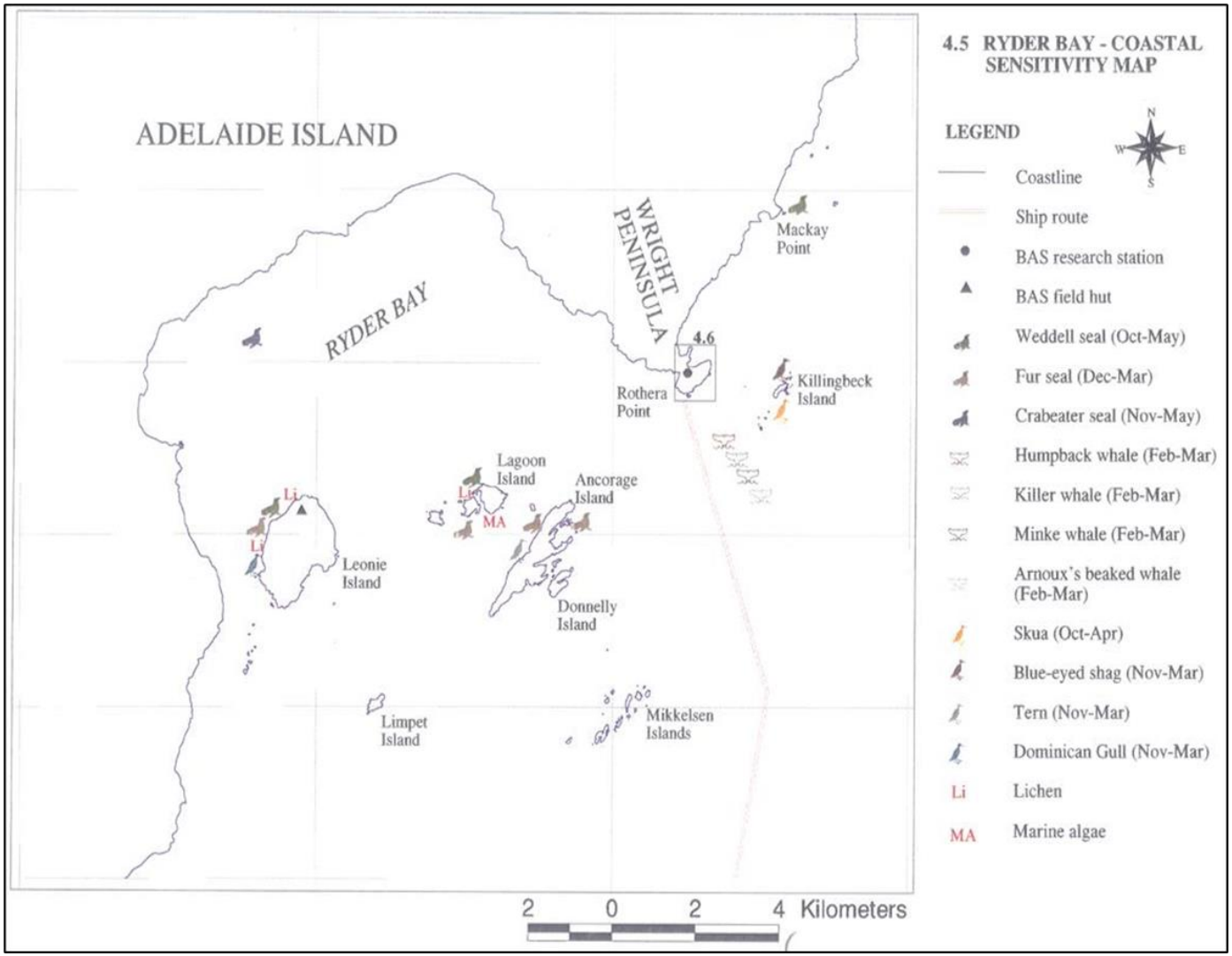


Figure 13: Sensitivities at risk

4.10 RESPONSE TECHNIQUES

The selection and employment of appropriate spill response techniques is driven by the protection of sensitivities (Section 4.9). An appropriate response technique will not cause more harm to the environment than good and will ideally return the sensitivity to its baseline condition without suffering further impact or affecting sensitivities not initially impacted by the spill. Select the response technique most suitable to the environment and oiling conditions, always ensuring that impacts of oil spills on people and the environment are minimised in accordance with the Net Environmental Benefit Analysis (NEBA)[6].

The response techniques available on Rothera are outlined in Sections 4.10.1 to 4.10.6 and include:

- Natural Recovery of oil through 'passive response'
- Containment and Recovery options
- Wildlife safekeeping
- Recovering dead wildlife

Each spill response operation will be influenced by many factors including the quantity of fuel spilt, location, resources available and weather conditions. **Techniques can be used separately or in conjunction with each other to minimise the environmental impact and maximise recovery.**

4.10.1 Natural Recovery

In certain situations, it may be appropriate to leave an oil spill to disperse and be broken down by natural processes. In such cases, a 'passive' response in the form of natural recovery, i.e. evaporation, may be adequate. When choosing this approach, seek advice from BAS Cambridge and notify the BAS Environment Office to ensure that this passive response is appropriate before disregarding any other type of response, regardless of the level of incident. The presence of sensitivities close by (Section 4.9) or the amount of oil spilt may warrant the need for an active response to the spill.

Natural Recovery for Petrol Spills
Section 3.2 outlines BAS' approach to petrol spills, which do not require an active response effort. Prioritise the health and safety of staff (Section 5) before stopping the source of the spill but do not attempt to recover spilled petrol. When choosing this approach seek advice from the BAS Environment Office to ensure this passive response is appropriate.

4.10.2 Containment and recovery

As per Section 3, the general response strategy of BAS is to contain and recover oil spills where possible. However, there are exceptions to this as discussed in Section 4.10.1. The general principle that any damage to the environment caused by the response to the spill rather than the spill itself must be considered carefully (4.10).

[6] NEBA-Net-Environmental-Benefit-Analysis-July-2013.pdf (api.org)

In the first few days after a spill as much oil as possible shall be removed. After which any remaining oil will be left to degrade and disperse in the environment. The progress of this natural attenuation will be monitored (Section 4.18).

Containment and recovery equipment available on Rothera are described in Sections 4.10.2.1 to 4.10.2.5 below and additional detail is also summarised in a table in the appendices (see Appendix F) and can be printed and laminated and kept with the oil spill response equipment. A full list of station oil spill response kit available is documented in Appendix J.

All equipment is stored in the Emergency Oil Spill Response ISO container at the wharf and the Consumables Oil Spill Response ISO container outside New Bransfield House.. During winter, the pumps are to be stored inside the generator shed, but they should be returned to the container immediately before the first vessel call of the season. All equipment is to be used in accordance with the manufacturer or supplier's instructions and prioritising health and safety requirements. Personnel deploying the equipment must have completed the practical pre-deployment OSRL training.

4.10.2.1 *Sorbents, putty and other containment*

Sorbents are used for manual recovery of oil and are any material that recovers oil through absorption, where the oil penetrates the pores of the material, or adsorption where the oil is attracted to the material surface and adheres to it. Sorbents are supplied as sheets, mats, pillows, socks or absorbent booms. These are particularly useful for small spills of light oil (e.g. MGO) but in a large spill they are not used as the primary method of clean-up as this would create an unnecessarily large amount of waste. Sorbents are most suitable in the final clean up.

Some sorbents are treated with oleophilic or hydrophobic agents to increase their recovery capacity. Oleophilic agents attract oil, whereas hydrophobic agents repel water. Both types will increase the amount of oil a sorbent will absorb rather than water. Without treatment, many sorbents can become waterlogged and sink if deployed in water. Therefore, it is important to use the appropriate sorbent for the spill location i.e. oleophilic and hydrophobic in wet conditions. Synthetic sorbents (which are stocked at all stations) have the highest recovery efficiency but must be removed from the spill site after use because they are non-biodegradable.

Putty is a temporary repair solution used to patch up leaking drums and pipes in an emergency situation. It can be kneaded together and applied on the crack or hole, to contain oil whilst the drum or pipe is being decanted/drained.

Containing the oil in damaged oil containers can also be achieved by turning an oil container over or on its side to prevent fuel from leaking, by placing in an overpack drum or by transferring the oil from the damaged container to an intact, leak-proof oil container.

See appendix J for a full list of oil spill response equipment available on station.

Information on how to use the different types of sorbents and repair putty is detailed in the appendices (see 7.5 Appendix H).

4.10.2.2 *Inflatable Booms*

Booms are temporary floating barriers used on the water to deflect or contain an oil spill. They can be used to deflect oil from the shoreline to protect sensitivities or assist in shoreline clean-up by containing the oil in an area where it can be recovered. At Rothera Research Station there are 3 x 20m Crest Flowline inflatable booms and 2 x 20m Crest Flowline intertidal booms as listed in Appendix J.

The Crest Flowline intertidal boom has two lower water ballast chambers and one upper air chamber and is used to protect the shoreline from an encroaching spill. It can be used on beaches and in intertidal zones (all water and land interfaces) and can be deployed from a boat or from the shore.

The Crest Flowline inflatable boom is a free-floating boom (with one chamber filled with air using the air inflator) used to contain oil on water, it can be deployed from the wharf. Staff deploying booms should have attended the BAS oil spill training course. Inflatable booms are used for oil collection, deflection, containment and/or protection. The free-floating inflatable booms can be deployed from the wharf or shore with one of the ships tenders or RIBs.

To ensure that oil is not lost over or under the boom, buoyancy should be as high as possible, and the curve of the boom must be as smooth as possible. The deployment of booms is not a simple operation and must be managed in a logical well-ordered manner to ensure the equipment does not get damaged and is effective. Weather conditions and sea state must be considered before use and booms should be continuously monitored whilst in position to avoid damage and maximise oil recovery.

Inflatable booms are reusable and should be cleaned thoroughly after use.

This information (along with other spill response equipment) is summarised in a table in the appendices (see Appendix H and J).

4.10.2.3 *Fence boom*

The GlobeBoom LWU (Lightweight Urethane) fence boom is a fast response boom comprised of special high-density polyethylene (HDPE) round floats of hemi-spherical design. This means that it does not require any inflation and can be deployed quickly and efficiently. Each globe segment has a cast handle that allows for easy handling. The handles are attached to both sides of the boom, creating stability in choppy waters. It is equally suitable for sheltered waters, and can be deployed without power packs, reels or inflators.

This information (along with other spill response equipment) is summarised in a table in the appendices (see Appendix H).

4.10.2.4 *Rope Mop Skimmer*

The rope mop is ideal for shallow water as the rope requires minimal water to float. It also works well in icy conditions as the rope can move easily through the ice and any ice which becomes attached to the rope falls off when it comes up to the wringer unit.

The rope mop is a 100+m loop of oleophilic material which attracts and picks up oil when moved across the surface of water. The skimmer unit rotates the mop and squeezes out the oil between two rollers into a small tank. The pulley which is positioned on the other end of the mop (attached to a boat or a fixed point) enables the rope to be directed across the water surface.

The oil that is collected in the small tank on the skimmer unit can be pumped directly into a drum for disposal. Whilst the rope mop is oleophilic it will still collect some water although in small quantities.

Staff deploying the rope mop should have attended the BAS oil spill training course. The deployment of the rope mop skimmer is not a simple operation and must be managed in a logical and well-ordered manner to ensure the equipment does not get damaged and is effective. Before commencing rope mop skimming, the skimmer should be set on firm, level ground and safely tethered to prevent movement. Please refer to user manuals for details on the operation and report any issues to the station facilities team.

4.10.2.5 *Fastanks*

Fastanks are portable and collapsible containment tanks that are quick and simple to erect in the location of the spill clean-up site. They are used to store oil contaminated water, which has been collected from a spill site. The Fastanks come with a lid and can be used to store oil contaminated water for a period of a time to allow the water and oil to separate. The water can then be re-skimmed using the skimmer and decanted into empty 205l drums before being transported off site for disposal. Additional information is summarised in a table in the appendices (see Appendix F Appendix H).

Recovery equipment available at Rothera Research Station is detailed in Appendix J. Please refer to the BAS Waste Management Handbook for correct disposal of oily mixtures.

4.10.3 The use of trenches in the recovery of oil

When responding to spills on the ground or snow/ice covered ground (permeable surfaces), it is important to minimise the amount of oil that can penetrate below the surface in order to prevent penetration of oil and further contamination sub-surface.

As a longer-term recovery technique, trenches can potentially be used to intercept and contain fuel. Please note that whilst this option is theoretically possible, in BAS practice it has been of limited benefit. Given the resources needed and disturbance created, advice must be sought from BAS Cambridge and permission given by BAS Cambridge (specifically Environment Office and Estates) before any digging begins.

BAS Environment Office will review and agree the potential effectiveness of this technique and advise on mineral resources specialist activity permitting requirements.

Underground services must be avoided when digging trenches. A permit to dig is required from BAS Estates on station prior to undertaking any groundworks.

If the consultations with BAS Cambridge confirm trenching is viable, then the following approach can be taken. Further detail will be provided by Cambridge throughout the spill response.

