

National Oil Spill Contingency Plan

Chapter 5 – Shoreline Cleanup
Assessment Techniques (SCAT)



Contents

- Introduction 3
 - Incorporation of SCAT in MNZ Oil Spill Response 3
 - SCAT SOP 8
- Supporting Information 9
 - 1. Initial Observation..... 9
 - 2. Shoreline Segmentation..... 9
 - 3. Survey Strategy..... 9
 - Aerial Survey 10
 - Systematic Ground Survey 10
 - Spot Ground Survey..... 10
 - 4. SCAT Teams..... 11
 - Number of SCAT Teams..... 11
 - SCAT Team Composition 11
 - 5. Survey Briefing..... 11
 - 6. Segments surveyed 11
 - Field Equipment Checklist..... 11
 - Aerial Surveys 12
 - Ground Surveys 13
 - 7. Data Collation..... 14
 - Data Management..... 14
 - 8. Data Analysis 14
 - Use and Application of SCAT Information 14
 - 9. Recommendations 15
 - 10. Cleanup Endpoints..... 15
 - Cleanup Endpoints for Shoreline Types 15
 - 11. Survey and Segment Signoff 18

Introduction

This chapter is designed to facilitate the SCAT process during a marine oil spill. The chapter is two linked parts:

- SCAT Standard Operating Procedures
 - Summarises the key operational aspects in the Foreshore Assessment process.
- SCAT Supporting Information
 - Provides detail on the key aspects.

Incorporation of SCAT in MNZ Oil Spill Response

SCAT plays a key role in the assessment of the scale and scope of a shoreline response programme. This document outlines how SCAT will be used in a Tier 3 incident involving a shoreline response.

Two processes have been identified for the use of SCAT, firstly for prior to a spill occurring or impacting the shoreline and secondly for once a spill has occurred.

The roles responsible for the actioning the task are in bracketed italics.

Pre-spill

SCAT teams survey shoreline predicted to be impacted by oil to identify: (*SCAT Teams*)

- Shoreline type
- Access options and constraints and staging areas for operations teams
- Potential shoreline clean-up response options
- Threatened resources.
 - Survey information assessed and collated. (*SCAT Coordinator*)
- Threatened resources and potential shoreline clean-up response options reported to Planning Manager.

Pre Spill Process:

Shoreline segmented (using ShoreAssess) and Shoreline Oiling Summary Forms distributed to SCAT team leaders

Shoreline segments surveyed

Shoreline Oiling Summary Form completed with shoreline type, coastal character and operational features information for segments

Oiling Summary Forms collated and assessed and input into ShoreAssess

Relevant information reported to Planning Manager.

Post-Spill

SCAT teams survey oiled shoreline impacted by oil to determine: (*SCAT Teams*)

- Shoreline type
- Coastal character
- Extent of surface and subsurface oiling
- Access options and constraints and staging areas for operations teams
- Potential shoreline clean-up response options
- Impacted resources.

Survey information collated and assessed (*SCAT Coordinator*)

- Access issues outlined
- Staging areas identified
- Shoreline clean-up response options identified for segments in consultation with Environmental Advisor and Operations Team.
- Segments prioritised for clean-up in consultation with Environmental Advisor
- Clean-up end points for segments determined in consultation with Environmental Advisor
- ShoreAssess reports generated, extent of oiling maps and Shoreline Treatment Recommendation Transmittal Forms produced

Segment information disseminated (*SCAT Coordinator*)

- Recommendations for clean-up response options and clean-up endpoints for segments provided to Planning Manager.
- Shoreline Treatment Recommendation Transmittal Forms for segments included as appropriate in IAP for On-Scene Commander approval.

Shoreline Clean-up

Operations undertake clean-up of segments (*Operations*)

Post clean-up

SCAT teams survey segments to determine if clean-up endpoints have been reached (*SCAT/Signoff Teams*)

- Shoreline Segment Inspection forms completed
- Further clean-up recommendations made / or
- Segments signed off

Below are the three forms identified in the process above.

