REGIONAL RESPONSE TEAM IX (RRT IX)
REGIONAL CONTINGENCY PLAN (RCP)

ENCLOSURE 4600

California Dispersant Plan and Federal On-Scene Coordinator (FOSC) Checklist

for

California Federal Offshore Waters

Fall 2008 Version
(2014 formatting changes)

Authorship and Acknowledgements

The principal organizer and compiler of the 2008 report was Ellen Faurot-Daniels (CCC), with critical conceptual input and resource information support provided by Yvonne Addassi (OSPR). Creating the 2008 draft California Dispersant Plan would not have proceeded smoothly or successfully without the contributions of thought, effort and review provided by many others.

We relied extensively on work already completed by other authors and institutions. Leigh Stevens of Cawthron Institute, New Zealand, led the way by allowing us to use his "Oil Spill Dispersants: Guidelines for Use in New Zealand" as an extremely helpful model for our document. We also drew from various dispersant guidelines provided by Regional Response Teams throughout the U.S., dispersant guidelines published by ExxonMobil, the Cutter Information Corporation's "Oil Spill Dispersants: From Technology to Policy", the "Assessment of the Use of Dispersants on Oil Spills in California Marine Waters" by S.L. Ross, and various oil spill job aids available from the NOAA web site. Please see the References Cited section in this document for the full citations.

Beyond the use of these reports was the steadfast assistance of those we worked with in our own agencies and those on the Los Angeles Area Committee, dispersant subcommittee, dispersant workgroups, and various interested parties watching and assisting from outside the immediate working groups. Randy Imai of OSPR provided the charts in this report, Al Allen (Spilltec) provided the information, figures and formulas for dispersant dosage rates and relating those rates to dispersant application systems, and the oil spill clean-up cooperatives in California provided updated information on dispersant application resources. Members of the Los Angeles workgroups reviewed early drafts of this document, with John Day (Santa Barbara County) and Craig Ogawa (Minerals Management Service) providing especially helpful comments along the way. Ben Waltenberger (NOAA), Ken Wilson (OSPR), Melissa Boggs-Blalack (OSPR) and Ellen Faurot-Daniels (CCC) pitched in to draft the Wildlife Aerial Observation Protocols, and Melissa Boggs-Blalack led the workgroup addressing public outreach.

We also extend particularly heartfelt thanks our colleagues in our own agencies who supported our efforts all along the way, and to the members of the Regional IX Regional Response Team and the U.S. Coast Guard who had the first vision of a California Dispersant Plan.

2014 formatting changes implemented by Ellen Faurot-Daniels (CDFW-OSPR) to address consistency with 2014 formatting changes within RCP.

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This page provided for spacing purposes.

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Overview

Purpose and authority

This document outlines the Dispersant Use Plan for state and federal marine waters within the Region IX Regional Response Team (RRT) area of operations.

This policy authorizes and provides guidelines to allow the federally pre-designated U. S. Coast Guard (USCG) Federal On-Scene Coordinator (FOSC) and/or the Unified Command to use dispersants in a timely manner to: 1) prevent or substantially reduce a hazard to human life; 2) minimize the adverse environmental impact of the spilled oil; and 3) reduce or eliminate the economic or aesthetic losses of recreational areas. This dispersant use plan will address the use of dispersants for each of two zones. Enclosure 4600a: Section I is for the Dispersant Pre-Approval Zone, and Enclosure 4600b: Section II addresses the RRT Expedited Approval Required Zone.

Subpart J of the National Contingency Plan (NCP) provides that the FOSC, with the concurrence of the EPA representative to the Regional Response Team and the State with jurisdiction over the navigable waters threatened by the oil discharge, and in consultation with the U.S. Department of Commerce (DOC) and U.S. Department of the Interior (DOI) natural resource trustees, when practicable, may authorize the use of dispersants on oil discharges; provided, however, that such dispersants are listed on the NCP Product Schedule. The EPA has been delegated authority to maintain a schedule of chemical countermeasures that may be authorized for oil discharges in accordance with procedures set forth in Section 300.900 of the NCP.

The USCG Eleventh District Commander has pre-designated the three USCG Captains of The Port (COTP) as the FOSCs for oil discharges in their respective COTP zones (as defined in 33 CFR Part 3 and subject to joint response boundary agreements with EPA described in Section 1400 of the three California Area Contingency Plans), and has delegated to each COTP the authority and responsibility for compliance with the Federal Water Pollution Control Act (FWPCA).

The Governor of the State of California has designated the Administrator of the Department of Fish and Wildlife Office of Oil Spill Prevention and Response (CDFW-OSPR) the authority and responsibility for providing approval for the use of dispersants for control of oil spills in or affecting California waters.

The USCG, EPA, DOI, DOC/NOAA, and CDFW-OSPR agree that one of the primary methods of controlling discharged oil shall be the physical removal of the oil by mechanical means. These agencies recognize that in certain instances timely, effective physical containment, collection and removal of the oil may not be possible, and the use of dispersants, alone or in conjunction with other removal methods, may be considered to minimize substantial threat to public health or welfare, or minimize serious environmental damage. Enclosure 4600a and 4600 b establish the policy under which dispersants listed on the NCP Product Schedule may be used in Federal waters off California by FOSCs.

The response planning process

The National Oil and Hazardous Substances Pollution Contingency Plan (National Contingency Plan – NCP) directs the RRTs and Area Committees to address, as part of their planning activities, the desirability of using appropriate dispersants, surface washing agents, surface collecting agents, bioremediation agents, or miscellaneous oil spill control agents listed on the NCP Product Schedule, and the desirability of using appropriate burning agents. Regional Contingency Plans and Area Contingency Plans shall, as appropriate, include applicable authorization plans and address the specific contexts in which such products should and should not be used (40 CFR § 300.910). Additional information on how this plan was directed and developed is included in Attachment VIII.

What is in the California Dispersant Plan (CDP)

In its current form, the CDP includes an updated Federal On-Scene Coordinator (FOSC) checklist, and a series of discussion and decision boxes to facilitate the FOSC decision. To provide the greatest likelihood that this CDP will not only train but serve the Coast Guard regardless of which personnel are in the FOSC position in the future, it includes a number of attached materials that put oil, dispersant, natural resource and response resource information close at hand in one document. The CDP also includes a number of blank forms that can be removed, duplicated as needed, and used in the field during a spill response to provide orderly and timely information to the FOSC as the spill unfolds and a decision whether or not to use dispersants becomes imminent. Other report forms document bird and mammal presence, dispersant application methods, and dispersant effectiveness.

This document is not a lengthy discussion of the relative merits of any response tool, of dispersant or dispersed oil toxicity, or the details of Net Environmental Benefit Analyses (although key points on several of these topics is embedded in the Discussion Notes on the FOSC checklist, or in the appendices). It is not a primer on oil spill response in general, or the Incident Command System. All this information is available from other resources, much of which was considered in developing the zone recommendations and CDP. This CDP instead assumes that an oil spill has occurred and all agency notifications have been made, various response agencies are on scene and using the Incident Command System to structure the response, and that dispersant use is under active consideration by the FOSC. This CDP takes over from there, offering tools to the FOSC to guide that decision.

Enclosure 4600a: Section I of this CDP primarily focuses on the federal offshore waters that have been designated as “pre-approved” for dispersant use. To date, this includes the waters 3 – 200 nautical miles from shore, not within a National Marine Sanctuary, and not within 3 miles of the California-Mexico border. As part of Enclosure 4600b: Section II, this CDP also addresses waters closer than 3 miles from shore, within a National Marine Sanctuary, and within 3 miles of the California-Mexico borders, under the RRT Expedited Approval Process. 4600b: Section II also addresses dispersant uses that are not pre-approved, such as dispersant applications on surface oil spills for more than 5 days (even if in an otherwise Pre-Approved area), or subsea use.

Quick Guide to Forms, Worksheets and Checklists

The CDP is designed primarily to assist the FOSC in making a dispersant use decision for the Pre-Approval Zone, or whether to ask for RRT review and approval if in the RRT Expedited Approval Required Zone, at the time of an incident. Many forms, worksheets, and checklists are included as a part of the CDP to facilitate information gathering, decision-making and providing supporting documentation, as necessary. These worksheets and forms should assist the FOSC in making dispersant use recommendations and decisions, not hinder the process with unnecessary paperwork.

As a part of the dispersant decision-making process, please use the quick guide to forms, worksheets and checklists outlined below.

1) Dispersant Assessment Worksheet **Not Required by RRT**

This document was designed to assist in the gathering and organization of pertinent information necessary to make a dispersant use decision.

2) Pre-Approval Zone Checklist **Required by RRT**

This checklist was designed to provide an overview of a dispersant decision-making process and to provide a "dispersant decision summary" for the incident, detailing the decisions made. Once this form is completed and the FOSC decides to use dispersants (if in the Pre-Approval Zone), or recommends asking the RRT for their review and approval (if in the RRT Expedited Approval Zone), the relevant checklist should be faxed to the RRT as soon as feasible for their review and records.

3) Pre-Approval Zone FOSC Record of Decision **Not Required by RRT**

This form was designed to provide a record of decision regarding the evaluation and authorization of dispersant use, consistent with the pre-approval criteria provided in the "Pre-Approval Zone" dispersant use checklist. The record of decision is to be signed by all members of the Joint Unified Command and should be faxed with the dispersant use checklist to the RRT as soon as feasible. (**This form was moved to Attachment XII**).

4) Checklist Documentation (Boxes 1 – 12) **Not Required by RRT**

This is a support tool to evaluate the information required in dispersant use checklist for either zone. This form guides the user through each decision-making point, allowing evaluation of each question that is a part of the dispersant use decision-making process. This form also cross-references the Attachments, as needed, where additional information can be found.

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DISPERSANT ASSESSMENT WORKSHEET

(Two pages)

Information gathered to complete this form will facilitate the dispersant pre-approval use determination; complete as much as possible without unadvisedly delaying a dispersant use decision.

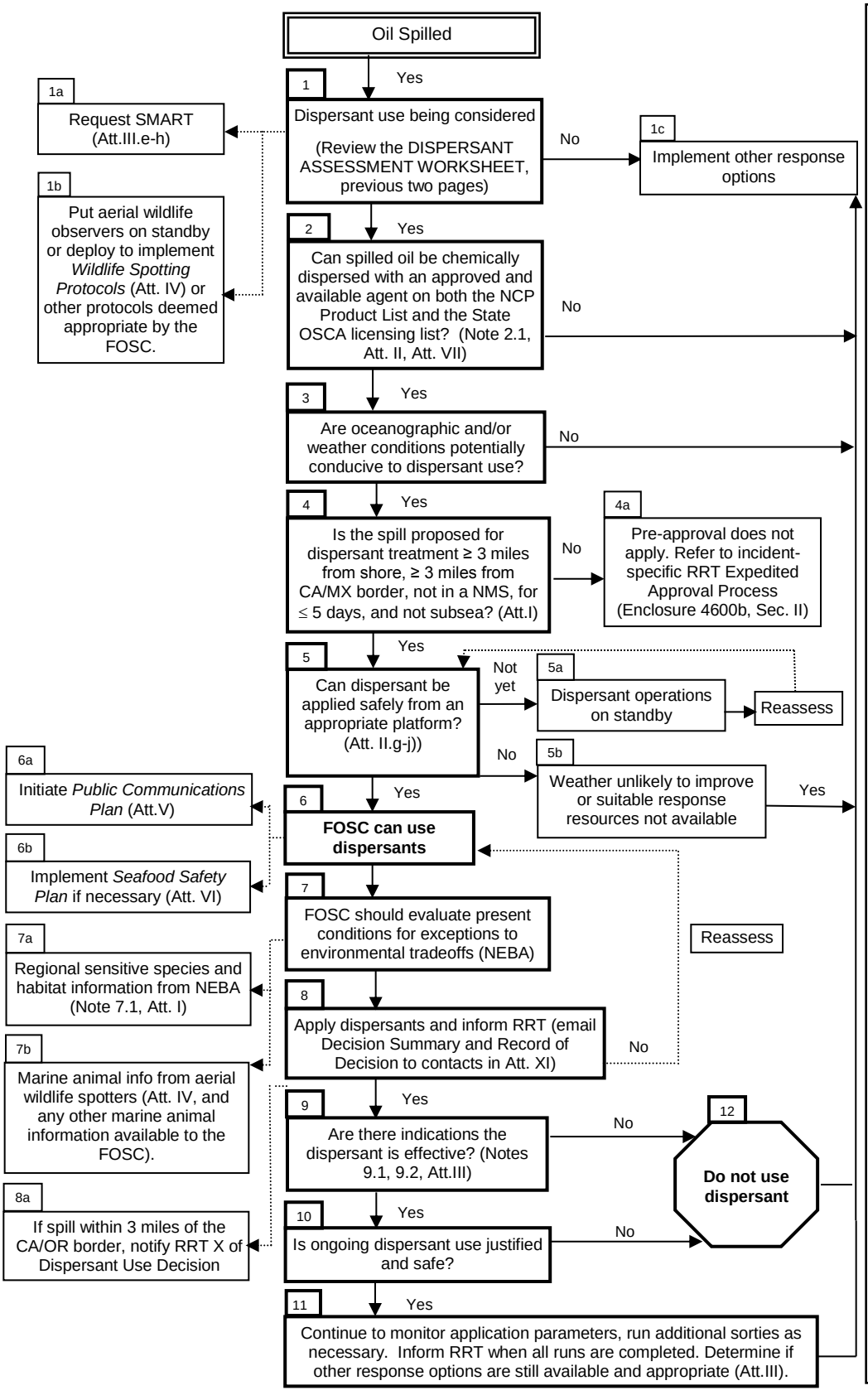
Worksheet completed by (print name): Organization:	Date: Time: Phone: Email:	
Cal-EOC Control #:	NRC Report #	
Federal On-Scene Commander (print name): Agency:	State On-Scene Commander (print name): Agency:	
SPILL INFORMATION		
Incident name:	Responsible party:	
Date of spill (mo/day/yr):	Time of spill (PST, 24-hr clock:	
General location:		
Latitude:	Longitude:	
Spill source and cause:		
Amount spilled (give units):	Oil name:	
Type of release: ☐ Instantaneous ☐ Continuous	API gravity:	Pour point (°F):
Estimated total spill area (width x length):	as ☐ acres ☐ sq. feet ☐ sq. miles ☐ sq. km	
Estimate (%) of actual oil coverage:	Estimate what % of slick is thick oil:	
ON-SCENE WEATHER, CURRENT AND TIDES		
Wind (from) direction:	Wind speed (knots):	
Current (to) direction: (circle) °true/°mag	Current speed (knots):	
Predicted slick direction: (circle) °true/°mag	Predicted slick speed:	
Ceiling height (feet):	Visibility (nautical miles):	
Any other comments:		
Information source:		

POTENTIAL RESOURCE IMPACTS

Using the predictive spill and weather information from the boxes above, ADIOS, the NOAA SSC, other RRT trustee agencies, aerial wildlife observers and regional resource information noted in Attachment 1, briefly describe offshore and coastal areas and resources that could be impacted from this spill.
Offshore waters (3+ miles from a shoreline)
Significant on-water resources:
Significant upper water column (0-30') resources:
Nearshore waters (0-3 miles from a shoreline)
Deeper subtidal water (> 30') and benthic:
Shallow subtidal (0-30') and benthic:
Intertidal (indicate primary type, *e.g*., mud, sand, rock, riprap, mixed):
Supratidal:
Ephemeral lagoon:
Anadromous streams/rivers:
Special habitat types (indicate type, *e.g*., kelp bed, eelgrass bed)
SPECIAL ECONOMIC AREAS
Examples: Mariculture, aquaculture, aquarium seawater intakes, larval retention areas, seasonally intense commercial or recreational fishing:
Dispersant Use Resources at Risk Information source:

ENCLOSURE 4600a: SECTION I

PRE-APPROVAL ZONE DISPERSANT USE FLOWCHART



Pre-Approval Zone

Dispersant Decision Summary

Spill location: _____

FOSC Name: _____

FOSC Signature: _____

Box	Decision	Time:	Date:	Initials:
1	Yes/No			
2	Yes/No			
3	Yes/No			
4	Yes/No			
5	Yes/No			
6	Yes/No			
7	Yes/No			
8	Yes/No			
9	Yes/No			
10	Yes/No			
11	Yes/No			
	Run 2			
	Run 3			
	Run 4			
	Run 5			
	Run 6			
	All done			
12	Do not use			

Supplemental Decisions:

1a	Yes/No			
1b	Yes/No			
5a	Yes/No			
5b	Yes/No			
6a	Yes/No			
6b	Yes/No			
7a	Yes/No			
7b	Yes/No			

Record of Decision:

If dispersant use is approved, sign and fax the Dispersant Pre-Approval Record of Decision with this Summary Sheet to the RRT.

Comments:

ENCLOSURE 4600a: SECTION I

PRE-APPROVAL ZONE DISPERSANT USE CHECKLIST

Complete as appropriate given time and information constraints. Do not allow completing each check-box to inadvisably delay decision-making.

BOX 1 **IS DISPERSANT USE BEING CONSIDERED?**

Dispersant use should be considered if one or more of the situations listed below exist:

- ❒ Oil is likely to significantly impact birds, marine mammals, or other flora and fauna at the water surface
- ❒ Natural dispersion is limited
- ❒ Other response techniques are unlikely to be adequate, effective, or economical
- ❒ The oil could emulsify and form mousse or tar balls
- ❒ Oil is likely to significantly impact shorelines, structures and facilities (*e.g.*, marinas, wharves)
- ❒ Oil is likely to significantly impact economically important resources (*e.g.*, shellfish beds, tourist beaches)
- ❒ Other ……

Decision: Consider dispersant use?

- ❒ Yes Make notifications in **Box 1a**
  Make notifications in **Box 1b**
- ❒ No Go to **Box 1c**

Make a note of the decision in the Dispersant Decision Summary box on the Dispersant Use Flowchart.

From Cawthron, 2000

Discussion Note 1.1 **KEY BENEFITS OF DISPERSANT USE**

- Dispersant use minimizes the effects of an oil spill principally by dispersing oil before it reaches shorelines or
  sensitive areas (*e.g.*, wetlands, estuaries).
- Removing oil from the surface of the water reduces the potential for impacts to birds and marine mammals, and
  limits the action of wind on spill movement.
- Dispersants can prevent oil from sticking to solid surfaces, and enhance natural degradation.
- Dispersants can effectively treat large spills more quickly and inexpensively than most other response methods.
- Dispersants can be effective in rough water and strong currents where mechanical responses are limited.
- Effective dispersant responses can greatly reduce the quantity of oil requiring recovery and disposal.
- Dispersant use is often the only feasible response to spills that exceed mechanical response capabilities.
- Dispersant use does not generally limit other options, except oleophilic mechanical responses.
- Dispersed oil that cannot be mechanically recovered generally poses few significant environmental problems.

From Cawthron, 2000

BOX 1a **REQUEST SMART**

Immediately deploy USCG Strike Team to the spill site if dispersant use is likely. Every attempt should be made by the FOSC and the Strike Team to implement the on-water component of the SMART (Special Monitoring of Advance Response Technologies) monitoring protocols in every dispersant application. **Dispersant application should <u>not</u> be delayed should sea conditions, equipment failure, or other unavoidable circumstances preclude the positioning of SMART monitoring equipment and personnel**. However, at a minimum, Tier 1 (visual) monitoring should occur by trained observers during any dispersant operation approved in accordance with this California Dispersant Plan. Tier 2 (on-site water column monitoring) and Tier 3 (fate and transport of the dispersed oil) SMART monitoring will be deployed as appropriate. Other information on monitoring dispersant effectiveness, including additional SMART background information, tools and report forms, is presented in **Attachments III.d-III.h**

Decision: Deploy SMART?

❒ Yes Use contact information in Attachment XI. **Estimated arrival time**: ……..…….. Go to **Box 1b**.
❒ No Note reason why not deployed:

Make a note of the decision in the Dispersant Decision Summary box on the Dispersant Use Flowchart.

Go to **Box 1b** or **Box 1c** as appropriate.

BOX 1b **PUT AERIAL WILDLIFE OBSERVERS ON STANDBY OR DEPLOY TO IMPLEMENT THE *WILDLIFE SPOTTING PROTOCOLS***

Consider deploying trained wildlife spotters in initial spill overflight aircraft so that they can determine if the presence of marine animals in the spill or dispersant application zones could influence spray pattern decisions by the FOSC. The goal is to minimize over-spray onto unaffected animals. Wildlife spotters should use the forms and procedures given in the *Wildlife Spotting Protocols* (**Attachment IV**). The FOSC will decide how subsequent and systematic wildlife spotting efforts can be safely conducted with the aerial resources available.

Decision: Notify/deploy aerial wildlife spotters?

❒ Yes Use wildlife spotter contact advice in **Attachment IV.a**. Go to **Box 2**.
❒ No Note reason why wildlife spotters not deployed

Make a note of the decision in the Dispersant Decision Summary box on the Dispersant Use Flowchart.

Reconsider under **Box 7**.

BOX 1c **IMPLEMENT OTHER RESPONSE OPTIONS**

Consider all response options to identify which option, or combination of options, is most appropriate.

❒ No action other than monitoring
❒ Mechanical containment and recovery of oil at sea
❒ Clean-up of oil from shorelines
❒ *In-situ* burning

From Cawthron, 2000

BOX 2 **CAN SPILLED OIL BE CHEMICALLY DISPERSED WITH AN APPROVED AND AVAILABLE AGENT ON BOTH THE NCP PRODUCT LIST AND THE STATE OSCA LICENSING LIST?**

A NCP Product List may be found in **Attachment VII**. Updated NCP Product Lists can be accessed via the EPA representative on the RRT (**Attachment XI**), by calling the Emergency Response Division of the U.S. EPA (202-260-2342) or accessing the Internet at http://www2.epa.gov/emergency-response/national-contingency-plan-subpart-j

The State OSCA licensed dispersants may also be found in **Attachment VII,** or by contacting the State OSPR licensing representative, or the State OSPR representative on the RRT (**Attachment XI**).

Decision: Can this oil be dispersed with an approved and available agent?

❒ Yes Go to **Box 3.**
❒ No Go to **Box 1c**

Make a note of the decision in the Dispersant Decision Summary box on the Dispersant Use Flowchart.

Taken in part from Cawthron, 2000

Discussion Note 2.1 **OIL DISPERSIBILITY (Also see Att. II.m for Window of Opportunity)**

Three types of oils are typical of those produced or transported in California offshore waters: a) crude oils produced in California Outer Continental Shelf (OCS) waters; b) oils imported from Alaska and foreign countries into California ports; and c) fuel oils that could be spilled from a variety of marine industrial activities (*e.g*., fuel tanks from ships, cargoes of small tankers). Dispersants only work if the spilled oil has a relatively low viscosity at the time of treatment.

Attachments II.a and II.b show the California platform-produced oils and tankered oils, respectively.

Most oils produced from offshore platforms are heavy, and border on the range of oils that are considered to be difficult or impossible to disperse. The oils transported by tanker include two-three dozen different types of oil (only the most common are listed in **Attachment II.b**). The most important is Alaska North Slope crude, which represents 50% of each annual total. Based on API gravity information, these oils appear to be dispersible when fresh.

- The most important criterion for dispersant use is whether the oil is dispersible.
- The best indication of oil dispersibility is from specific oil weathering and dispersion data from field trials (see **Attachment II.c** for some tested and modeled oils).
- Potential dispersibility can be *estimated* from physical properties of oils, under different oil weathering and spill scenarios (*e.g*., ADIOS, Table 2.1 below). The ADIOS computer database predicts oil dispersion based on physical and chemical properties of spilled oil under specified spill conditions.
- Dispersant use should not be rejected exclusively on the basis of predictive models.

Generally, if:

- Oil is able to spread on the water, it is likely to be dispersible.
- Viscosity is < 2000 cSt, dispersion is probable.
- Viscosity is > 2000 cSt, dispersion is possible.
- Viscosity is > 5000 cSt, dispersion is possible with concentrated dispersant (*e.g*., Corexit 9500).
- Sea temperature is <10º C or below oil pour point, dispersion is unlikely.

Potential dispersion may also be assessed using tables in Attachment II.

Limitations of predicting dispersion:

- Using generic values of viscosity and/or pour point to predict dispersion (*e.g*., ADIOS, **Attachments II.c and II.d** can underestimate the potential for oil to be dispersed.
- Most models are based on limited oil weathering, emulsification or dispersion data, therefore estimated windows of opportunity may be inaccurate.

Table 2.1 ADIOS (AUTOMATED DATA INQUIRY FOR OIL SPILLS) COMPUTER DATABASE

Use the **DISPERSANT ASSESSMENT WORKSHEET** and the NOAA SSC (**Attachment XI**) for the information needed by ADIOS, or use the form below. The NOAA SSC should also be able to assist with ADIOS.

Copies of ADIOS are available from the NOAA website: http://response.restoration.noaa.gov/adios

Oil/product name: _____
Amount spilled: _____ (gal or bbl)
Type of release: Circle one
- ❑ Instantaneous
- ❑ Continuous

Wind speed: _____ (knots)
Wave height: _____ (m)
Water temp.: _____ (ºC)
Water salinity: _____ (ppt)

Important limitations on the use of ADIOS: ADIOS predicts dispersibility based on estimates of oil properties (including emulsification) under different conditions. As emulsification data are scarce, **predicted rates of dispersion may be different than actual rates of dispersion**. ADIOS is intended for use with floating oils only, and does not account for currents, beaching or containment of oil. ADIOS is unreliable for very large or very small spills. It is also unreliable when using very high or very low wind speeds in modeling the spill.

From Cawthron, 2000

BOX 3 ARE OCEANOGRAPHIC AND/OR WEATHER CONDITIONS POTENTIALLY CONDUCIVE TO DISPERSANT USE?

Does the available technical information indicate that the existing oceanographic (*e.g.*, surface current direction and speed, wave and chop height) and weather (*e.g.*, wind direction and speed, visibility, ceiling height) conditions are suitable for a successful dispersant application?

Use the following resources:

- ❒ Information on the DISPERSANT ASSESSMENT WORKSHEET
- ❒ Consultation with the NOAA Scientific Support Coordinator (**Attachment XI**)
- ❒ Information resources and web sites noted in **Attachment XI**
- ❒ Information from aerial overflights
- ❒ Information from ADIOS

Decision: Are ocean and weather conditions potentially suitable for a dispersants application?

❒ Yes Go to **Box 4**.
❒ No Go to **Box 1c**

Make a note of the decision in the Dispersant Decision Summary box on the Dispersant Use Flowchart.

BOX 4 IS THE SPILLED OIL PROPOSED FOR DISPERSANT TREATMENT AT LEAST 3 MILES FROM SHORE, NOT WITHIN NMS BOUNDARIES, NOT WITHIN 3 MILES OF THECA/MEXICO BORDER, NOT BEING USED ON SURFACEOIL SPILLS FOR MORE THAN FIVE DAYS, AND NOT A SUBSEA USE?