In summer, if the water table is high and the oil will not permeate the soil, shallow trenches may be dug to collect oil for removal.

In winter, spilt fuel is likely to be absorbed by surrounding snow or run vertically through snow until it reaches frozen ground. Fuel may then pool in depressions, for example under buildings. During the spring melt, fuel may then be flushed down slope to North or South Beach.

Trenches can be dug across the path of the spill to intercept and contain fuel as shown in Figure 14 below. Fuel can be mopped up with absorbents if on impermeable (frozen ground) or if in very large volumes it can be moved by hand squeegees along the impermeable (frozen) ground and into the trenches or move slowly into the trenches along the water table. The fuel can then be pumped out of the trench into a Fastank and be decanted as required.

Seawater can be sprayed above the spill using the fire pump to flush fuel into the trench, which can then be skimmed off using a pump. If flushing occurs near to the shoreline, booms and where required, additional absorbents should be used as a precautionary measure to avoid wider contamination.

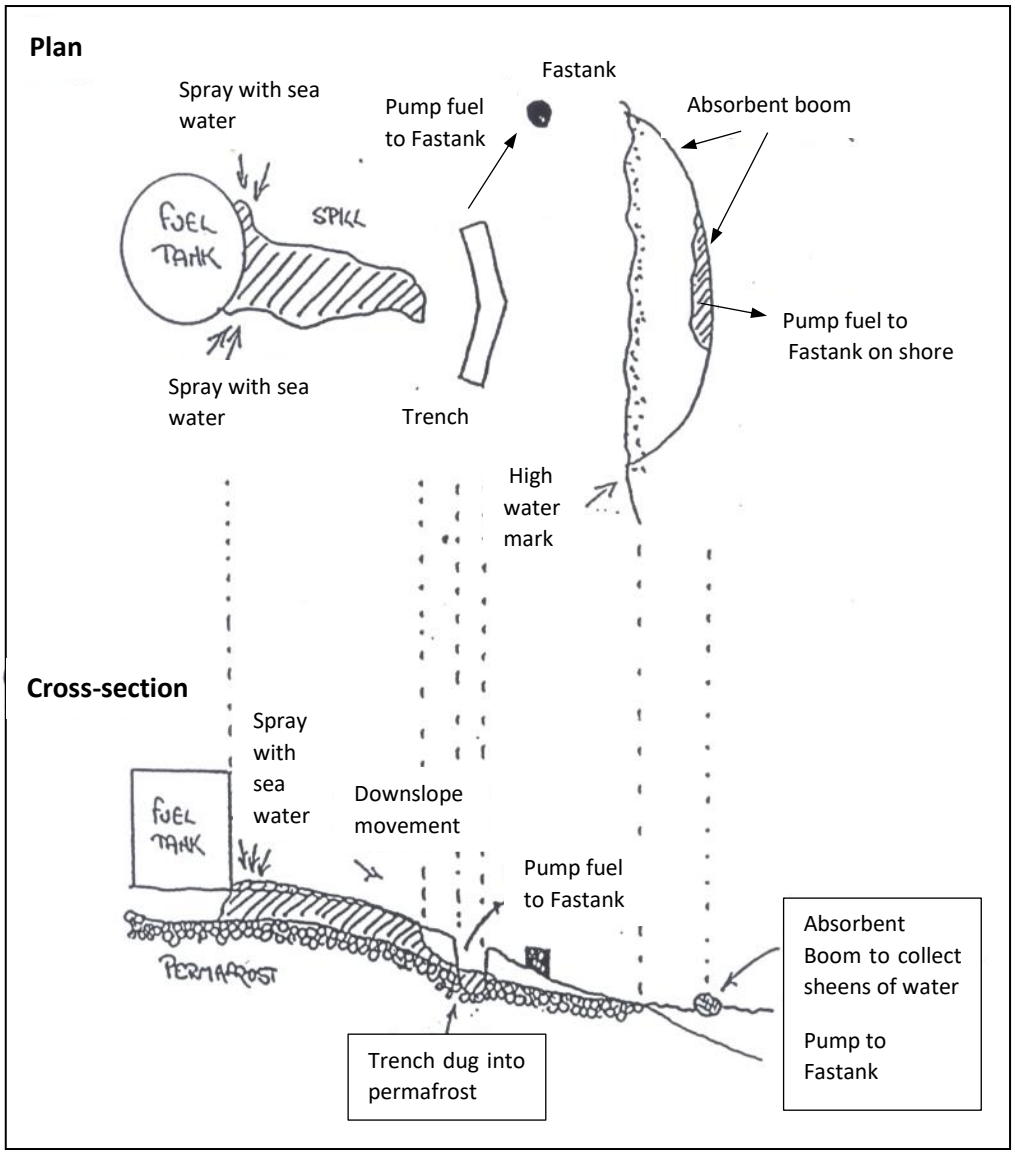


Figure 14: Trenching schematics

4.10.4 Wildlife safekeeping

During an incident, it may be necessary to designate a member of staff to watch wildlife to ensure that wildlife is protected from the spill and the spill response activities. It may also be necessary to ensure that spill responders are kept safe from wildlife.

Wherever possible, avoid contact with wildlife, however in some situations it may be necessary to move wildlife away from the spill site or erect temporary barriers to stop wildlife from becoming contaminated by oil or to stop them from entering working zones where staff may be at risk. Please refer to latest issued version of the BAS Station Wildlife Movement Guidance for general advice and safety considerations.

4.10.5 Recovering dead wildlife

Should the oil spill result in wildlife dying, dead limpets and other dead fauna contaminated with oil must be removed to prevent ingestion by birds. These will need to be segregated from all other waste streams and at Rothera may be disposed of through incineration.

However, please contact the Environment Office for advice prior to proceeding with this disposal method. Please also refer to safety guidance in Section 5.8.

4.10.6 Recovering oiled wildlife

Currently, BAS are not in a position to recover any contaminated live wildlife.

4.11 LONG-TERM CLEAN-UP

A long-term intensive clean-up is unlikely to be carried out by BAS because of the rapid evaporation and dispersion of most refined fuel products used on station. In addition, the severe climatic conditions, and logistical constraints of operating safely will limit the ability of the team to undertake such a clean-up. Should long-term clean-up operations be required, BAS will seek advice from external advisors (Section 7.5).

4.12 INCIDENT REPORTING ON MAXIMO

Any oil spill incidents regardless of quantity spilled (including near misses) are to be reported on Maximo. This ensures that important lessons can be learnt, and a review of BAS' oil spill contingency plans can be undertaken as necessary.

4.13 FINAL REPORT

For Tier 2 and 3 spills the Station Leader is to prepare a final report on the spill at the end of the incident. The 'incident log' (see Section 4.8.3) and 'oil spill report forms' (Appendix B) used to communicate with Cambridge should be used as the basis of the information. The report is to describe the:

- time (GMT) and date of spill;
- estimated quantity of fuel spilled (litres)[7];
- oil sampling results, if undertaken;
- type of fuel;
- source and cause;
- location and extent of spill (map);
- sensitivities and resources affected;
- environmental impact;
- response action taken;
  - stopping or minimising spill
  - technical work carried out to fuel tanks or pipelines;
  - clean-up (number of personnel, techniques in use, amount of oil/water collected (litres));
  - environmental monitoring (photographs, other digital documentation)
- value of response action;
- health of station personnel, if affected by spill incident;
- final classification of spill (Tier 2 or 3);
- post spill evaluation of contingency plan, and suggested amendments if necessary;

[7] Refer to Bonn Agreement Oil Appearance Code and Section 3.3

- further action(s).

The final report and any accompanying photographs are to be submitted on Maximo within one month of the end of the incident.

4.14 WASTE MANAGEMENT

The BAS Waste Management Policy in the Antarctic is:

- to minimise waste in the first instance;
- reuse and recycle at source where possible and
- to remove all wastes other than sewage, grey water or food waste from the Antarctic.

Waste produced as a result of an oil spill in the Antarctic will be managed in line with the BAS Waste Management Handbook. Waste will be segregated on site, packaged in line with the International Maritime Dangerous Goods (IMDG) Code for transport by sea and stored on site until it can be collected by the BAS vessel for return to the UK and disposal by the BAS authorised and licensed hazardous waste contractor.

4.14.1 Storage and disposal of waste

A minimum of 40 empty fuel drums are designated for oil spill response. It is the responsibility of the Station Leader to ensure that this stock of drums is to be rotated each summer and checked for holes and rust. At Rothera Research Station, these drums are stored on North Beach.

All waste from the spill response is to be stored in empty 205 litre drums. The different types of waste (waste oil, oily mixtures, contaminated absorbents, contaminated PPE) are to be segregated and stored separately as described below. In addition, keep different types of wastes segregated by fuel type wherever possible.

Store separately in 205l drums:

- Waste oil
- Oily mixtures (mixture with any oil content, may be contaminated with water/ice/snow/soil)
- Contaminated absorbents (booms, mats, pillows, granules)
- Contaminated PPE

Final packaging, consignment and disposal of waste oil and oil contaminated wastes must follow the instructions given in the BAS Waste Management Handbook. At the first available opportunity, drums containing recovered fuel and other wastes from the clean-up should be sent out on the BAS vessel. These are to be returned to the UK, consigned to the Environmental Manager. This usually only occurs once a season when the BAS vessel makes its last call at BAS stations prior to sailing back to the UK.

4.15 TERMINATION OF OIL SPILL RESPONSE

It is the Station Leader's responsibility to define the end point of the response to a Tier 1 incident (Section 4.2.2).

In case of a Tier 2 or 3 incident, it is the Cambridge Incident Response Team (Operations Programme Manager, Head of Environment Office and the Head of Estates). responsibility to decide the end point in consultation with the Station Leader.

Clean-up endpoints must be determined early so that appropriate methods can be selected to meet the overarching clean-up objectives:

- Minimise risk to human health;
- Reduce the threat of additional or prolonged impacts;
- Facilitate the natural recovery of impacted areas;
- Minimise the amount of waste created e.g. waste oily mixtures, contaminated sorbents

4.16 MEDICAL CHECK-UP

It is the responsibility of the Station Leader to stand down the Station Response Team after a Tier 1 incident. All personnel involved in the response to a Tier 2 or Tier 3 spill must be given a medical check-up by a BAS doctor at the first opportunity. This may also be required in case of injury/ illness caused by a Tier 1 incident. The BAS Medical Unit will provide instructions (Section 6.5).

4.17 POST-INCIDENT EQUIPMENT DECONTAMINATION AND INVENTORY

All reusable equipment (e.g. booms, skimmers, Fastanks etc.) must be washed and cleaned by the response team before being put into storage. The Fastank can be used for temporary storage of contaminated equipment that is waiting to be cleaned. Firstly, remove as much oil as possible from reusable equipment using absorbent mats (dispose of the single use contaminated sorbents as described above) and then, if necessary, wash the equipment with warm soapy water to remove any remaining oily residue.

The water pump must be emptied of water. The water pump and any other mechanical spill response equipment (such as the petrol pump, air inflator etc.) must also be inspected by the Facilities Engineer.

The Station Leader is to reorder any materials consumed after checking the equipment and consumables against the oil spill response equipment inventory. Arrangements for the repair and replacement of damaged equipment are to be made with the Head of Environment Office at BAS Cambridge at the earliest opportunity.

4.18 POST-INCIDENT MONITORING

Any post-incident environmental monitoring is the responsibility of the Head of Environment Office. The monitoring programme will be agreed by the Head of Environment Office in consultation with the Operations Programme Manager, the Station Leader and the Ecosystems Science Programme Coordinator and appropriate Ecosystems Project Leader(s).

Ongoing monitoring in the post-incident phase may be required depending on the risks posed by the spill. In line with PREMIAM guidelines[8], monitoring is required "*when an incident is*

[8] PREMIAM Guidelines

expected to have the potential for a significant environmental impact". When assessing the significance of the impact of a spill, the nature of the oil, the quantity, the location, and sensitivities at risk need to be considered.

As part of a post-spill monitoring programme, the following tasks are to be undertaken:

- Establish baseline of pre-existing levels of contamination prior to the incident;
- Set endpoint for monitoring (e.g. achieve recovery);
- Select environmental parameters and key indicators for biological and chemical sampling;
- Site selection for sampling, where appropriate;
- Consider the need for a specialist activity permit (Antarctic Treaty Area) or regulated activity permit (South Georgia)
- Undertake sampling per monitoring programme

As described in Section 3.3, BAS' capabilities in terms of surveillance of spills by aircraft, watercraft, or autonomous platforms are limited and are therefore not routinely available for deployment during post-incident monitoring. However, visual diving inspections may be viable (refer to section 4.18.1 below).

The Head of Environment Office can offer more detailed advice in terms of post-monitoring requirements.

4.18.1 Visual diving inspections

At Rothera, diving surveys may be used to undertake a visual assessment of an oil spill in the sea. This may help to determine the environmental impact of an oil spill under sea-ice, in the water column and on sub-tidal communities, and must be coordinated in liaison with the Head of Environment Office, Operations Programme Manager, Science Programme Co-ordinator, Station Operations Manager and the Field and Institute Diving Officers. The health and safety of all divers is paramount (Section 5.7).