NZ SHORELINE TREATMENT RECOMMENDATION TRANSMITTAL FORM

INCIDENT NAME: _____

GENERAL INFORMATION:
Site Location: _____
Segment ID: _____ Length (m): _____ Survey Date: _____
Shoreline Type: _____ Substrate: _____
Coastal Character: _____

Oiled Area for Treatment:

Treatment Recommendations:

Recommendations/Staging and or Logistic Constraints:

Waste Issues:

Ecological Resources Comments:

Cultural Resources Comments:

Safety Issues:

Attached: Segment Map Sketch Map SOS Form

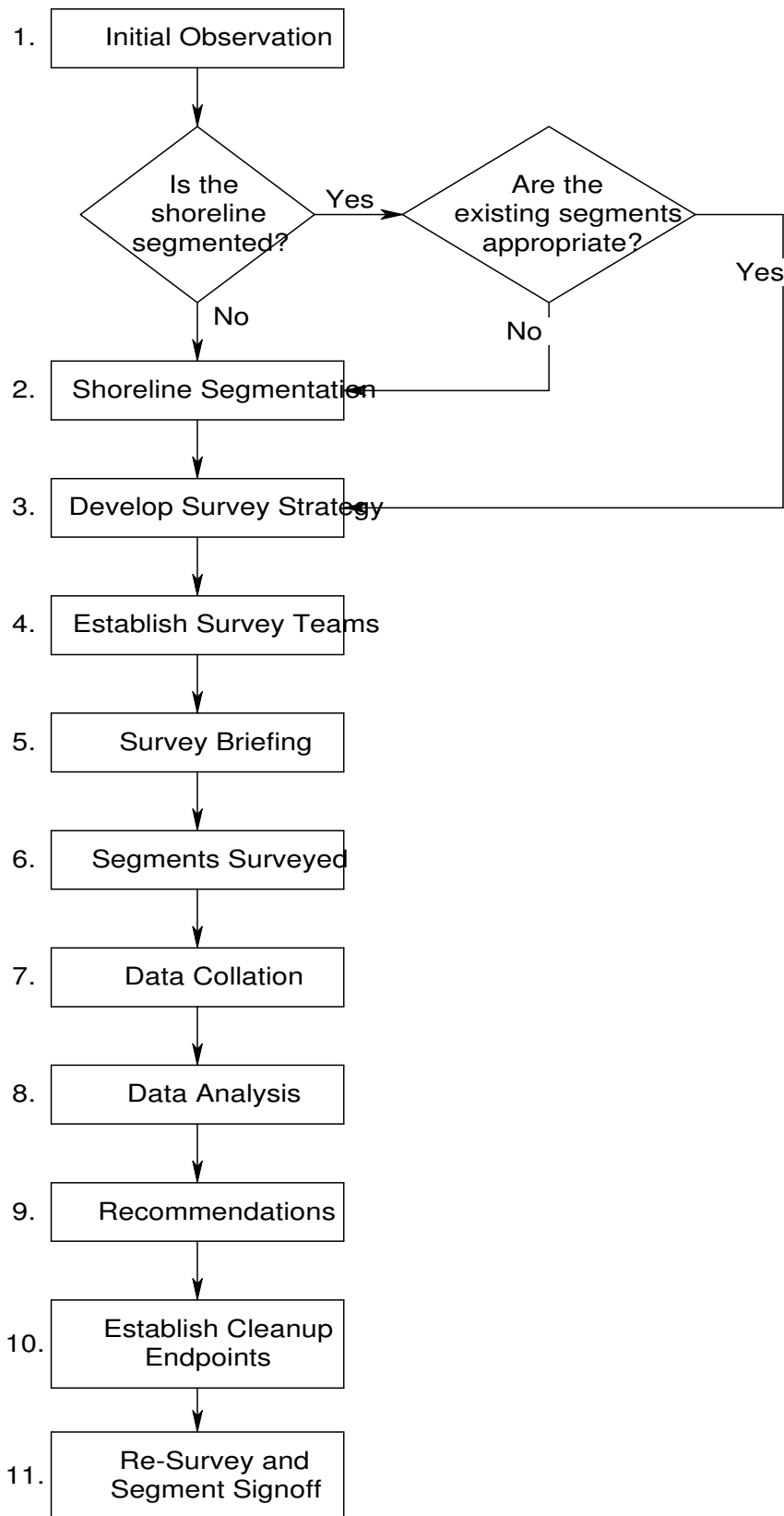
Final Approvals:

Environmental Advisor	Planning Manager
<input type="text"/>	<input type="text"/>
Operations Manager	On-Scene Commander
<input type="text"/>	<input type="text"/>

Prepared By: _____

Date Prepared: _____

SCAT SOP



Supporting Information

1. Initial Observation

Purpose To make broad scale observations of the impacted area to get an appreciation of the extent of oiling, but not to specifically map or document the oiling conditions, so that relatively large areas can be covered in a relatively short time period.

Action

- Generally done by aerial reconnaissance.
- Document the general picture of the extent and character of the oiled shorelines.
- Information used to develop response objectives and to define the overall scale of the response operation and to direct more detailed surveys.

2. Shoreline Segmentation

Purpose To divide the coast into working units called segments, within which the shoreline character is relatively homogenous in terms of physical features and sediment type.

Actions

- Each segment given unique identifier.
- Segment boundaries can be either:
 - prominent geological features (e.g. headland), or
 - changes in oiling conditions.
 - For homogenous shorelines segments may be based on operational considerations.
- Segment lengths typically 0.2 – 2 km long.
- Existing segmentation may be available in the form of a GIS database or identified during pre-spill planning.
 - segments may need to be reviewed and compared to oiling conditions in the field if oiling conditions vary significantly within the segment, segments can be subdivided.

3. Survey Planning

Purpose To determine the best method(s) for surveying the affected coastline and plan survey.

Shoreline surveys can be conducted by different methods and at different scales depending on the size of the affected area, the character of the coastal area, and the level of detail required.

For pre-survey planning:

- decide on segments to be surveyed based on survey priorities, logistics, low-tide window and associated logistics.
- decide on method of survey: aerial survey, systematic ground survey, spot ground survey.
- select alternate areas in case weather or tide conditions prevent access to primary target(s).
- collect all necessary equipment and supplies (see field equipment checklist).
- review existing information and data.

SURVEY METHOD	KEY OBJECTIVES
Aerial Survey	Systematically document or map to: create segments, develop regional strategies and plans, and define lengths of oiled shoreline. Roughly estimate extent of oiling
Systematic Ground Survey	Systematically document shoreline oiling conditions in all segments within the affected area.
Spot Ground Survey	Systematically document shoreline oiling conditions for selected segments within the affected area.

Aerial Survey

Purpose To prepare a map or maps showing the locations of stranded oil and the distribution and character of that oil.

Actions

- Documents the oil in a systematic manner.
- Preferably use geo-referenced video or photographs to record information.
- Use data as foundation for the development of:
 - segmentation of shoreline, and
 - definition of lengths of oiled shoreline in terms of shoreline types and the oil character.
- May be the only practical method available to survey in areas with inaccessible shorelines or difficult access.

Systematic Ground Survey

Purpose To systematically document shoreline oiling conditions in all segments within the affected area and to complete shoreline oiling summary forms and generate sketch maps for each segment.

Actions

- A ground team systematically assesses each segment in the affected area.
- Shoreline oiling summary forms completed, sketch maps, photographs and video used to record oiling conditions, shoreline type and operational data such as access/staging points.

Spot Ground Survey

Purpose To systematically document oiling conditions for selected segments within the affected area and to complete shoreline oiling summary forms and generate sketch maps for those segments.

Actions

- Used to focus on specific locations if the aerial survey identifies discontinuous oiling conditions or if treatment or cleanup is planned only for selected segments within the affected area.
- Shoreline oiling summary forms completed, sketch maps, photographs and video used to record oiling conditions, shoreline type and operational data such as access/staging points.