A full-page statewide chart indicating the area three nautical miles from shore and the areas within National Marine Sanctuaries (Gulf of the Farallones, Cordell Banks, Monterey, Channel Islands) is in Chart 4.1 below. Regional charts, with pre-approval dispersant zones noted, are in **Attachment I**.

Decision: Is the spilled oil within a Pre-Approval Zone?

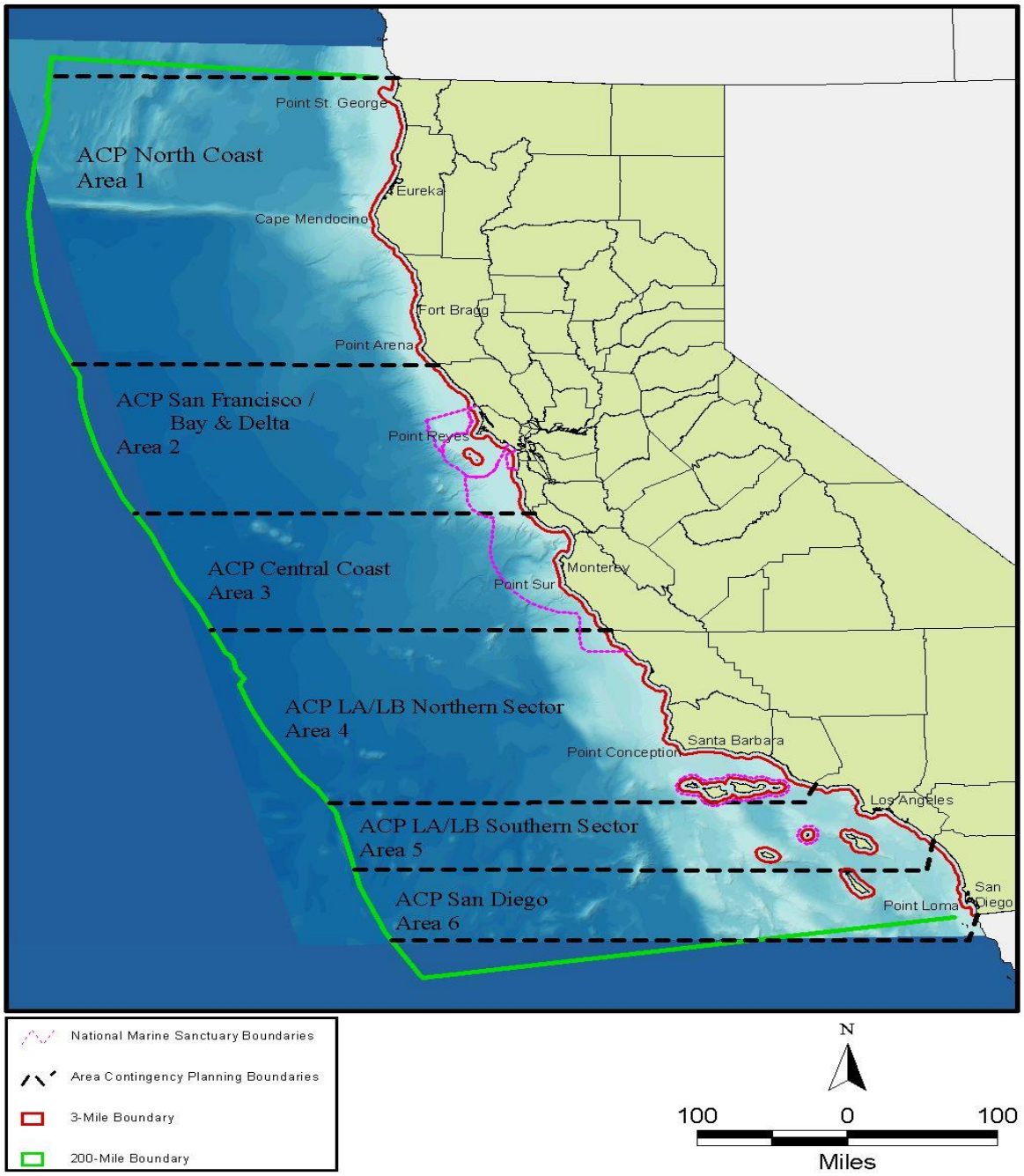
❒ Yes Go to **Box 5**.
❒ No Pre-Approval does not apply. Go to **Box 4a**.

Make a note of the decision in the Dispersant Decision Summary box on the Dispersant Use Flowchart.

BOX 4a	PRE-APPROVAL DOES NOT APPLY; REFER TO RRT APPROVAL PROCESS.
	The request for dispersant use does not qualify under the pre-approval guidelines for the use of dispersants in RRT Regional IX. Contact the OSPR ART Technical Specialist (831-233-0723) or the NOAA SSC (Attachment XI) and begin the dispersant *RRT Expedited Approval Process* **(Enclosure 4600b Section II).**

Chart 4.1

California Marine Waters Pre-Approval Dispersant Zone



BOX 5 CAN DISPERSANT BE APPLIED SAFELY FROM AN APPROPRIATE PLATFORM?

Use the information in the **DISPERSANT ASSESSMENT WORKSHEET** to evaluate which application platform(s) will be most effective, given the following particular considerations:

- The amount of oil spilled;
- The location of the operational area;
- The volume of available dispersants;
- The timeframe in which the required equipment can be on-scene.

Assume for planning purposes that the weather information on the **DISPERSANT ASSESSMENT WORKSHEET** will remain the same during the timeframe in which this decision is operating. At the earliest opportunity, contact the NOAA SSC (**Attachment XI**) for more detailed and updated weather information, but do not delay this decision process for the NOAA SSC weather input. Weather information may also be available from other resources noted in **Attachment XI**. See **Attachments II.g – II. j** f or specific information on dispersant application platforms.

Decision: Is there a safe and appropriate application platform for a dispersant operation?
(See Discussion Note 5.2 below for important safety information)

	Yes	(Type)	No	(Why not appropriate?)
C-130/ADDS Pack	☐		☐	
DC-4	☐		☐	
Other large multi-engine airplane	☐		☐	.
Cessna AT-802	☐		☐	
Other single-engine airplane	☐		☐	
Helicopter	☐		☐	
Work boat	☐		☐	
	Go to **Box 6**		Go to **Box 5a and/or 5b**	

Make a note of the decision in the Dispersant Decision Summary box on the Dispersant Use Flowchart.

Taken in part from Cawthron, 2000 and S.L. Ross, 2002

Discussion Note 5.1 CURRENT LOGISTICS FOR A CALIFORNIA DISPERSANT APPLICATION

Use the information on the **DISPERSANT ASSESSMENT WORKSHEET** to consider the following:

- ❒ Is the selected dispersant available in the quantity needed?
- ❒ Can the estimated "window of opportunity" for getting the dispersant on the oil be met?
- ❒ Can the dispersant and application resources get to the spill scene on time?
- ❒ Will there be enough daylight hours for an effective dispersant application?

Refer to **Attachment II** for more specific regional dispersant resource information.

Discussion Note 5.2 **GENERAL SAFETY ISSUES**

- The FOSC is responsible for ensuring that health and safety requirements are adequately addressed during a response.
- Individuals should not engage in activities that they are not appropriately trained to perform.
- Individuals are expected to adhere to safety procedures appropriate to the conditions they are working under and/or are included in a dispersant-specific Site Safety Plan Annex.
- Vessel/aircraft operators are expected to define appropriate operational limits and safety and maintenance requirements for their craft.
- Vessels and response resources should be properly maintained and undergo proper decontamination procedures.
- Apply dispersants only if there is no significant risk to response personnel (*e.g.*, ignition risk, operational hazards).
- Ensure the appropriate personal protective equipment (PPE) is available.
- Ensure that application aircraft and vessels remain within standard operating limits.
- Each person involved in a response is required to take personal responsibility for his or her safety. The FOSC may appoint a Safety Officer and request development of a specific Site Safety Plan Annex. Key safety aspects to be considered in the plan may include:

  - Physical hazards (*e.g.*, waves, tides, unstable or slippery surfaces)
  - Heavy machinery and equipment
  - Chemical hazards (*e.g.*, oil and dispersant exposure)
  - Atmospheric hazards (*e.g.*, fumes, ignition risks)
  - Confined spaces
  - PPE
  - Noise
  - Fatigue
  - Heat/cold stress
  - Wildlife (bites/stings)
  - Cleanup facilities
  - Medical treatment

HUMAN SAFETY OVERRIDES ALL OTHER CONSIDERATIONS DURING A RESPONSE

From Cawthron, 2000

BOX 5a **DISPERSANT OPERATIONS ON WEATHER STANDBY**

Consult with appropriate RRT IX members (USCG/District 11 Co-Chair, EPA, DOI, DOC and OSPR (See **Attachment XI** for contact information) to notify them that dispersants are being considered, but delayed due to weather.

Decision: Has the weather improved to the point where dispersants can be applied?

❒ Yes Go to **Box 6**
❒ No Continue to **reassess** (until/unless time window for successful application closed) or Go to **Box 5b**

Make a note of the decision in the Dispersant Decision Summary box on the Dispersant Use Flowchart.

BOX 5b **WEATHER UNLIKELY TO IMPROVE OR SUITABLE RESPONSE RESOURCES NOT AVAILABLE**

There will be spill situations where dispersant use may be appropriate but weather conditions and available resources will not allow dispersants to get on the oil within the appropriate weather window. In these cases, dispersant use will need to be abandoned and other response options considered instead.

Go to **Box 1c**

BOX 6 **FOSC CAN USE DISPERSANTS**

DISPERSANTS APPROVED FOR USE BY THE FOSC NEED TO BE APPLIED USING THESE RRT IX GUIDELINES:

- ❒ Pre-approval zones are only in waters no closer than 3 nautical miles from the nearest shoreline, not within 3 mile of the CA/Mexico border, not within a National Marine Sanctuary, and for uses that do not involved subsea application or application at the surface for more than 5 days.
- ❒ Dispersants will not be applied in waters less than 60' deep (although unlikely in the Pre-Approval Zone)
- ❒ Dispersants cannot be applied to any diesel spill, or similar light product (gasoline, jet fuel, kerosene)
- ❒ The SMART controller/observer should be over the spray site before the start of the operation. If possible, a DOI/DOC-approved marine mammal/turtle and pelagic/migratory birds observation specialist (see **Attachment IV)** will accompany the SMART observer. However, the operation will not be delayed for either function.
- ❒ The marine wildlife observer, or the person functioning as that observer, is strongly encouraged to use the Wildlife Observation Report Form and the Wildlife Spotting Protocols (**Attachment VI)**). However, the operation will not be delayed for this function
- ❒ Personnel protective equipment for personnel on-site will conform to the appropriate dispersant's Material Safety Data Sheet (MSDS) (**Attachment X).**
- ❒ Dispersant application aircraft will maintain a minimum 1000-foot horizontal separation from rafting flocks of birds. Caution will be taken to avoid spraying over marine mammals and marine turtles (see **Attachment XI** for resource agency contact information).
- ❒ If the dispersant application platform is a boat, see Discussion Note 8.3.

BOX 6a **INITIATE *PUBLIC COMMUNICATIONS PLAN***

Once a decision to use dispersants is made, it is critical that a public communications plans be implemented (**Attachment V**). The general public as well as stakeholders must be made aware of any decision to use dispersants and a mechanism created for reliable and continuous updates.

An initial press conference should be held which outlines the decision to use dispersants, provides background and scientific information, and addresses any other environmental and safety considerations expressed by the public. Sample press releases are in **Attachment V.a,** with other public meeting and risk communication tips offered throughout **Attachment V**.

A public meeting should be scheduled as soon as possible to provide a mechanism for sharing information and addressing public concerns and fears**. Attachment V.d and V.e** provides guidelines for preparing and conducting a public meeting. Areas that must be adequately addressed during the meeting include:

- Seafood safety concerns posed by dispersants (**Attachment VI**).
- Risk communication (**Attachment V.c and Attachment VI**).
- Results of net environmental benefit analyses, and species of special concern (**Attachment I**).
- Monitoring policies established for the spill (tools used from **Attachment III**).

BOX 6b **IMPLEMENT *SEAFOOD SAFETY PLAN* IF NECESSARY**

Refer to **Attachment VI** for key points to consider regarding seafood tainting, as well as information on accessing NOAA and state resources for assessing seafood safety.

BOX 7 **FOSC SHOULD EVALUATE PRESENT CONDITIONS FOR EXCEPTIONS TO ENVIROMENTAL TRADEOFFS (NEBA)**

This FOSC Checklist applies only to those California offshore waters pre-approved for dispersant use (see **Box 4**). However, dispersant use even in the pre-approval areas must follow certain guidelines (**Box 6)** and may be further limited by federal agencies with responsibility for endangered marine animal management (**Attachment XI**).

Pre-approval dispersant zone recommendations do not presume the absence of sensitive species, other marine species, or impacts to species on the water surface or in the upper water column. It does presume that there will be impacts from the spilled oil, and from dispersant use, to some of those species. However, based on the natural resource information used in the planning stage, it was determined that there could be a net environmental benefit to the use of dispersants.

However, at the time of an actual spill and a decision to use dispersants, real-time information on marine animal presence (**Box 1b** and **Box 7b**), the potential impacts from the spill (**DISPERSANT ASSESSMENT WORKSHEET**), and important supplemental information (**Attachment I** and **Boxes 7a-b**) should all be considered and weighed by the FOSC in making a final decision to use dispersants, probable impacts, and where the net environmental benefits will occur.

The FOSC may use the regional sensitive species and habitat information from **Attachment I**for each major coastal area in which dispersant use may have an impact in order to consider:

- ❒ The type and value of habitat potentially affected.
- ❒ The sensitivity of affected resources to oil, and to different oil response strategies.
- ❒ Natural recovery rates of affected species and habitats.
- ❒ Likely oil persistence and degradation rates with and without dispersant use.
- ❒ Potential oil toxicity on surface water species compared to water column and/or seafloor species.

Dispersant use is generally not appropriate in areas with limited water circulation and flushing, near aquaculture facilities, shellfish beds and fish-spawning grounds, and around seawater intakes.

The central question to be answered in assessing Net Environmental Benefit is:

Will dispersant use significantly reduce the impact of the spilled oil?

- Rapid decisions on use are essential as dispersant must be applied quickly to be effective.
- Decision-makers must consider the various environmental, social, economic, political and cultural factors unique to each spill.
- Tradeoffs will be necessary, as no response is likely to satisfy all parties and protect all resources. The ecological impacts of oil are generally longer-lasting and more persistent than most other impacts.
- Ecological effects will be due primarily to the spilled oil. Dispersant applied at recommended rates is unlikely to cause significant adverse effects, even in multiple applications.
- Oil dispersed into water depths greater than 30 feet (~10 meters) will quickly dilute to levels where acute toxic effects are unlikely.
- The California policy is that dispersants will not be used over water shallower than 60 feet deep.
- Few acute toxic effects have been reported for crude oil dispersed into less than 30’ (10m) water depth if the water is well-flushed.
- Small spills seldom require dispersants use.
- Dispersant use is not recommended for spills of light fuels such as gasoline, jet fuel, kerosene, diesel and light fuel oils.
- Dispersants are not recommended for use on oil sheens.

BOX 7a **REGIONAL SENSITIVE SPECIES AND HABITAT INFORMATION FROM NEBA**

At the time of an actual oil spill or a decision to use chemical dispersants on the oil, marine species are expected to be on the water surface or in the upper water column. Before using chemical dispersants, the FOSC will have decided that there may be a net environmental benefit from dispersant use. Information on regional sensitive species and habitat information from the Net Environmental Benefit Analyses (NEBA), summarized for each region in **Attachment I**, can help the FOSC determine which species might actually be in the area and scouted for by the aerial observers (**Box 1b** and **Box 7c**). This additional information can provide further validation and justification to a FOSC that impacts of chemical dispersant application will be minimized wherever possible, and net environmental benefit maximized.

BOX 7b **MARINE ANIMALS INFORMATION FROM AERIAL WILDLIFE SPOTTERS**

The FOSC can take additional information and advantage from the Aerial Wildlife Observers if they have been deployed (**Box 1b**), or information from the Wildlife Aerial Survey Form (**Attachment IV.c**) available from other aerial spotters, or information from wildlife spotters (**Attachment IV**) available to the FOSC from other data collection forms or notes used by those spotters. Any of these resources will provide real-time or near real-time information on marine seabird and mammal presence, and can guide the FOSC on dispersant application parameters that may minimize impacts to those resources.

BOX 8 **APPLY DISPERSANTS AND INFORM RRT**

- ❑ Use the information on <u>estimated oil spill volume</u> from the DISPERSANT ASSESSMENT WORKSHEET and Discussion Note 8.1 below to:
  - Determine the dispersant application ratio (usually 1:20), and
  - Calculate the volume of dispersant required (**Attachments III.a** and **III.b**).
- ❑ Record the details on the Dispersant Application Summary Form (**Attachment III.d**);
- ❑ Mobilize application team;
- ❑ If not already done, mobilize SMART. Some blank SMART forms are included in **Attachment III** for use by other trained professionals, if appropriate and when approved by the FOSC.
- ❑ Inform RRT (see **Attachment XI** for contact information).

Decision: Dispersants applied?

- ❑ Yes Go to **Box 9**
- ❑ No Explain.

Make a note of the decision in the Dispersant Decision Summary box on the Dispersant Use Flowchart.

Reassess as necessary and appropriate.

BOX 8a **NOTIFICATION OF RRT X OF DISPERSANT USE WITHIN 3 MILES OF THE OR/CA BORDER**

The FOSC can approve the use of dispersants within the 3 miles zone of the California/Oregon border. Once a dispersant use decision is made, the FOSC should contact the RRT X Liaison of the decision as soon as possible and should also endeavor to fax the Dispersant Record of Decision as well. The CG Coordinator to the RRT IX, or the NOAA SSC **(Attachment XI)** can assist with RRT X contact information.

Discussion Note 8.1 **GENERAL APPLICATION INFORMATION**

- The FOSC has final responsibility for operational aspects of dispersant applications.
- Dispersant must only be applied by experienced spray applicators and in accordance with manufacturer instructions.
- The persons applying dispersant are responsible for the calibration and operation of the spraying system, and the safety and maintenance of the application platform.
- Droplet size is the key variable influencing dispersant effectiveness. Undersized droplets (*e.g.*, fog or mist) will be lost through drift and evaporation. Oversized droplets will punch through the oil and be lost in the water column.
- Dispersants pre-diluted in water are less effective than undiluted dispersant.
- Only undiluted concentrate dispersant is applied from aircraft. Dispersant should, where possible, be applied into the wind and parallel with the slick.
- Dispersant should be applied in a methodical and continuous manner to ensure the entire target area is treated.
- Spraying effort should concentrate on the thickest sections, and/or the leading edges, of oil that threaten sensitive areas.
- Thick portions of the slick may require several applications.
- Oil sheen should not be sprayed with dispersant.

Regarding the relationship between Dispersant-to-Oil Ratio (DOR) and the concentration of oil being treated:

- Regardless of DOR ratios suggested by dispersant manufacturers, there are many factors that influence dispersibility (*e.g.*, oil characteristics, degree of weathering, water salinity, sea state) that may make it very difficult to select an appropriate DOR for the conditions faced on the day of a specific spill
- The variability of slick thickness (or oil concentration) is such that one can never really characterize the actual oil concentration for more than a few seconds within the speed and swath constraints of a particular application system.
- With most application systems, one is usually overdosing and under-dosing as the system moves through light, heavy and sometimes "no" oil on the water surface.
- The best estimate of the average oil thickness (or average volume of oil per unit are) must be used.
- Given that precise spray parameters are extremely difficult to achieve, dispersant applicators generally use about 5 gallons of dispersant per acre on their first run.
- Area, volume and thickness can be related with the following expression:

$$\mathbf{10^4 \times Area\ (hectare) \times Thickness\ (mm) = Volume\ (liters)}$$

or

$$\mathbf{Volume\ (liters/Area\ (hectares) = 10^4 \times Thickness\ (mm)}$$

- ► To convert liters/hectare to gallons/acre, multiply by 0.107. To convert liters/hectare to gallons/square kilometer, multiply by 26.42.
- ► These values (in any units) multiplied by the DOR (as a fraction, *e.g.*, 1:5 = 1/5 or .2) will then yield the desired dosage (in those units) for that value of DOR.
- ► Refer to **Attachment III.a** for some pre-calculated values.

From Cawthron, 2000 and Al Allen (Spilltec), 2003 personal communication

Discussion Note 8.2 **AERIAL APPLICATION**

This general aerial application guide is intended simply to highlight key issues. The FOSC will coordinate and oversee operational aspects of aerial dispersant applications.

- Aircraft applications should always include pump-driven spray units.
- Dispersant droplet size should be between 400 and 1000 microns.
- Commercial aircraft spray nozzles generally range between 350 and 700 microns.
- 1000-micron spray nozzles may be needed for use on viscous oils.
- Nozzles should achieve an application rate of 5.3 gallons per acre if using a 1:20 ratio.
- Spray nozzles should be installed to discharge directly aft.
- Underslung buckets on helicopters should be mounted so the pilot can see the ends of the spray booms in flight.
- The altitude of the aircraft should be as low as possible.

From Cawthron, 2000

Discussion Note 8.3 **BOAT APPLICATION**

- Spray booms should be mounted as far forward as possible to prevent oil being moved aside by the bow wave before being sprayed. This then uses the mixing energy of the bow wave to break up the oil.
- Spraying systems should be set so that the spray pattern is flat, striking the water in a line perpendicular to the direction of the boat's travel.
- The fan-shaped sprays from adjacent nozzles should be set as low as possible, overlapping just above the oil/water surface, with the inboard spray striking the hull just above the waterline.

Undiluted dispersants

- Air blast sprayers and modified spray pumps can be used to apply undiluted concentrated dispersants and conventional dispersants.
- Treatment rate is usually constant and determined by nozzle size and spray pressure.
- Calibration and use of an appropriate droplet size is critical to effective applications.

Pre-diluted dispersants

- Concentrated dispersants can be applied after pre-dilution in seawater, but will be less effective.
- The dispersant : water ratio should be equal to, or greater than, 10%
- Applications through ship's fire-fighting equipment are controlled by opening or closing the dispersant supply. Vessel speed is used to control the treatment rate.
- Dual pump systems for dispersant and seawater-supplying spray booms allow the dilution rate to be adjusted.
- Boat speed is the main determinant of dispersant dose rate (reduce boat speed to increase the dose rate).
- Boat speed should be in the order of 5 knots for fresh spills of liquid crude or fuel oil, which assumes that the oil has spread to 0.1 mm thick.
- With reduced boat speeds, the required application rate per acre or km^2 can be maintained by reducing pump speed.

The following ASTM standards apply to systems involving spray arms or booms that extend over the edge of the boat and have fan-type nozzles that spray dispersant in a fixed pattern:

- ASTM F 1413-92: Standard Guide for Oil Spill Dispersant Application Equipment: Boom and Nozzle Systems
- ASTM F-1460-93: Standard Practice for Calibrating Oil Spill Dispersant Application Equipment Boom and Nozzle Systems
- ASTM F 1737-96: Standard Guide for use of Oil Spill Dispersant Application Equipment During Spill Response: Boom and Nozzle Systems.

Boat-based systems using a fire monitor and/or fire nozzle shall avoid a straight and narrow "firestream" flow of dispersant directly into the oil. There are no applicable ASTM standards for these systems at this time (December 2003).

In part from Cawthron, 2000

BOX 9 **ARE THERE INDICATIONS THE DISPERSANT IS EFFECTIVE?**

- ❑ Acquire information from dispersant monitoring team (SMART team or other FOSC-designated monitors).
- ❑ Review dispersant monitoring results after each dispersant application.
- ❑ Determine if chemical dispersion is significantly greater than natural dispersion.
- ❑ Assess whether changing application parameters could make the application more effective.

Decision: Are there indications the dispersant is effective?

- ❑ Yes Go to **Box 10**
- ❑ No See Discussion Note 9.2 and return to **Box 8**, or Go to **Box 12.**

Make a note of the decision in the Dispersant Decision Summary box on the Dispersant Use Flowchart

From Cawthron, 2000

Discussion Note 9.1 ASSESSING DISPERANT EFFECTIVENESS

- Dispersant applications must be monitored to confirm whether or not dispersant use is effective, and to determine the fate and transport of treated oil.
- Dispersant applications should not be delayed simply because monitoring is not in place.
- Visual observation is the minimum level of monitoring. Observations teams may use the forms in **Attachment III**.
- There will be very few instances where a dispersant application is possible but visual monitoring is not.
- Because dispersed oil plumes are often highly irregular in shape and thickness, it can be difficult to accurately estimate dispersant efficiency.
- The appropriate dispersant application dose depends on the oil thickness (see **Attachments III.a** and **III.b** for common dose rates based on oil thickness). Slicks are generally not of uniform thickness, and it is not always possible to distinguish among thicker and thinner portions of the same slick. It is therefore possible to apply too much or too little dispersant to some parts of a slick. Because over- and under-dosing can lead to variations in effectiveness, these variations should be noted.
- On-site monitoring of oil dispersed in the water column should support visual monitoring whenever possible. See **Attachment III** for additional information and forms.
- Decisions to terminate operations due to poor effectiveness should ideally be based on on-site monitoring results.
- A visible coffee-colored cloud in the water column indicates the dispersant is working.
- A milky-white plume in the water column can indicate excessive dispersant application.
- When dispersant is working, oil remaining on the water surface may also change color.
- A difference in the appearance of treated and untreated slicks indicates dispersion is likely.
- Absence of a visible cloud in the water column makes it difficult to determine whether the dispersant is working. When the water is turbid, you may not be able to see a plume. Oil remaining at the surface and sheens can also obscure an ability to see oil dispersing under the slick.
- Successful dispersion can occur with no visible indication of dispersion.
- A subsurface plume may not form instantly once dispersant has been applied. In some cases (*e.g*., emulsified oil) it can take several hours for a plume to form. In other cases, a visible plume may not form, and you may wish to use sampling to learn whether dispersion has occurred.
- Boat wakes may physically part oil, falsely indicating successful dispersion. Mechanically dispersed oil will re-coalesce and float to the surface.
- Dispersants sometimes have a herding effect on oil after initial applications, making a slick appear to be shrinking when, in fact, the dispersant is “pushing” the oil together. The effect results from the surfactants in the dispersant, which causes a horizontal spreading of thin oil films. This can cause parts of a slick to seem to disappear from the sea surface for a short time.