If deemed appropriate and safe, a visual diving assessment should be made of the area affected by the spill. Monitoring should include dives at the impact site and at control sites, away from any likely effects for comparison. The Ocean Scientist and BAS Senior Marine Scientists should advise the Diving Officer on choice of suitable sites for monitoring impacts on local marine life.

Section 5

HEALTH AND SAFETY

5. HEALTH AND SAFETY

During the incident response, there is the risk of acute toxicity as well as physical hazards associated with noise levels, sun exposure, heat stress, injuries, and ergonomic stressors. The following subsections give an overview of points to be considered to minimise risks to health and safety. For further details on risks to the health and safety of responders and station staff please refer to the risk assessment in Appendix C.

5.1 EXPOSURE TO OIL

The type of oil must be established before any response actions are undertaken. Testing and sampling of the oil may be beneficial if the source is not known however BAS currently lacks the required sampling and analysis capability to undertake this work on site (Section 3.4). This will ensure that the oil's specific hazards, which can be found on its Safety Data Sheet (SDS), are known to the responders.

5.1.1 Safety Data Sheets (SDS)

The Safety Data Sheets for Marine Gas Oil, petrol, kerosene, AVTUR, AVCAT and all lubricating oils used at Rothera Station are held on the shared drive on station and in Cambridge.

5.1.2 Inhalation of fumes

Inhalation of hydrocarbon fumes can cause headaches and nausea. For small spills, ensure adequate ventilation in clean-up work areas and monitor staff health. For large spills, it may take 2-3 days to allow sufficient ventilation to gain safe entry into some areas.

Fumes may also build up inside the station by the response team bringing in fuel-soaked clothing. An emergency drying room should be established, away from the main living area on the station. The Station Leader must establish a cleaning rota to ensure that rooms used by the response team are washed daily. The contamination of the main living area should be mitigated by establishing appropriate warm and cold zones (Section 4.5). Contaminated PPE is not to be brought into the cold zone.

5.1.3 Skin irritation

Fuel and oil can be a skin irritant. Severe reactions can lead to dermatitis. Clean-up personnel must wear one-piece suits, rubber gauntlets and protective eye goggles during response efforts. Showers must be taken at the end of the working day.

5.1.4 Advice on health

During the response, the Station Leader must pay close attention to signs of fatigue or stress amongst the response crew. These may include:

- Being uncommunicative
- Risky behaviour
- Difficulty concentrating
- Making mistakes or responding slowly to situations
- More irritable than usual
- Feeling tired or yawning all the time
- Falling asleep on the job

The Station Leader must establish rotas as required to ensure that responders have sufficient rest periods (in the cold zone). In addition, the Station Leader should ensure that spill responders are familiar with the most likely health effects of an oil spill. These may include:

- Nausea
- Dizziness
- Headaches.

For further advice, the Station Leader should contact the nearest doctor (ship or station). If symptoms attributable to the spill occur, the doctor is to inform the BAS Medical Unit immediately who will provide instructions and advice.

5.2 CONTAMINATION OF DRINKING WATER

Drinking water would need to be highly contaminated by hydrocarbons for harm to occur. This is highly unlikely since very low concentrations of hydrocarbons alter the taste of water and make it completely unpalatable. Should contamination of drinking water occur, the water is to be monitored for hydrocarbon content. No analytical kit is available on station for testing the hydrocarbon content of contaminated water. Water can be sampled on site and tested through simple smell and if necessary, taste tests. If hydrocarbons can be smelled or tasted the water is unsafe to drink. The Station Leader should consult the H&S Advisor prior to undertaking any drinking water sampling.

5.3 SLIPS AND TRIPS

Spilled fuel increases the risks of slips and falls. Correct protective footwear, good 'housekeeping' and limiting the spread of contamination will help to reduce these risks. Due attention must be paid in order to avoid slips, trips, and accidents from manual handling of the equipment.

5.4 MANUAL HANDLING

The risk of manual handling is to be minimised by following the station specific manual handling risk assessments and through appropriate training. During spill response ensure that personnel are rotated on a frequent basis to avoid fatigue.

5.5 WORKING NEAR WILDLIFE

Working near wildlife presents a number of hazards. Please refer to the BAS Station Wildlife Movement Guidance for general advice and safety considerations.

5.6 WORKING NEAR WATER

During spill response, some personnel may be working near water depending on the location of the spill. Slips, trips and falls near water can result in responders falling into the water and suffering hypothermia or, in the worst case, drowning.

Responders should work with a partner or team when working around water and wear suitable life jackets in accordance with relevant station RAs. At least two people need to be in sight of each other at all times. A rescue vessel may also be required (where available). Communication devices are necessary, and they must be waterproof, suitable to the area of

operation and tested before work commences. There must be an emergency plan, including provision for rescue. Throw ropes as well as facilities for warmth and shelter may be required.

5.7 VISUAL DIVING INSPECTIONS

Should diving inspections be undertaken as part of post incident monitoring (Section 4.18), the health and safety of divers is paramount. A comprehensive risk assessment is to be undertaken before deploying divers in and around on oil spill. The Field Diving Officer should coordinate any diving with the Institute Diving Officer and Ocean Scientist. The Diving Officers advising on the any risk to health and safety and appropriate mitigation measures to be implemented.

5.8 HANDLING OF OIL-CONTAMINATED DEAD ANIMALS

When handling oil-contaminated dead animals, appropriate PPE must be worn to avoid direct contact to any oil. Time handling oiled dead animals shall be kept to a minimum to reduce potential exposure to volatile organic compounds of personnel staff.

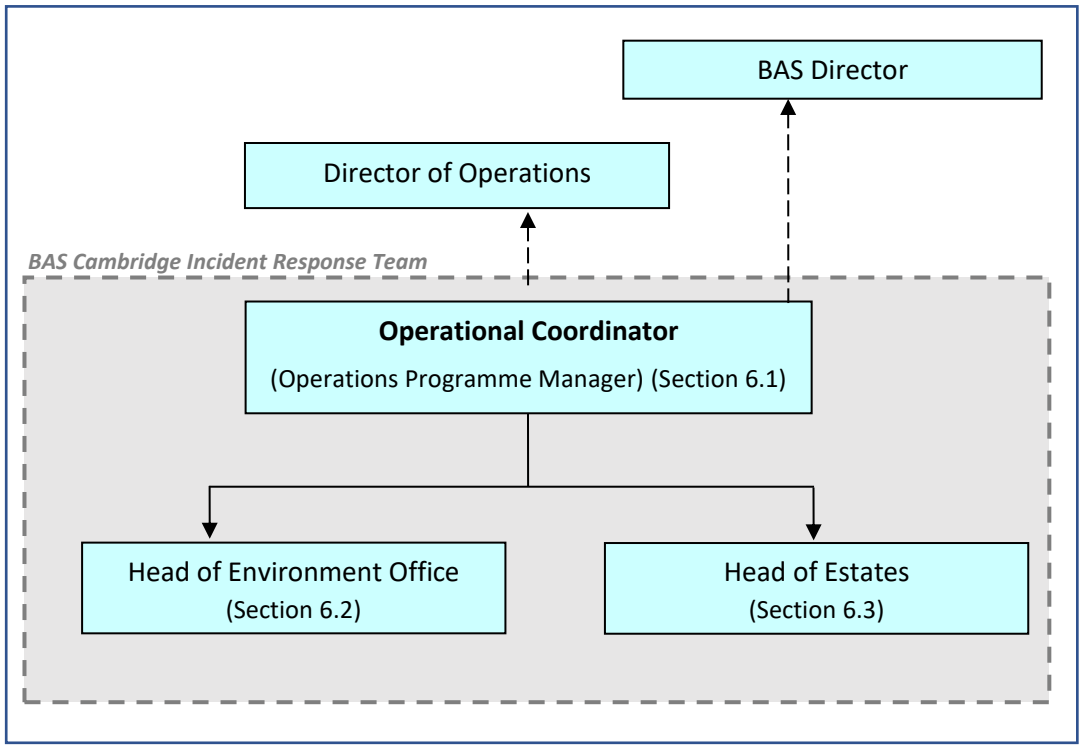
Section 6

RESPONSIBILITIES AND ACTIONS AT BAS CAMBRIDGE

6. RESPONSIBILITIES AND ACTIONS AT BAS CAMBRIDGE

At BAS Cambridge, the Incident Response Team will be notified of a Tier 2 or 3 spill via Operations on Call. The Cambridge Incident Response Team will consist of the Operational Coordinator (usually filled by the Operations Programme Manager), the Head of Environment Office and the Head of Estates, or their nominated deputies (refer to Figure 15). In the event of medical emergencies, the Cambridge Incident Response Team will also open line of communication with BAS Health and Safety and the BAS Medical Unit (BASMU). Information on other internal and external communication is provided in Section 7.

Figure 15: Oil spill response Structure BAS Cambridge



6.1 OPERATIONAL COORDINATOR / OPERATIONS ON CALL

This role is usually filled by the Operations Programme Manager (OPM) and is initially notified through the member of staff on Operations on Call (OpsonCall / 07894 935 223). The Operational Coordinator's responsibilities following on from the initial notification are outlined in the Operational Coordinator Action Plan (Figure 16). The actions required by the Operational Coordinator in a Tier 1, Tier 2 and Tier 3 incident are identified in Sections 6.1.1, 6.1.2 and 6.1.3, respectively overleaf.

6.1.1 Tier 1 Actions Operational Coordinator

Where a Tier 1 spill is reported by the Station Leader, the Operational Coordinator will complete the following actions in line with Figure 16 on page 66:

- Acknowledge initial notification from SL by email or telephone call.
- Inform the Head of Environment, Head of Estates and the Director's office after the initial contact with the SL in due course and where necessary.
- Lastly, the Operational Coordinator will advise the Station Leader to report the incident on Maximo.

6.1.2 Tier 2 Actions Operational Coordinator

In case of a Tier 2 spill the Operational Coordinator takes overall control of the response and undertakes the following actions in line with Figure 16 on page 66:

1. Provides **immediate**[9] notification to the Head of Environment Office and Head of Estates.
2. Confirms the following through discussion with the SL by telephone (and follow up by email):
    - Time (GMT) and date of spill
    - Estimated quantity of fuel spilled (litres)
    - Time (GMT) & date of spill
    - Type of fuel
    - Source and cause
    - Location of spill
    - Harm to human health
    - Risk of fire/explosion
    - Freshwater source at risk
    - Site sensitivities under threat/impact (environment, wildlife, science)
    - Response actions already taken
    - Useable bulk fuel remaining
3. After responding to the Station Leader's initial notification by telephone, the Operational Coordinator will alert the Director of Operations and the BAS Director.
4. Advises the Station Leader on:
    - Technical/Facilities remediation actions
    - Response Techniques
    - Operations (itineraries/pax movements)
    - Weather maps
5. Notifies outside agencies (FCDO, COMNAP) as appropriate.
6. Prepares draft press statements for release by the Director's Office.
7. Decides when to terminate a response.
8. Files and logs communications with Station Leader (oil spill report forms, final report from SL, photographs etc.)

[9] Within 30 minutes of the initial notification unless there is risk to life or personnel safety in which case that would be dealt with first before environmental considerations.

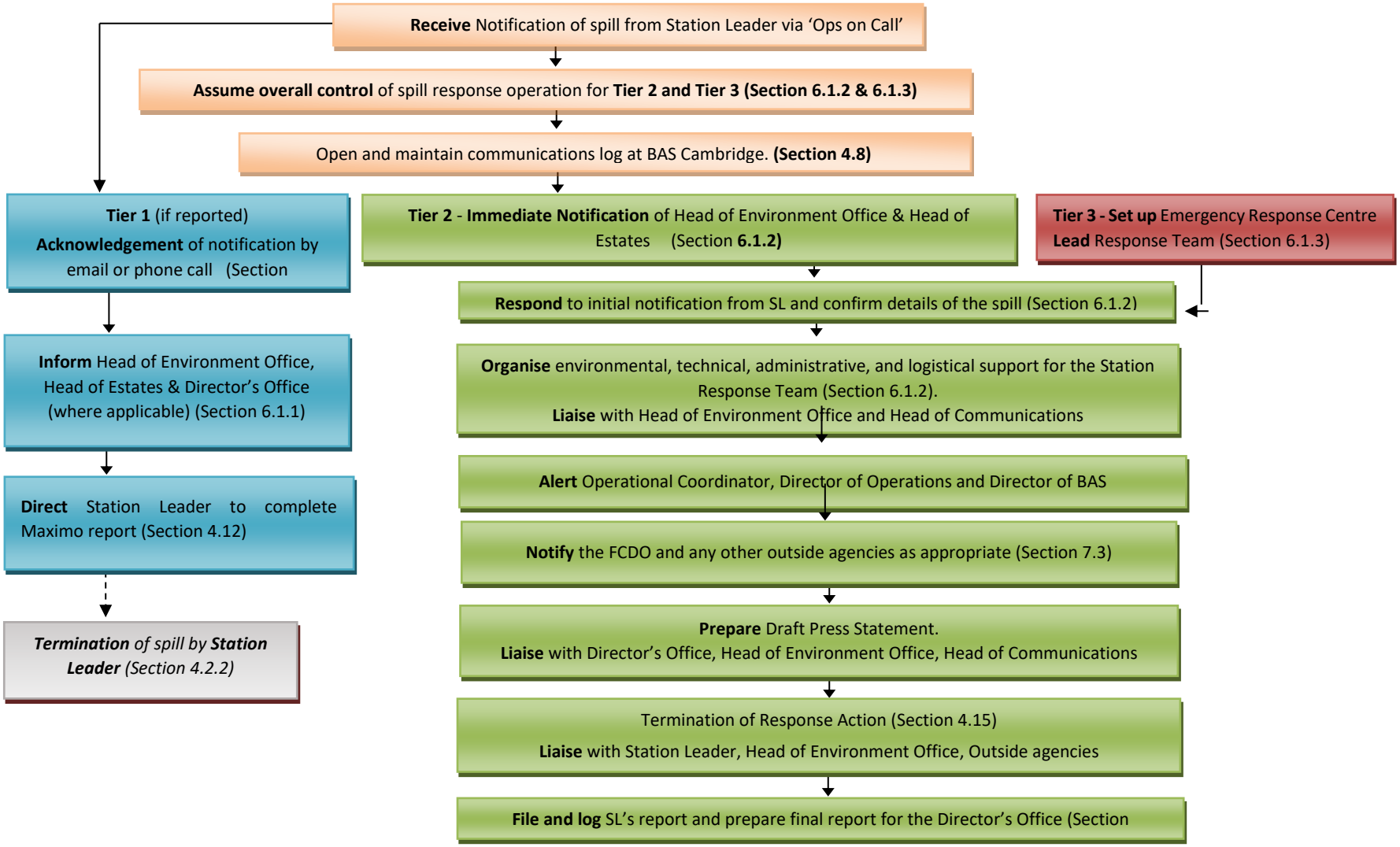
9. Prepares final report on the spill for the Director's Office.