4. SCAT Teams

Purpose Foreshore Assessment teams undertake the surveying of the affected coastline.

Number of SCAT Teams

Required amount of teams depends on the complexity of the affected area and the required turnaround time for the information. In general, the required scale is 'however many teams it takes to cover that area in time to provide the information'.

SCAT Team Composition

The minimum composition of a SCAT team should be:

- an individual with oil spill experience and SCAT training who can identify and document oil on the shore from the air or on the ground;
- a representative from the operations team or an individual with field operations expertise who can identify feasibility issues, logistical constraints and solutions, and who can evaluate the types of resources and level of effort that might be required for cleanup or treatment of a segment.

Additional team members when available/required may be:

- an individual familiar with coastal ecology of the affected area who can document the impacts of the oil and who can recommend priorities and cleanup endpoints;
- in areas where archaeological or cultural resources exist, a specialist who can advise on precautions and constraints to protect those resources.

5. Survey Briefing

Purpose To brief SCAT teams on all aspects of the surveying task to ensure consistency between SCAT teams and segments.

Before SCAT teams undertake surveys, the SCAT Coordinator should brief them on the following:

- Survey objectives;
- Survey area;
- Methodology;
- Forms;
- Communications; and
- Health and Safety.

6. Segment Surveys

Purpose To collect data from the field for analysis by the SCAT Coordinator.

Field Equipment Checklist

The following is a checklist of equipment that can be used by the field teams:

Survey gear

- waterproof paper for field forms and sketch maps; field notebooks (waterproof)
- SCAT Manual
- office supplies; pencils, paper, waterproof markers, rulers, paperclips, clipboard
- segment maps and base sketch maps (if available), aerial photographs, topographic or nautical charts of area
- compass, liquid filled, 1-degree graduations, Brunton types are preferable if bearings are recorded

- shovels; folding or clam, preferably with the pick on the backside
- Global Positioning System (GPS) receiver (hand-held, portable)
- tape measure or range finder (hand-held, 0-500 m or greater range)
- digital camera that can date the photos
- video camera and videotapes, if required
- batteries, charged battery packs (for cameras, radios, etc.)
- 10-cm long photo scale with 1-cm increments for close-ups
- day pack (waterproof)
- communication equipment (hand-held 2-way radio(s), VHF Marine (5 watt), cellular phones)

Personal gear

- rain gear
- sun screen, hat, rubber boots, non-skid soles
- gloves & liners, waterproof, work type, high quality
- first aid kit
- Food and water

Aerial Surveys

An aerial reconnaissance requires prior experience as this technique relies heavily on the ability of the observer(s) to identify substrate materials and oil and to distinguish oil from the many other materials of similar colour and texture that occur naturally on the shoreline (lichen, mussel beds, heavy mineral deposits, stranded seaweed or sea grasses, peat, etc.).

Typical steps for an aerial reconnaissance include:

- define the low-tide window;
- decide on area or segments to be surveyed, the flight line direction, and associated logistics;
- collect all necessary equipment and supplies (see Field Equipment Checklist);
- review existing information and data;
- brief all team members on the survey's objectives, methodology, and health and safety concerns;
- take photos (or record videotapes if planned);
- fill in flight-line maps, appropriate forms, etc., record GPS track and waypoints, or take notes to be able to complete forms later;
- discuss assessments / major observations prior to return from the survey;
- finalise and copy all maps, forms, field notes and photo/videotape logs;
- submit copies to the SCAT Coordinator or Data Manager;
- file a daily report form with the SCAT Coordinator; and
- review day's activities, discuss improvements, and prepare for next day, if necessary.