From Cawthron 2000 and NOAA Oil Spill Job Aids

Discussion Note 9.2 WHEN DISPERSANT IS NOT EFFECTIVE

If monitoring shows dispersion does not appear effective, review all aspects of the application and monitoring for possible reasons why. Aspects to consider include:

- Dispersant formulation
- Application ratios (increase or decrease oil: dispersant ratio)
- Application methods
- Monitoring methods
- Interpretation of monitoring results
- Oil weathering
- Weather conditions

From Cawthron, 2000

BOX 10 **IS ONGOING DISPERSANT USE JUSTIFIED AND SAFE?**

All of the following must apply to justify ongoing dispersant use:

- ❑ The spill can be chemically dispersed with an approved and available agent (see **Box 2** and **Attachment VII**);Oceanographic and weather conditions are potentially conducive to dispersant use (see **Box 3** and DISPERSANT ASSESSMENT WORKSHEET);
- ❑ The spilled oil is at least 3 nautical miles from shore, not within the boundaries of a National Marine Sanctuary (see **Box 4**), and not within 3 miles of the CA/Mexico border, not being used at the surface for more than 5 days, and not a subsea use:
- ❑ The dispersant will have a net environmental benefit (see **Box 7a**);
- ❑ The dispersant can be applied safely (see **Box 5**), with suitable weather (**Box 5a**) and available resources (**Box 5b**);
- ❑ There are indications the dispersant continues to be effective (see **Box 9**).

Decision: Continue with dispersant use?

- ❑ Yes Go to **Box 11**
- ❑ No Go to **Box 12**

BOX 11 **CONTINUE TO MONITOR APPLICATION PARAMETERS AND RUN ADDITIONAL DISPERSANT SORTIES AS NECESSARY**

More than one dispersant sortie (run) may be necessary to effectively treat the oil spill. Continue to monitor information on the spill extent, dispersant effectiveness, continued availability of suitable weather "windows" and dispersant application equipment and personnel, and perform addition applications as necessary.

- ❒ Record information from each sortie on the Dispersant Decision Summary.
- ❒ Inform RRT when all runs are completed (fax Dispersant Decision Summary form to RRT contacts in **Attachment IX**).

THERE WILL BE A POINT WHEN DISPERSANTS ARE NO LONGER EFFECTIVE.

BOX 12 **DO NOT USE DISPERSANT**

Pre-approval to use dispersants does not apply if **any** of the following occur:

- ❑ The spill cannot be chemically dispersed with an approved and available agent (see **Box 2** and);Oceanographic and weather conditions are not potentially conducive to dispersant use (see **Box 3** and DISPERSANT ASSESSMENT WORKSHEET);
- ❑ The spilled oil is closer than 3 nautical miles from shore, within the boundaries of a National Marine Sanctuary (see **Box 4**), within 3 miles of the CA/Mexico borders, will be applied surface water oil spill for more than 5 days, or is a subsea use. Approval to use dispersants outside the Pre-Approval Zone, and/or for uses that have not been pre-approved in any zone (surface use for more than 5 days, subsea use) do not fall within the Pre-Approval guidelines, and will instead need to be considered under the RRT Expedited Approval Process (see **Box 4a** and **Attachment 4600b Section II**);
- ❑ The dispersant will not have a net environmental benefit (see **Box 7a**);
- ❑ The dispersant cannot be applied safely (see **Box 5**), with suitable weather (**Box 5a**) or available resources (**Box 5b**);
- ❑ The dispersant is not significantly more effective than natural dispersion or other response options (see **Box 9**).

IF DISPERSANT USE IS CONSIDERED INAPPROPRATE, CONSIDER OTHER RESPONSE OPTIONS.

Go to **Box 1a**.

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ENCLOSURE 4600b

SECTION II: RRT IX EXPEDITED APPROVAL DISPERSANT ZONE

TABLE of CONTENTS

References Cited

Overview

Purpose and authority

This document outlines the Dispersant Use Plan for state and federal marine waters within the Region IX Regional Response Team (RRT) area of operations.

This policy authorizes and provides guidelines to allow the federally pre-designated U. S. Coast Guard (USCG) Federal On-Scene Coordinator (FOSC) and/or the Unified Command to use dispersants in a timely manner to: 1) prevent or substantially reduce a hazard to human life; 2) minimize the adverse environmental impact of the spilled oil; and 3) reduce or eliminate the economic or aesthetic losses of recreational areas. This dispersant use plan will address the use of dispersants for each of two zones. Enclosure 4600a: Section I is for the Dispersant Pre-Approval Zone, and Enclosure 4600b: Section II addresses the RRT Expedited Approval Required Zone.

Subpart J of the National Contingency Plan (NCP) provides that the FOSC, with the concurrence of the EPA representative to the Regional Response Team and the State with jurisdiction over the navigable waters threatened by the oil discharge, and in consultation with the U.S. Department of Commerce (DOC) and U.S. Department of the Interior (DOI) natural resource trustees, when practicable, may authorize the use of dispersants on oil discharges; provided, however, that such dispersants are listed on the NCP Product Schedule. The EPA has been delegated authority to maintain a schedule of chemical countermeasures that may be authorized for oil discharges in accordance with procedures set forth in Section 300.900 of the NCP.

The USCG Eleventh District Commander has pre-designated the three USCG Captains of The Port (COTP) as the FOSCs for oil discharges in their respective COTP zones (as defined in 33 CFR Part 3 and subject to joint response boundary agreements with EPA described in Section 1400 of the three California Area Contingency Plans), and has delegated to each COTP the authority and responsibility for compliance with the Federal Water Pollution Control Act (FWPCA).

The Governor of the State of California has designated the Administrator of the Department of Fish and Wildlife Office of Oil Spill Prevention and Response (CDFW-OSPR) the authority and responsibility for providing approval for the use of dispersants for control of oil spills in or affecting California waters.

The USCG, EPA, DOI, DOC/NOAA, and CDFW-OSPR agree that one of the primary methods of controlling discharged oil shall be the physical removal of the oil by mechanical means. These agencies recognize that in certain instances timely, effective physical containment, collection and removal of the oil may not be possible, and the use of dispersants, alone or in conjunction with other removal methods, may be considered to minimize substantial threat to public health or welfare, or minimize serious environmental damage. Enclosure 4600a and 4600 b establish the policy under which dispersants listed on the NCP Product Schedule may be used in Federal waters off California by FOSCs.

The response planning process

The National Oil and Hazardous Substances Pollution Contingency Plan (National Contingency Plan – NCP) directs the RRTs and Area Committees to address, as part of their planning activities, the desirability of using appropriate dispersants, surface washing agents, surface collecting agents, bioremediation agents, or miscellaneous oil spill control agents listed on the NCP Product Schedule, and the desirability of using appropriate burning agents. Regional Contingency Plans and Area Contingency Plans shall, as appropriate, include applicable authorization plans and address the specific contexts in which such products should and should not be used (40 CFR § 300.910). Additional information on how this plan was directed and developed is included in Attachment VIII.

What is in the California Dispersant Plan (CDP)

In its current form, the CDP includes an updated Federal On-Scene Coordinator (FOSC) checklist, and a series of discussion and decision boxes to facilitate the a FOSC recommendation. To provide the greatest likelihood that this CDP will not only train but serve the Coast Guard regardless of which personnel are in the FOSC position in the future, it includes a number of attached materials that put oil, dispersant, natural resource and response resource information close at hand in one document. The CDP also includes a number of blank forms that can be removed, duplicated as needed, and used in the field during a spill response to provide orderly and timely information to the FOSC as the spill unfolds and a decision whether or not to use dispersants becomes imminent. Other report forms document bird and mammal presence, dispersant application methods, and dispersant effectiveness.

This document is not a lengthy discussion of the relative merits of any response tool, of dispersant or dispersed oil toxicity, or the details of Net Environmental Benefit Analyses (although key points on several of these topics is embedded in the Discussion Notes on the FOSC checklist, or in the appendices). It is not a primer on oil spill response in general, or the Incident Command System. All this information is available from other resources, much of which was considered in developing the zone recommendations and CDP. This CDP instead assumes that an oil spill has occurred and all agency notifications have been made, various response agencies are on scene and using the Incident Command System to structure the response, and that dispersant use is under active consideration by the FOSC. This CDP takes over from there, offering tools to the FOSC to guide that decision.

Enclosure 4600a: Section I of this CDP primarily focuses on the federal offshore waters that have been designated as “pre-approved” for dispersant use. To date, this includes the waters 3 – 200 nautical miles from shore, not within a National Marine Sanctuary, and not within 3 miles of the California-Mexico border. As part of Enclosure 4600b: Section II, this CDP also addresses waters closer than 3 miles from shore, within a National Marine Sanctuary, and within 3 miles of the California-Mexico borders, under the RRT Expedited Approval Process. 4600b: Section II also addresses dispersant uses that are not pre-approved, such as dispersant applications on surface oil spills for more than 5 days (even if in an otherwise Pre-Approved area), or subsea use.

Quick Guide to Forms, Worksheets and Checklists

The CDP is designed primarily to assist the FOSC in making a dispersant use recommendation in the RRT Expedited Approval Zone at the time of an incident. Many forms, worksheets, and checklists are included as a part of the CDP to facilitate information gathering, decision-making and providing supporting documentation, as necessary. These worksheets and forms should assist the FOSC in making dispersant use recommendations and decisions, not hinder the process with unnecessary paperwork.

As a part of the dispersant decision-making process, please use the quick guide to forms, worksheets and checklists outlined below.

1) Dispersant Assessment Worksheet **Not Required by RRT**

This document was designed to assist in the gathering and organization of pertinent information necessary to make a dispersant use decision.

2) RRT Expedited Approval Zone Checklist **Required by RRT**

This checklist was designed to provide an overview of a dispersant decision-making process and to provide a "dispersant decision summary" for the incident, detailing the decisions made. Once this form is completed and the FOSC recommends asking the RRT for their review and approval, the relevant checklist should be emailed or faxed to the RRT as soon as feasible for their review and records.

3) RRT Expedited Approval Zone Record of Decision **Required by RRT**

This form was designed to provide a record of decision regarding the evaluation and authorization of dispersant use, consistent with other approval criteria provided in the "RRT Expedited Approval Zone" dispersant use checklist. The record of decision is to be signed by all members appropriated members of the RRT as soon as feasible so that it can be operationally implemented. (**This form was moved to Attachment XII**).

4) Checklist Documentation (Boxes 1 – 12) **Not Required by RRT**

This is a support tool to evaluate the information required in dispersant use checklist for either zone. This form guides the user through each decision-making point, allowing evaluation of each question that is a part of the dispersant use decision-making process. This form also cross-references the Attachments, as needed, where additional information can be found.

This page provided for spacing purposes

DISPERSANT ASSESSMENT WORKSHEET

(Two pages)

Information gathered to complete this form will facilitate the dispersant RRT approval use determination; complete as much as possible without unadvisedly delaying a dispersant use decision.

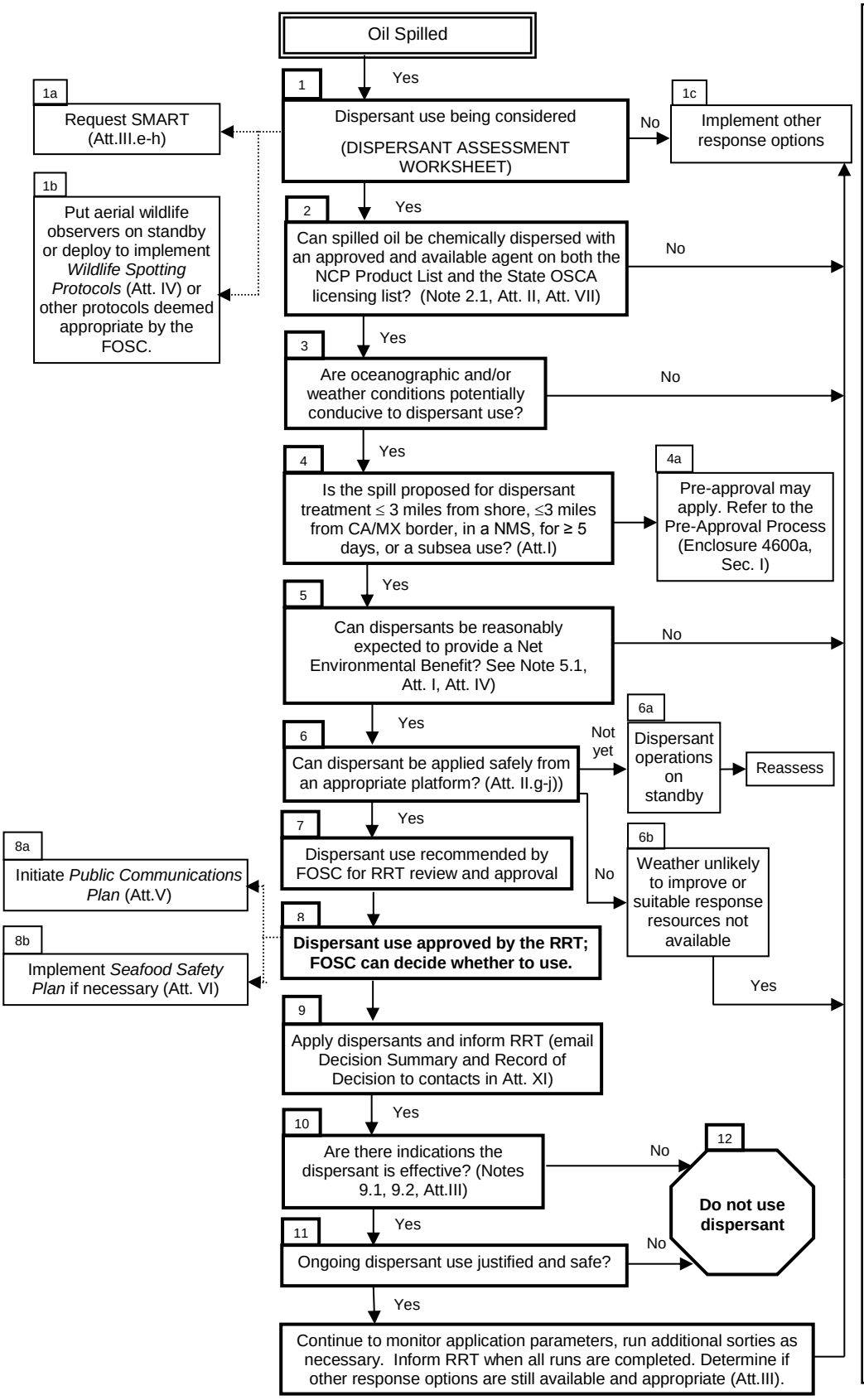
Worksheet completed by (print name): Organization:	Date: Time: Phone: Email:	
Cal-EOC Control #:	NRC Report #	
Federal On-Scene Commander (print name): Agency:	State On-Scene Commander (print name): Agency:	
SPILL INFORMATION		
Incident name:	Responsible party:	
Date of spill (mo/day/yr):	Time of spill (PST, 24-hr clock:	
General location:		
Latitude:	Longitude:	
Spill source and cause:		
Amount spilled (give units):	Oil name:	
Type of release: ☐ Instantaneous ☐ Continuous	API gravity:	Pour point (°F):
Estimated total spill area (width x length):	as ☐ acres ☐ sq. feet ☐ sq. miles ☐ sq. km	
Estimate (%) of actual oil coverage:	Estimate what % of slick is thick oil:	
ON-SCENE WEATHER, CURRENT AND TIDES		
Wind (from) direction:	Wind speed (knots):	
Current (to) direction: (circle) °true/°mag	Current speed (knots):	
Predicted slick direction: (circle) °true/°mag	Predicted slick speed:	
Ceiling height (feet):	Visibility (nautical miles):	
Any other comments:		
Information source:		

POTENTIAL RESOURCE IMPACTS

Using the predictive spill and weather information from the boxes above, ADIOS, the NOAA SSC, other RRT trustee agencies, aerial wildlife observers and regional resource information noted in Attachment 1, briefly describe offshore and coastal areas and resources that could be impacted from this spill.
Offshore waters (3+ miles from a shoreline)
Significant on-water resources:
Significant upper water column (0-30') resources:
Nearshore waters (0-3 miles from a shoreline)
Deeper subtidal water (> 30') and benthic:
Shallow subtidal (0-30') and benthic:
Intertidal (indicate primary type, *e.g*., mud, sand, rock, riprap, mixed):
Supratidal:
Ephemeral lagoon:
Anadromous streams/rivers:
Special habitat types (indicate type, *e.g*., kelp bed, eelgrass bed)
SPECIAL ECONOMIC AREAS
Examples: Mariculture, aquaculture, aquarium seawater intakes, larval retention areas, seasonally intense commercial or recreational fishing:
Dispersant Use Resources at Risk Information source:

ENCLOSURE 4600b: SECTION II

RRT IX EXPEDITED APPROVAL ZONE: DISPERSANT USE FLOWCHART



RRT Expedited Approval Zone

Dispersant Decision Summary

Spill location: _____

FOSC Name: _____

FOSC Signature: _____

Box	Decision	Time:	Date:	Initials:
1	Yes/No			
2	Yes/No			
3	Yes/No			
4	Yes/No			
5	Yes/No			
6	Yes/No			
7	Yes/No			
8	Yes/No			
9	Yes/No			
10	Yes/No			
11	Yes/No			
	Run 2			
	Run 3			
	Run 4			
	Run 5			
	Run 6			
	All done			
12	Do not use			

Supplemental Decisions:

1a	Yes/No			
1b	Yes/No			
6a	Yes/No			
6b	Yes/No			
8a	Yes/No			
8b	Yes/No			

Comments:

ENCLOSURE 4600b: SECTION II

RRT EXPEDITED APPROVAL ZONE DISPERSANT USE CHECKLIST

Complete as appropriate given time and information constraints. Do not allow completing each check-box to inadvisably delay decision-making.

BOX 1 **IS DISPERSANT USE BEING CONSIDERED?**

Dispersant use should be considered if one or more of the situations listed below exist:

- ❒ Oil is likely to significantly impact birds, marine mammals, or other flora and fauna at the water surface
- ❒ Natural dispersion is limited
- ❒ Other response techniques are unlikely to be adequate, effective, or economical
- ❒ The oil could emulsify and form mousse or tar balls
- ❒ Oil is likely to significantly impact shorelines, structures and facilities (*e.g.*, marinas, wharves)
- ❒ Oil is likely to significantly impact economically important resources (*e.g.*, shellfish beds, tourist beaches)
- ❒ Other ……

Decision: Consider dispersant use?

- ❒ Yes Make notifications in **Box 1a**
  Make notifications in **Box 1b**
- ❒ No Go to **Box 1c**

Make a note of the decision in the Dispersant Decision Summary box on the Dispersant Use Flowchart.

From Cawthron, 2000

Discussion Note 1.1 **KEY BENEFITS OF DISPERSANT USE**

- Dispersant use minimizes the effects of an oil spill principally by dispersing oil before it reaches shorelines or
  sensitive areas (*e.g.*, wetlands, estuaries).
- Removing oil from the surface of the water reduces the potential for impacts to birds and marine mammals, and
  limits the action of wind on spill movement.
- Dispersants can prevent oil from sticking to solid surfaces, and enhance natural degradation.
- Dispersants can effectively treat large spills more quickly and inexpensively than most other response methods.
- Dispersants can be effective in rough water and strong currents where mechanical responses are limited.
- Effective dispersant responses can greatly reduce the quantity of oil requiring recovery and disposal.
- Dispersant use is often the only feasible response to spills that exceed mechanical response capabilities.
- Dispersant use does not generally limit other options, except oleophilic mechanical responses.
- Dispersed oil that cannot be mechanically recovered generally poses few significant environmental problems.

From Cawthron, 2000

BOX 1a **REQUEST SMART**

Immediately deploy USCG Strike Team to the spill site if dispersant use is likely. Every attempt should be made by the FOSC and the Strike Team to implement the on-water component of the SMART (Special Monitoring of Advance Response Technologies) monitoring protocols in every dispersant application. **Dispersant application should <u>not</u> be delayed should sea conditions, equipment failure, or other unavoidable circumstances preclude the positioning of SMART monitoring equipment and personnel**. However, at a minimum, Tier 1 (visual) monitoring should occur by trained observers during any dispersant operation approved in accordance with this California Dispersant Plan. Tier 2 (on-site water column monitoring) and Tier 3 (fate and transport of the dispersed oil) SMART monitoring will be deployed as appropriate. Other information on monitoring dispersant effectiveness, including additional SMART background information, tools and report forms, is presented in **Attachments III.d-III.h**

Decision: Deploy SMART?

❒ Yes Use contact information in Attachment XI. **Estimated arrival time**: ……..…….. Go to **Box 1b**.
❒ No Note reason why not deployed:

Make a note of the decision in the Dispersant Decision Summary box on the Dispersant Use Flowchart.

Go to **Box 1b** or **Box 1c** as appropriate.

BOX 1b **PUT AERIAL WILDLIFE OBSERVERS ON STANDBY OR DEPLOY TO IMPLEMENT THE *WILDLIFE SPOTTING PROTOCOLS***

Consider deploying trained wildlife spotters in initial spill overflight aircraft so that they can determine if the presence of marine animals in the spill or dispersant application zones could influence spray pattern decisions by the FOSC. The goal is to minimize over-spray onto unaffected animals. Wildlife spotters should use the forms and procedures given in the *Wildlife Spotting Protocols* (**Attachment IV**). The FOSC will decide how subsequent and systematic wildlife spotting efforts can be safely conducted with the aerial resources available.

Decision: Notify/deploy aerial wildlife spotters?

❒ Yes Use wildlife spotter contact advice in **Attachment IV.a**. Go to **Box 2**.
❒ No Note reason why wildlife spotters not deployed

Make a note of the decision in the Dispersant Decision Summary box on the Dispersant Use Flowchart.

Reconsider under **Box 7**.

BOX 1c **IMPLEMENT OTHER RESPONSE OPTIONS**

Consider all response options to identify which option, or combination of options, is most appropriate.

❒ No action other than monitoring
❒ Mechanical containment and recovery of oil at sea
❒ Clean-up of oil from shorelines
❒ *In-situ* burning

From Cawthron, 2000

BOX 2 **CAN SPILLED OIL BE CHEMICALLY DISPERSED WITH AN APPROVED AND AVAILABLE AGENT ON BOTH THE NCP PRODUCT LIST AND THE STATE OSCA LICENSING LIST?**

A NCP Product List may be found in **Attachment VII**. Updated NCP Product Lists can be accessed via the EPA representative on the RRT (**Attachment XI**), by calling the Emergency Response Division of the U.S. EPA (202-260-2342) or accessing the Internet at http://www2.epa.gov/emergency-response/national-contingency-plan-subpart-j

The State OSCA licensed dispersants may also be found in **Attachment VII,** or by contacting the State OSPR licensing representative, or the State OSPR representative on the RRT (**Attachment XI**).

Decision: Can this oil be dispersed with an approved and available agent?

❒ Yes Go to **Box 3.**
❒ No Go to **Box 1c**

Make a note of the decision in the Dispersant Decision Summary box on the Dispersant Use Flowchart.

Taken in part from Cawthron, 2000

Discussion Note 2.1 **OIL DISPERSIBILITY (Also see Att. II.m for Window of Opportunity)**

Three types of oils are typical of those produced or transported in California offshore waters: a) crude oils produced in California Outer Continental Shelf (OCS) waters; b) oils imported from Alaska and foreign countries into California ports; and c) fuel oils that could be spilled from a variety of marine industrial activities (*e.g*., fuel tanks from ships, cargoes of small tankers). Dispersants only work if the spilled oil has a relatively low viscosity at the time of treatment.

Attachments II.a and II.b show the California platform-produced oils and tankered oils, respectively.

Most oils produced from offshore platforms are heavy, and border on the range of oils that are considered to be difficult or impossible to disperse. The oils transported by tanker include two-three dozen different types of oil (only the most common are listed in **Attachment II.b**). The most important is Alaska North Slope crude, which represents 50% of each annual total. Based on API gravity information, these oils appear to be dispersible when fresh.

- The most important criterion for dispersant use is whether the oil is dispersible.
- The best indication of oil dispersibility is from specific oil weathering and dispersion data from field trials (see **Attachment II.c** for some tested and modeled oils).
- Potential dispersibility can be *estimated* from physical properties of oils, under different oil weathering and spill scenarios (*e.g*., ADIOS, Table 2.1 below). The ADIOS computer database predicts oil dispersion based on physical and chemical properties of spilled oil under specified spill conditions.
- Dispersant use should not be rejected exclusively on the basis of predictive models.

Generally, if:

- Oil is able to spread on the water, it is likely to be dispersible.
- Viscosity is < 2000 cSt, dispersion is probable.
- Viscosity is > 2000 cSt, dispersion is possible.
- Viscosity is > 5000 cSt, dispersion is possible with concentrated dispersant (*e.g*., Corexit 9500).
- Sea temperature is <10º C or below oil pour point, dispersion is unlikely.

Potential dispersion may also be assessed using tables in Attachment II.

Limitations of predicting dispersion:

- Using generic values of viscosity and/or pour point to predict dispersion (*e.g*., ADIOS, **Attachments II.c and II.d** can underestimate the potential for oil to be dispersed.
- Most models are based on limited oil weathering, emulsification or dispersion data, therefore estimated windows of opportunity may be inaccurate.

Table 2.1 ADIOS (AUTOMATED DATA INQUIRY FOR OIL SPILLS) COMPUTER DATABASE

Use the **DISPERSANT ASSESSMENT WORKSHEET** and the NOAA SSC (**Attachment XI**) for the information needed by ADIOS, or use the form below. The NOAA SSC should also be able to assist with ADIOS.

Copies of ADIOS are available from the NOAA website: http://response.restoration.noaa.gov/adios

Oil/product name: _____
Amount spilled: _____ (gal or bbl)
Type of release: Circle one
- ❑ Instantaneous
- ❑ Continuous

Wind speed: _____ (knots)
Wave height: _____ (m)
Water temp.: _____ (ºC)
Water salinity: _____ (ppt)

Important limitations on the use of ADIOS: ADIOS predicts dispersibility based on estimates of oil properties (including emulsification) under different conditions. As emulsification data are scarce, **predicted rates of dispersion may be different than actual rates of dispersion**. ADIOS is intended for use with floating oils only, and does not account for currents, beaching or containment of oil. ADIOS is unreliable for very large or very small spills. It is also unreliable when using very high or very low wind speeds in modeling the spill.

From Cawthron, 2000

BOX 3 ARE OCEANOGRAPHIC AND/OR WEATHER CONDITIONS POTENTIALLY CONDUCIVE TO DISPERSANT USE?

Does the available technical information indicate that the existing oceanographic (*e.g.*, surface current direction and speed, wave and chop height) and weather (*e.g.*, wind direction and speed, visibility, ceiling height) conditions are suitable for a successful dispersant application?

Use the following resources:

- ❒ Information on the DISPERSANT ASSESSMENT WORKSHEET
- ❒ Consultation with the NOAA Scientific Support Coordinator (**Attachment XI**)
- ❒ Information resources and web sites noted in **Attachment XI**
- ❒ Information from aerial overflights
- ❒ Information from ADIOS

Decision: Are ocean and weather conditions potentially suitable for a dispersants application?

❒ Yes Go to **Box 4**.
❒ No Go to **Box 1c**

Make a note of the decision in the Dispersant Decision Summary box on the Dispersant Use Flowchart.

BOX 4 IS THE SPILLED OIL WITHIN 3 MILES OF SHORE, WITHIN A NMS, WITHIN 3 MILES OF THECA/MEXICO BORDER, BEING USED ON SURFACEOILSPILLS FOR LESS THAN FIVE DAYS, OR A SUBSEA USE?