6.1.3 Tier 3 Actions Operational Coordinator

In case of a Tier 3 spill, all Tier 2 actions apply as per Section 6.1.2 with the addition of setting up an Emergency Response Centre at BAS Cambridge in Room 133a and following all incident guidance specified in the 'BAS Incident Response Plan' along with this Oil Spill Contingency Plan. The BAS Incident Response Team comprises of a minimum of the Operational Coordinator (filled by the Operations Programme Manager) and an Operational Controller (filled by the Head of Polar Operations) and in the case of oil spills also includes the Head of Environment Office and Head of Estates.

In the event of remote working, BAS would make a judgement at the time as to whether an incident can be adequately responded to remotely or whether the Incident Response Team needs to convene in person. A third option, a hybrid model where parts of the team convene in BAS Cambridge and others join remotely, may be considered.

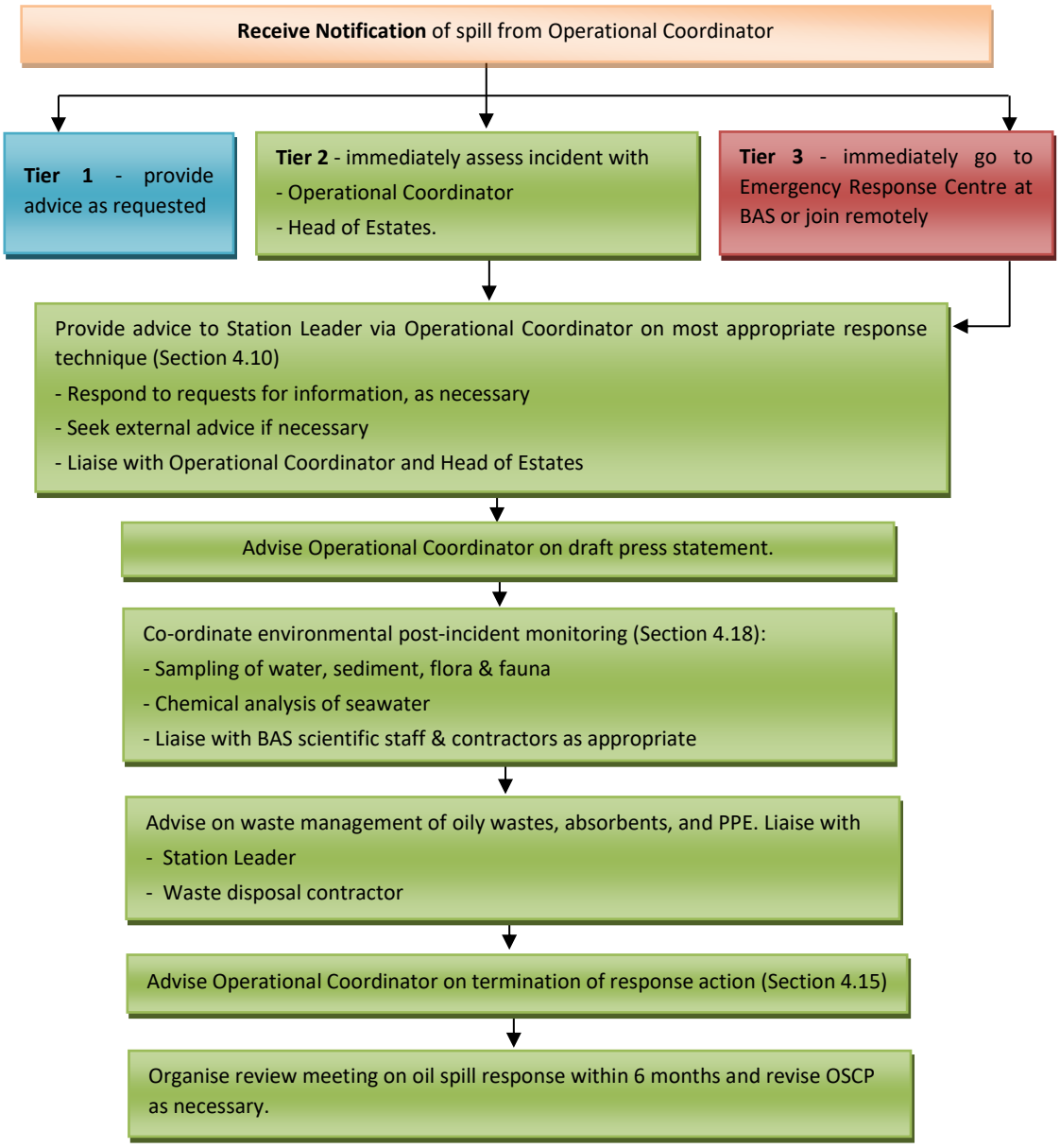
Figure 16: Action Plan – Operational Coordinator at Cambridge



6.2 HEAD OF ENVIRONMENT OFFICE

The responsibilities of the Head of Environment Office following on from the notification by the Operational Coordinator are outlined in the Head of Environment Office Action Plan in Figure 17 below.

Figure 17: Action Plan – Head of Environment Office at Cambridge



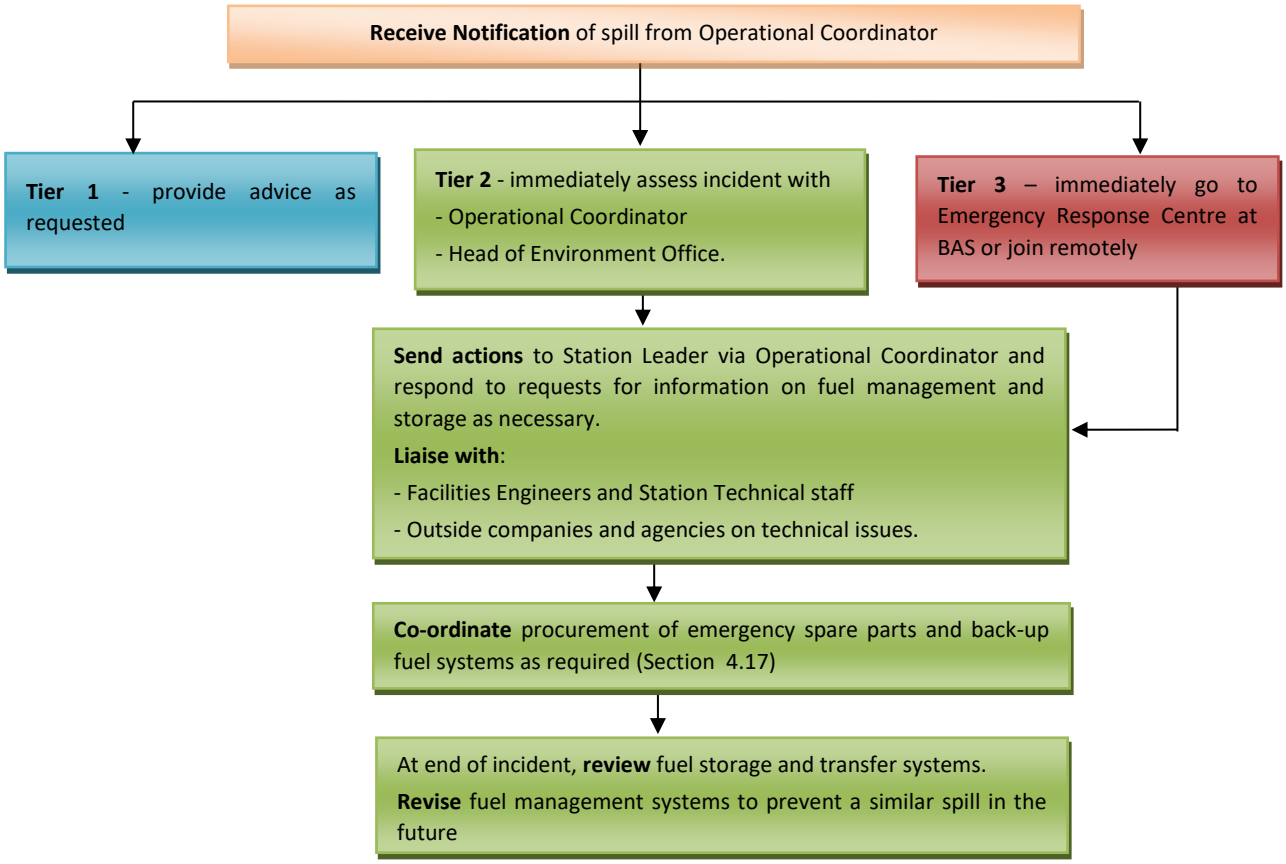
In summary, the responsibilities of the Head of Environment are as follows:

1. Advise on best practicable response techniques including containment and recovery options, the site ecological sensitivities most at risk and likely environmental impact;
2. Contact appropriate outside bodies for information and assistance regarding clean-up (e.g. OSRL);
3. Authorise expenditure on clean-up equipment and disposal of oily wastes;
4. Advise the Operational Coordinator on the environmental content of press statements;
5. Devise and coordinate scientific post-incident monitoring and studies (see 3.3 and 3.4 and 4.18);
6. Organise a review meeting on the spill response within 6 months of a Tier 2 or 3 spill and revise the OSCP as necessary.
7. Organise oil spill response courses for Antarctic staff in the UK;
8. Review and update the OSCP every 5 years or as and when required.

6.3 HEAD OF ESTATES

The responsibilities of the Head of Estates following on from the notification by the Operational Coordinator are outlined in the Head of Estates Action Plan in Figure 18 below.

Figure 18: Action Plan – Head of Estates at Cambridge



In summary, the responsibilities of the Head of Estates are as follows:

1. Advise on emergency fuel management and the integrity of oil storage facilities and pipelines;
2. Advise on the emergency shutdown of reverse osmosis system if not already undertaken by Station Facilities Engineer;
3. Procure emergency spare parts for fuel tanks and pipelines as well as back up fuel systems and review the fuel storage and transfer systems as necessary;
4. Contact BAS Facilities Engineers, outside companies and agencies for information and assistance regarding technical services;
5. Review fuel storage and transfer system after an incident (including any learning points and possible improvements), and review fuel management system to prevent a similar spill in the future;
6. Authorise expenditure on technical services.

6.4 BAS HEALTH & SAFETY

The BAS Cambridge Health and Safety Advisor has the following responsibilities in terms of oil spill response:

- Advises on Health and Safety issues as they arise during exercises or incidents
- Reviews and provides advice upon appropriate PPE for oil spill response
- Reviews and provides advice on the H&S Section of BAS Oil Spill Contingency Plans.

6.5 THE BRITISH ANTARCTIC SURVEY MEDICAL UNIT (BASMU)

The BAS Medical Unit (Medical Adviser) will provide medical advice on health care required as a result of an oil spill. The unit can be contacted by the Operations Programme Manager or Station Leader.