Key elements of a successful Aerial Videotape Mapping Survey include:

- flight-path planning with respect to (tidal) water levels, sun angles, and flying altitude;
- communication with the pilot regarding flying height and distance from shore to minimize camera work (e.g. use of the zoom lens) and to ensure complete coverage;
- a "rule of thumb" for height and speed is that a point on the ground passes through the video image for approximately six seconds;
- accurate flight-line data that are linked to the tapes (for example, automatic GPS data logging), photographs can be taken of the GPS at the beginning of the flight to allow comparison of time stamps if the camera equipment does not have positioning capability;

- ground calibration where it is difficult to distinguish shoreline features;
- continuous commentary using the video image as the background for the observations that are documented on the audio channel; and
- open-window or open-door for the camera and a mouth microphone for the observer (to minimize wind sounds).

Ground Surveys

General elements of a ground survey include:

On-site activities

- Conduct segment overview; gain an overall perspective.
- Complete observations and measurements of the segment. Take photos and/or videotapes ensuring that a scale object is present in all images.
- Draw sketch maps, including a scale bar, captions and north point.
- Fill in required forms, or take appropriate notes to be able to complete forms later.
- Discuss assessments/major observations prior to departure.

Post-survey activities

- Finalise and copy all forms, maps, field notes and photo/videotape logs.
- Submit copies to the SCAT Coordinator or Data Manager. File a daily report form with the SCAT Coordinator.
- Review day's activities, discuss improvements, and prepare for next day, if necessary.

Specific details of the on-site activities within each segment include:

Segment overview on arrival

On arrival at the site, traverse the entire segment by skiff or helicopter, or if operating from a vehicle, view the segment from an elevated vantage point in the backshore to:

- verify if the pre-determined segment boundaries are correct,
- acquire a good perspective of the extent of stranded oil, and
- estimate the level of *effort* required to complete the assessment.

If working from vessel or aircraft, conduct a radio check before departing and agree on calls, channels, and ETA's (estimated times of arrival) with the captain or pilot.

Survey methodology

Once on shore, the team spreads out and begins walking from one end of the shoreline to the other while observing and documenting important oil features. If little or no oil is observed and treatment is not recommended, only a cursory assessment is required of ecological or cultural resource features.

- On short segments: walk the entire segment while making general observations and then return to areas that require more detailed documentation.
- On long segments: it is more efficient to make extensive notes as team members progress along the shore, to avoid backtracking.
- Site activities consist of systematic observing, collecting and documenting of the information on field forms, sketches, maps, and by photo and videotape recording methods, ensuring that a scale object is present in all images.
- Completion of the Shoreline Oiling Summary Form (Section 1.5) focuses on the physical aspects of the shoreline and the oiling conditions (typically, the mid- and upper-intertidal zones).
- If present, an ecologist would focus on the biological environment, and typically would concentrate near the lower intertidal/swash zone (usually the most ecologically productive area).

- If present, an archaeologist would typically focus on the supratidal and backshore regions, as this is where most archaeological or cultural features would be found.
- If operations or agency personnel are present on the assessment team, then they can assist in a variety of ways (e.g., photos, measuring, documentation, digging pits, etc.) as well as assessing operations features such as access, potential staging areas, safety issues etc.

Prior to departing the site

- As a team, review the individual assessments and discuss treatment or cleanup options to ensure nothing has been overlooked, and reach agreement on major points. At a minimum there must be a consensus on oil character and distribution.
- Check that forms and sketch maps are complete and consistent, or ensure that adequate notes and measurements have been taken to complete them later.
- Ensure that all photographs and videotapes have been accurately logged in the field notes and that all of the documented and unusual features of the segment have been photographed.
- Check that all equipment, survey gear, personal items, and litter are taken when leaving the site.

7. Data Collation

SCAT teams survey data converted into information available for analysis by the SCAT Coordinator.

Data Management

- Survey data must be rapidly processed and analysed.
- Survey data needs to be assessed for accuracy and consistency.
- Survey data entered into ShoreAssess
- Data must be made available quickly to decision makers especially at the start of a response.

8. Data Analysis

Purpose To analyse the field survey information and make recommendations for appropriate response options.

Use and Application of SCAT Information

Incident Command

- Evaluate the scale of the problem and scope of response.