A full-page statewide chart indicating the area three nautical miles from shore and the areas within National Marine Sanctuaries (Gulf of the Farallones, Cordell Banks, Monterey, Channel Islands) is in Chart 4.1 below. Regional charts, with dispersant zones noted, are in **Attachment I**.

Decision: Is the spilled oil within the RRT IX Expedited Approval Zone?

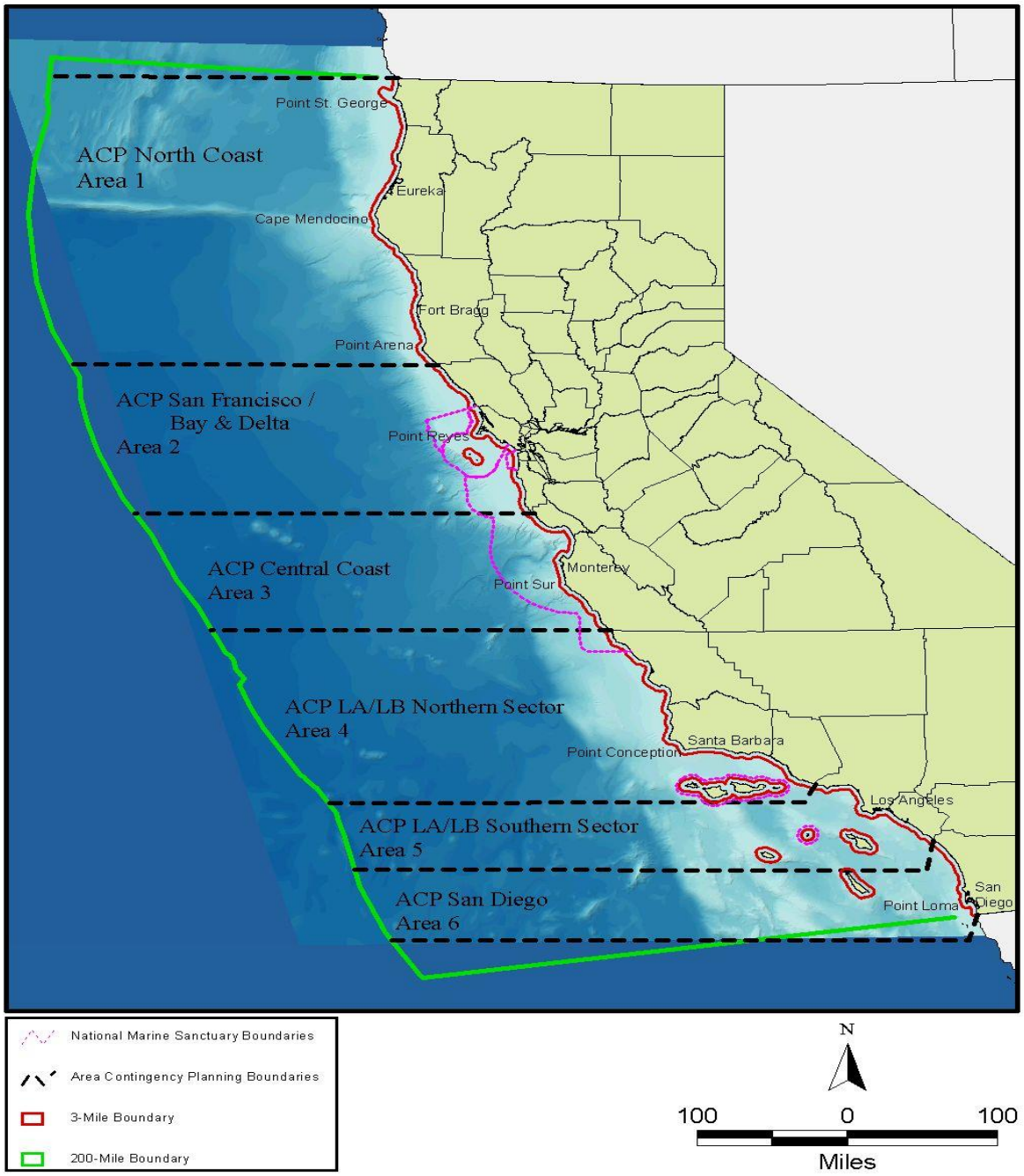
❒ Yes Go to **Box 5**.
❒ No Pre-Approval may apply. Go to **Box 4a**.

Make a note of the decision in the Dispersant Decision Summary box on the Dispersant Use Flowchart.

BOX 4a	PRE-APPROVAL MAY APPLY; REFER TO THE PRE-APPROVAL PROCESS.
	The request for dispersant use may not require RRT IX Expedited Approval. Review the Pre-Approval guidelines and begin the pre-approval process if appropriate (see **ENCLOSURE 4600a: Section I**) .

Chart 4.1

California Marine Waters Pre-Approval Dispersant Zone



BOX 5 CAN DISPERSANT BE REASONABLY EXPECTED TO HAVE A NET ENVIRONMENTAL BENEFIT?

Use the regional sensitive species and habitat information from the Net Environmental Benefit Analyses for each major coastal area in which dispersant use may have an impact.

Consider:

- ❒ The type and value of habitat potentially affected.
- ❒ The sensitivity of affected resources to oil, and to different oil response strategies.
- ❒ Natural recovery rates of affected species and habitats.
- ❒ Likely oil persistence and degradation rates with and without dispersant use.
- ❒ Potential oil toxicity on surface water species compared to water column and/or seafloor species.

Decision: Will the dispersant use have a net environmental benefit?

- ❒ Yes Go to **Box 6**.
- ❒ No Go to **Box 1c**.

Make a note of the decision in the Dispersant Decision Summary box on the Dispersant Use Flowchart.

Discussion Note 5.1 ASSESSING NET ENVIRONMENTAL BENEFIT

The central question to be answered in assessing Net Environmental Benefit is:

Will dispersant use significantly reduce the impact of the spilled oil?

- Rapid decisions on use are essential as dispersant must be applied quickly to be effective.
- Decision-makers must consider the various environmental, social, economic, political and cultural factors unique to each spill.
- Tradeoffs will be necessary, as no response is likely to satisfy all parties and protect all resources. The ecological impacts of oil are generally longer-lasting and more persistent than most other impacts.
- Ecological effects will be due primarily to the spilled oil. Dispersant applied at recommended rates is unlikely to cause significant adverse effects, even in multiple applications.
- Oil dispersed into water depths greater than 30 feet (~10 meters) will quickly dilute to levels where acute toxic effects are unlikely.
- The California policy is that dispersants will not be used over water shallower than 60 feet deep.
- Few acute toxic effects have been reported for crude oil dispersed into less than 30' (10m) water depth if the water is well-flushed.
- Small spills seldom require dispersants use.
- Dispersant use is not recommended for spills of light fuels such as gasoline, jet fuel, kerosene, diesel and light fuel oils.
- Dispersants are not recommended for use on oil sheens.
- Dispersant use is generally not appropriate in areas with limited water circulation and flushing, near aquaculture facilities, shellfish beds and fish-spawning grounds, and around seawater intakes.

BOX 6 **CAN DISPERSANT BE APPLIED SAFELY FROM AN APPROPRIATE PLATFORM?**

Use the information in the **DISPERSANT ASSESSMENT WORKSHEET** to evaluate which application platform(s) will be most effective, given the following particular considerations:

- The amount of oil spilled;
- The location of the operational area;
- The volume of available dispersants;
- The timeframe in which the required equipment can be on-scene.

Assume for planning purposes that the weather information on the **DISPERSANT ASSESSMENT WORKSHEET** will remain the same during the timeframe in which this decision is operating. At the earliest opportunity, contact the NOAA SSC (**Attachment XI**) for more detailed and updated weather information, but do not delay this decision process for the NOAA SSC weather input. Weather information may also be available from other resources noted in **Attachment XI**. See **Attachments II.g – II. j** f or specific information on dispersant application platforms.

Decision: Is there a safe and appropriate application platform for a dispersant operation?
(See Discussion Note 5.2 below for important safety information)

	Yes (Type)	No (Why not appropriate?)
C-130/ADDS Pack	☐	☐
DC-4	☐	☐
Other large multi-engine airplane	☐	☐ .
Cessna AT-802	☐	☐
Other single-engine airplane	☐	☐
Helicopter	☐	☐
Work boat	☐	☐
	Go to **Box 6**	Go to **Box 5a and/or 5b**

Make a note of the decision in the Dispersant Decision Summary box on the Dispersant Use Flowchart.

Taken in part from Cawthron, 2000 and S.L. Ross, 2002

Discussion Note 6.1 **CURRENT LOGISTICS FOR A CALIFORNIA DISPERSANT APPLICATION**

Use the information on the **DISPERSANT ASSESSMENT WORKSHEET** to consider the following:

- ❒ Is the selected dispersant available in the quantity needed?
- ❒ Can the estimated "window of opportunity" for getting the dispersant on the oil be met?
- ❒ Can the dispersant and application resources get to the spill scene on time?
- ❒ Will there be enough daylight hours for an effective dispersant application?

Refer to **Attachment II** for more specific regional dispersant resource information.

Discussion Note 6.2 **GENERAL SAFETY ISSUES**

- The FOSC is responsible for ensuring that health and safety requirements are adequately addressed during a response.
- Individuals should not engage in activities that they are not appropriately trained to perform.
- Individuals are expected to adhere to safety procedures appropriate to the conditions they are working under and/or are included in a dispersant-specific Site Safety Plan Annex.
- Vessel/aircraft operators are expected to define appropriate operational limits and safety and maintenance requirements for their craft.
- Vessels and response resources should be properly maintained and undergo proper decontamination procedures.
- Apply dispersants only if there is no significant risk to response personnel (*e.g.*, ignition risk, operational hazards).
- Ensure the appropriate personal protective equipment (PPE) is available.
- Ensure that application aircraft and vessels remain within standard operating limits.
- Each person involved in a response is required to take personal responsibility for his or her safety. The FOSC may appoint a Safety Officer and request development of a specific Site Safety Plan Annex. Key safety aspects to be considered in the plan may include:

    - Physical hazards (*e.g.*, waves, tides, unstable or slippery surfaces)
    - Heavy machinery and equipment
    - Chemical hazards (*e.g.*, oil and dispersant exposure)
    - Atmospheric hazards (*e.g.*, fumes, ignition risks)
    - Confined spaces
    - PPE
    - Noise
    - Fatigue
    - Heat/cold stress
    - Wildlife (bites/stings)
    - Cleanup facilities
    - Medical treatment

HUMAN SAFETY OVERRIDES ALL OTHER CONSIDERATIONS DURING A RESPONSE

From Cawthron, 2000

BOX 6a **DISPERSANT OPERATIONS ON WEATHER STANDBY**

Consult with appropriate RRT IX members (USCG/District 11 Co-Chair, EPA, DOI, DOC and OSPR (See **Attachment XI** for contact information) to notify them that dispersants are being considered, but delayed due to weather.

Decision: Has the weather improved to the point where dispersants can be applied?

❒ Yes Go to **Box 6**
❒ No Continue to **reassess** (until/unless time window for successful application closed) or Go to **Box 5b**

Make a note of the decision in the Dispersant Decision Summary box on the Dispersant Use Flowchart.

BOX 6b **WEATHER UNLIKELY TO IMPROVE OR SUITABLE RESPONSE RESOURCES NOT AVAILABLE**

There will be spill situations where dispersant use may be appropriate but weather conditions and available resources will not allow dispersants to get on the oil within the appropriate weather window. In these cases, dispersant use will need to be abandoned and other response options considered instead.

Go to **Box 1c**

BOX 7 DISPERSANT USE RECOMMENDATION FORWARDED BY THE FOSC TO THE RRT FOR REVIEW AND APPROVAL

Once the FOSC has completed as much as possible of the DISPERSANT ASSESSMENT WORKSHEET and the DISPERSANT USE CHECKLIST and completed the dispersant decision summary, the FOSC will forward a request, along with any other requested data, to the RRT via a phone conference. Based on the information provided, the RRT will provide an approval/disapproval decision for dispersant use within 2 hours of the request.

A dispersant use approval will be made with the concurrence of the U.S. Environmental Protection Agency and and the State of California, as appropriate, and in consultation with the U.S. Department of Commerce and U.S. Department of the Interior natural resource trustees.

BOX 8 DISPERSANT USE APPROVED BY THE RRT

DISPERSANTS APPROVED FOR USE BY THE FOSC NEED TO BE APPLIED USING THESE RRT IX GUIDELINES AS WELL AS ANY CASE-SPECIFIC GUIDELINES ISSUED BY THE RRT AS PART OF THE APPROVAL:

- ❒ The SMART controller/observer should be over the spray site before the start of the operation. If possible, a DOI/DOC-approved marine mammal/turtle and pelagic/migratory birds observation specialist will accompany the SMART observer, but in any event, operations will not be delayed for these individuals.
- ❒ Dispersants cannot be applied to any diesel spill in the San Diego Area Contingency Plan area.
- ❒ Personnel protective equipment for personnel on-site will conform to the appropriate dispersant's Material Safety Data Sheet (MSDS).
- ❒ Dispersant application aircraft will maintain a minimum 1000-foot horizontal separation from rafting flocks of birds. Caution will be taken to avoid spraying over marine mammals and marine turtles (see **Attachment XI** for resource agency contact information).
- ❒ If the dispersant application platform is a boat:
  - The following ASTM standards apply to systems involving spray arms or booms that extend over the edge of the boat and have fan-type nozzles that spray dispersant in a fixed pattern:
    - ASTM F 1413-92: Standard Guide for Oil Spill Dispersant Application Equipment: Boom and Nozzle Systems
    - ASTM F-1460-93: Standard Practice for Calibrating Oil Spill Dispersant Application Equipment Boom and Nozzle Systems
    - ASTM F 1737-96: Standard Guide for use of Oil Spill Dispersant Application Equipment During Spill Response: Boom and Nozzle Systems.
  - Boat-based systems using a fire monitor and/or fire nozzle shall avoid a straight and narrow "firestream" flow of dispersant directly into the oil. There are no applicable ASTM standards for these systems at this time (December 2003).

BOX 8a **INITIATE *PUBLIC COMMUNICATIONS PLAN***

Once a decision to use dispersants is made, it is critical that a public communications plans be implemented (**Attachment V**). The general public as well as stakeholders must be made aware of any decision to use dispersants and a mechanism created for reliable and continuous updates.

An initial press conference should be held which outlines the decision to use dispersants, provides background and scientific information, and addresses any other environmental and safety considerations expressed by the public. Sample press releases are in **Attachment V.a,** with other public meeting and risk communication tips offered throughout **Attachment V**.

A public meeting should be scheduled as soon as possible to provide a mechanism for sharing information and addressing public concerns and fears**. Attachment V.d and V.e** provides guidelines for preparing and conducting a public meeting. Areas that must be adequately addressed during the meeting include:

- Seafood safety concerns posed by dispersants (**Attachment VI**).
- Risk communication (**Attachment V.c and Attachment VI**).
- Results of net environmental benefit analyses, and species of special concern (**Attachment I**).
- Monitoring policies established for the spill (tools used from **Attachment III**).

BOX 8b **IMPLEMENT *SEAFOOD SAFETY PLAN* IF NECESSARY**

Refer to **Attachment VI** for key points to consider regarding seafood tainting, as well as information on accessing NOAA and state resources for assessing seafood safety.

BOX 9 **APPLY DISPERSANTS AND INFORM RRT**

- ❑ Use the information on <u>estimated oil spill volume</u> from the DISPERSANT ASSESSMENT WORKSHEET and Discussion Note 8.1 below to:
  - Determine the dispersant application ratio (usually 1:20), and
  - Calculate the volume of dispersant required (**Attachments III.a** and **III.b**).
- ❑ Record the details on the Dispersant Application Summary Form (**Attachment III.d**);
- ❑ Mobilize application team;
- ❑ If not already done, mobilize SMART. Some blank SMART forms are included in **Attachment III** for use by other trained professionals, if appropriate and when approved by the FOSC.
- ❑ Inform RRT (see **Attachment XI** for contact information).

Decision: Dispersants applied?

- ❑ Yes Go to **Box 9**
- ❑ No Explain.

Make a note of the decision in the Dispersant Decision Summary box on the Dispersant Use Flowchart.

Reassess as necessary and appropriate.

Discussion Note 9.1 **GENERAL APPLICATION INFORMATION**

- The FOSC has final responsibility for operational aspects of dispersant applications.
- Dispersant must only be applied by experienced spray applicators and in accordance with manufacturer instructions.
- The persons applying dispersant are responsible for the calibration and operation of the spraying system, and the safety and maintenance of the application platform.
- Droplet size is the key variable influencing dispersant effectiveness. Undersized droplets (*e.g*., fog or mist) will be lost through drift and evaporation. Oversized droplets will punch through the oil and be lost in the water column.
- Dispersants pre-diluted in water are less effective than undiluted dispersant.
- Only undiluted concentrate dispersant is applied from aircraft. Dispersant should, where possible, be applied into the wind and parallel with the slick.
- Dispersant should be applied in a methodical and continuous manner to ensure the entire target area is treated.
- Spraying effort should concentrate on the thickest sections, and/or the leading edges, of oil that threaten sensitive areas.
- Thick portions of the slick may require several applications.
- Oil sheen should not be sprayed with dispersant.

Regarding the relationship between Dispersant-to-Oil Ratio (DOR) and the concentration of oil being treated:

- Regardless of DOR ratios suggested by dispersant manufacturers, there are many factors that influence dispersibility (*e.g*., oil characteristics, degree of weathering, water salinity, sea state) that may make it very difficult to select an appropriate DOR for the conditions faced on the day of a specific spill
- The variability of slick thickness (or oil concentration) is such that one can never really characterize the actual oil concentration for more than a few seconds within the speed and swath constraints of a particular application system.
- With most application systems, one is usually overdosing and under-dosing as the system moves through light, heavy and sometimes “no” oil on the water surface.
- The best estimate of the average oil thickness (or average volume of oil per unit are) must be used.
- Given that precise spray parameters are extremely difficult to achieve, dispersant applicators generally use about 5 gallons of dispersant per acre on their first run.
- Area, volume and thickness can be related with the following expression:

$$\mathbf{10^4 \times Area\ (hectare) \times Thickness\ (mm) = Volume\ (liters)}$$

or

$$\mathbf{Volume\ (liters/Area\ (hectares) = 10^4 \times Thickness\ (mm)}$$

► To convert liters/hectare to gallons/acre, multiply by 0.107. To convert liters/hectare to gallons/square kilometer, multiply by 26.42.
► These values (in any units) multiplied by the DOR (as a fraction, *e.g*., 1:5 = 1/5 or .2) will then yield the desired dosage (in those units) for that value of DOR.
► Refer to **Attachment III.a** for some pre-calculated values.

From Cawthron, 2000 and Al Allen (Spilltec), 2003 personal communication

Discussion Note 9.2 **AERIAL APPLICATION**

This general aerial application guide is intended simply to highlight key issues. The FOSC will coordinate and oversee operational aspects of aerial dispersant applications.

- Aircraft applications should always include pump-driven spray units.
- Dispersant droplet size should be between 400 and 1000 microns.
- Commercial aircraft spray nozzles generally range between 350 and 700 microns.
- 1000-micron spray nozzles may be needed for use on viscous oils.
- Nozzles should achieve an application rate of 5.3 gallons per acre if using a 1:20 ratio.
- Spray nozzles should be installed to discharge directly aft.
- Underslung buckets on helicopters should be mounted so the pilot can see the ends of the spray booms in flight.
- The altitude of the aircraft should be as low as possible.

From Cawthron, 2000

Discussion Note 9.3 **BOAT APPLICATION**

- Spray booms should be mounted as far forward as possible to prevent oil being moved aside by the bow wave before being sprayed. This then uses the mixing energy of the bow wave to break up the oil.
- Spraying systems should be set so that the spray pattern is flat, striking the water in a line perpendicular to the direction of the boat's travel.
- The fan-shaped sprays from adjacent nozzles should be set as low as possible, overlapping just above the oil/water surface, with the inboard spray striking the hull just above the waterline.

Undiluted dispersants

- Air blast sprayers and modified spray pumps can be used to apply undiluted concentrated dispersants and conventional dispersants.
- Treatment rate is usually constant and determined by nozzle size and spray pressure.
- Calibration and use of an appropriate droplet size is critical to effective applications.

Pre-diluted dispersants

- Concentrated dispersants can be applied after pre-dilution in seawater, but will be less effective.
- The dispersant : water ratio should be equal to, or greater than, 10%
- Applications through ship's fire-fighting equipment are controlled by opening or closing the dispersant supply. Vessel speed is used to control the treatment rate.
- Dual pump systems for dispersant and seawater-supplying spray booms allow the dilution rate to be adjusted.
- Boat speed is the main determinant of dispersant dose rate (reduce boat speed to increase the dose rate).
- Boat speed should be in the order of 5 knots for fresh spills of liquid crude or fuel oil, which assumes that the oil has spread to 0.1 mm thick.
- With reduced boat speeds, the required application rate per acre or km^2 can be maintained by reducing pump speed.

The following ASTM standards apply to systems involving spray arms or booms that extend over the edge of the boat and have fan-type nozzles that spray dispersant in a fixed pattern:

- ASTM F 1413-92: Standard Guide for Oil Spill Dispersant Application Equipment: Boom and Nozzle Systems
- ASTM F-1460-93: Standard Practice for Calibrating Oil Spill Dispersant Application Equipment Boom and Nozzle Systems
- ASTM F 1737-96: Standard Guide for use of Oil Spill Dispersant Application Equipment During Spill Response: Boom and Nozzle Systems.

Boat-based systems using a fire monitor and/or fire nozzle shall avoid a straight and narrow "firestream" flow of dispersant directly into the oil. There are no applicable ASTM standards for these systems at this time (December 2003).

In part from Cawthron, 2000

BOX 10 **ARE THERE INDICATIONS THE DISPERSANT IS EFFECTIVE?**

- ❑ Acquire information from dispersant monitoring team (SMART team or other FOSC-designated monitors).
- ❑ Review dispersant monitoring results after each dispersant application.
- ❑ Determine if chemical dispersion is significantly greater than natural dispersion.
- ❑ Assess whether changing application parameters could make the application more effective.

Decision: Are there indications the dispersant is effective?

- ❑ Yes Go to **Box 10**
- ❑ No See Discussion Note 9.2 and return to **Box 8**, or Go to **Box 12.**

Make a note of the decision in the Dispersant Decision Summary box on the Dispersant Use Flowchart

From Cawthron, 2000

Discussion Note 10.1 ASSESSING DISPERANT EFFECTIVENESS

- Dispersant applications must be monitored to confirm whether or not dispersant use is effective, and to determine the fate and transport of treated oil.
- Dispersant applications should not be delayed simply because monitoring is not in place.
- Visual observation is the minimum level of monitoring. Observations teams may use the forms in **Attachment III**.
- There will be very few instances where a dispersant application is possible but visual monitoring is not.
- Because dispersed oil plumes are often highly irregular in shape and thickness, it can be difficult to accurately estimate dispersant efficiency.
- The appropriate dispersant application dose depends on the oil thickness (see **Attachments III.a** and **III.b** for common dose rates based on oil thickness). Slicks are generally not of uniform thickness, and it is not always possible to distinguish among thicker and thinner portions of the same slick. It is therefore possible to apply too much or too little dispersant to some parts of a slick. Because over- and under-dosing can lead to variations in effectiveness, these variations should be noted.
- On-site monitoring of oil dispersed in the water column should support visual monitoring whenever possible. See **Attachment III** for additional information and forms.
- Decisions to terminate operations due to poor effectiveness should ideally be based on on-site monitoring results.
- A visible coffee-colored cloud in the water column indicates the dispersant is working.
- A milky-white plume in the water column can indicate excessive dispersant application.
- When dispersant is working, oil remaining on the water surface may also change color.
- A difference in the appearance of treated and untreated slicks indicates dispersion is likely.
- Absence of a visible cloud in the water column makes it difficult to determine whether the dispersant is working. When the water is turbid, you may not be able to see a plume. Oil remaining at the surface and sheens can also obscure an ability to see oil dispersing under the slick.
- Successful dispersion can occur with no visible indication of dispersion.
- A subsurface plume may not form instantly once dispersant has been applied. In some cases (*e.g*., emulsified oil) it can take several hours for a plume to form. In other cases, a visible plume may not form, and you may wish to use sampling to learn whether dispersion has occurred.
- Boat wakes may physically part oil, falsely indicating successful dispersion. Mechanically dispersed oil will re-coalesce and float to the surface.
- Dispersants sometimes have a herding effect on oil after initial applications, making a slick appear to be shrinking when, in fact, the dispersant is “pushing” the oil together. The effect results from the surfactants in the dispersant, which causes a horizontal spreading of thin oil films. This can cause parts of a slick to seem to disappear from the sea surface for a short time.

From Cawthron 2000 and NOAA Oil Spill Job Aids

Discussion Note 10.2 WHEN DISPERSANT IS NOT EFFECTIVE

If monitoring shows dispersion does not appear effective, review all aspects of the application and monitoring for possible reasons why. Aspects to consider include:

- Dispersant formulation
- Application ratios (increase or decrease oil: dispersant ratio)
- Application methods
- Monitoring methods
- Interpretation of monitoring results
- Oil weathering
- Weather conditions

From Cawthron, 2000

BOX 11 **IS ONGOING DISPERSANT USE JUSTIFIED AND SAFE?**

All of the following must apply to justify ongoing dispersant use:

- ❑ The spill can be chemically dispersed with an approved and available agent (see **Box 2** and **Attachment VII**);Oceanographic and weather conditions are potentially conducive to dispersant use (see **Box 3** and DISPERSANT ASSESSMENT WORKSHEET);
- ❑ The spilled oil is at least 3 nautical miles from shore, not within the boundaries of a National Marine Sanctuary (see **Box 4**), and not within 3 miles of the CA/Mexico border, not being used at the surface for more than 5 days, and not a subsea use:
- ❑ The dispersant will have a net environmental benefit (see **Box 7a**);
- ❑ The dispersant can be applied safely (see **Box 5**), with suitable weather (**Box 5a**) and available resources (**Box 5b**);
- ❑ There are indications the dispersant continues to be effective (see **Box 9**).

Decision: Continue with dispersant use?

- ❑ Yes Go to **Box 11**
- ❑ No Go to **Box 12**

CONTINUE TO MONITOR APPLICATION PARAMETERS AND RUN ADDITIONAL DISPERSANT SORTIES AS NECESSARY

More than one dispersant sortie (run) may be necessary to effectively treat the oil spill. Continue to monitor information on the spill extent, dispersant effectiveness, continued availability of suitable weather "windows" and dispersant application equipment and personnel, and perform addition applications as necessary.

- ❒ Record information from each sortie on the Dispersant Decision Summary.
- ❒ Inform RRT when all runs are completed (fax Dispersant Decision Summary form to RRT contacts in **Attachment IX**).

THERE WILL BE A POINT WHEN DISPERSANTS ARE NO LONGER EFFECTIVE.