Section 7

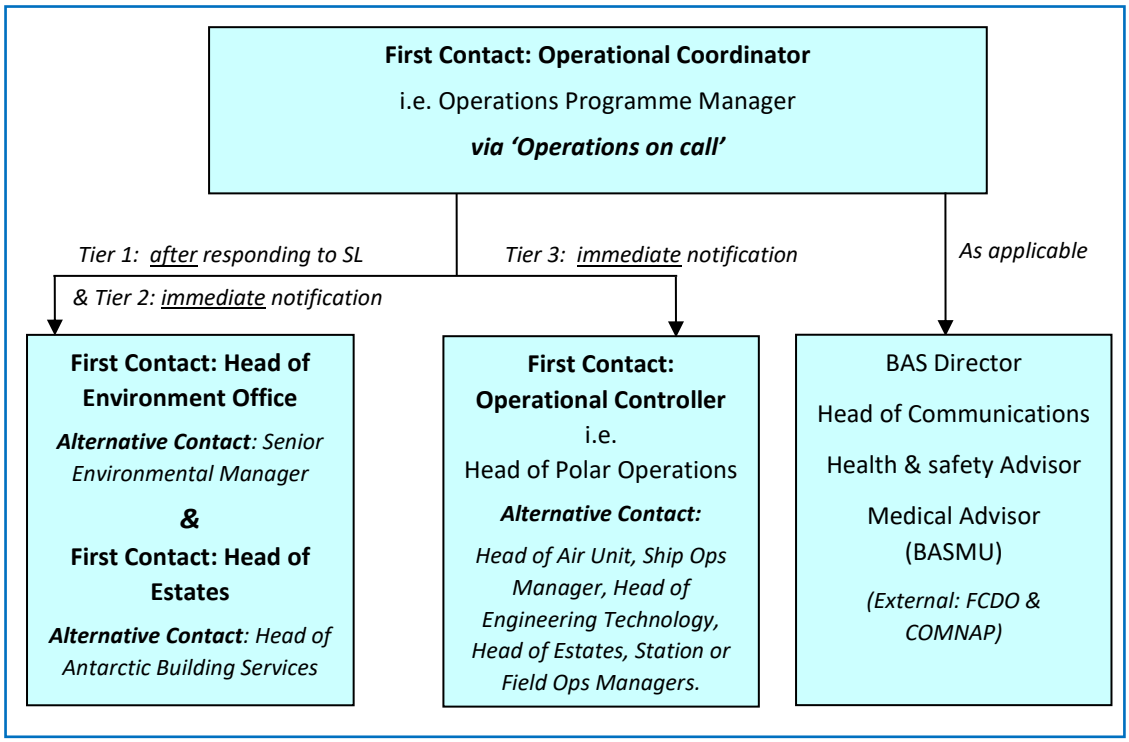
COMMUNICATION

7. COMMUNICATION

7.1 BAS CAMBRIDGE – LINES OF COMMUNICATION

Following the initial notification of an oil spill by the Station Leader to BAS Cambridge via the Operations on Call contact, the Operational Coordinator will lead on communications within and outside Cambridge as described below in the figure below.

Figure 19: Lines of communication within BAS Cambridge



7.2 CONTACT LIST BAS CAMBRIDGE

The most up to date contact details for the positions indicated below can be found in the emergency contact database stored on the ***BAS Incident Response Microsoft Teams site***, maintained by the Operations Programme Manager. The Station Leader has password-protected access to this database.

7.3 INFORMING FCDO AND COMNAP

Under Condition 7 of the Operating Permit issued to BAS by the Foreign, Development and Commonwealth Office (FCDO), any issue or incident which could reasonably be considered a breach of a permit condition must be reported to the permitting authority as soon as possible upon discovery. Contacts are the Head or Deputy Head of the Polar Regions Department of the FCDO, or out-of-hours through the Global Response Centre. The permitting authority may then request further information in relation to the incident before determining whether further action is needed.

BAS is a founder member of Council of Managers of the National Antarctic Programmes (COMNAP). All national operators are required to report significant oil spills to COMNAP. The Operations Programme Manager is to notify the COMNAP Executive Secretary as necessary.

7.4 STAFF INFORMATION AND PUBLIC RELATIONS

A Tier 3 spill will concern staff and is likely to attract public and media attention. The Director of Operations is responsible for ensuring that all staff are aware of a Tier 3 oil spill. A staff notice is to be prepared as soon as practicable after initial notification has been received at BAS Cambridge.

The official spokesperson for BAS in the event of a major oil spill will be the Head of Communications who will be briefed regularly by the BAS Cambridge Incident Response Team. No unauthorised BAS personnel are to contact or talk to the media.

The Operations Programme Manager will assist the Head of Communications in preparing a draft press statement. Advice on environmental issues will be provided by the Head of Environment Office.

7.5 EXTERNAL ADVISORS

In the event of a Tier 2 or Tier 3 spill BAS Cambridge will seek expert advice where necessary and available e.g., from Oil Spill Response Ltd (OSRL), for information and advice on the best practicable response techniques and clean-up techniques. Contact will normally be made by the Head of Environment Office. However, as outlined in Section 3.6.3, it must be noted that there realistically are no further Tier 3 capabilities that could be called upon.

APPENDICES

Appendix A Rapid Initial Assessment (RIA) Form

Rapid Initial Assessment Form for Oil Spill Incident

Assessor's details		**Incident details**				
Name/ Role	Date	Location of spill	Time of spill	Type of fuel	Probable quantity	Probable source and cause

Initial categorisation of incident		
Tier 1 (one or two local staff sufficient)	**Tier 2** (local response team and BAS Cambridge support sufficient)	**Tier 3** (local response team, BAS Cambridge support **not** sufficient)

Task	Assessment	Action(s) required	**Action(s) completed** *(including time and date)*
Harm to human health	Adequate ventilation of work area?		
	Hydrocarbon/ oxygen levels safe?		
	Appropriate PPE available?		
	Drinking water at risk?		
	Food at risk?		
Risk of fire	Obvious sources of ignition present?		
	Volatile fumes present?		
	Excessive heat present?		
Site Sensitivities at risk	Site sensitivities impacted by spill or at risk of potential impact?		
Emergency shutdown	Emergency shutdown actions required and safe to do?		
Muster	Has everyone been accounted for?		

Weather conditions	Are conditions safe for response to proceed?		
Response Capability	Members of response Team present?		
	Replacement members required?		
	Spill Response Equipment available and adequate?		
Site Management	Determine Hot, Warm and Cold Zones		

Overall Assessment:

☐ **Safe** to proceed with spill response ➔ **Mobilise** Response Team	☐ **NOT** safe to proceed with oil response ➔ Do **NOT** proceed and **notify** BAS Cambridge

Appendix B Oil Spill Report Form

BAS OIL SPILL REPORT FORM						
SELECT BAS STATION/SITE OF SPILL						
Rothera ☐	Halley ☐	Rothera ☐	Bird Island ☐	KEP ☐	Traverse ☐	Other ☐
URGENT **To: Operations Programme Manager/Operational Coordinator, BAS** **Email: opsoncall@bas.ac.uk and call 07894 935 223 (Operations on Call)** after immediate notification by email						
Status of Spill: Initial Response ☐ Ongoing response ☐ Terminated response ☐						
Situation report of ongoing response: 3hrs ☐ 6hrs ☐ 12hrs ☐ 24hrs ☐ __hrs ☐ after initial response						
Classification of Spill: Tier 2 ☐ Tier 3 ☐						
Date: **Time** (GMT = local time + 3hrs) :						
Reported by: **Position:**						
Type of fuel and estimated quantity / revised estimate of quantity of fuel spilt (litres):						
Weather conditions: Wind speed: Wind direction: Visibility: Cloud cover: Sea state: Temperature:						
Source and cause:						
Location, area covered, appearance and movement of spill (attach map if possible):						

Known safety risks (H&S, Fire risk, freshwater contamination etc.):
Sensitivities at risk and environmental impact:
Response action (include actions to stop or minimise spill, clean-up techniques, number of personnel involved, quantity of fuel recovered, environmental monitoring / samples taken)
Useable bulk fuel remaining (litres):
Advice requested from BAS Cambridge:
Additional comments (continue on separate sheet if necessary) : Signature:

Appendix C Risk assessment

1. List hazards or hazardous activities? *(List individually below)*	2. What harm is likely to occur or what could go wrong? *(with no controls}*	3. What are your control measures? *(Please use brief bullet points as description)*	4. Overall risk with controls in place *(See risk evaluation guidance)*	5. Further actions needed and by when?	6. Responsible person?
1. Exposure to AVTUR, AVCAT, MGO & lube oils	■ Health issues associated with exposure to fuel oils (carcinogens) either through inhalation, ingestion or direct dermal contact. Over exposure may lead to cancer and birth defects. **Eyes**: Contact may cause mild eye irritation resulting in redness stinging and eye watering. **Skin:** Direct contact may result in itching, burning or skin damage which may be exacerbated in cold conditions. Longer term and/or repeated exposure may result in, aggravation of existing skin conditions, dermatitis or severe skin damage. **Inhalation**: Over exposure can cause irritation to respiratory inhalation	■ Station specific 'Oil Spill Contingency Plans' produced ■ Comprehensive oil spill kit provided on all stations and stored in easily accessible location. ■ Oil spill response training provided to all wintering and relevant technical staff prior to season. ■ Additional training provided on station for wintering staff and key summer staff. ■ Biannual spill response exercises provided on station for wintering (and key summer) staff ■ Oil spill specific PPE provided on all stations which includes goggles, gloves, overalls, etc ■ Doctor and or medically trained staff on all stations. Comprehensive first aid kits available. ■ During a spill, clean areas (cold zone) will be set up for eating	Low	Training on station and biannual exercises ensures that all staff who may be involved in a spill are prepared, know how to deploy the equipment and understand their role in the event of a spill.	Station Leader or Winter Station Leader

	and central nervous system and asphyxiation. **Ingestion:** Lesser degree of toxicity if ingested but swallowing and vomiting may result in entry to lungs causing inflammation and more significant damage.	and drinking to reduce mouth to mouth contact and ingestion. ■ Various RAs and SOP have been prepared for activities involving the use of fuels with the aim of minimising the risk of spills through good practice. These include: ○ Use of Petrol, Oils and lubricants ○ Fuel Tank Cleaning ○ Vehicle Use on station ○ Vehicle refuelling ○ Station Refuelling procedures			
2. Exposure to Petrol	■ Health issues associated with exposure to petrol (carcinogens) either through inhalation, ingestion or direct dermal contact. Over exposure may lead to cancer, birth defects and death **Eyes**: Contact may cause eye irritation resulting in redness stinging and eye watering. **Skin:** Direct contact may result in itching, burning or skin damage which may be exacerbated in cold conditions. Longer term and/or repeated exposure may result in, aggravation of existing skin	■ Petrol spills are generally not to be recovered and should be left to evaporate. ■ Eating and drinking prohibited near to spill site. ■ Wash thoroughly after exposure. ■ Any contaminated clothing to be air dried in well ventilated area before washing. ■ Only small quantities of petrol stored on station ■ Petrol stored in designated areas away from station sensitivities such as freshwater source and sensitive environmental receptors.	Low	Report all petrol spills through Maximo Incident reporting	Station Leader or Winter Station Leader

	conditions, dermatitis or severe skin damage. **Inhalation**: Over exposure can cause irritation to respiratory inhalation, and central nervous system. Continued exposure may lead to unconsciousness and death. **Ingestion:** Lesser degree of toxicity if ingested but swallowing and vomiting may result in entry to lungs causing inflammation and more significant damage.	■ Petrol only to be handled in well ventilated areas or outdoors. ■ Refer to specific RAs for activities where petrol handling occurs e.g. refuelling skidoos			
3. Working with flammable & explosive materials	■ Petrol especially is extremely flammable and explosions or fire could cause severe burns or fatalities. ■ Electrostatic charges may be generated during handling. Electrostatic discharge may cause fire.	■ Majority of fuels used have very low flash points. ■ Petrol spills are generally not to be recovered and should be left to evaporate. ■ No petrol to be stored inside accommodation or admin buildings or in confined spaces. Petrol only stored in garage, workshop or external store areas. ■ Petrol stored in designated areas away from station sensitivities such as freshwater source and sensitive environmental receptors.	Low		Station Leader or Winter Station Leader

		■ Smoking near any stored or spilt oil is prohibited. ■ Remove ignition sources from spill site and consideration of remote ignition from vapours travelling along the ground to be made. ■ Refer to RAs and SOPs for refuelling bulk fuel tanks, day tanks, boats, tools and vehicles to minimise potential for spills ■ SDS sheets available for all fuels and oils used on station. ■ General principles are to not commence a spill response until an area has been made safe and is well ventilated. ■ Safety of staff during a spill is paramount and is reiterated in the OSCP.			
4. Work in confined spaces	■ Health issues associated with exposure to fuel oils (carcinogens) either through inhalation, ingestion or direct dermal contact. ■ Depleted oxygen, insufficient air. ■ Explosion or flash fire risk if spill is petrol. ■ Electrostatic conditions within buildings could cause ignition point for spilt petrol.	■ General principles are not to commence a spill response until an area has been made safe and is well ventilated. However, spill response should **not** occur in confined spaces unless specifically advised by BAS, Cambridge. ■ Safety of staff during a spill is paramount and is reiterated in the OSCP. ■ Refer to RAs for Bulk Fuel Tank Cleaning and Confined Space Working in Aviation Fuel and	Low		Station Leader or Winter Station Leader