Planning section

- Define shoreline treatment priorities.
- Select cleanup methods.
- Identify level of effort for shoreline operations.
- Apply cleanup endpoint criteria and monitor cleanup task.

Operations

- Locate work sites and implement cleanup tasks.
- Identify access and staging locations and logistical requirements.
- Determine what and how much waste will be generated at each site.

Environmental

- Identify scale and nature of likely impacts.
- Assess effects and recovery.

OSH

- Identify shore-zone hazards and other site-specific safety issues.

9. Recommendations

Purpose To recommend priority areas for cleanup and preferred cleanup options.

Recommendations are made by the SCAT Coordinator to the Planning Manager.

10. Cleanup Endpoints

Purpose To establish a measured end of treatment or cleanup activities. The treatment or cleanup for a segment is completed when the endpoint has been attained, i.e. when the standard or measure has been achieved.

- Establish treatment objectives for a specified area before response operation begins.
- Define end points of the cleanup, treatment or restoration activities so that operations team will know when they have completed a task.
- Bring closure to the response activities so that the operations can demobilise.

Actions

- End point achieved by human intervention techniques or by allowing natural cleaning processes without intervention.
- Need to make a decision about when to stop clean-up at the outset of a response.
- Cleanup endpoint determination should include consultation with key stakeholders such as;
 - P & I Club/spiller's representative,
 - Local and central government agencies,,
 - NGOs,
 - Tangata Whenua.

NOTE: The determination of cleanup endpoints will normally be included as a part of response termination planning and be included in the Response Termination Plan.

Cleanup Endpoints for Shoreline Types

Example cleanup endpoints are listed below. Each spill will have a unique combination of oil type, rate of natural recovery, biological sensitivity, and human use issues that may lead to different endpoints. Cleanup end points may be determined by shoreline type and/or resource/environmental value. Examples are given below, these are not inflexible, but should be amended or combined as appropriate to gain the required outcome:

SHORELINE TYPE	CLEANUP ENDPOINT
Exposed rocky shores and wave cut platforms	Cleanup may be terminated when the shoreline no longer generates sheens that affect sensitive wildlife. On exposed rocky shores used as seal haulouts, persistent oil should be removed until the oil is no longer sticky, unless cleanup is determined to be too disruptive to animals at the site.
Solid man-made structures	In industrial areas, cleanup may be terminated when the shoreline no longer generates liquid oil and heavy rainbow sheens. In areas of high public use, more intensive cleanup should be conducted to remove the oil until it no longer rubs off on contact. In areas of low public use, visible oil can remain as stain and patches of coat.
Sand Beaches	Cleanup may be terminated when there is no visible oil on the surface. All tarballs or tar patties that could be removed by reasonable cleanup techniques or that could be remobilised should be removed. Remaining tarballs and patties should be at or below normal background frequency. Cleanup may be terminated when no layers of oil are found in trenches dug into the beach.
Mixed sand and gravel beaches	Cleanup may be terminated when all liquid oil in the sediments has been removed. No more than a stain may remain on the gravel-sized sediments. There should be no oil layers in pits dug. Buried tarballs should be at or below background frequency. Removal of subsurface oil should be terminated when further cleanup efforts will result in excessive habitat disruption that will cause more harm than natural removal of oil residues.
Riprap structures	In industrial areas, cleanup may be terminated when the shoreline no longer releases liquid oil and heavy rainbow sheens. Visible oil can remain as stain and patches of coat on the outer surface of the structure. All flushable oil in the crevices and on the sides and bottom of individual pieces of the riprap should be removed. In areas of high public use, more intensive cleanup should be conducted to remove the oil until it no longer rubs off on contact.
Exposed and sheltered tidal flats	Cleanup may be terminated when the shoreline no longer releases sheens that will affect sensitive areas, wildlife, or human health. Gross oil removal can be terminated when further cleanup efforts will result in excessive habitat disruption that will cause more harm than natural removal of oil residues.
Marshes	Cleanup may be terminated when there is no more free-floating oil in the marsh and when the shoreline no longer releases sheens that will affect sensitive areas, wildlife, or human health.