BOX 12 **DO NOT USE DISPERSANT**

Pre-approval to use dispersants does not apply if **any** of the following occur:

- ❑ The spill cannot be chemically dispersed with an approved and available agent (see **Box 2** and);Oceanographic and weather conditions are not potentially conducive to dispersant use (see **Box 3** and DISPERSANT ASSESSMENT WORKSHEET);
- ❑ The spilled oil is closer than 3 nautical miles from shore, within the boundaries of a National Marine Sanctuary (see **Box 4**), within 3 miles of the CA/Mexico borders, will be applied surface water oil spill for more than 5 days, or is a subsea use. Approval to use dispersants outside the Pre-Approval Zone, and/or for uses that have not been pre-approved in any zone (surface use for more than 5 days, subsea use) do not fall within the Pre-Approval guidelines, and will instead need to be considered under the RRT Expedited Approval Process (see **Box 4a** and **Attachment 4600b Section II**);
- ❑ The dispersant will not have a net environmental benefit (see **Box 7a**);
- ❑ The dispersant cannot be applied safely (see **Box 5**), with suitable weather (**Box 5a**) or available resources (**Box 5b**);
- ❑ The dispersant is not significantly more effective than natural dispersion or other response options (see **Box 9**).

IF DISPERSANT USE IS CONSIDERED INAPPROPRATE, CONSIDER OTHER RESPONSE OPTIONS.

Go to **Box 1a**.

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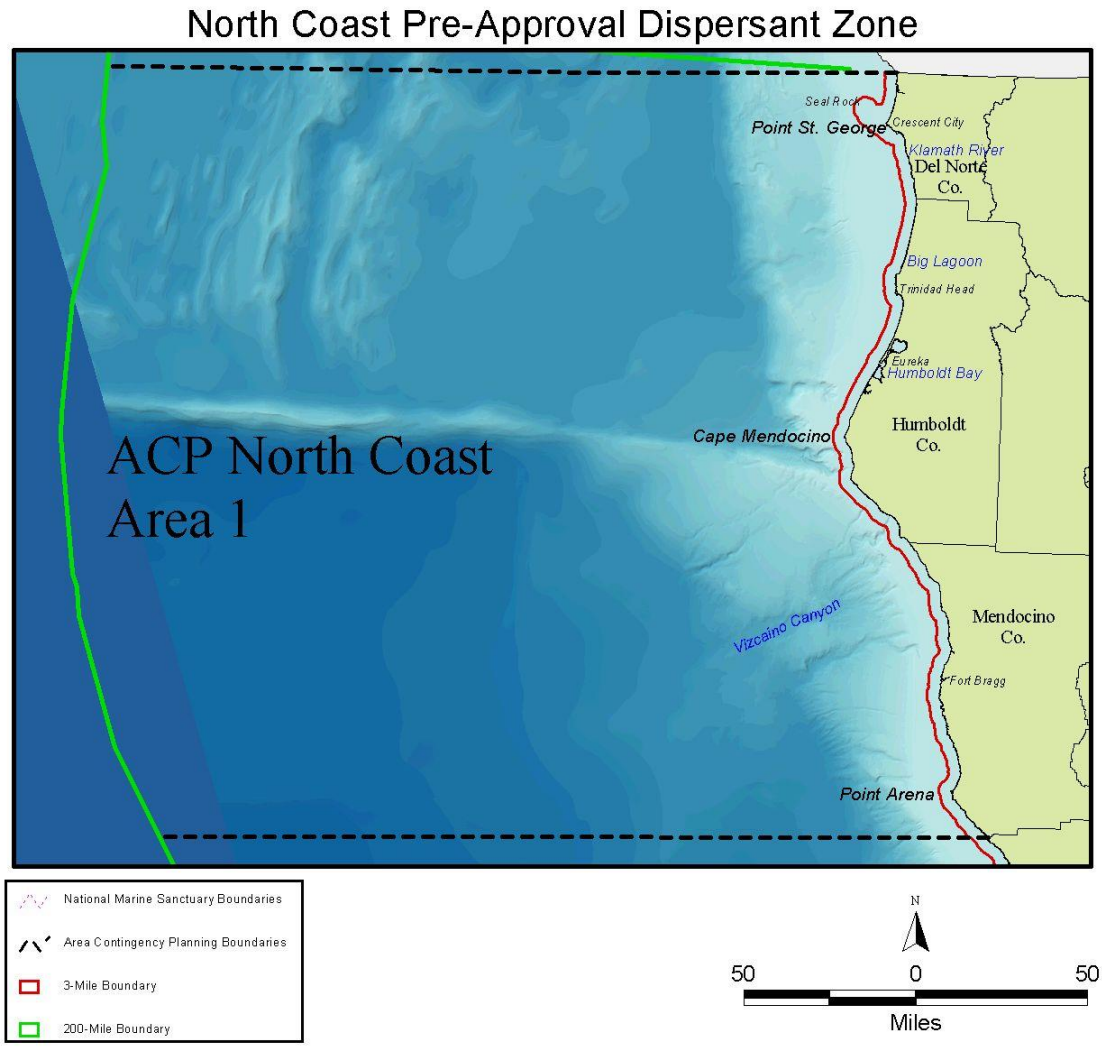
ENCLOSURE 4600 – ATTACHMENT I

DISPERSANT ZONE CHARTS AND REGIONAL WILDLIFE RESOURCE SUMMARIES

I.a North Coast



The North Coast dispersant use pre-approval area includes all waters seaward of the 3-mile state waters line (shown in red) and shoreward of the 200-mile line (shown in green). Areas inside state waters or within 3 miles of the California-Oregon border are "RRT Expedited Approval Required"; RRT approval will be case-specific. RRT Expedited Approval would also be required for any subsea use of dispersants and for dispersant use at the surface (in any zone) for more than 5 days.

Offshore sea birds are seasonally concentrated in the areas off Point Arena, Cape Mendocino and Point St. George. These include phalaropes, auklets, storm-petrels, shearwaters, fulmars, gulls and murres. Loons, grebes, cormorants, scoters, brown pelicans and endangered marbled murrelets commonly occur inshore. Recent oil spills in the Humboldt Bay region have demonstrated that common murres and marbled murrelets are very susceptible to spilled oil. Shore birds, including the threatened western snowy plover, are also at risk should spilled oil reach the shore.

Offshore and nearshore rocks of the north coast provide important roost and nest sites for seabirds and haulouts for marine mammals. Castle Rock is the largest and most structurally diverse nearshore rock in California and is the second largest seabird colony south of Alaska providing habitat for thousands of resident and migratory birds and marine mammals. Other significant near and offshore rock complexes of the north coast are in the vicinity of St. George Reef, the Klamath River, Trinidad, Cape Mendocino and Cape Vizcaino.

Nesting seabirds using offshore rocks and at risk of oiling include at least 12 species: common murre, western gull, Brandt's, pelagic and double-crested cormorants, Leach's and fork-trailed storm-petrels, pigeon guillemots, rhinoceros and Cassin's auklets, tufted puffins and black oystercatchers. Offshore rocks of the north coast provide nesting habitat for a significant proportion of California's seabird population.

Many marine mammal species are potentially at risk, including several species of cetaceans (whales, dolphins, porpoises) and pinnipeds (seals and sea lions). Endangered cetaceans include blue, fin, humpback, sei and sperm whales, as well as the Southern Resident population of killer whales. Transient populations of killer whales may be found periodically off the entire California coast, although sightings increase during gray whale migration season. Numerous species of dolphins are common, often in groups of dozens to hundreds. Pinnipeds of the north coast include harbor seals, northern fur seals, northern elephant seals, California sea lions and the threatened Steller's sea lion Northern fur seal adults rely on their fur, rather than blubber, for insulation, so should also be considered especially vulnerable to oiling. Guadalupe fur seals, listed as threatened, may also be found in the area, as there have been reports of stranded animals in northern California. Heavy oiling of the intertidal and upland areas of the northern coast can threaten seal and sea lion pups. River otters are a common resident of north coast bays, estuaries and nearshore habitats and would be at risk from oiling.

Sensitive marine mammal areas include the slopes and offshore waters over Mendocino Ridge, the Vizcaino Canyon fan (used seasonally by northern fur seals), the Steller sea lion rookeries at Cape Mendocino and Seal Rock, and the sea lion and harbor seal haul outs on St. George Reef and Trinidad Head. Critical habitat for Stellar sea lions has been designated at Sugarloaf Island and Cape Mendocino. In addition, the waters near St. George Reef, the Klamath River mouth, and Big Lagoon near Trinidad Head support seasonal populations of gray whales.

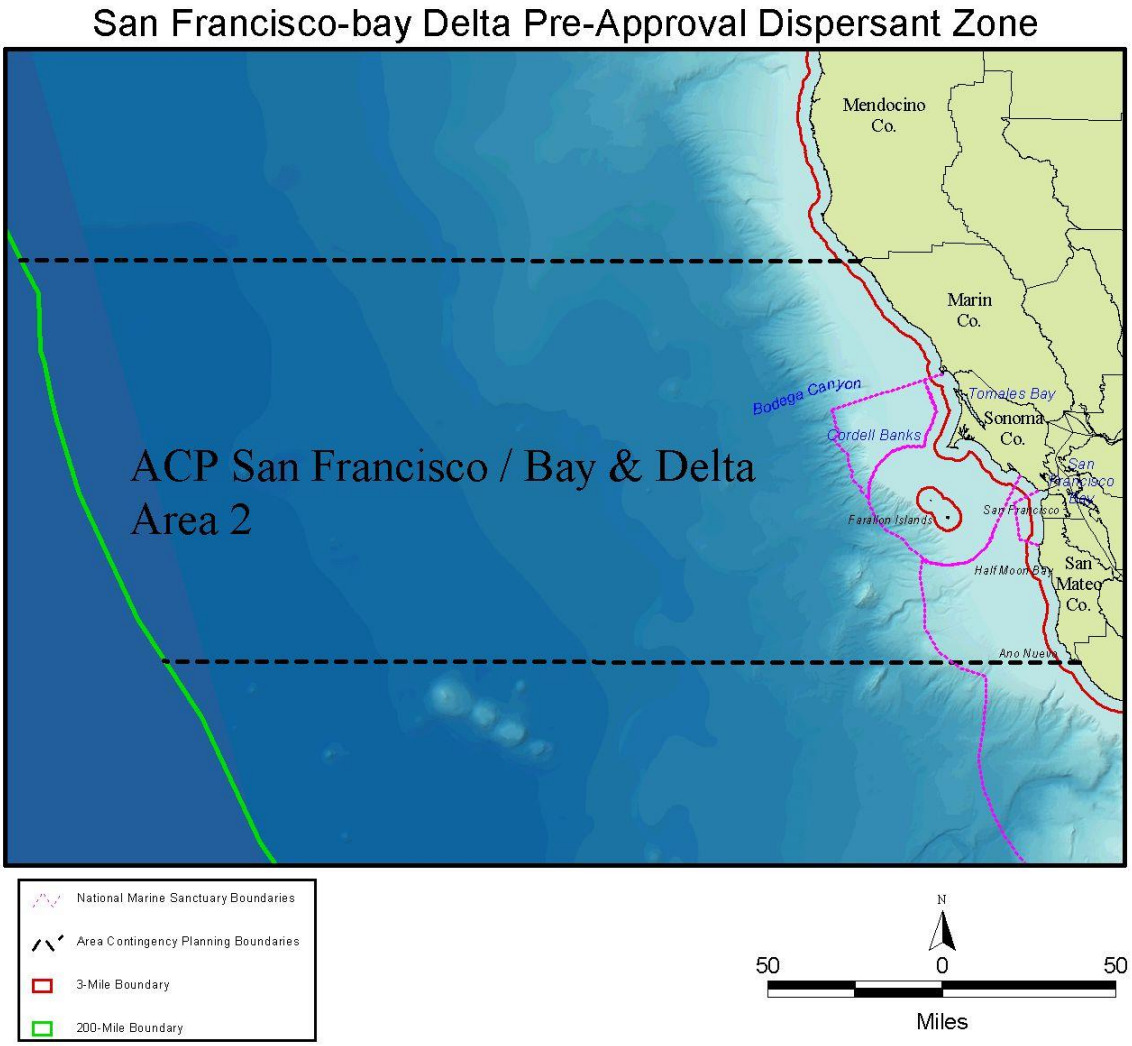
There are four species of sea turtle found in waters off California, three of which may be found in this zone. None of the species are known to nest anywhere along the U.S. west coast. Leatherback sea turtles are ESA listed as endangered and are known to forage in the northern California area to the Oregon border. Designated critical habitat has been proposed for this species from Point Arena (Mendocino County) south to Point Vicente (Los Angeles County). Green sea turtles found in California waters are likely to be from the endangered Pacific Coast of Mexico population. Although more prominent in southern zones, strandings have been reported in Humboldt County and their presence should be assumed. Olive Ridley sea turtles found in California waters are likely from the endangered Pacific coast of Mexico population as well. Their presence is sporadic and unpredictable, but strandings have been reported in Humboldt county and their presence should be assumed. The fourth species of sea turtle, the threatened loggerhead, is not likely to be found in this zone.

As oil comes ashore, the rocky intertidal habitat, as well as wetlands and mud flats adjacent to river mouths, are at significant risk both from the beached oil and from most of the cleanup procedures used to remove the oil. Of special concern in the marsh/wetland areas are the many species of resident or migratory birds, mammals, and fish including endangered tidewater goby and young-of-the-year and adult endangered Coho and Chinook salmon and threatened steelhead trout. Threatened green sturgeon also use coastal embayments and estuarine areas and all areas to a depth of 60 fathoms (360 feet); these areas have been designated as critical habitat for the southern distinct population segment of green sturgeon.

The endangered black abalone is found in waters with rocky substrate to a depth of 6 meters, including intertidal areas, from Point Arena to the south. They are considered very rare north of Point Arena although their historic range includes all areas north to the Oregon border.

Humboldt Bay is one of California's largest estuaries, second only to San Francisco in overall size, and is vital habitat for a vast array of marine dependent invertebrates, fishes, birds, and mammals. Humboldt Bay contains large areas of eelgrass habitat, intertidal mud flats, and is one of the state's most productive areas for bivalve aquaculture. In winter months, the bay may provide habitat for over 100,000 migratory waterfowl, shorebirds and other water birds and is a notable rest stop for birds along the Pacific Flyway.

I.b San Francisco-Bay Delta



The San Francisco-Bay Delta dispersant use pre-approval area includes all waters seaward of the 3-mile state waters line (shown in red), shoreward of the 200-mile line (shown in green) and outside the Gulf of the Farallones, Cordell Banks, and Monterey Bay National Marine Sanctuaries (shown in magenta). Areas inside state waters or a National Marine Sanctuary are "RRT Expedited Approval Required"; RRT approval will be case-specific. RRT Expedited Approval would also be required for any subsea dispersant use and for dispersant use at the surface (in any zone) for more than 5 days.

The most sensitive regions of the waters off the San Francisco Area are the highly productive upwelling zones and shelf areas where sea birds and marine mammals congregate in the spring and summer months to feed. These regions include Bodega

Canyon, Cordell Banks, the region between Point Reyes and the Farallon Islands, and the shelf break off the most northern of the Farallon Islands.

Much of this offshore area is part of the Gulf of the Farallones or Cordell Banks National Marine Sanctuaries, together recognized as a complex region with high biological diversity. The high diversity and abundance of birds, fish, marine mammals, invertebrates, algae and plats are due in part to the variety of island, coastal and subtidal habitats, and the highly variable physical processes affecting the area. It is a nationally significant wildlife breeding and foraging area, home to 27 endangered or threatened species.[1]

Invertebrates can be found in most habitat types, from rocky shores (*e.g*., Farallon Islands, Duxbury Reef, Fitzgerald Marine Reserve) and mudflats (along the mainland coast) to deep benthic and pelagic habitats throughout the sanctuary. The intertidal invertebrate community includes barnacles, limpets, turban snails, mussels, sea anemones and sea urchins. Intertidal mudflats along the coast support high concentrations of burrowing organisms (clams, snails, worms and crabs) that are a main food source for shorebirds and wading birds. Coralline algae dominate the Farallon Islands rocky intertidal communities, providing cover and food for a diverse population of marine invertebrates. At depths of about 60 feet, encrusting coralline algae, brittle stars and serpulid worms begin to dominate. Along the continental slope, invertebrate infaunal and epifaunal communities will vary with depth of water; species along the slope can include polychaete worms, pelecypod and scaphopod mollusks, shrimp and brittle stars. The invertebrates of the deep sea are dominated by cnidarians (*e.g*., hydroids, jellies, sea anemones, corals), ctenophores (*e.g*., ribbon worms), arrow worms, annelid worms, molluscs (*e.g*., chitons, snails, nudibranchs, clams, squid, octopus), and arthropods (*e.g*., barnacles, copepods, isopods, amphipods, shrimp, crabs). Deep-sea coral and sponges are present, but little is known of their status. Two species of krill (*T. spinifera*, *E. pacifica*) are the most common in the sanctuary, and will be important forage species in both offshore and coastal zones for most of the year. The endangered black abalone is found in waters with rocky substrate to a depth of 6 meters, including intertidal areas, from Point Arena to the south. All appropriate habitat areas for black abalone have been proposed for critical habitat designation.

Nearshore kelp beds are an important source of primary productivity, and an important haven for congregations of fish, pinnipeds and birds. Kelp beds occur near Bodega Head, Point Reyes, Duxbury Reef, Point Bonita, Point San Pedro, Fitzgerald Marine Reserve, Pescadero and Pigeon Point. Information on primary productivity is limited regarding the deeper, subtidal habitats of the sanctuary. At depths of about 60 feet, the lack of adequate light penetration limits kelp growth. Many organisms that live on the continental slope and in the deep sea instead depend on the primary production occurring in surface waters.

[1] Much of the information presented in this section is excepted from material on the following site: http://farallones.noaa.gov/science/conditionreport.html

Bays and estuaries are important spawning and nursery areas for fish (*e.g*., Pacific herring, smelt, starry flounder, surfperch, sharks, rays). Fish in the intertidal (*e.g*., pricklebacks, rock eels, dwarf surfperch, sculpins, blennies) are important food sources for shorebirds and seabirds). Subtidal habitats, especially those around rocky reefs and kelp beds, support large populations of juvenile finfish (*e.g*., flatfish, rockfish, perch) and cabezon; rocky banks in waters deeper than 180 feet support large populations of more than 48 species of rockfish. Soft bottom habitats in the nearshore support sablefish and flatfish, while over sand and mud bottoms at mid-and deeper depths rockfish and hake are common. The continental shelf and slope are highly productive areas for salmon (chinook, coho), northern anchovy, rockfish and flatfish. Large predatory finfish such as sharks, tunas and mackerel are found in nearshore pelagic areas (one of the largest know concentrations of adult and sub-adult white sharks in the world are seasonal visitors to the sanctuary). The extension of Point Reyes and the resulting current patterns tend to retain larval and juvenile forms of these and other species within the sanctuary, easing recruitment pressures and helping sustain populations. The composition of fish species in the pelagic zone varies through the year with migration and spawning, and the offshore waters areas around the Farallon Islands provide additional and important shallow and intertidal areas for living resources.

As oil comes to shore, the rocky intertidal habitat, as well as wetlands and mud flats adjacent to river mouths, are at significant risk not only from the beached oil, but also from most of the cleanup procedures used to remove the oil. Of special concern in the marsh/wetland are many species of birds and mammals that inhabit these areas, as well as the potential for impacts to the young-of-the-year and adults of the endangered coho and chinook salmon and threatened steelhead trout that may be residing in the area. Threatened green sturgeon also use coastal embayments and estuarine areas and all areas to a depth of 60 fathoms (360 feet); these areas have been designated as critical habitat for the southern distinct population segment of green sturgeon. Throughout late fall and winter large concentrations of Pacific herring enter San Francisco Bay to spawn on intertidal and subtidal substrates; herring eggs are commercially harvested. Typical of most invertebrate and fish eggs and larvae, herring eggs and larvae are very susceptible to hydrocarbon toxicity.

There are four species of sea turtle found in waters off California, three of which may be found in this zone. None of the species are known to nest anywhere along the U.S. west coast. Leatherback sea turtles are ESA listed as endangered and are known to forage in the northern California area to the Oregon border. Designated critical habitat has been proposed for this species from Point Arena (Mendocino County) south to Point Vicente (Los Angeles County). Green sea turtles found in California waters are likely to be from the endangered Pacific Coast of Mexico population. Although more prominent in southern zones, strandings have been reported as far north as Humboldt County and so their presence should be assumed. Olive Ridley sea turtles found in California waters are likely from the endangered Pacific coast of Mexico population as well. Their presence is sporadic and unpredictable, but strandings have been reported as far north as Humboldt County and so their presence should be assumed. The fourth species of sea turtle, the threatened loggerhead, is not likely to be found in this zone.

At least 19 marine and coastal bird species that are federally listed as threatened endangered or species of concern can be found in, and are highly dependent upon, the productive waters of the sanctuary. More than 160 species use the sanctuary for shelter, food, or as a migration corridor. Of these, 57 species are known to use the sanctuary during their breeding season. Eleven of the 16 species of seabird known to breed along the U.S. Pacific Coast have breeding colonies on the Farallon Islands and feed in the sanctuary (common murres, two species of auklets, storm petrels, Leach's petrel, tufted puffins, pigeon guillemots, and two species of cormorants. An additional 35 species of sea birds are seasonal visitors to the region (USGS, 2000). Several species of birds occur inshore, including the endangered marbled murrelet.

Approximately 80 of the more than 400 shorebird species are found within sanctuary boundaries, 27 of which are regularly seen (*e.g*., black oystercatcher, dowitcher, sandpipers, curlews, sanderlings, godwit). Other coastal and aquatic birds (e.g., herons and egrets, ducks, geese and other waterfowl, rails, bittern) are also common in the sanctuary or adjacent wetlands.

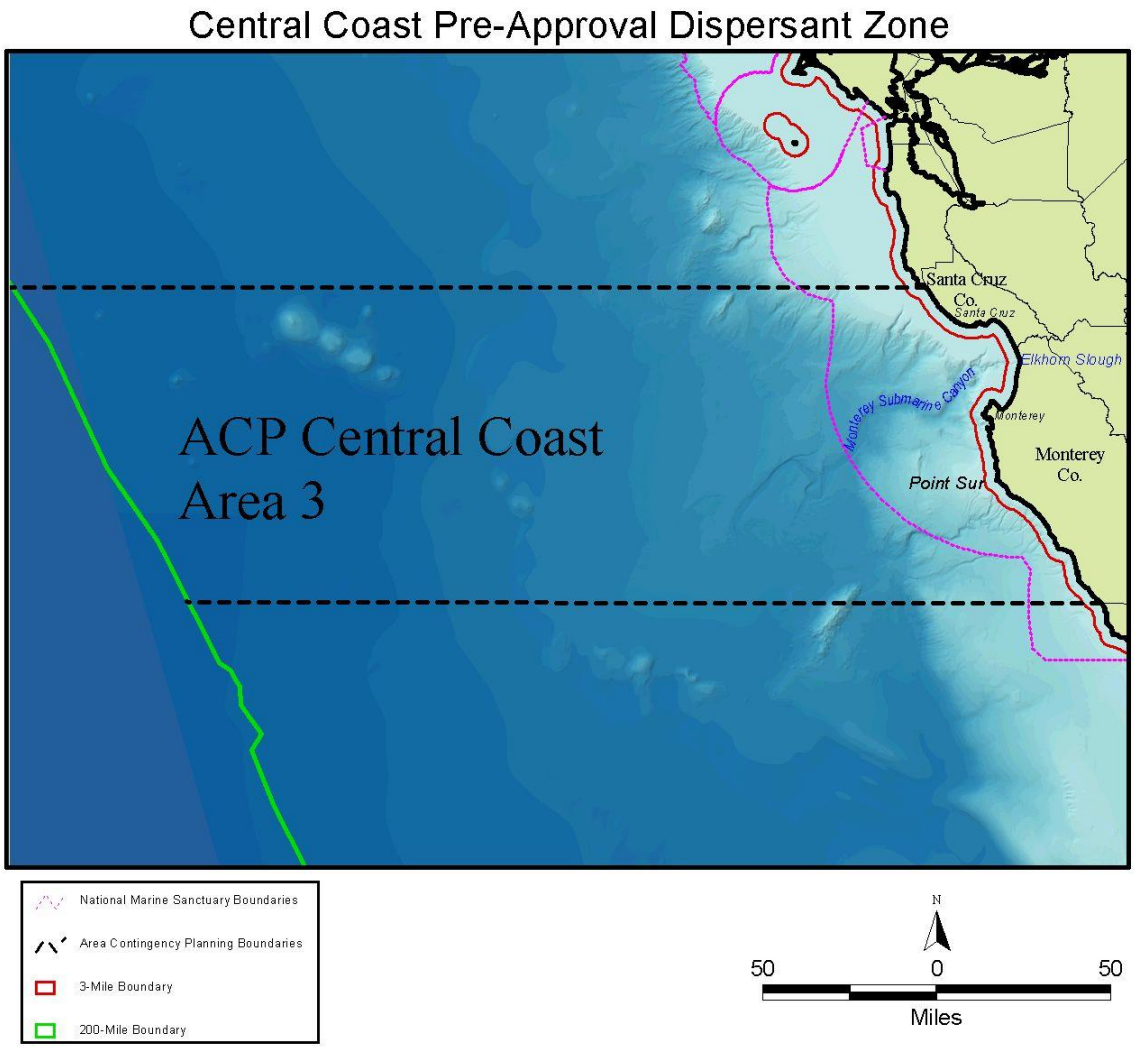
Recent oil spills in the San Francisco region have demonstrated that particular birds (e.g., common murres, marbled murrelets, brown pelicans, grebes, cormorants, loons) are very susceptible to spilled oil. Shore birds, including the endangered western snowy plover, are also at risk should spilled oil reach the shore.

The offshore area is a haven for marine mammals. At least 36 species of marine mammals have been reported for the region, many of which are federally listed as endangered or threatened. Endangered species include the blue, humpback, fin, sei, right and sperm whales, as well as the Southern Resident population of killer whales; threatened species include the Steller sea lion, Guadalupe fur seal and the California sea otter. The sanctuary is a nursery area for 20% of California's harbor seals, as well as for harbor porpoises and Pacific white-sided dolphins. The Farallon Islands (and Año Nuevo Island to the south) support breeding populations of harbor seals, northern elephant seals, Steller sea lions, and California sea lions; a small colony of about 90 northern fur seals has also resumed breeding at the Farallon Islands. Gray whales migrate along the entire California coast during the fall through early summer, with a few gray whales remaining in the sanctuary year-round. Transient populations of killer whales may be found periodically off the entire California coast, although sightings increase during gray whale migration season. April through November, the sanctuary is a destination feeding ground for one of the largest concentrations of blue and humpback whales in the Northern Hemisphere. The minke whale, harbor porpoise, Dall's porpoise and Pacific white-sided dolphin are considered year-round residents of the sanctuary; the harbor porpoise is the most abundant small cetacean occurring here. Numerous other species of dolphins are common, often in groups of dozens to hundreds.