		MGO tanks for general work in confined spaces. ■ Gas detector to be used at Halley station for the under croft. ■ No petrol to be stored in a confined space that cannot be well ventilated.			
5. Slips, trips and falls	■ Staff may suffer injuries if they slip on spilt fuel, or trip on uneven ground whilst trying to recover oil. Increased risk of slips, trips and falls due to tension involved with dealing with an emergency situation	■ Spill response to be coordinated by Station Leader (or Winter Station Leader) who will remind staff to be extra vigilant during clean up. ■ Safety of staff during a spill is paramount and is reiterated in the OSCP. ■ Absorbent mats are provided in all spill kits which would help to make oily surfaces less slippery. ■ Demarcation of hot, warm and cold zones will help to highlight areas of higher risk.	Low		Station Leader or Winter Station Leader
6. Manual Handling	■ Staff may suffer back injuries or pain elsewhere from handling heavy and/or bulky spill response equipment; e.g. entrapment of limbs, Ligament/ Tendon injuries, Muscular/Skeletal injuries, Rupture, Hernias, Crush injuries, Cuts, Bruises.	■ Refer to station specific manual handling RAs. ■ Eliminate the need for manual handling to occur where reasonably practicable. ■ Use trolleys and mechanical assistance where possible. ■ Make personnel aware of equipment available for specific tasks i.e. drum up righter tool; drum chains, cranes etc.	Low		Station Leader or Winter Station Leader

		■ Improve the task by making the loads lighter where possible at source or by breaking down into more manageable components. ■ Use the balance wheel truck, sack truck and pallet truck. ■ Whenever practicable limit load carrying capacity to 25kg per person and provide sufficient people to lift very heavy cases within this lifting capacity. ■ Increase awareness of manual handling hazards by regular training and supervision. ■ Advise all staff that rushing / peer pressure / work pressures are unsafe factors. ■ Wear PPE: safety boots, gloves, hard hats, goggles, overalls and clothing as appropriate to the task in hand. ■ Be aware of slippery uneven surfaces i.e. natural ice shelf surfaces, sledge decking etc ■ SL to ensure that personnel are rotated on a frequent basis to avoid fatigue.			
7. Working in extreme weather conditions	■ Effects of prolonged work in cold temperatures, wind and snow which could result in hypothermia, poor judgement, chilblains, asthma, frost nip or frost bite.	■ Refer to general RAs for working in Antarctica. Usual station procedures to be followed when weather conditions are adverse. ■ As stated in OSCP safety of personnel is paramount during a	Low		Station Leader or Winter Station Leader

	■ Increased risk of slips, trips and falls due to reduced capability and poor judgement.	spill and SL will stop response if conditions deteriorate. ■ SL to rotate staff to ensure that symptoms of prolonged work in the cold do not occur. ■ Appropriate cold weather clothing provided to all staff. ■ Where present station doctors to monitor staff symptoms and chefs to provide subsistence in the form of hot drinks and food			
8. Fatigue, hunger , de-hydration, stress	■ Dealing with an emergency situation can lead to staff forgetting to take appropriate breaks in the day to rest, eat, rehydrate and take stock of the situation.	■ SL to rotate staff to ensure that everyone has a break and an opportunity to eat and drink. ■ Where present station doctors to monitor staff symptoms and chefs to provide messing stations and refreshments.	Low		Station Leader or Winter Station Leader
9. Working on small boats or near water	■ Hypothermia / Drowning / Frostbite, Frostnip / Bites, Cuts and Scratches / Slips, Trips and Falls / Capsize, Sinking, Drifting, Immobilisation, Structural damage / Burns and Scalds (Heat and Chemical) / Laceration, Fracture, Unconsciousness/ Disorientation, Direction Loss / Sprains, Strains and Breaks	■ RAs for Small boating to be referred to. ■ Compliance with BAS Field Operations Manual and Boating Manuals by all personnel involved in small boat operations. ■ Appropriate training of coxswain and vehicle operatives. ■ PPE All boat occupants must wear approved thermal protection (e.g. boatsuits or diving drysuits) and life jackets. Shore line worker to wear appropriate cold weather	Low		Station Leader or Winter Station Leader/Boating Officers

		clothing (and waders and lifejackets if necessary.) ■ Where lifting operations are involved, all personnel involved must wear hard hats. ■ The Communications protocol of Boating Manuals to be followed. ■ All boat personnel are to remain aware and vigilant of local marine life. ■ Continuous observation of weather to be made by operating boat personnel. ■ Minimum of two people working on shoreline for shoreline operations.			
10. Working with and near to vehicles	■ During an emergency response reduced concentration could result in contact with people, buildings, aircraft, masts, scientific equipment, other vehicles and services. This could result in a possible loss, severe or otherwise, of scientific data / communications ■ Death or injury caused by overturning vehicle due to unstable loads, snow banks, high speed, uneven terrain, reduced visibility, unmarked construction hazards such as holes and trenches etc. ■ Electric shock from crane or digger striking overhead, or underground cables and antennas.	■ Vehicle specific RAs to be referred to. ■ Strictly adhering to the 'Trained and Designated driver' policy, whereby only selected and adequately trained operators are allowed to drive machines on base. ■ Garage to maintain all vehicles and mobile plant in a safe and reliable condition. ■ Provision of P.P.E. for working around vehicles. ie. hard hats, suitable gloves, steel toecap boots, high visibility jackets. ■ No vehicle or mobile plant operations to take place until the	Low		Station Leader or Winter Station Leader/Vehicles Manager

	■ Death, severe injury, crush, limb entrapment, puncture wounds etc. whilst assisting with vehicle loading/unloading.	mechanic has been informed of what is intended and has allocated the appropriate vehicle for that job. ■ No overloading of machines. Only use lifting /towing /winching gear as specified by the mechanic. ■ No vehicle or mobile plant operations to take place until the mechanic has been informed of what is intended and has allocated the appropriate vehicle for that job. ■ Driver awareness to be kept high and guarded against complacency during operation of any type of vehicle during spill response.			
11. Working in darkness	■ Could lead to increased danger from all of the above hazards	■ Spill response at night is not generally advocated unless inside in lit areas. Where it has to be completed during darkness (e.g. austral winter) RAs and operating procedures for station operations during winter must be adhered to. ■ Major refuelling of bases only occurs during daylight. See SOP for refuelling. ■ Most operations occur during Austral summer where there are long hours of daylight.	Very Low		

12. Environmental exposure to fuels	■ Fuels toxic to aquatic organisms, and may cause long-term adverse effects in the aquatic environment.	■ Station specific 'Oil Spill Contingency Plans' produced for each base ■ Comprehensive oil spill kit provided on all stations and stored in easily accessible location. ■ Clean up of oiled animals is not part of BAS oil spill response strategy and should not be undertaken without direction from BAS Cambridge	Low		
13. Wildlife	■ Bites from seals or pecks from birds ■ Disturbance to wildlife as a result of spill response activities ■ Stress to wildlife being affected by oil spill	■ Designate a member of staff on wildlife watch to ensure protection of wildlife and staff ■ Refer to RAs for 'Living amongst wildlife',' Working with Birds and Seals'. ■ If necessary to move wildlife away from spill response site then follow BAS Wildlfe Movement Guidelines ■ Clean up of oiled animals is not part of BAS oil spill response strategy and should not be undertaken without direction from BAS Cambridge.	Low		Station Leader or Winter Station Leader/Zoological Field Assistant
14. Generation of hazardous waste	■ Pollution to local environment and wildlife if not contained appropriately. ■ Exposure to spill response team and associated risks as per hazard No.1.	■ Waste Management Handbook (WMH) sets out how to deal with waste generated from a spill. ■ OSCP highlights the importance of managing waste as part of the	Low		Station Leader or Winter Station Leader/Station General Assistants

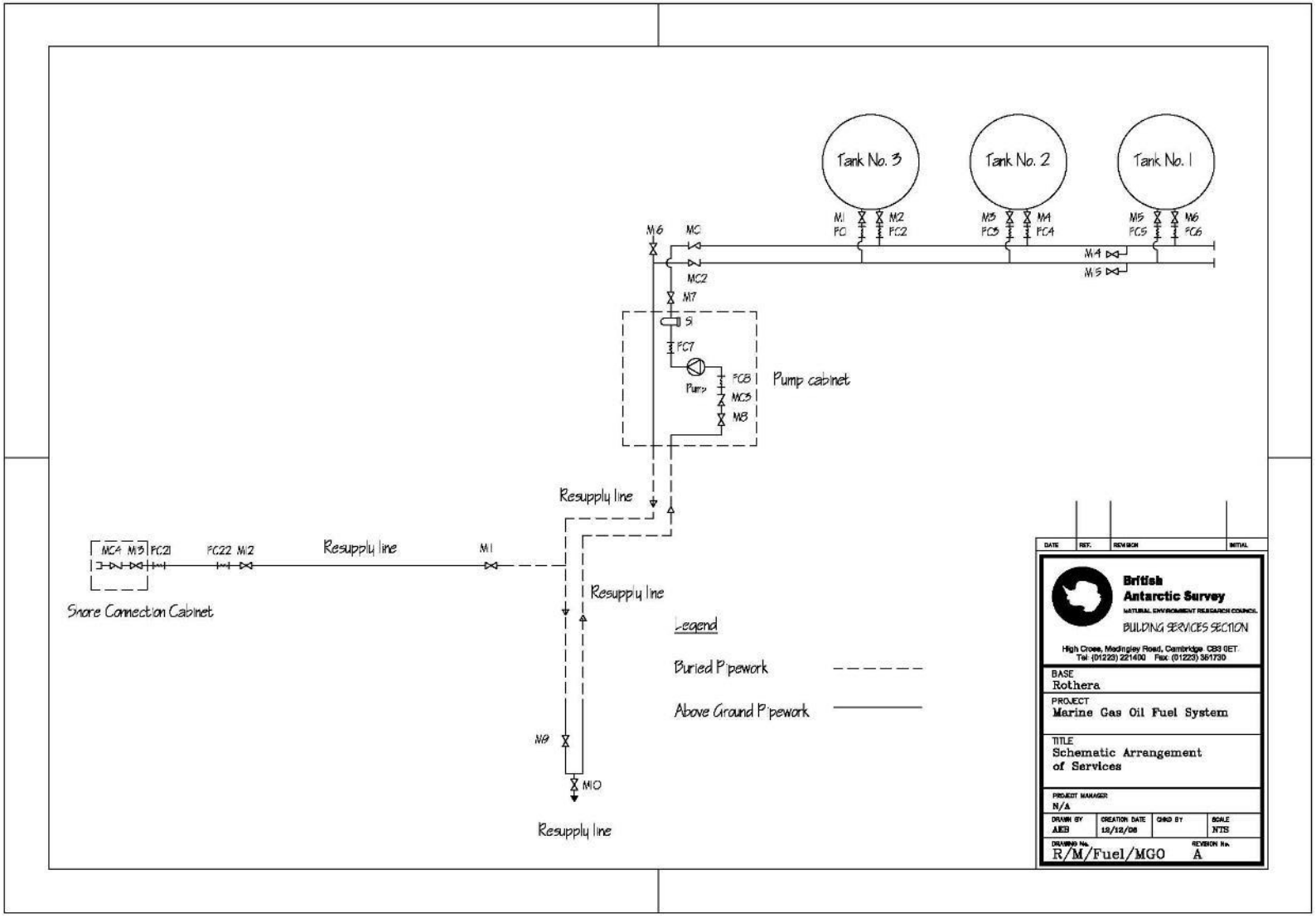
	■ During an emergency situation waste management may not be prioritised.	spill response and references the WMH. ■ Good culture of waste management on station and clear established procedures for removing waste from Antarctica. ■ Senior Environmental Manager to be contacted in the event of a spill who will where necessary, advise SL on appropriate waste management during a spill.			