Michel, J. and B. Benggio, 1999. "Guidelines for Selecting Appropriate Cleanup Endpoints at Oil Spills".

Resource/Environmental Value	Acceptable level of clean
Contact Surfaces ¹	No visible tar balls, slicks or sheens that could adhere to organisms or interfere with normal animal/plant feeding, life cycle processes and behaviour.
Shoreline/intertidal sediments as habitat ²	Need not be totally clean, but remaining residues must not inhibit potential for recovery through toxic or smothering effects.
Subtidal substrata as habitat ³	Remaining residues must not inhibit potential for recovery through toxic or smothering effects. Compliance with ANZECC Water Quality Guidelines for Protection of Aquatic Ecosystems to the required level of environmental protection.
Subsurface water as habitat	Oil contamination should not interfere with normal animal/plant feeding, movement, life history processes and behaviour. Must not exceed 0.3mg/l oil in water (based on recommended concentrations from ANZECC Water Quality Guidelines for commercial culture of aquatic species).
Shoreline (as an ecosystem interacting with other aquatic nearshore ecosystems)	Remaining residues must not be mobile such that they will leach out into near-shore waters.
Cultural and historic value ⁴	Sensitive to and, where possible, addressing needs of cultural custodians.
Food organisms and water that may be used for human consumption	Must meet relevant statutory specification for residues and taints (e.g. NHMRC, NFA, ANZECC). Kaimoana species must have no detectable oil tainting (as determined by independent laboratory testing).
Amenity and/or safety of beaches and structures (e.g. jetties and slipways)	No visible oil. No oil that rubs off on people, boats or infrastructure, or causes a slip hazard.

AMSA, 2007 "Foreshore Assessment, Termination of Clean-up and Rehabilitation Monitoring."11. Survey and segment signoff

¹ 'Surfaces' includes water surfaces, sediment surfaces and hard surfaces, and is intended to encompass hard/sediment surfaces that organisms move across, water surfaces that animals might broach to breath, feed or flee, and air/water interface for air-breathing organisms. In this last case, the definition of clean would include no air contamination.

² Habitat is the place where organisms live. Habitat should be suitable for all organisms that naturally occur in the area.

¹ 'Surfaces' includes water surfaces, sediment surfaces and hard surfaces, and is intended to encompass hard/sediment surfaces that organisms move across, water surfaces that animals might broach to breath, feed or flee, and air/water interface for air-breathing organisms. In this last case, the definition of clean would include no air contamination.

² Habitat is the place where organisms live. Habitat should be suitable for all organisms that naturally occur in the area.

³ Under this Environmental Value, water is considered as a habitat for plankton, fish, corals, mammals, seagrasses, aquacultured species etc. Habitat includes suitable conditions to live in, as well as an appropriate environment to feed and to otherwise sustain viable populations (i.e. support life cycle processes).

⁴ Cultural values may be diverse and particular to each location and resource. Responders should consult relevant managers and stakeholders and be aware that, in some circumstances, oiling may be preferable to disturbance of sites.

³ Under this Environmental Value, water is considered as a habitat for plankton, fish, corals, mammals, seagrasses, aquacultured species etc. Habitat includes suitable conditions to live in, as well as an appropriate environment to feed and to otherwise sustain viable populations (i.e. support life cycle processes).

⁴ Cultural values may be diverse and particular to each location and resource. Responders should consult relevant managers and stakeholders and be aware that, in some circumstances, oiling may be preferable to disturbance of sites.

11. Survey and Segment Signoff

Purpose Segments are surveyed to see if cleanup endpoints have been met.

Signoff that a cleanup endpoint has been reached for shoreline segments should include consultation with key stakeholders such as:

- P & I Club/spiller's representative,
- Local and central government agencies,
- NGOs, and,
- Tangata Whenua

NOTE: The determination of cleanup endpoints will normally be included as a part of response termination planning and be included in the Response Termination Plan.