Most of the marine mammals are potentially at risk from spilled oil. In addition, heavy oiling of the intertidal and upland areas of the coast and Farallon Islands will threaten harbor seal, Steller sea lion, northern elephant seal and northern fur seal pups. Critical

habitat for Steller sea lions has been designated at Southeast Farallon Island and Año Nuevo Island.

I.c Central Coast



The Central Coast dispersant use pre-approval area includes all waters seaward of the 3-mile state waters line (shown in red), shoreward of the 200-mile line (shown in green) and outside the Monterey Bay National Marine Sanctuary (shown in magenta). Areas inside state waters or National Marine Sanctuaries are "RRT Expedited Approval Required"; RRT approval will be case-specific. RRT Expedited Approval would also be required for any subsea dispersant use and for dispersant use at the surface (in any zone) for more than 5 days.

Oil spills within the offshore region of the Central Coast initially threaten all sea birds and marine mammals that frequent the area. If the spilled oil is driven on shore by the sea conditions and prevailing winds, additional resources (*e.g.*, shore birds, intertidal organisms, and seal and sea lion pups) are at risk for oiling.

Seabirds off California are generally most abundant in nearshore waters over the continental shelf; abundance drops off dramatically over the continental slope and deep offshore waters. High concentrations of seabirds occur in nearshore waters off Santa Cruz and Monterey counties, although seabird abundance drops south of Pt. Sur due to low water column productivity. Sea birds seasonally tend to concentrate near upwelling zones, in and "down stream" of offshore current jets associated with headlands, along temperature and salinity gradients, and along the shelf break. Both seabirds and marine mammals concentrate in these regions due to the high abundance of food.

Sea bird densities are typically highest during the late summer through fall and winter periods (July through January) and lowest in April to June when birds are concentrated on their colonies. In general, sea bird densities decrease when moving from the inshore to the offshore environment, dropping off considerably seaward of the continental shelf break.

Over 100 species of sea birds have been reported from the region; about 70 of these species occur regularly. In the offshore (water depth > 200m) waters, common sea bird species occurring seasonally include sooty shearwaters, phalaropes, Leach's storm petrel, northern fulmars, black-legged kittiwake, herring, Bonaparte's, western and California gulls, Cassin's and rhinoceros auklets, and common murres. In Monterey Bay proper, a significant segment of the world's ashy storm-petrel population is present during the autumn. Near shore (water depth <200m), common species include sooty shearwaters, phalaropes, common murres, loons, western grebes, and western, California and Bonaparte's gulls. In addition, endangered species including brown pelicans, marbled murrelets (northern area of region), western snowy plovers, and least terns occur seasonally in the nearshore area and would be at risk from oil entering this area.

Of all the sea birds occurring in the region, the common murre appears to be one of the species most frequently involved in oil spills. Data collected by the Office of Oil Spill Prevention and Response indicate that common murres are the most frequently oiled bird collected during recent central California spill responses affecting offshore waters (Monterey Bay Mystery Oil Spill, 1997; Pt. Reyes tar ball incidents, 1997-98; T/V *Command* spill, 1999; San Mateo Mystery Spill (*Jacob Luckenbach*), 2001-03).

Shorebirds are another important component of the avifauna of the Central Coast area. More than 40 shorebird species have been recorded in central California; however, many of these are extremely rare, and only about 24 species occur regularly in the area. Although the majority of shorebirds occupy coastal wetlands, including estuaries, lagoons, and salt and freshwater marshes, they also occupy other coastal habitats, including sandy beaches and rocky shores. Common shorebird species in the area include black-bellied plover, willet, whimbrel, marbled godwit, black turnstone, sanderling, western sandpiper, least sandpiper, dunlin and dowitchers. Breeding shorebirds are limited to black oystercatcher, black-necked stilt, American avocet,

killdeer, and the threatened western snowy plover, which nests and winters on sandy beaches.

Because of their migratory nature and the fact that few breed in the area, shorebirds are most abundant from fall through spring; comparatively few shorebirds remain during the summer months.

A number of marine mammal species are potentially at risk from spilled oil in this region of the coast. At least 34 species of marine mammals inhabit or visit California waters. These include six species of pinnipeds (seals and sea lions), 27 species of cetaceans (whales, porpoises and dolphins) and the sea otter. Cetaceans, including a number of endangered species (blue, humpback, fin, sei, right and sperm whales), use area waters as year-round habitat and calving grounds, important seasonal foraging grounds, or annual migration pathways. The endangered Southern Resident population of killer whales has been observed as far south as the Monterey Bay area in the winter. Gray whales migrate along the entire California coast during the fall through early summer, during which sightings of transient killer whales groups may also increase. Numerous species of dolphins and porpoise are common, often in groups of dozens to hundreds, and commonly associated with the Monterey submarine canyon. The Guadalupe fur seal is occasionally seen in the area but does not breed here. A large breeding population of northern elephant seals occurs at Año Nuevo, directly to the north and adjacent to the Central Coast planning area; Año Nuevo has also been designated as critical habitat for the Steller sea lions, which also breed there. California sea lions, harbor seals and sea otters are also common. Harbor seals breed on offshore rocks and isolated beaches of the central coast. Aside from the breeding locations (Año Nuevo, the central coast) thousands of pinnipeds (elephant seals, California sea lions, harbor seals, Guadalupe fur seals, northern fur seals, Stellar sea lions) feed in and move through the area as either resident or migrating populations. The threatened southern sea otter, a year-round resident of mainland central coast nearshore waters (generally within 6 miles of shore), is an endemic population of limited range and numbers currently experiencing population stress.

Marine mammals vary in their susceptibility to the effects of oiling. Since oil can destroy the insulating qualities of hair or fur, resulting in hypothermia, marine mammals that depend on hair or fur for insulation against the cold are among the most sensitive marine mammals to the effects of oil contamination. Most vulnerable to the direct effects of oiling among the pinnipeds are fur seals and newborn pups, which lack a thick insulating layer of fat. Cetaceans, which rely on layers of body fat and vascular control rather than pelage to retain body heat, are considered less vulnerable to the effects of oiling than pinnipeds.

Sea otters would be at high risk from an oil spill if oil were to reach nearshore waters of the region where most of the population is concentrated. Sea otters are totally dependent on their fur to maintain body heat, thus they are highly susceptible to hypothermia when their fur is exposed to oil. Depending on the time of year, heavy

oiling of intertidal and upland areas of the mainland coast could also threaten harbor seal and northern elephant seal pups.

There are four species of sea turtle found in waters off California, three of which may be found in this zone. None of the species are known to nest anywhere along the U.S. west coast. Leatherback sea turtles are ESA listed as endangered and are known to forage in the northern California area to the Oregon border. Designated critical habitat has been proposed for this species from Point Arena (Mendocino County) south to Point Vicente (Los Angeles County). Green sea turtles found in California waters are likely to be from the endangered Pacific Coast of Mexico population. This area is one of the key foraging areas for leatherback sea turtles due to the seasonal upwelling relaxation and concentration of prey, primarily brown sea nettles, in the late summer and fall. Unlike other sea turtles which are prominent in southern zones, leatherback sea turtles are more commonly found north of the Southern California Bight and have been tracked regularly to waters of central California. Olive Ridley sea turtles found in California waters are likely from the endangered Pacific coast of Mexico population as well. Their presence is sporadic and unpredictable, but strandings have been reported as far north as Humboldt County and so their presence should be assumed. The fourth species of sea turtle, the threatened loggerhead, is not likely to be found in this zone.

At least 554 species of California marine fishes inhabit or visit California waters. The high species richness is probably due to the complex topography, convergence of several water masses and changeable environmental conditions. The Monterey Submarine Canyon is an extremely important topographical feature in the central coast region, to which the area's large faunal species diversity and density is attributed. The fish represent a mix of permanent residents and periodic visitors. The important fish species of central California include northern anchovy, albacore tuna, jack mackerel, Pacific mackerel, Pacific bonito, Pacific sardine, Pacific whiting, Pacific herring, salmon, steelhead trout and sharks. Most of these species are widely distributed in the area, and it is unlikely that an oil spill will harm enough individuals, their prey or habitat to significantly decrease these populations. However, northern anchovy are of concern since their restricted distributions during parts of their life cycle make them vulnerable to impacts from spilled oil. Another species that is abundant in the epipelagic zone and vulnerable to impacts is the market squid. Although squid are widely distributed offshore during most of their life cycle, they congregate inshore in very large numbers during spawning. Monterey Bay is one of the most important spawning areas in the state. Threatened green sturgeon also use coastal embayments and estuarine areas and all areas to a depth of 60 fathoms (360 feet); these areas have been designated as critical habitat for the southern distinct population segment of green sturgeon.

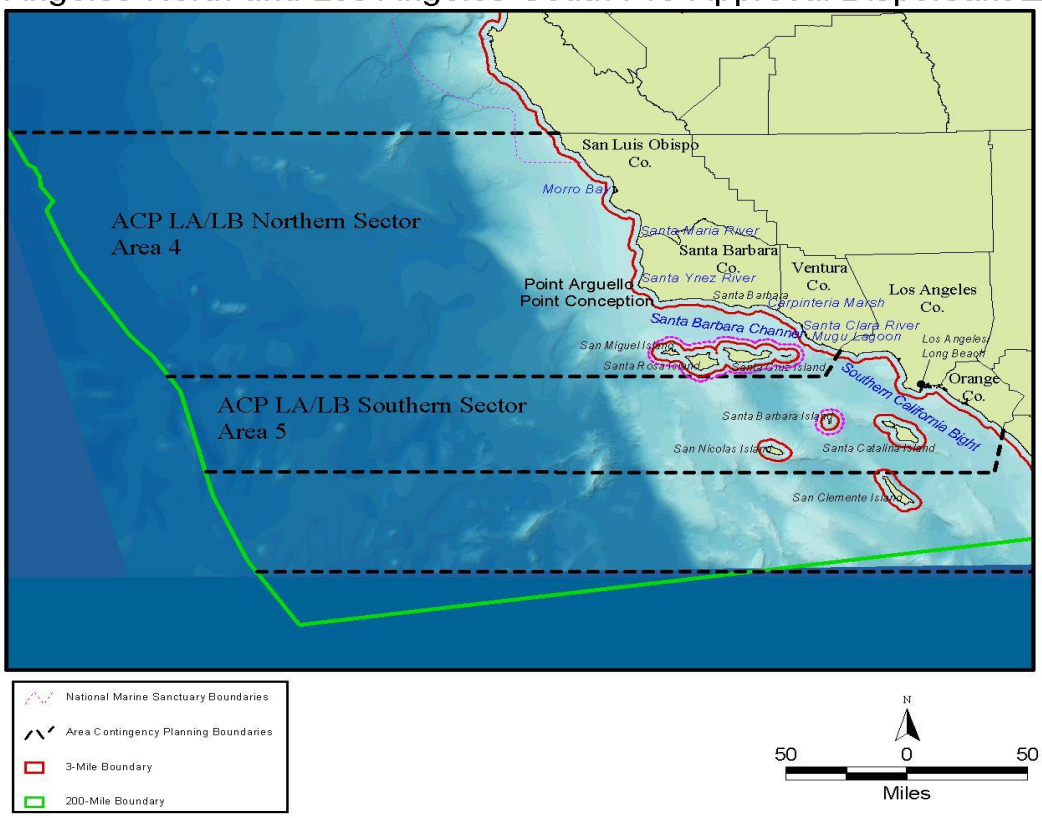
Both rocky and sandy shallow habitats are at risk from spilled oil when it comes ashore. Various species of abalone, where they occur, are especially at-risk members of the shallow rocky habitat. Currently, all major species of abalone in the central California area are severely depleted. Their depleted condition and life histories make abalone in shallow habitats especially vulnerable (at the population level) to impacts from spilled oil. The endangered black abalone is found in waters with rocky substrate to a depth of

6 meters, including intertidal areas, from Point Arena to the south. All appropriate habitat areas from the northern edge of this zone to Natural Bridges State Beach and from Pacific Grove to the southern edge of this zone have been proposed for critical habitat designation.

As oil comes on shore, the rocky intertidal habitat as well as coastal wetlands and mud flats adjacent to river mouths are at significant risk both from the beached oil and from most of the cleanup procedures used to remove the oil. Of special concern in the coastal marsh/wetland areas is the potential for oiling many species of resident or visiting birds, mammals, young-of-the-year endangered Coho salmon, and steelhead trout.

I.d Los Angeles (north and south)

Los Angeles-North and Los Angeles-South Pre-Approval Dispersant Zone



The Los Angeles (north and south) dispersant use pre-approval area includes all waters seaward of the 3-mile state waters line (shown in red), shoreward of the 200-mile line (shown in green) and outside the Channel Islands National Marine Sanctuary (shown in magenta). Areas inside state waters or National Marine Sanctuaries are "RRT Expedited Approval Required"; RRT approval will be case-specific. RRT Expedited Approval would also be required for any subsea dispersant use and for dispersant use at the surface (in any zone) for more than 5 days.

Seabirds off California are generally most abundant in nearshore waters over the continental shelf; abundance drops off dramatically over the continental slope and deep offshore waters. High concentrations of seabirds occur in nearshore waters from Morro Bay to Point Arguello and the Santa Barbara Channel. Sea birds seasonally tend to concentrate near upwelling zones, in and "down stream" of offshore current jets associated with headlands, along temperature and salinity gradients, and along the shelf break. Both seabirds and marine mammals concentrate in these regions due to the high abundance of food.

Seabird densities are typically highest during the late summer through fall and winter periods (July through January) and lowest in April to June when birds are concentrated on their colonies. In general, seabird densities decrease when moving from the inshore to the offshore environment, dropping off considerably seaward of the continental shelf break.

Although over 100 species of seabirds have been reported from the region, the majority of individuals are composed of about 30 species. In the offshore waters (water depth > 200m), common seabird species occurring seasonally include sooty shearwaters, phalaropes, Leach's storm petrel, northern fulmar, black-legged kittiwake, gulls (herring, Bonaparte's, western and California), auklets (Cassin's and rhinoceros) and common murres. Nearshore (water depth <200m), common species include sooty shearwaters, phalaropes, common murres, loons, western and Clarks's grebes and western, California and Bonaparte's gulls, and California brown pelicans. In addition, endangered species including, marbled murrelets (northern area of region), western snowy plovers, and California least terns occur seasonally in the nearshore area and would be at risk from oil entering this area.

Breeding seabirds are especially vulnerable to oil spills. Seabird colonies occur on the Channel Islands and along the mainland from Pt. Conception north; few, if any, seabirds nest on the mainland south of Pt. Conception. The most common breeding species in this area include storm petrels (Leach's, ashy, and black), California brown pelican, cormorants (Brandt's, double-crested, and pelagic), western gulls and alcids (pigeon guillemot, Cassin's auklet, rhinoceros auklet). Although breeding seasons also vary from species to species, one or more species is generally conducting some aspect of reproduction (nest building, egg laying, chick rearing, etc.) from April through August. In 1989-1991, the total breeding seabird population of the project area was estimated at over 100,000 birds, representing about 16 percent of the total California seabird population.

Shorebirds are another important component of the avifauna of the Los Angeles-Long Beach area. More than 40 shorebird species have been recorded in central and southern California; however, many of these are extremely rare, and only about 24 species occur regularly in the area. Almost all shorebirds migrate to the area from northern breeding sites; very few shorebirds breed in this area. Although the majority of

shorebirds occupy coastal wetlands, including estuaries, lagoons, and salt and freshwater marshes, they also occupy other coastal habitats, including sandy beaches and rocky shores. Common shorebird species in the area include black-bellied plover, willet, whimbrel, marbled godwit, black turnstone, sanderling, western sandpiper, least sandpiper, dunlin, and dowitchers. Breeding shorebirds are limited to black oystercatcher, black-necked stilt, American avocet, killdeer, and the threatened western snowy plover, which nests and winters on sandy beaches.

Because of their migratory nature and the fact that few breed in the area, shorebirds are most abundant from fall through spring; comparatively few shorebirds remain during the summer months. Important shorebird use areas include Mugu Lagoon, Santa Clara River mouth, Carpinteria Marsh, Goleta Slough, the Santa Ynez River mouth, and the Santa Maria River mouth. Shorebird densities are not available for these areas, but they are generally considered to be lower than heavily used areas, such as the San Francisco Bay. Although densities are not available, shorebirds occupying sandy beaches in nearby Ventura County averaged about 44 birds per linear kilometer of beach.

A number of marine mammal species are potentially at risk from spilled oil in this region of the coast. At least 34 species of marine mammals inhabit or visit California waters. These include six species of pinnipeds (seals and sea lions), 27 species of cetaceans (whales, porpoises, and dolphins), and the sea otter. Pinnipeds breed on the Channel Islands and on offshore rocks and isolated beaches along the mainland coast; thousands also move through the area during their annual migrations. Cetaceans, including a number of endangered species, use area waters as year-round habitat and calving grounds, important seasonal foraging grounds, or annual migration pathways. The sea otter, a year-round resident of the mainland coast north of Point Conception, is appearing in increasing numbers in the western Santa Barbara Channel and around the northern Channel Islands.

The threatened or endangered marine mammal species found in southern California waters include six whales (blue, humpback, fin, sei, right, and sperm whales), two pinnipeds (Guadalupe fur seal and Steller sea lion), and the southern sea otter. Large whales, including ESA listed blue and humpback whales, commonly feed in the water of the LA/LB area, particularly around the northern Channel Islands during the summer and fall. Other common summer feeding areas include the waters off southern Los Angeles County and Orange County. Gray whales migrate along the entire California coast during the fall through early summer. Transient populations of killer whales may be found periodically off the entire California coast, although sightings increase during gray whale migration season. Numerous species of dolphins are common, often in groups of dozens to hundreds. The threatened Steller sea lion does not breed in the area and are not commonly found in southern California waters. There is a small Guadalupe fur sea rookery on San Miguel Island and this species is seen in low numbers in southern California waters.

Marine mammals vary in their susceptibility to the effects of oiling. Since oil can destroy the insulating qualities of hair or fur, resulting in hypothermia, marine mammals that depend on hair or fur for insulation are most likely to suffer mortality from exposure. Sea otters, which rely almost entirely on maintaining a layer of warm, dry air in their dense underfur as insulation against the cold, are among the most sensitive marine mammals to the effects of oil contamination. Most vulnerable to the direct effects of oiling among the pinnipeds are fur seals and newborn pups, which lack a thick insulating layer of fat. Cetaceans, which rely on layers of body fat and vascular control rather than pelage to retain body heat, are considered less vulnerable to the effects of oiling than pinnipeds.

Sea otters would be at high risk from an oil spill if oil were to reach nearshore waters (mainland or Channel Islands) of the region. Depending on the time of year, heavy oiling of intertidal and upland areas of the mainland coast could also threaten harbor seal and northern elephant seal pups. Similar contact to the northern Channel Islands, particularly San Miguel Island, could have significant impacts on California sea lion, northern fur seal, northern elephant seal, and harbor seal pups, and possibly on adult fur seals as well.

There are four species of sea turtle found in waters off California. None of the species are known to nest anywhere along the U.S. west coast. Leatherback sea turtles are ESA listed as endangered and are known to forage in the northern California area to the Oregon border. Designated critical habitat has been proposed for this species from Point Arena (Mendocino County) south to Point Vicente (Los Angeles County). Green sea turtles found in California waters are likely to be from the endangered Pacific Coast of Mexico population. Their presence particularly in the Long Beach area is established; there is a small population in the San Gabriel River. The offshore range of green sea turtles is an area of research for the NMFS. Although more prominent in southern zones, strandings have been reported as far north as Humboldt County and so their presence should be assumed. Olive Ridley sea turtles found in California waters are likely from the endangered Pacific coast of Mexico population as well. Their presence is sporadic and unpredictable, but strandings have been reported in the area and so their presence should be assumed. The threatened loggerhead sea turtle has been found stranded from San Luis Obispo county south and should be assumed to be present in this zone, particularly during periods of warm sea surface temperatures in the Southern California Bight.

At least 554 species of California marine fishes inhabit or visit California waters. The high species richness is probably due to the complex topography, convergence of several water masses, and changeable environmental conditions. Point Conception is widely recognized as a faunal boundary with mostly cold-water species found to the north and warm-water species found to the south, though extensive migrations do occur as a result of fluctuating environmental conditions. In fact, warm- and cool-water events in the Southern California Bight (SCB) affect fish recruitment and can alter the composition of some fish assemblages for years. The SCB is located in the transition area between Pacific subarctic, Pacific equatorial, and North Pacific central water

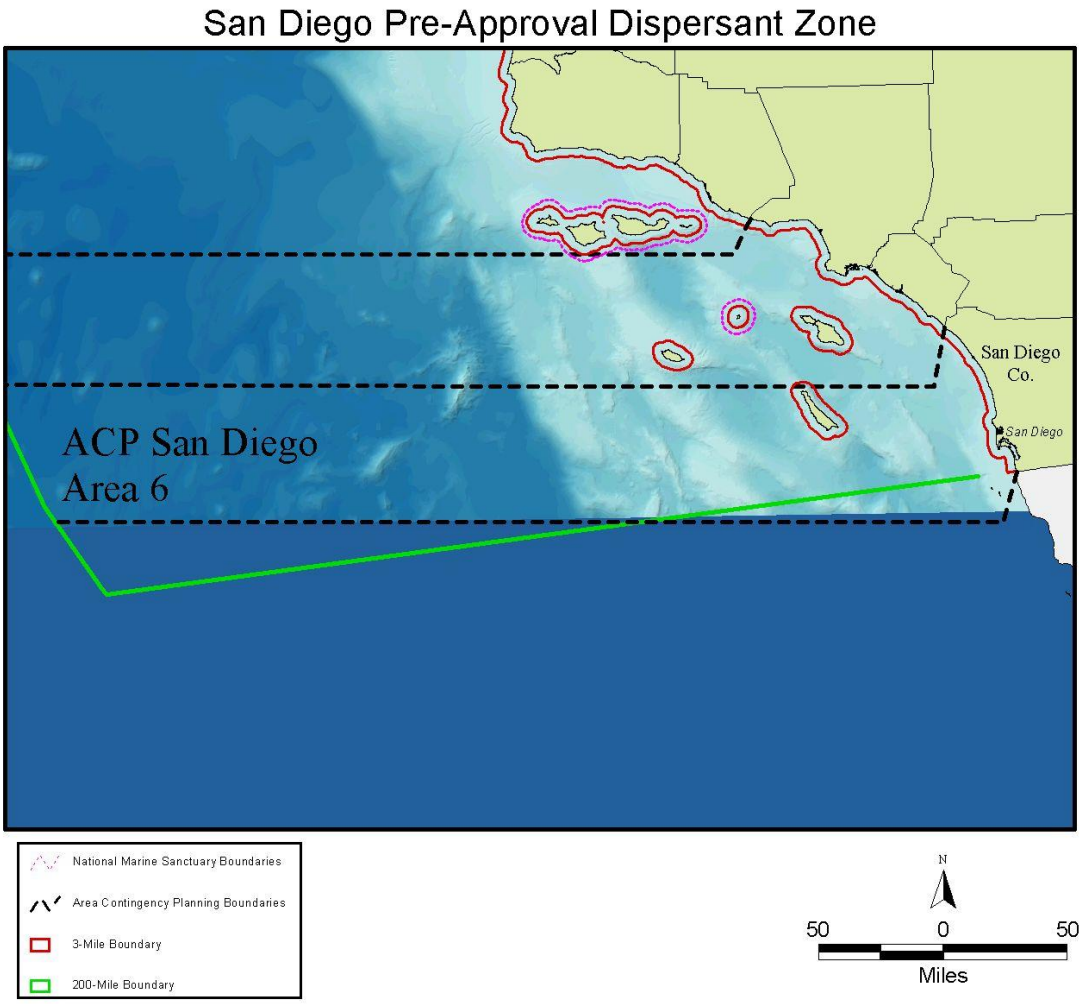
masses, and the fish fauna contains representatives from each of these sources. Of the 554 species of California marine fishes, 481 species occur in the SCB.

The pelagic realm is the largest habitat in the SCB and the home of 40 percent of the species and 50 percent of the families of fish. The pelagic zone includes the water column covering the shelf and the upper 150 to 200 m of water overlying the slope and deep basins. The fish from this zone represent a mix of permanent residents and periodic visitors. The important pelagic species of southern and central California include northern anchovy, albacore tuna, bluefin tuna, jack mackerel, Pacific mackerel, Pacific bonito, Pacific sardines, Pacific whiting, Pacific herring, salmon, steelhead trout, swordfish, thresher shark, shortfin mako and blue shark. Most of these species are widely distributed in the SCB, and it is unlikely that an oil spill will harm enough individuals, their prey, or habitat to significantly decrease the population of a given species. However, northern anchovy are of concern since their restricted distribution during parts of their life cycle makes them vulnerable to impacts from spilled oil. Another species that is abundant in the epipelagic zone and is vulnerable to impact is the market squid. Although during most of their life cycle squid are widely distributed offshore, squid congregate inshore in very large numbers during spawning. Monterey Bay and the northern Channel Islands are the most important spawning areas, but large spawning aggregations are known to occur along the entire coast from San Diego to Monterey.

Both rocky and sandy shallow habitats are at risk from spilled oil when it comes ashore. Abalones are an especially at-risk gastropod species of the shallow rocky habitat. Currently, all major species of abalone in central and southern California are severely depleted. Their depleted condition and life histories make abalone in shallow habitats especially vulnerable (at the population level) to impacts from spilled oil. The endangered black abalone is found in the waters of this zone with rocky substrate to a depth of 6 meters, including intertidal areas. All appropriate habitat areas from the northern edge of this zone to Cayucos and from Moñtana de Oro Sate Park to just south of Government Point, including around all of the Channel Islands, have been proposed for critical habitat designation. The coastal area form the Palos Verdes/Torrance border of the Los Angeles Harbor has also been designated as critical habitat. Endangered white abalone are found in open low and high relief rock or boulder habitat that is interspersed with sand channels. Sand channels may be important for the movement and concentration of drift macroalgae, such as *Laminaria farlowii*, *Agarum fimbriatum* and a variety of red algae, upon which white abalone are known to feed. White abalone are reported to be most abundant between 25-30 m (80-100 ft) depth. Their current range is from Point Conception south into Mexican waters.

As oil comes on shore, the rocky intertidal habitat, as well as coastal wetlands and mud flats adjacent to river mouths are at significant risk both from the beached oil and from most of the cleanup procedures used to remove the oil. Of special concern in the coastal marsh/wetland areas is the potential for oiling many species of resident or visiting birds, mammals, and endangered juvenile steelhead trout, which spawn in several streams located in this zone.

I.e San Diego



The San Diego dispersant use pre-approval area includes all waters seaward of the 3-mile state waters line (shown in red), and shoreward of the 200-mile line (shown in green). Areas inside state waters or within 3 miles of the California-Mexico border are "RRT Expedited Approval Required"; RRT approval will be case-specific. RRT Expedited Approval would also be required for any subsea dispersant use and for dispersant use at the surface (in any zone) for more than 5 days.