Risk Evaluation guidance

Likelihood verses severity	1. Remote possibility (Rarely heard of in industry)	2. Possible (Is heard of in our industry)	3. Likely (Occurring at least once in 10 years at BAS)	4. Highly probable (Occurring at least once a year at BAS)	5. Virtually Certain (Occurring a number of times a year at BAS)
1. **Minor** - Causing minor injuries (e.g. cuts, scratches).	1	2	3	4	5
2. **Low** – Causing injuries and medical attention, but no lost time at work	2	4	6	8	10
3. **Medium** - Causing temporary disability and lost time at work	3	6	9	12	15
4. **High** - Causing permanent disability	4	8	12	16	20
5. **Major** - causing death to one or more people	5	10	15	20	25

Risk	Action
Very Low 1>2	No further action
Low 3>4	Further action: (if appropriate) as resources allow
Medium 5>9	Requires action: Set timetable for improvements
High 10>12	Priority action: Review controls immediately
Very High 15 >25	Unacceptable: Stop activity until risk can be reduced

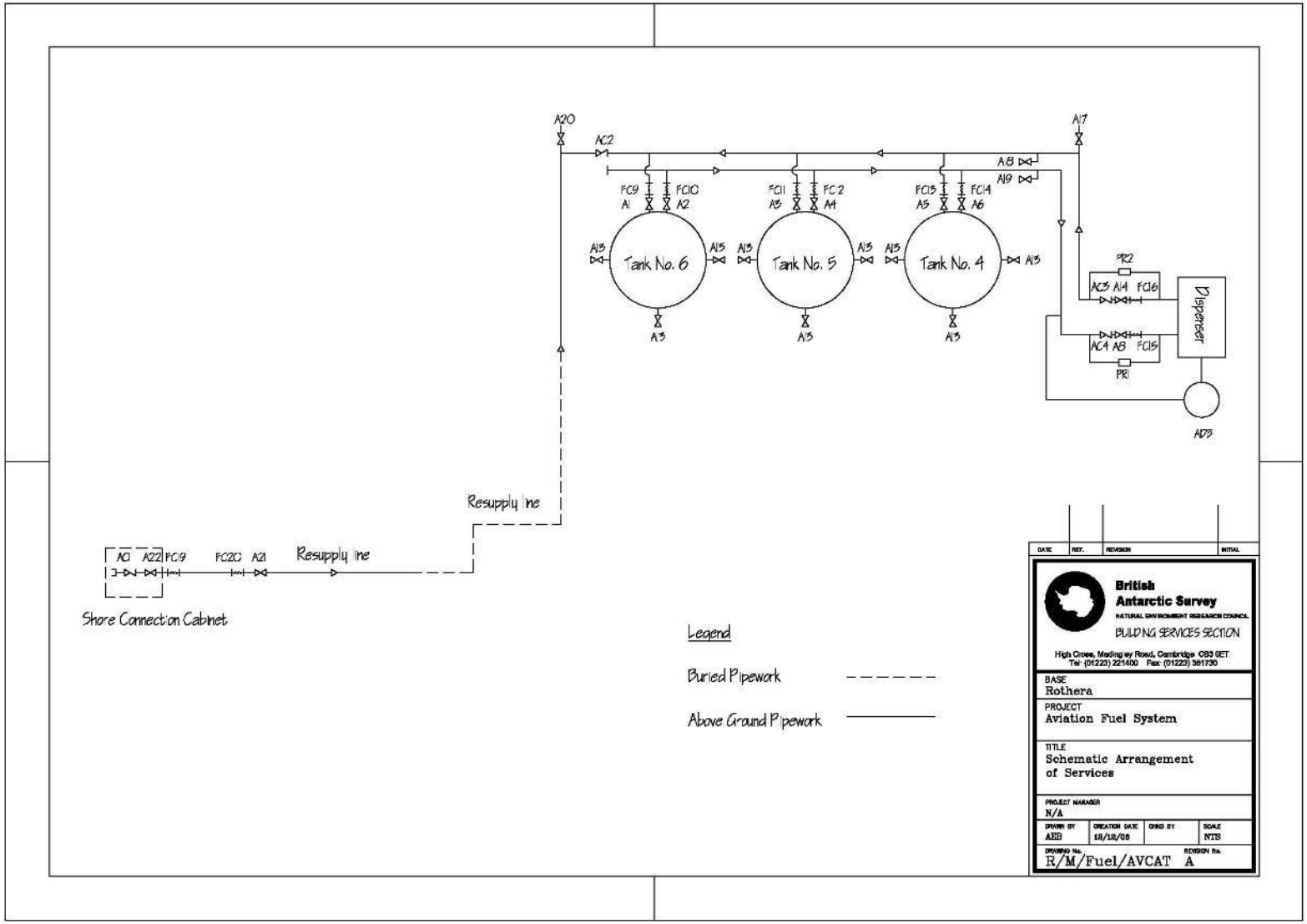
Appendix D Marine Gas Oil System



Appendix E Rothera Marine Gas Oil system components

No.	Component	Function	Remarks
MC1 MC3	Check valve 4" dia flanged	Prevents reverse flow from dispenser or day tank through to storage tanks	
MC2 MC4	Check valve 4" dia flanged	Prevents reverse flow from tanks to pipeline	Prevents loss of fuel from pipeline
MC7 MC8	Gate valve 4" dia	Isolates Marine Gas Oil dispenser from system	Keep open whilst system is operational
M9 M10	Circulation line stop valves	To shut down line	Keep open unless emergency or service
M9A	Gate valve 4" dia	Allows Marine Gas Oil to circulate through the system	Keep open to allow circulation close when filling the day tank
M10A	Gate valve 4" dia flanged	Isolates day tank	Open when filling day tank keep closed at all other times
M11	Gate valve 4" dia	Isolates shore connection line	Open only during Marine Gas Oil resupply
M12	Gate valve 4" dia	Allows Isolation of pipe sections between Boatshed and Bonner Lab	Keep closed at all times. Open only during resupply
M13	Gate valve 4" dia	Allows fuel transfer from flex hoses through system to tank valves. Prevents drainage of supply line	Keep closed at all times. Open only during resupply
M14	Gate valve 1" dia	Allows for venting on return line should line need draining	Keep closed at all times. Open only if line is to be drained
M15 M16	Gate valve 1" dia	Allows line drainage	Keep closed at all times. Open only to bleed line down.
M1 M2 M3 M4 M5 M6	Gate valve 4" dia flanged	Isolate each tank	Keep closed except when filling or dispensing fuel from tank
FC1 FC2 FC3 FC4 FC5 FC6 FC7 FC8 FC9 FC21 FC22	Flexible connectors 4" dia flanged	Accommodates for differential settlement acting upon the tank/dispenser or pipeline	Adjust pipe supports to keep flexible line straight

Appendix F Aviation Fuel System



Appendix G AVCAT and AVTUR system components

No.	Component	Function Performed	Remarks
A21	Gate valve 4" dia flanged	Allows fuel transfer from flex hose through system to tank valves. Prevents drainage of supply line.	Keep closed at all times. Open only during resupply.
AC1	Check valve 4" dia flanged	Prevents reverse flow from supply pipeline	Prevents supply line drainage if the flex hose ruptures
AC2	Check valve 4" dia flanged	Allows system recirculation without charging supply line	Prevents reverse flow from storage tanks to supply line.
A20 & A17	Gate valve 1" dia threaded	Allows for venting should line need drained.	Keep closed at all times except when draining the line.
A18 & A19	Gate valve 1" dia threaded	Allows supply and discharge lines to be drained	Keep closed at all times except when draining line.
A1, A3 & A5	Gate valve 4" dia flanged	Allows for tank filling. Isolates tank.	Keep open when filling or drawing from tank. Allows fuel to recirculate.
A2, A4 & A6	Gate valve 4" dia flanged	Allows fuel to be drawn from tank. Isolates tank.	Keep open when drawing from tank. Close when fuel not required.
A13	Gate valve 2" dia threaded	Allows water to be drawn from the tank sumps (3 per tank)	Keep closed at all times unless drawing water from tank sump basins.
FC9, FC10 FC11 FC12 FC13 FC14	Flexible connectors 4" dia flanged	Accommodates any differential settlement between tank and piping	Adjust pipe supports as required.
AC4	Check valve 3" dia flanged	Prevents reverse flow from dispenser back to suction line.	-
AC3	Check valve 3" dia flanged	Prevents reverse flow from supply line into dispenser piping	-
A14	Gate valve 3" dia	Isolates dispenser return line	Keep valve open when dispenser is operational
A8	Gate valve 3" dia flanged	Isolates dispenser from suction line	Keep open when dispenser is operational
FC15 & FC16	Flexible connecter 3" dia flanged	Accommodates differential settlement in piping	Adjust pipe support stands as required.

Appendix H How to use the equipment

Spill Equipment	What does it do?	Where can it be used?	How do I use it?
1. Blue/Grey Absorbents – socks -**general purpose** 	Designed to soak up and retain oils, coolants, solvents and **water.** (Contains vermiculite.)	• Indoors, around leaking machines, garage floors etc, • Work best when in direct contact with the floor or ground. (Heavier than the grey socks, so hugs the floor better) • Use outside in dry weather	• Can be used effectively as a barrier/dike to surround a spill and contain it. • Shake the sock before placing it to evenly distribute filler. • Place socks overlapping around the edge of spill to stop the flow. • Dispose of when saturated.
2. Blue and Grey absorbents – rolls, mats and pillows - **general purpos**e 	Grey and blue absorbents are usually for general purpose. Designed to soak up and retain oils, coolants, solvents and **water.**	• Highly absorbent, can be used anywhere. • Pre-cut mats e.g. for drum tops very useful for minimising leaks and spills during everyday use. • Rolls are ideal for covering large areas near or under machinery • Use outside in dry weather	• Ideal for recovery of fluids rather than containment. • Place directly on spilt fluid • Ideal for small spills • Dispose of when saturated
3. White absorbents - socks, pre-cut mats, pillows - **OIL ONLY/do not absorb water**	White absorbents are usually for OIL ONLY. Absorb oil-based liquids, lubricants and fuels but **do not absorb water.**	• Outdoors in wet conditions, rain or snow • In water and anywhere that you don't want to absorb water • Ideal for soaking up waterborne spills. • Fuel bunds	• Ideal for outdoor use, in wet and marine conditions. • Pillows and mats float on water. Ideal for collecting oil/fuel spilt in the water. • Socks should be used for containment (dikes/booms) and

  			pillows and mats for recovery of oils/fuels. • Pillows good for high volume spills. • Can be used during initial clean up but also useful for final sheen removal and longer term maintenance absorption of oil • Dispose of when saturated.
4. Pink Absorbents - socks, pre-cut mats, pillows - **use for chemicals**   	Pink (sometimes yellow) absorbents are usually for chemicals. Absorb acids, caustics, oil and water based liquids (won't degrade on contact with chemicals)	• Primarily for labs where **chemicals** are being used • Indoors	• Should only be used for chemical spills. • Socks for use as containment dikes, mats for recovery of fluids • Dispose of when saturated – segregate from other absorbents.
5. Pig Putty 	Patches up leaking drums and pipes as an emergency measure	• Damaged drums or fuel pipes	• Knead components together and apply to hole • Fuel should be decanted to an undamaged drum as soon as possible
6. Overpack Drum	Used to store leaking drums or waste absorbents	• Anywhere – this is a UN approved container so can be used to transport absorbents in ships and planes	• When recovering a drum – place lid on floor, position damaged drum on lid, screw overpack drum on top and then turn the whole thing the right way up. • Easily moved with forklift once fuel drum is inside.

			• Can be used for storing and transporting used absorbents and contaminated clothing. • X-rated for Packing groups I,II, and III for transportation on ships and aircraft
7. Waste bags yellow 	Used to store waste absorbents.	• Can be used for blue, grey and white absorbents that have been used for oil/fuel recovery. • May not be suitable for pink absorbents which contain chemicals. (Check what chemical has been recovered)	• Ensure filled bags are cabled tied and clearly labelled • Bags should be placed in UN approved over- pack drum prior to transportation by plane. • Bags should be placed in old fuel drums prior to transportation on board the ship.
8. Poly Drum Trolley 	• Transports 210l drums • Tilts to create a dispensing station • Acts as a temporary secondary containment for a leaking drum	• Anywhere drums are being used.	• Drums can be mounted onto the dolly for ease of transportation. • When the trolley is laid flat and the drum secured in place, the trolley provides a contained area to dispense the contents of the drum into another container. • Or it can be used as a temporary containment measure when a drum is leaking.

9. Fast tank 	Provides a 'quick to erect' temporary storage tank for collecting polluted water/snow where oils/fuel can be separated	• Anywhere there is flat ground. • Place to the side/ turn over any sharp stones/ rocks.	• Instructions for erection are provided with the kit. • Polluted water or snow can be collected in the tank and absorbents or skimmers can be used to collect oil. • The fast tanks are reusable and should be cleaned thoroughly after use. • Waste oil and waste absorbents should be packed in empty 205L drums.
10. Inflatable Booms  Intertidal Boom (three chambers: two lower water ballast chambers and one upper air chamber)  Sentinel Boom (Single chamber free floating boom which is filled with air only)	• Used to protect shorelines from encroaching spill • Used to contain large spills on open water	• Beaches and intertidal zones (all water and land interfaces) • Can be deployed from a boat or from the shore • Open waters, coastal waters, ports. • Can be deployed from a boat or from the shore	• Use depends on location and movement of spill. Booms can be deployed to contain oil, deflect a spill, or protect an area of shore. • Staff deploying booms should have attended the BAS oil spill training course. • Requires anchor points either on land or boat, to secure its position. • Requires use of air inflator to fill the air chambers of booms. • Care should be taken in strong winds as the boom may be uncontrollable. • Care is required when deploying in waters where there is floating ice and icebergs. • Inflatable booms are reusable and should be cleaned thoroughly after use.

11. Fence Boom (GlobeBoom) 	• Used to contain large spills on open water or to protect sensitivities on the shoreline from spills on the water	• Open waters, coastal waters, fast flowing water, rivers • Can be deployed from the wharf, shore or boat	• Lightweight, fast response boom • Floating boom due to high-density polyethylene (HDPE) round floats of hemi-spherical design. • Can be deployed without power packs, reels or inflators. • Requires anchoring • Each globe segment has a cast handle that allows for easy handling.
12. Rope Mop 	• 120m length of polypropylene absorbent mop which rotates on a pulley system to collect oil from the surface of water	• In calm waters (can be used where there is ice in the water) • Can recover oil over small or large areas, in fuel bunds, harbours and in icy conditions	• The floating rope is driven over the surface of the oil by a drive unit which also squeezes the oil out of the rope for recovery. • One end of mop is attached to a separating tank which separates and returns any water picked up by the rope mop. Only oil is collected in the separator for disposal. • Should only be used in calm water. • Requires boat deployment to tether pulley system to.