Oil spills within the offshore region initially threaten all seabirds and marine mammals that frequent the area. If the spilled oil is driven on shore by the sea conditions and prevailing winds, additional resources (*e.g.*, shorebirds, intertidal organisms, seal and sea lion pups) and their shoreline haulout, roosting, and nesting habitats are also at risk for oiling.

Seabirds off California are generally most abundant in nearshore waters over the continental shelf; abundance drops off dramatically over the continental slope and deep offshore waters. Sea birds seasonally tend to concentrate near upwelling zones, in and "down stream" of offshore current jets associated with headlands, along temperature and salinity gradients, and along the shelf break. Both seabirds and marine mammals concentrate in these regions due to the high abundance of food.

Seabird densities are typically highest during the late summer through fall and winter periods (July through January) and lowest in April to June when birds are concentrated on their colonies. In general, seabird densities decrease when moving from the inshore to the offshore environment, dropping off considerably seaward of the continental shelf break.

Although over 100 species of seabirds have been reported from the region, the majority of individuals are composed of about 30 species. In the offshore (water depth > 200m) waters, common seabird species occurring seasonally include sooty shearwaters, phalaropes, Leach's storm petrel, northern fulmar, black-legged kittiwake, gulls (herring, Bonaparte's, western and California), auklets (Cassin's and rhinoceros) and common murre. Nearshore (water depth <200m), common species include sooty shearwaters, phalaropes, common murres, loons, western grebes and western, California and Bonaparte's gulls. In addition, endangered species including the brown pelicans, marbled murrelets (northern area of region), western snowy plovers, and least terns occur seasonally in the nearshore area and would be at risk from oil entering this area.

Shorebirds are another important component of the avifauna of the San Diego area. More than 40 shorebird species have been recorded in central and southern California; however, many of these are extremely rare, and only about 24 species occur regularly in the area. Almost all shorebirds migrate to the project area from northern breeding sites; very few shorebirds breed in this area. Although the majority of shorebirds occupy coastal wetlands, including estuaries, lagoons, and salt and freshwater marshes, they also occupy other coastal habitats, including sandy beaches and rocky shores.

A number of marine mammal species are potentially at risk from spilled oil in this region of the coast. At least 34 species of marine mammals inhabit or visit California waters. These include six species of pinnipeds (seals and sea lions) and 27 species of cetaceans (whales, porpoises, and dolphins). Cetaceans, including a number of endangered species, use area waters as year-round habitat and calving grounds, important seasonal foraging grounds, or annual migration pathways.

The threatened or endangered marine mammal species found in southern California waters include six whales (blue, humpback, fin, sei, right, and sperm whales) and two pinnipeds (Guadalupe fur seal and Steller sea lion). The occurrence of ESA listed whales is unpredictable, although there have been sightings in the area. Gray whales migrate along the entire California coast during the fall through early summer. Transient populations of killer whales may be found periodically off the entire California coast,

although sightings increase during gray whale migration season. Numerous species of dolphins are common, often in groups of dozens to hundreds. The threatened Steller sea lion does not breed in the area and are not commonly found in southern California waters. There is a small Guadalupe fur seal rookery on San Miguel Island and this species is seen in low number in southern California waters.

Marine mammals vary in their susceptibility to the effects of oiling. Since oil can destroy the insulating qualities of hair or fur, resulting in hypothermia, marine mammals that depend on hair or fur for insulation are most likely to suffer mortality from exposure. Most vulnerable to the direct effects of oiling among the pinnipeds are fur seals and newborn pups, which lack a thick insulating layer of fat. Cetaceans, which rely on layers of body fat and vascular control rather than pelage to retain body heat, are considered to be less vulnerable to the effects of oiling than pinnipeds.

There are four species of sea turtle found in waters off California. None of the species are known to nest anywhere along the U.S. west coast. Leatherback sea turtles are ESA listed as endangered and have been observed foraging and migrating through waters in this zone. Green sea turtles found in California waters are likely to be from the endangered Pacific Coast of Mexico population. Their presence in San Diego Bay is well established and they should be expected to be found in offshore waters. Olive Ridley sea turtles found in California waters are likely from the endangered Pacific coast of Mexico population as well. Their presence is sporadic and unpredictable, but strandings have been reported as far north as Humboldt County and so their presence should be assumed. The threatened loggerhead sea turtle has been found stranded from San Luis Obispo county south and should be assumed to be present in this zone, particularly during periods of warmer than usual sea surface temperatures.

At least 554 species of California marine fishes inhabit or visit California waters. The high species richness is probably due to the complex topography, convergence of several water masses, and changeable environmental conditions. Point Conception is widely recognized as a faunal boundary with mostly cold-water species found to the north and warm-water species found to the south, though extensive migrations do occur as a result of fluctuating environmental conditions. In fact, warm- and cool-water events in the Southern California Bight (SCB) affect fish recruitment and can alter the composition of some fish assemblages for years. The SCB is located in the transition area between Pacific subarctic, Pacific equatorial, and North Pacific central water masses, and the fish fauna contains representatives from each of these sources. Of the 554 species of California marine fishes, 481 species occur in the SCB.

The pelagic realm is the largest habitat in the SCB and the home of 40 percent of the species and 50 percent of the families of fish. The pelagic zone includes the water column covering the shelf and the upper 150 to 200 m of water overlying the slope and deep basins. The fish from this zone represent a mix of permanent residents and periodic visitors. The important pelagic fish species of southern and central California include northern anchovy, albacore tuna, jack mackerel, Pacific mackerel, Pacific bonito, Pacific sardines, Pacific whiting, Pacific herring, salmon, steelhead trout,

swordfish, and thresher shark. Most of these species are widely distributed in the SCB, and it is unlikely that an oil spill will harm enough individuals, their prey, or habitat to significantly decrease the population size of any given species. However, northern anchovy are of concern since their restricted distributions during parts of their life cycle make them vulnerable to impacts from spilled oil. Another species that is abundant in the epipelagic zone and is vulnerable to impacts is the market squid. Although during most of their life cycle squid are widely distributed offshore, squid congregate inshore in very large numbers during spawning. Monterey Bay and the northern Channel Islands are the most important spawning areas, but large spawning aggregations are known to occur along the entire coast from San Diego to Monterey.

Both rocky and sandy shallow habitats are at risk from spilled oil when it comes ashore. Abalones are an especially at-risk gastropod species of the shallow rocky habitat. Currently, all major species of abalone in central and southern California are severely depleted. Their depleted condition and life histories make abalone in shallow habitats especially vulnerable (at the population level) to impacts from spilled oil. The endangered black abalone is found in the waters of this zone with rocky substrate to a depth of 6 meters, including intertidal areas. Only the area around San Clemente Island has been proposed for critical habitat designation in this zone although the black abalone may be found elsewhere in appropriate habitat conditions. Endangered white abalone are found in open low and high relief rock or boulder habitat that is interspersed with sand channels. Sand channels may be important for the movement and concentration of drift macroalgae, such as *Laminaria farlowii*, *Agarum fimbriatum* and a variety of red algae, upon which white abalone are known to feed. White abalone are reported to be most abundant between 25-30 m (80-100 ft) depth. Their current range is from Point Conception south into Mexican waters.

As oil comes on shore, the rocky intertidal habitat, as well as coastal wetlands and mud flats adjacent to river mouths are at significant risk both from the beached oil and from most of the cleanup procedures used to remove the oil. Of special concern in the coastal marsh/wetland areas is the potential for oiling many species of resident or visiting birds, mammals, and endangered juvenile steelhead trout, which use streams in the northern portion of this zone.

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ENCLOSURE 4600 – ATTACHMENT II

DISPERSANT EFFICACY AND AVAILABLE RESOURCES

II.a Oils produced from California offshore platforms

Oil Field Name	Platform Name	Pacific Outer Continental Shelf Study	Minerals Management Service/EC Catalog	
		API Gravity	Name	API Gravity
Beta	Ellen Elly Eureka Edith	17.3 – 18.3	Beta	13.7
Carpinteria	Hogan Houchin Henry	24.2	Carpinteria	22.9
Dos Cuadras	Hillhouse A B C	24.3	Dos Cuadras	25.6
Hondo	Hondo Harmony	21.5	Hondo	19.6
Hueneme	Gina	20.9	Port Hueneme	
Pescado	Heritage	21.5		
Pitas Point	Habitat		Pitas Point	38
Point Arguello	Hidalgo Harvest Hermosa	22.2	Point Arguello Commingled Point Arguello Heavy Point Arguello Light	21.4 18.2 30.3
Point Pedernales	Irene	21.1	Platform Irene	11.2
Sacate				
Santa Clara	Gilda Grace	20.9	Santa Clara	22.1
Sockeye	Gail	21.6	Sockeye Sockeye Commingled Sockeye Sour Sockeye Sweet Platform Holly	26.2 19.8 18.8 29.4 11

From S.L. Ross, 2002

II.b Some fresh oil properties of top ten oils shipped to California by tank ship, 1999-2001

Oil Type	Identifying Properties			
	API gravity	Sulfur content (%)	Viscosity at 15º C, cP	Pour point, ºC
Alaska North Slope	26.8	1.15	17	-15
Arab Medium	30.8	2.4	29	-10
Maya	21.8	3.3	299	-20
Arabian Light	33.4	1.77	14	-53
Oriente	29.2	1.01	85	-4
Basrah Light	33.7	1.95	20	-15
Escalante/Canadon Seco	24.1	0.19	?	?
Arabian Extra Light	37.9	1.2	?	?
FAO Blend	31.0	3.0	?	?
Yemen	31.0	0.6	?	?

II.c Properties of refined oil products

Refined Product Name	Specific Gravity @ 15.5˚C	API Gravity @ 15.5˚C	Pour Point ˚C	Viscosity cSt @ 20˚C	Dispersibility at Specified Sea Temperature Ranges (˚C)			
					7-13	13-18	18-24	>24
Asphalt (Bitumen) – no solvent	0.99-1.2	NA	+40-+80	Solid	No?	No?	No?	No?
Automotive Gasoil	0.84	36.3	-15	7.5	Yes	Yes	Yes	Yes
Aviation Gasoline	0.716	66.2	-60	1.0	Yes	Yes	Yes	Yes
Bunker Fuel C (No. 6 fuel oil)	0.984	12.3	+15	Solid	No?	No?	No?	Yes?
Bunker Fuel C	1.000	10.0	+2	Solid	No?	No?	Yes?	Yes?
Bunker Fuel C (BHP Hawaii)	0.993	11.0	+10	>3000	No?	No?	No?	Yes?
Bunker Fuel No. 6 (BP)	0.991	11.3	-1	>800	No?	No?	No?	Yes?
Bunker Fuel No. 6 (Phillips)	1.022	7.0	+26	>650	No?	No?	No?	Yes?
Bunker Fuel Caltex/Ampol (K-940)	0.991	11.3	+15	>2000	No?	No?	No?	Yes?
Bunker Fuel Shell (FO-467)	0.980	12.9	+15	>300	No?	Yes?	Yes?	Yes?
Diesel (automotive winter blend)	0.855	34.0	-20	7.0	Yes	Yes	Yes	Yes
Diesel (automotive summer blend)	0.865	32.0	-12	13.0	Yes	Yes	Yes	Yes
Diesel (Marine Diesel/Gasoil)	0.854	34.2	-11	13	Yes	Yes	Yes	Yes
Gasoline	0.739	60.0	-18	3.0	Yes	Yes	Yes	Yes
Gasoline (Leaded)	0.750	57.2	-29	1.0	Yes	Yes	Yes	Yes
Heating Oil (fuel oil #2)	0.876	30.0	-12	7.0	Yes	Yes	Yes	Yes
Heating Oil (fuel oil #5)	0.925	21.5	-9	190	No	No	Yes?	Yes?
Heavy Fuel Oil	0.94	17.5	-6 - 15	1343	No?	No?	No?	Yes?
IF-30	0.936	19.7	-6	180	No?	No?	Yes?	Yes
IFO-180 Bunker (BHP)	0.983	12.5	4 - 15	>1000	No?	No?	Yes?	Yes?
IFO-280 Bunker (BHP)	0.986	12.0	4 - 15	>1700	No?	No?	No?	Yes?
IFO-380 Bunker (BHP)	0.990	11.5	4 - 15	>2400	No?	No?	No?	Yes?
Jet Fuel (fuel oil #1 A-1)	0.806	44.0	NA	1.0	Yes	Yes	Yes	Yes
Jet Fuel (JP-1)	0.800	45.4	-40	1.2	Yes	Yes	Yes	Yes
Kerosene (dual purpose, fuel oil #1)	0.800	45.4	-25	1.5	Yes	Yes	Yes	Yes
Light Fuel Oil	0.91	23.9	-9 – -24	166	Yes	Yes	Yes	Yes
Lube Oil 10W30	0.882	29.0	-40	200	No?	Yes?	Yes?	Yes
Naphtha (White Spirit)	0.794	46.8	NA	1.0	Yes	Yes	Yes	Yes
Naphtha (Exxon)	0.758	55.0	-17	3.0	Yes	Yes	Yes	Yes
No. 2 Fuel Oil	0.871	31.0	-30	6.5	Yes	Yes	Yes	Yes
Mineral Spirits (Petroleum Spirits)	0.794	46.8	NA	1.0	Yes	Yes	Yes	Yes
Paraffin/Waxes	-	-	-	Solid	No?	No?	No?	No?
Residual Oils #6	0.986	12.0	+15	>45,000	No?	No?	No?	No?
Solvents	-	-	-	1 – 5	No?	No?	No?	No?
Transformer Oil (Electrical Oil)	0.883	28.8	-30	18	Yes?	Yes	Yes	Yes

? Indicates where data on the potential for dispersion are not unanimous or are uncertain

II.d Appropriateness/effectiveness of dispersant use on different oil and oil products

Incident Involving:	Spilled Oil	Dispersant Use Effective or Appropriate?
Fishing vessel	Marine diesel oil Marine gas oil	No
Small cargo ship	Medium fuel oil	Yes
Medium cargo ship	Medium fuel oil	Yes
Product tanker	Medium/heavy fuel oil	Yes
Product tanker	Gasoline cargo	No
Product tanker	Jet fuel cargo	No
Product tanker	Diesel cargo Vegetable oil cargo	No No
Product tanker	HFO for power use	No
Large cargo ship	Heavy fuel oil	Possibly
Oil tanker	Heavy fuel oil	Possibly
Oil tanker	Condensate	Probably not
Oil tanker	Crude oil cargo	Yes – for perhaps a significant time window

II.e Description of general oil characteristics based on oil type

Type	Description	Characteristics	Crude oil examples	Refined product examples
I	**Light distillates** No need to disperse; oil will dissipate rapidly**.**	Specific gravity: <0.80 API gravity: >45 Viscosity: 0.5-2.0 cSt @ 15º C Non-persistent, very volatile, highly flammable, high evaporation rates, rapid spreading rates, highly toxic to biota, little if any emulsification, high penetration of substrate.	Algerian blend	Maui and Kapuni distillate, gasoline blendstocks, motor spirit (RMS/PMS), Avgas, Jet A1, kerosene
II	**Light crudes** Relatively non-persistent. Easily dispersed if pour point under 41º F; probably difficult to disperse if water temperature is below pour point (behaves like a Group IV oil).	Specific gravity: 0.80-0.85 API gravity: 35-45 Viscosity: 4 cSt to solid @ 15º C Non-persistent, moderate to high volatility, low to moderate viscosity, moderate to high toxicity, can form stable emulsions, moderate to high penetration of substrates.	Pour point <41º F: Brent, Ekofisk, Forties, Murban, Seria Light Pour point >41º F: Ardjuna, Beatrice, Camar, Lucina, Palanca, Angola, Pennington	Unfinished oils; automotive gas oil, marine gas oil, Navy gas oil
III	**Medium – heavy crudes, fuel oils** Fairly persistent, easily dispersed if treated promptly.	Specific gravity: 0.80-0.95 API gravity: 17.5-35 Viscosity: 8 cSt to solid @ 15º C Persistent, moderate volatility, moderate viscosity, variable acute toxicity, can form stable emulsions, low to moderate penetration of substrates.	Pour point < 41º F: Alaskan, Arabian light, Basrah, Dubai, Iranian heavy, Kuwaiti, Maya, Oriente Pour point > 41º F: Bonny light, Coban blend, Gamba, LSWR, Minas, Santa Cruz, Taching, Zaire	
IV	**Heavy crudes and residues** Fairly persistent, probably difficult to disperse if water temperature is below pour point of material.	Specific gravity: 0.95-1.00 API gravity: 10.0-17.5 Viscosity: 1500 cSt to solid @ 15º C Persistent, low to moderate volatility, moderate to high viscosity, variable acute toxicity, can form stable emulsions, low to moderate penetration of substrates.		Heavy fuel oil, residues, Fletcher blend, Maui F sands < pour point, lube oils, lube oil blendstocks
V	**Non-spreading oils** Persistent, generally not dispersible	Specific gravity: >1.00 API gravity: <10.0 Viscosity: Solid unless heated Persistent, very low volatility, little if any evaporation, very high viscosity, very low acute toxicity, can form stable emulsions, little if any penetration of substrate.		Heavy bunker fuel oil, bitumen, very heavy fuel oil, asphalt, paraffins, waxes, residual fuels

In part from Cawthron, 2000

II.f Pacific OCS and imported California oils that have undergone spill-related testing and modeling

Crude oil name	API gravity	Fresh oil pour point (ºC)	Oil viscosity @ 15 ºC at various weathered states			Emulsion formation tendency	Dispersant "Window of Opportunity"
HIGHLY EMULSIFIABLE OILS (Emulsion forms at 0 to 10% oil evaporation)							
Arab Medium	29.5	-10	29	91	275	Yes @ 0%	Very narrow
Arab Light	31.8	-53	14	33	94	Yes @ 0%	Narrow
Hondo	19.6	-15	735	9583	449700	Yes @ 0%	Very narrow
Hueneme	14.8	-9	4131	20990		Yes @ 0%	Very narrow
Maya	21.8	-20	299	99390		Yes @ 0%	Very narrow
Oriente	25.9	-4	85		6124	Yes @ 0%	Very narrow
Pt. Arguello Commingled	21.4	-12	533	41860	2266000	Yes @ 0%	Very narrow
Pt. Arguello Heavy	18.2	-4	3250		4953000	Yes @ 0%	Very narrow
Pt. Arguello Light	30.3	-22	22	183	671	Yes @ 0%	Very narrow
Santa Clara	22.1	-3	304	1859	22760	Yes @ 0%	Very narrow
Sockeye	26.2	-12	45	163	628	Yes @ 0%	Very narrow
Sockeye Sour	18.8	-22	821	8708	475200	Yes @ 0%	Very narrow
MEDIUM EMULSIFIABLE OILS (Emulsion forms at 11 to 29% oil evaporation)							
Alaska North slope	26.8	-15	17	110	650	Yes @ 26%	Narrow
Carpinteria	22.9	-21	164	3426		Yes @ 11%	Narrow
Dos Cuadras	25.6	-30	51	187	741	Yes @ 11%	Narrow
Sockeye Sweet	29.4	-20	20	39	321	Yes @ 17%	Narrow
OILS THAT DO NOT EMULSIFY							
Diesel	39.5	-30	8	25	100	No	Very wide
Pitas Point	38.0	<-60	2		2	No	Very wide

Crude oil name	Hours for oil to reach specified viscosity in 10 kt winds and 15ºC water temperature					
	(Modeled) 1000 barrel batch spill (*i.e.*, from tank ship)			(Modeled) 10,000 barrel batch spill (*i.e.*, from tank ship)		
	2000 cP	5000 cP	20,000 cP	2000 cP	5000 cP	20,000 cP
HIGHLY EMULSIFIABLE OILS (Emulsion forms at 0 to 10% oil evaporation)						
Arab Medium	4.2	6.4	22.0	4.9	7.7	39.0
Arab Light	10.0	36.0	Disp @ 41 hrs	13.3	68.8	Disp @ 68 hrs
Hondo	2.0	3.0	5.5	2.4	3.7	6.2
Hueneme	0.0	0.5	1.9	0.0	0.5	1.9
Maya	1.6	2.3	4.8	1.8	2.6	5.1
Oriente	2.2	3.2	5.2	2.8	3.8	6.4
Pt. Arguello Commingled	1.6	2.6	4.3	1.7	2.9	4.9
Pt. Arguello Heavy	0.0	0.5	1.7	0.0	0.5	1.9
Pt. Arguello Light	4.4	6.9	23.0	5.1	8.1	42.0
Santa Clara	2.6	3.8	6.6	2.9	4.4	7.9
Sockeye	3.9	5.6	13.2	4.3	6.4	20.4
Sockeye Sour	1.1	1.9	3.1	1.3	2.0	3.5
MEDIUM EMULSIFIABLE OILS (Emulsion forms at 11 to 29% oil evaporation)						
Alaska North slope	37.9	39.7	43.3	60.7	62.2	66.7
Carpinteria	5.6	6.6	8.9	8.3	9.5	12.0
Dos Cuadras	5.4	7.0	11.0	7.4	8.9	14.3
Sockeye Sweet	8.6	10.6	28.8	11.6	14.1	47.8
OILS THAT DO NOT EMULSIFY						
Diesel	60.0	Disp @ 69 hrs		101.0	Disp @ 111 hrs	
Pitas Point	Disp @ 2.3 hrs			Disp @ 3.5 hrs		

The opportunity for using dispersants effectively on most oils listed above is limited. Only a few of the produced oils appear amenable to dispersion. However, if spill circumstances are right and response is very rapid, some success might be possible. The situation is different for the imported oils. Alaska North Slope crude, which represents about 50% of the oil spill risk from tankers in California, appears to be quite

II.g General California dispersant application platform information

Application method	Weather limitations	Advantages	Disadvantages
C-130/ADDS Pack	Winds: 30 – 35 kts Waves: 17 – 23 ft	Suitable for very large spills with longer (several day) time windows to accommodate the minimum 24-hour startup time. Greatest delivery capacity; might be capable of fully treating all of the oil spilled in a blowout spill and all oil in a 10,000 bbl batch spill.	At present the nearest ADDS Pack units are outside the state; start-up times may be lengthy; spraying not likely to begin until the second day of the spill; very expensive; requires runway.
DC-4		Suitable for very large spills with longer (several day) time windows to accommodate the minimum 24-hour startup time. The platform modeled is owned by Airborne Support Incorporated of Houma, LA; delivery capacity is approximately one-half that of the C-130 ADDS Pack.	Earliest this aircraft can begin spraying dispersant in California is probably the morning of the second day.
Single-engine planes (*e.g.*, Cessna AT-802 "Agtruck")	Winds: 17 – 21 kts Waves: 6 – 9 ft Ceiling: ≥1000 ft Visibility: ≥ 3 nm	Suitable for small- to mid-sized spills that occur at considerable distance from the response centers provided the time window is long enough to accommodate their slower startup time. Purpose-built for aerial spraying; capable of fairly short start-up time; a number of Agtrucks available for use in a large spill; other small planes may be relatively inexpensive.	Smaller payload; more limited range; not yet available in California, although one AZ operator may be under contract to CA OSRO; platform may not be available until beginning of the second day; limited to smaller spills; uses neat dispersant only
Medium-size helicopter	Winds: 17 – 27 kts Waves: 6 – 17 feet	Available; highly maneuverable; capable of being re-supplied near spill site; good operational efficiency; lands almost anywhere. Above sea blowouts from oil platforms (of oils with a <u>medium</u> emulsification rate) are good candidates for treatment by ship and helicopter platforms because they can remain on-scene and deliver dispersants constantly when needed. May be adequate to deal with small tanker spills close to their re-supply bases; could also respond to mid-sized spills provided the time window is long enough.	Limited by small payload and range; two are available in southern CA; use neat dispersant only. Blowouts of high emulsification rate oils will <u>not</u> be good candidates for dispersion from any platform type. Ship-based delivery may be limited by slow transit speed and small payload. These platforms are limited for spills at a distance from their base of operations, either because of slow transit speed or limited operating range. These limitations can be overcome in some circumstances by re-supplying them at or near the spill site.
Work boat	Winds: 7 – 21 kts Waves: 1 – 9 feet	Good control; mixes water. Above-sea blowouts from oil platforms (of oils with a <u>medium</u> emulsification rate) are good candidates for treatment by ship and helicopter platforms because they can remain on-scene and deliver dispersants constantly when needed. May be adequate to deal with small tanker spills close to their re-supply bases; could also respond to mid-sized spills provided the time window is long enough.	Moderate transit speed; only two ship-based systems (high-speed crew-cargo vessels) available in CA; limited to small spills; limited swath width. Blowouts of high emulsification rate oils will <u>not</u> be good candidates for dispersion from any platform type. Ship-based delivery may be limited by slow transit speed and small payload. These platforms are limited for spills at a distance from their base of operations, either because of slow transit speed or limited operating range. These limitations can be overcome in some circumstances by re-supplying them at or near the spill site.

From S.L. Ross, 2002

II.h Characteristics of dispersant spraying platforms available to operators in California

Application system	Payload (gallons)	Pump rate (gpm)	Swath width (feet)	Average transit speed (knots)	Average				
					Start-up time (hours)	Spray speed (knots)	Repositioning time (minutes)	Resupply time (hours)	Range
C-130/ADDS-pack	5500	600	100	214	24	140	2	1	7 hours
DC-4 [a]	2000-2500	500	100	214	1	157	2	1	
Agtruck AT-802	800	120	80	200	4	140	0.5	1	200 miles
Agtruck AT-502	500	120	80	200	4	140	0.5	1	200 miles
Helicopter	150	79	80	90	1	50	0.5	0.25	1.75 miles
Vessel A [b]	1000	10	120	7	1	7	2	1	
Vessel D [c]	20,000	60	175	25	1	25	2	1	

[a] Values reported in the literature for aircraft logistic characteristics such as payload are somewhat variable. For the DC-4 payload, values range from 2000 to 2500 gallons. The value used in calculations is at the upper end of this range, 2500 gallons. It must be recognized that the payload of the existing DC-4 platform in the Gulf of Mexico area is somewhat lower than this at 2000 gallons.

[b] Modeled after Clean Seas boom type vessel spray system.