Appendix I Training Details

Station Leader Pre-deployment Training

Pre-deployment training for Station Leaders

Station Leader Spill Response Training	Content of training element	Frequency
Introduction and familiarisation with station/site OSCP– delivered by BAS Environment Office	**Classroom theory training** ▪ The role of OSCP ▪ BAS policy on oil pollution ▪ Activities and areas (scope) covered by each OSCP ▪ Introduction to the fuel storage at each site ▪ Highlighting spill risks at each site ▪ Spill incident Tier Classification ▪ Rapid Initial Assessments ▪ Station Leader Action Plan ▪ Escalating incidents to BAS Cambridge ▪ Mobilising station response teams ▪ Conditions required for clean-up ▪ Site management – hot/warm/cold zones ▪ Use of inflatable booms, skimmers and fast tanks ▪ SL responsibility for on-site training and conducting exercises	1 year
Two day bespoke Station Leader Training delivered by Oil Spill Response Ltd (OSRL) in Southampton	**Theory topics:** • Causes and fates of oil spills • Containment and protection • Recovery of oil • Cold weather specific considerations • Tabletop spill exercises – coordinating the response team **Practical training:** On site (coastal or river location) practical involving deployment of containment booms, use of recovery skimmers and fast tanks.	3 years

Station Response Team Pre-deployment Training

Classroom and practical training delivered to station staff by BAS staff and Oil Spill Response Ltd during pre-deployment training.

Station Spill Response Team Training	Content of Training element	Frequency
Classroom theory session/Presentations by BAS speakers	**Environment** ▪ Fate & Behaviour of Spilt Oil ▪ Environmental Impacts ▪ BAS Response Strategies	3 years
	Oil Spill Contingency Planning ▪ Purpose of OSCPs ▪ Tier classification ▪ Reporting spills ▪ Spill exercises	
	H&S ▪ Hazards of spilt oil ▪ Mitigating hazards ▪ First Aid Measures	
	Fuel Management ▪ Overview of all station fuel systems and networks ▪ Activities that involve fuel usage/transfer ▪ Spill prevention through design ▪ Spill prevention through procedures	
Practical familiarisation with BAS Spill Response Equipment/Delivered by Oil Spill Response Ltd	▪ Appropriate use of PPE ▪ Demonstration of site management - hot/warm/cold zones ▪ Demonstration and explanation of the different types of spill response equipment including: - absorbents/pom poms - Shoreline boom - Skimmer/Rope mop - Fast tank ▪ Practical hands-on experience inflating and anchoring the shoreline boom. ▪ Practical hands-on experience erecting/setting up a fast tank.	3 years
Desk-top spill scenario exercise/Facilitated by BAS Station Leaders or Facilities Engineers	Utilising the station OSCP to plan a response to a theoretical (but potentially real) spill scenario specific to the responder's station. Staff are required to: ▪ Prepare an initial notification of the spill ▪ Predict the movement of the spill ▪ Identify resources at risk and sensitive receptors ▪ Plan their response to stop or minimise the spill and attempt a clean-up. ▪ Plan the PPE and oil spill response equipment to be deployed ▪ Plan their site management ▪ Consider how they would manage waste	3 years

On-Site Station Response Team Training

Training must be delivered on station by the Station Leader, assisted by the Station Facilities Engineer where available, to the station response team. The table below details the requirements and frequency of the training and has been broken down into three key areas that can be delivered as a single session or as three separate sessions. The training should be delivered to the spill response team in early summer, prior to the bulk fuel delivery and prior to a spill response exercise taking place.

The Station Leader may choose to combine the training with one of the spill response exercises – please note that if they are combined that it is important that all training requirements are covered first so that staff are appropriately briefed and familiar with spill response equipment prior to undertaking the exercise and fully deploying the kit.

On-site Station response team training	Content of training element	Frequency
Theory introduction to OSCP and role of a responder	▪ Overview of Station OSCP including access to up-to-date copy for review ▪ Role of a spill responder (identifying any job specific responsibilities e.g., emergency shutdown or waste management) ▪ Reporting all spills regardless of fuel type/size ▪ BAS spill response strategies ▪ Spill site set-up and management (hot/warm/cold zones) ▪ H&S of responders highlighting risks of petrol and other volatile fuels	1 year
Physical introduction to station	▪ Physical walkaround station and introduction to: ▪ All oil storage locations (bulk tanks, day tanks, fuel bowsers, drummed fuel, smaller volumes of fuel such as those in hazardous cabinets) ▪ Locations of all spill response equipment kits including day to day absorbents in areas where fuel is routinely used ▪ Highlight all oil spill risks on station ▪ Locations of all station resources at risk of a spill such as fresh water source, long-terms science experiments. ▪ Locations of all sensitive environmental receptors such as seal breeding/haul out site, penguin moulting sites, nesting birds, feeding grounds, areas of vegetation etc.	1 year
Hands-on familiarisation with spill response kit	▪ Correct use of PPE ▪ Use of different absorbents including mats, socks, pillows, pom poms highlighting use of hydrophobic and hydrophilic. ▪ Hands-on practice with setting up and trialling all fence booms, shoreline booms and skimmers ▪ Erecting and setting up a fast tank	1 year

Appendix J Oil Spill Response Kit Inventory

Table 10 (Spill Kit Types) outlines where on station oil spill response kits are available, what type of spill kit should be there and who is responsible for the oil spill kit in that area. Table 11 (Spill Kit Type) outlines the contents of each different type of spill kit.

At Rothera the intention is:

- The Emergency Oil Spill Response container is only accessed in emergencies and for training.
- The Consumables Oil Spill Response container can be accessed by all and should be used to restock area oil spill kits or for routine use e.g., when refuelling/ decanting oil containers.
- The stocking of area oil spill kits is managed by the person responsible for that area.
- The Station Leader should instruct all area managers to restock their area spill kits prior to the Station Leader undertaking the annual indent of the 'consumables oil spill response container'.

Table 5: Spill Kit Types

Spill Kit Types	**Location**	**Indenting Responsibility (with ability to delegate)**
Emergency Oil Spill Response Container	Wharf	Station Leader
Consumables Oil Spill Response Container	Outside NBH	Station Leader
Wheelie Bin Oil Spill Response Kit	Vehicle's workshop (also includes drain cover)	Vehicles Manager
Overpack Drum Spill Kit (for 205L drums)	IWHF	Station Logistics Manager
	Hanger	Chief Pilot
	Genny shed	Facilities Engineer
Oil Spill Response Bag (ability to absorb 38.5L spills)	Kitchen	Station Logistics Manager
	Fuchs House	Field Operations Manager
	Incinerator	Station Logistics Manager
	Boat Shed	Deputy SOM
	NBH plant room OBH plant room Bonner lab plant room Vikings House plant room Giants plant room Admirals House plant room Fuel farm shed Fuel farm polishing shed	Facilities Engineer
	Petrol bowser 1- skidoos Petrol bowser 2- boats MGO/AVCAT/AVTUR bowser	Vehicles Manager for petrol, Facilities Engineer for MGO/ AVTUR
Vehicle spill kit	All vehicles • T,02 – Air Unit Tractor • T,03 – Boating Tractor • T,04 – Station Tractor • L5 – Air Unit Telehandler • L8 - Volvo L180H	Vehicles Manager

	• L9 – JCB 535-95 • L10 – Volvo L180H • EX02 – JCB JS130 Excavator • D4 – Dozer • POLAR2 – Pisten Bully 300 • NOD2 – Nodwell • CHPU1 – Hydraulic Power Unit – this also acts as the mini spill kit for the Wharf Crane	

Table 6: Spill Kit Type

Spill Kit Type	Contents[10]	Unit	Stock Level QTY[11]
Emergency Oil Spill Response Container			
	GlobeBoom 25m with 8" floats	Each	12
	GlobeBoom tow set including ASTM connectors, buoys, tow rope, bridles and shackles	Each	2
	GlobeBoom anchoring set for 15-20m water depth, 30m rope, 25kg anchor, 2 prong bridle, shackles and eye bolts	Each	6
	GlobeBoom float repair kit 8"	Each	6
	Rope Mop Skimmer (OM 140 mop skimmer system, stainless steel frame, diesel driven with recoil start and spark arrester)	Each	1
	Rope mop 30m x 100mm	Each	4
	Rope mop tail pully with Ø 10 x 12 m rope with snap hook and light weight 300 l aluminum oil separation tank with wheels. Including 3" ball valve with male Camlock	Each	1
	Plant nappy for rope mop	Each	1
	Crest Flowline inflatable boom (20 m length) *Description: Inflatable boom with one chamber (filled with air)* *Accessories: c/w Unicon connectors with stainless steel thumbscrews, Towing/mooring bridles*		3
	Hand reel	Each	1
	Crest Flowline inflatable intertidal boom (20m length) *Description: Inflatable boom with three chambers (2 filled with water and 1 with air)*	Each	2

[10] Contents do not need to be exact in terms of exact sizes and specification or exact quantity i.e., if the stock level indicates 1 box of absorbent pillows 31cm2 and you have none of that size but you have 1 box of slightly larger pillows that is fine. Use your judgement.

[11] This is the required stock minimum- if there is more and/ or more useful stock not listed here please keep.

	Accessories: c/w Unicon connectors and stainless steel thumbscrews		
	Petrol driven Water pump Pump type: WB20XT Drive: Honda 20 XT discharge capacity 620L Accessories: hose set and end strainer	Each	1
	Vikoma PB4600 Petrol driven air inflator		1
Consumables Oil Spill Response Container 1			
	Spate 75 PD self-priming transfer pump in steel frame with wheels and Yanmar 3.1 kW diesel engine.	Each	1
	Hose set for spate pump (2x 5m and 2x 10m 3" suction/discharge hoses, 2 hose floats, M/F couplings	Each	1
	Spares kit for spate pump	Each	
	Plant nappy for spate pump	Each	1
	Fastank 10m^3 with roof cover	Each	3
	Fastank repair kit	Each	1
	Vikoma M25B Peristaltic Pump Set Pump type: M25B Drive: Honda GX 160 Petrol Peristaltic hose: Hypalon Fittings: Quick release Kamlock couplings Accessories: Suction probe (1), Disc strainer (1), Flexi hose (15m), Semi-rigid hose (30m), Delta skimmer head & float (1)	Each	1
	Overpack drum	Each	2
	Overpack drum spill kit including contents	Each	1
	Pig Putty	Pack of 6	10
	Absorbent boom 20cm x 3m	Each	2
	Absorbent socks 8cm x 3m	Box of 6	4
	Absorbent socks 8cm x 122cm	Box of 10	8
	Absorbent pillows 31cm2	Box of 10	4

	Absorbent pom poms	Box of 20	1
	Drum top absorbent mats	Box of 25	2
	Oil only absorbent mats 38cm x 51cm	Box of 50	10
	Oil only absorbent mats 38cm x 46m	Box of 2 rolls	8
	Universal absorbent mats 38cm x 51cm	Box of 100	5
	Universal absorbent mat 38cm x 46m	Box of 2 rolls	4
	Molegrips (for bladder leaks)	Each	2
	Universal poly drum funnel	Each	2
	Various funnels	Each	10
	Yellow waste bags (roll)	Roll of 100	6
	Drum wrench	Each	1
	Protective coverall (Tyvek) S	Each	10
	Protective coverall (Tyvek) M	Each	10
	Protective coverall (Tyvek) L	Each	10
	Protective coverall (Tyvek) XL	Each	10
	Disposable gloves L pack	Box of 100	1
	Rubber Gloves S	Each	10
	Rubber Gloves M	Each	10
	Rubber Gloves L	Each	10
	Goggles	Each	20
	Decontamination bund 1m x 2m x 0.25m	Each	1
	Bootwasher	Each	1
	Bootbrush	Each	1
	4 drum bund	Each	2
	Empty 205L tighthead drums	Each	40
Types of spill kit available on station[12]:			
Wheelie Bin Oil Spill Response Kit			
	Socks 8cm x 122cm	Each	4
	Socks 8cm x 3m		2
	Pillows 31cm^2		4

[12] Spill kit type is only a guide; it does not need to be exact.

	Absorbent mats		50
	Yellow waste bags		10
	Drip Tray		1
	Pig Putty		6
	Rubber Gloves L		1
	Goggles		1
Overpack Drum Spill Kit			
	Socks 8cm x 122cm	Each	4
	Socks 8cm x 3m		2
	Absorbent Mats		50
	Drip Tray		1
	Drum funnel		1
	Yellow waste bags		10
	Pig Putty		2
	Rubber Gloves L		1
	Goggles		1
Oil Spill Response Bag (ability to absorb 38.5L spills)			
	Socks 8 x 122cm	Each	4
	Absorbent mats		25
	Yellow waste bags		10
	Pig Putty		2
	Rubber Gloves L		1
	Goggles		1
Vehicle Spill Kit			
	Pig Putty	Each	1
	Absorbent mats		2