[c] Modeled after new portable single-nozzle spray system developed by National Response Corporation (NRC) and mounted on one of NRC's crew-cargo vessels. System characteristics are as follows:

- Payload: capacity is up to 20,000 gallons in the form of up to 10 2000-gallon DOT marine-portable tanks
- Pump rates: variable at 12, 25, 40 and 60 gallons per minute
- Swath width: range of nozzle varies with pump rate up to 70 feet @ 60 gpm, with one system on each side. Allowing for the 35' beam of the vessel, swath width is 140'
- Vessel speed: maximum speed is 25 knots

From S.L. Ross, 2002

II.i Dispersant spraying capacity of platforms as a function of distance [a]

Platform	Operating distance (miles)	Number of sorties per day	Payload (barrels)	Volume of dispersant sprayed per day (barrels)	Volume of oil dispersed per day (barrels) [b]
C-130/ADDS Pack [c]	10	4	130.8	523.2	10464
	30	4	130.8	523.2	10464
	100	3	130.8	39234	7848
	200	3	130.8	392.4	7848
DC-4 [d]	10	6	47.6	285.6	5712
	30	5	47.6	238.1	4761
	100	4	47.6	190.4	3808
	200	3	47.6	142.8	2856
AT-802	10	8	18.9	151.2	3024
	30	7	18.9	132.1	2642
	100	5	18.9	94.4	1887
	200	3	18.9	56.6	1132
Helicopter	1	30	5.7	169.8	3396
	10	21	5.7	119.7	2394
	30	11	5.7	62.3	1245
Vessel [e]	1	3	23.8	71.4	1428
	10	2	23.8	47.6	952
	30	1	23.8	23.8	476
	100	1	23.8	23.8	476

[a] Based on response to a batch spill of 3180 m^3 (20,000 barrels).
[b] Assuming 20 volumes of oil are dispersed per 1 volume of dispersant sprayed.
[c] ADDS Pack specifications as per Biegert Aviation: Maximum reservoir capacity = 5500 gallons (20.8 m^3 = 130.8), recommended capacity = 5500 gallons (18.9 m^3).
[d] Values reported in literature for payload of DC-4 range from 2000 to 2500 gallons (7.5 to 9.5 m^3); value used here is 2000 gallons (= 47.6 barrels) as per ASI, Houma, LA.
[e] Modeled after Clean Seas boom type vessel spray system.

From S.L. Ross, 2002

II.j Stockpiles of dispersant application resources in California and North America

California				
Owner/Holder	**Dispersant Location**	**Manager**	**Corexit 9500 (gallons)**	**Corexit 9527 (gallons)**
MSRC	990 West Waterfront Drive, Suite B Eureka, CA 95501 707-442-2903	Randy Anzalone 281-776-4335 (office) 713-471-2680 (cell)	660	
	Richmond RRC Warehouse 702 National Ct., Suite 1 Richmond, CA 94804 510-578-0700		1980	
	Chevron Environmental Management Co. 990 Hensley Street Richmond, CA 94801 510-578-0700		8,745	
	Buchanan Field Airport 550 Sally Ride Drive Concord, CA 94520 925-646-5722		330	
	Tesoro Marine Terminal 3300 E. Spring Street Long Beach, CA 562-981-7600		12,870	
NRC	NRC Equipment Storage Site Alameda, CA	Chris Eilers 631-224-9141 x145 (office) 631-383-5213 (cell)	4,240	
	NRC Equipment Storage Site Long Beach, CA		4,240	
Clean Seas	Clean Seas, LLC Carpinteria, CA	Kyle Hanson 805-684-3838 (office)	9,900	9,550

Outside California: Within Pacific Northwest				
Owner/Holder	**Dispersant Location**	**Manager**	**Corexit 9500 (gallons)**	**Corexit 9527 (gallons)**
MSRC	MSRC Warehouse 1330 Industry Street, Suite 100 Everett, WA 98203-7123 425-252-1300	Randy Anzalone 281-776-4335 (office) 713-471-2680 (cell)	14,190	
	MSRC/OSRV Pier 35 Honolulu, HI 96819 808-847-8144			600
NRC	NRC Equipment Storage Site Seattle, WA	Chris Eilers 631-224-9141 x145 (office) 631-383-5213 (cell)	4,240	
	NRC Equipment Storage Site Portland, OR		4,240	
Clean Islands Council and State of Hawaii	Honolulu, HI	Kim Beasely 808-536-5814 (24/7) 808-845-8465 (office)	38,018	
Canadian Coast Guard	Victoria, B.C. Canada	Don Rodden 604-270-3273		5,000
CISPRI (CIRO)	Anchorage, Univar and Nikiski, AK	Todd Paxton 907-776-5129 (office)	13,200	
Alyeska Pipeline Service Company	Anchorage, Univar and Valdez, AK	Jennifer Bleicher 907-834-6963 (office) 907-461-7141 (cell)	72,857	
ASRC Energy Services	Anchorage and Univar, AK		25,000	

II.j, cont. Stockpiles of dispersant application resources in California and North America

Other U.S./Canada Dispersant Stockpiles				
Owner/Holder	**Dispersant Location**	**Manager**	**Corexit 9500**	**Corexit 9527**
MSRC	Phoenix-Mesa Gateway Airport 6033 S. Sossaman Road Mesa, AZ 85212 520-723-6555	Randy Anzalone 281-776-4335 (office) 713-471-2680 (cell)	3,330	
	MSRC Site 1667 Main Street Ingleside, TX 78362 361-776-5336		3,330	
	MSRC Site 8400 Old Causeway Road Galveston, TX 77554 409-740-9188		11,550	
	Stennis International Airport 7110 Roscoe Turner Road Kiln, MS 39556 800-259-6772		16,009	
	Moran Environmental 2600 Seaboard Coastline Dr. Savannah, GA 31415 912-232-3224		6,600	
	MSRC Site 1305 Shoreline Ave., #PA 129 Tampa, FL 33605 813-241-2521		5,280	
	MSRC Site 1020 Port Blvd. Miami, FL 33132 305-347-2200		990	
	MSRC Site PMB 391 90 Avenue Rio Hondo Bayamon, Puerto Rico 00961-3105 787-641-5369		3,300	900
	Delaware Bay River Co-Op 100 Passwaters Drive Milford, DE 19963 302-422-7604		330	
	MSRC Site 220 Boat Yard Road Chesapeake City, MD 21915 410-885-3503		13,035	
	Wilcomico Regional Airport-Corporate 5485 Airport Terminal Road Salisbury, MD 800-259-6772		330	
	MSRC Site 14 Union Wharf Portland, ME 04101 207-780-1821		990	
NRC	NRC Equipment Storage Site Corpus Christi, TX	Chris Eilers 631-224-9141 x145 (office) 631-383-5213 (cell)	4,240	
	NRC Equipment Storage Site La Porte, TX		4,240	
	NRC Equipment Storage Site Ft. Lauderdale, FL		4,240	
	NRC Equipment Storage Site Jacksonville, FL		4,240	
	NRC Equipment Storage Site Wilmington, NC		4,240	
	NRC Equipment Storage Site Dennisville, NJ		4,240	

II.j, cont. Stockpiles of dispersant application resources in California and North America

Other U.S./Canada Dispersant Stockpiles				
Owner/Holder	**Dispersant Location**	**Manager**	**Corexit 9500 (gallons)**	**Corexit 9527 (gallons)**
NRC, continued	NRC Equipment Storage Site East Providence, RI	Chris Eilers 631-224-9141 x145 (office) 631-383-5213 (cell)	4,240	
	NRC Equipment Storage Site San Juan, PR		4,240	
	NRC Equipment Storage Site St. Croix, US Virgin Islands			2,750
Nalco/Exxon Energy Chemical, LP	Sugarland, TX	Kathryn Preston 281-202-8126 (cell) 281-263-7200 (after hours) Debbie Albright 281-263-7709 (office)	0-5,500 (depending on orders being filled)	330
Clean Gulf Associates, New Orleans, LA	Galveston –Timbalier Bay, TX	Frank Paskewich 504-799-3035 (office) Frankie Palmisano 504-799-3037 (office) 504-234-1279 (cell)		330
	Houma – RW Armstrong, LA (stored at ASI facilities)		33,300	330
	Lake Charles-Bastion Bay, LA			330
	Venice-Grand Bay, LA			330
LOOP, Inc.	Houma, LA	Cindy Gardner-LeBlanc 985-276-6299 (office) 504-289-6307 (cell) 504-565-9797 (pager)	14,500	
Airborne Support, Inc,	3626 Thunderbird Road Houma, LA	Brand Barker 985-851-6391	14,500	
Clean Caribbean and America	Pt. Everglades, FL	Paul Schuler or Mike Gass 954-983-9880 (24/7)	30,000	
Clean Harbors Cooperative	Linden, NJ	Dennis McCarthy 908-862-7500 908-862-7560 (fax)	1,200	

II.k OSRO Dispersant Application Platforms and Response Times in California

OSRO	Equipment Types/	Response Times to CA	Amount of Dispersant That Can Be Applied
MSRC	Air: C-130 from Mesa, AZ King Air from Concord, CA	7 hours after notification 5 hours after notification	3250 gallons/sortie, swath width = 1oo' 250 gallons/sortie 250 gallons/sortie
NRC	Dispersant available in truck-delivered totes (see table III.j)		
Clean Seas Cooperative 990 Cindy Lane, Unit B Carpinteria, CA 93013 24-hr phone: 805-684-3838 Contact: Kyle Hanson 805-684-3838	Boats "Clean Ocean" - 1100 gallon capacity "Ocean Guardian" - 250 gallon capacity "Ocean Scout" - 250 gallon capacity Aerial (helicopter) - Storage 250 gal max; pumping rate 50 – 100 gal per minute; boom length 32 ft, swath 50 – 60 ft depending on speed; speed 50 – 100 kts; dosage rate 2, 3 or 5 gal per acre. Clean Seas also has 880 gals of shoreline dispersant (Corexit 7664) stored at yard.	The Clean Seas Cooperative has primarily platform owners/operators as their customers. Response times are based on federal requirements, and vary depending on platform distance from shore, but are all generally in the 2-6 hr timeframe.	Boats "Clean Ocean" swath width = 105' "Ocean Guardian" & "Ocean Scout" swath width = 52' Calibration and dosage rates will vary depending on speed (3-10 kts) and rates (2-10 gal/acre). Helicopter Boom length = 32', swath width 50-60' Speed 50-100 kts, pumping rate 50-100 gal/min, 2,3 or 5 gal/acre.

II.l Manufacturers of dispersant spray systems for boats, helicopters and fixed-wing aircraft

Dispersant spray equipment for boats, helicopters and fixed-wing aircraft are available from various manufacturers throughout the world. Table C.9 is a partial representative listing. Publications such as the *International Oil Spill Control Directory* and the *World Catalog of Oil Spill Response Products* have more complete listings that are periodically updated.

Dispersant application systems differ in design, capability, versatility, size, weight, ease of handling and control of dosage. Their suitability depends in part on the type of dispersant used. Concentrated dispersants such as Corexit 9500 and Corexit 9527 are generally most appropriate for modern spray equipment. A detailed description of application equipment requirements is presented in the 1997/1998 *World Catalog of Oil Spill Response Products*.

	Boats	Helicopters	Fixed-wing aircraft
ABASCO 363 West Canino Houston, Texas 77037 Phone: 800-242-7745	X	X	X
Ayles Fernie International, Ltd. Unit D5 Chaucer Business Park Kemsing, Seven Oaks, Kent TN15 6YU England Phone: 44/1732762962	X		
Biegert Aviation, Inc. 22022 South Price Road Chandler, Arizona 85245 Phone: 602-796-2400			X
CECA S.A. (Subsidiary of Elf Aquitane Group) Avenue Alfred Nobel – 64000 PAU France Phone: 33/559 92 44 00	X		
Helitask Bourne Airfield Cambridge CB3 7TQ England Phone: 44/954-210-765		X	
KU-SINTEF Group S.P. Andersens vei 15b N-7034 Trondheim, Norway Phone: 47 73 59 11 00		X	
KOLDA Corporation 16770 Hedgecroft, Suite 708 Houston, Texas 77060 Phone: 281-448-8995	X		X

II.I, continued Manufacturers of dispersant spray systems for boats, helicopters and fixed-wing aircraft

	Boats	Helicopters	Fixed-wing aircraft
KAAF Agro Aviation Les Jasses D'Albaron 13123 Albaror Arles, France Phone: 33/9071188		X	
Kepner Plastic Fabricators, Inc. 3131 Lomita Blvd. Torrance, California 90505 Phone: 310-325-3162	X		
Ro-Clean Desmi 21B Hestehaven DK5260, Odense S. Denmark Phone 45-65-910-201	X		
Simplex Manufacturing Company 13340 NE Whitaker Way Portland, Oregon 97230 Phone: 503-257-3511		X	
Slickbar Products Corporation 18 Beach Street Seymour, Connecticut 06483 Phone: 203-888-7700	X		
Transland, Inc. 24511 Frampton Avenue Harbor City, California 90710 Phone: 310-534-2511	X		
Vikoma International Ltd. Prospect Road Cowes, Isle of Wight PO31 7AD, England		X	

From ExxonMobil, 2000

II.m Dispersant "Window of Opportunity"

The "window of opportunity" for dispersant use is general defined as the timeframe that is generally available for application of chemical dispersants in which that application can be expected to be reasonably effective. It is often difficult to accurately predict the "window of opportunity" for any given dispersant application. As a result, the use of "rules of thumb" combined with "best professional judgment" often provides for the best results.

A number of factors will affect the efficacy of dispersant use and these factors with either expand or narrow a given "window of opportunity." In general, most dispersant formulations are designed to work in ocean water with an average salinity around 35 ppt. The efficacy of most salt water dispersant formulations drop off significantly as the ocean salinity decreases, such as in bays and estuaries during times of fresh water incursion. In general, heavier crudes are more difficult to disperse than lighter crude oils. Additionally, dispersant efficacy will vary based on the weathering of oils, most significant are emulsion formation and evaporation. A number of studies have been funded by the United States Minerals Management Service, evaluating the perimeters that contribute to the "window of opportunity" for dispersant use and have found that in many cases the "window of opportunity" may be extended. The information found in this section will be revised to address the latest scientific information. Currently, the information below provides good, albeit perhaps conservative, parameters regarding the "window of opportunity" for dispersant use. Additionally, at the time of an oil spill incident, the NOAA Scientific Support Coordinator can run several models estimating the "window of opportunity" for dispersant use. The mathematics in these models, however, may not take into account the latest scientific data and as a result, something the best means of determining if dispersants will be effective during an oil spill incident is to conduct field tests and visually monitor dispersant efficacy.

Type	Description & General Dispersibility
I	**Light distillates** No need to disperse; oil will dissipate rapidly**.**
II	**Light crudes** Relatively non-persistent. Easily dispersed if pour point under 41º F; probably difficult to disperse if water temperature is below pour point (behaves like a Group IV oil).
III	**Medium – heavy crudes, fuel oils** Fairly persistent, easily dispersed if treated promptly.
IV	**Heavy crudes and residues** Fairly persistent, probably difficult to disperse if water temperature is below pour point of material.
V	**Non-spreading oils (sinking oils)** Persistent, generally not dispersible

III.m, cont.

GENERAL DISPERSABILITY RELATIVE TO API GRAVITY AND POUR POINT

<table>
<tr>
<td rowspan="2">Probably difficult or impossible to disperse</td>
<td>Medium weight material. Fairly persistent. Probably difficult to disperse if water temperature is below pour point of material.</td>
<td>Lightweight material. Relatively non-persistent. Probably difficult to disperse if water temperature is below pour point of material.</td>
<td rowspan="2">No need to disperse. Very light weight material. Oil will dissipate rapidly</td>
</tr>
<tr>
<td>Medium weight material. Fairly persistent. Easily dispersed if treated promptly.</td>
<td>Lightweight material. Relatively non-persistent. Easily dispersed.</td>
</tr>
</table>

API	17	34.5	45
Gravity	.953	.852	.802

Derived from information published by the International Tanker Owners Pollution Federation, Ltd., London (API 1986)

This table provides general guidance only. Note that specific dispersant formulations are designed to treat heavier, more viscous oils. Consult manufacturer recommendations prior to application and recommendations from monitoring team for continued use.

This page provided for spacing purposes.

ENCLOSURE 4600 – ATTACHMENT III

INSTRUCTIONS AND DISPERSANT OBSERVATION FORMS

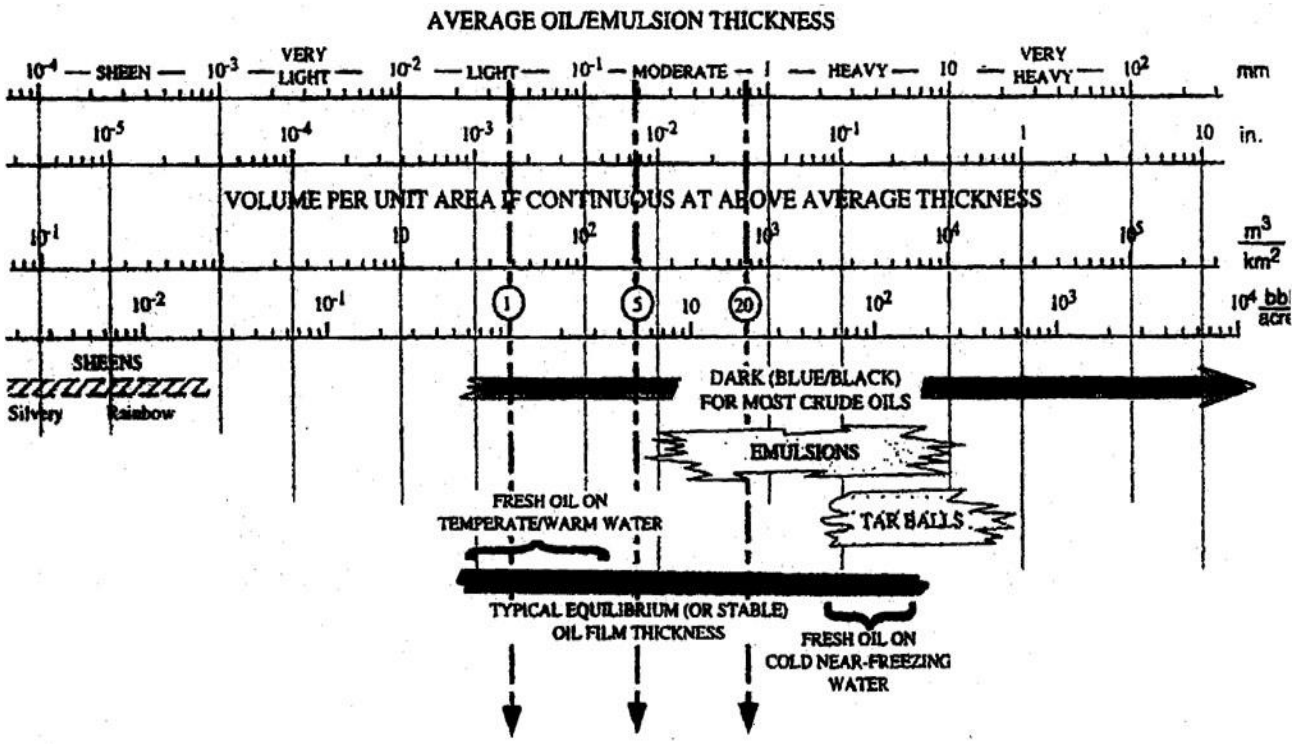
III.a Estimated dispersant dosages based on average oil thickness and dispersant-to-oil ratios

Average oil thickness (inches) (mm)	Relative thickness	Dispersant-to-oil ratio (DOR)						
		Oil concentration (volume of oil/unit area)	1:1	1:5	1:10	1:20	1:50	1:100
.0004 in (0.01 mm)	Very light to light	Gallons/acre	10.7	2.14	1.1	0.5	0.2	0.1
.001 in (0.02 mm)	Light	Gallons/acre	21.4	4.3	2.1	1.1	0.4	0.2
.002 in (0.05 mm)	Light	Gallons/acre	53.5	10.7	5.4	2.7	1.1	0.5
.004 in (0.1 mm)	Light to moderate	Gallons/acre	107	21.4	10.7	**5.4 ****	2.1	1.1
.019 in (0.5 mm)	Moderate	Gallons/acre	535	107	53.5	26.8	10.7	5.4
.04 in (1.0 mm)	Moderate to heavy	Gallons/acre	1070	214	107	53.5	21.4	10.7
.08 in (2.0 mm)	Heavy	Gallons/acre	2140	428	214	107	42.8	21.4
0.12 in (3.0 mm)	Heavy	Gallons/acre	3210	642	321	160.5	64.2	32.1

The 5 gallons/acre number was generated, assuming a light to moderate oil thickness and a DOR of 1:20. However, the table also makes it apparent that many other ratios may be appropriate depending on the volume or thickness of the spilled oil. How the oil behaves in the environment once it is spilled, and the dispersant application platform chosen, will also add a number of variables the FOSC will need to consider. Please see Discussion Note 9.1 for more information on slick thickness, oil volume, and dosage rate, as well as the figures in Tables III.b and III.c.

III.b Representative oil concentrations and corresponding average thicknesses

The circled numbers on the vertical lines in the figure below refer to 1, 5 and 20 barrels/acre as representative values for days 1, 2 and 3 following a significant crude oil spill.

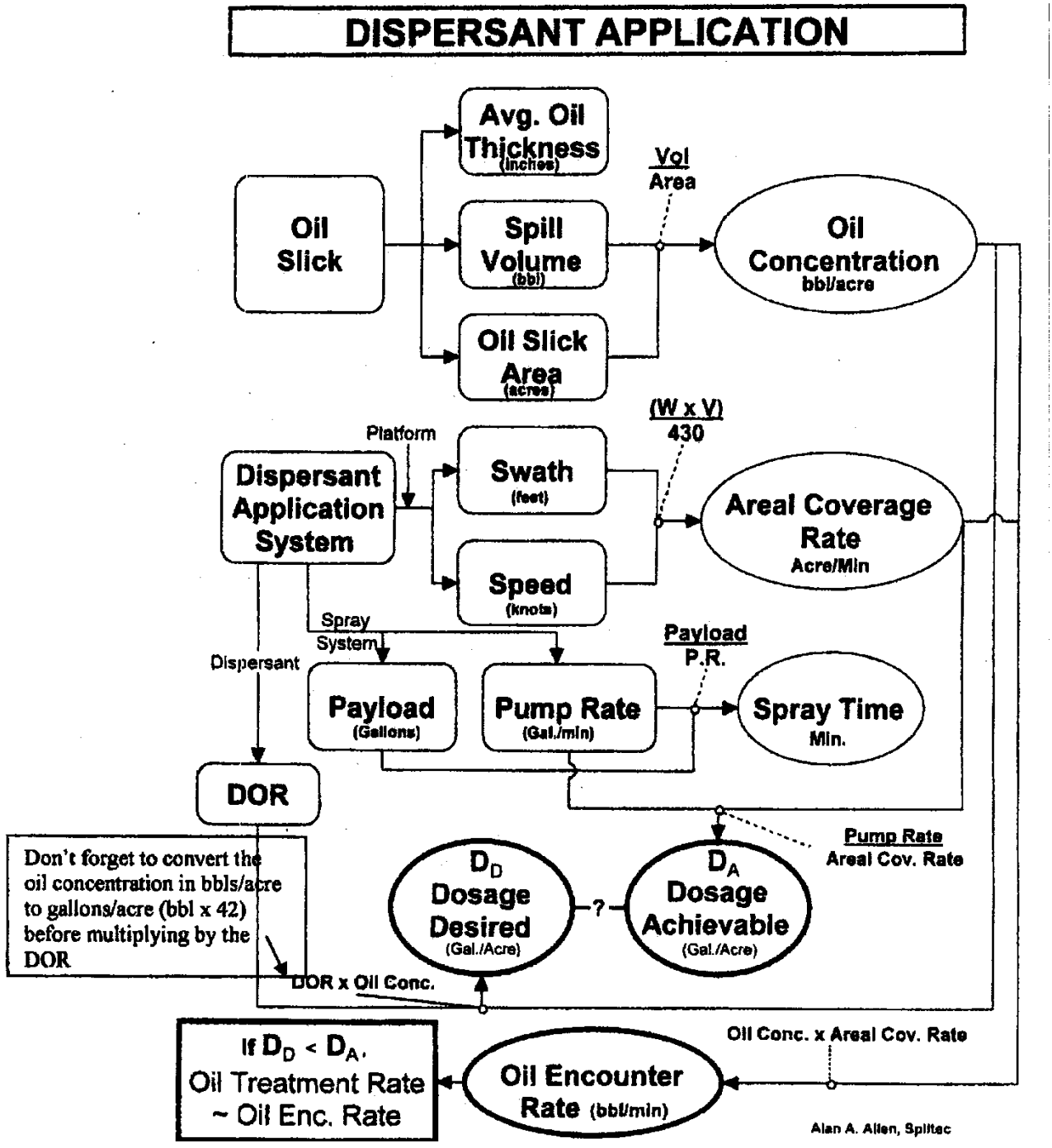


Estimated Volume/Unit Area (bbl/acre)	1	5	20
Average Oil Thickness (inches)	0.0016	0.0077	0.031
Average Oil Thickness (millimeters)	0.039	0.197	0.79

REPRESENTATIVE OIL CONCENTRATIONS & CORRESPONDING AVERAGE THICKNESS
(For Planning Purposes)

From Alan A. Allen (Spiltec), 2003 personal communication

III.c Oil slick characteristics and DOR as they apply to the dispersant application system



III.d Dispersant Application Summary Form

Incident name: _____ Report number: _____

This report made by: _____ Organization/agency: _____ Date: _____ Time: _____

Application parameters:

General location of application: _____

Size of target area: _____ (m^2/km^2/acres) Circle one

Volume of oil targeted: _____ (gal/bbl) Circle one
(from Dispersant Pre-Approval Assessment Form)

Dispersant: oil ratio used: _____

Volume of dispersant required: _____ (gal/bbl) Circle one
(calculate or use Attachment III.a)

Diagram of application. Include scale, north arrow, location of oil, flight path and application location. Partition this box if multiple passes are expected so that each pass may be sketched.

Application platform:

Aircraft/Boat/Other: _____

Type: _____

Capacity: _____

Pump rate: _____

Swath width: _____

Application speed: _____

Application capacity:

Distance to slick: _____

Base to spill return time: _____

Applications per hour: _____

Coverage per hour: _____

Application details:

Pass number:	Start time	Finish time	Total dispersant applied
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

III.e Monitoring dispersant effectiveness

Information in this section is based on the SMART (Special Monitoring of Advanced Response Technologies) Guidelines – a joint project of the U.S. Coast Guard, National Oceanic and Atmospheric Administration (NOAA), US Environmental Protection Agency (EPA), the Centers for Disease Control and Prevention and the Minerals Management Service. Additional information is from the NOAA HAZMAT Report 96-7.

- It is essential to monitor the effectiveness of dispersant applications on oil dispersion.
- It is desirable to monitor the fate of oil, and to assess the impact of dispersed oil on the environment.
- Monitoring intensity should reflect spill size and prevailing conditions, as well as the potential effects of the spill, and logistical and physical constraints. Monitoring intensity should increase with spill size as follows:

Spill size	Visual monitoring	Water column monitoring and sample collection	
		1 m depth	multiple depths
Small	✔		
Medium	✔	✔	
Large	✔	✔	✔

- Visual observation of dispersant effectiveness is the minimum acceptable level of monitoring.
- Termination of dispersant operations should, wherever possible, be based on real-time on-site water column monitoring results from at least one depth.
- Monitoring at multiple depths (either with real-time data or samples collected for later analysis) will provide the best information on dispersant effectiveness and the fate of dispersed oil.

Mobilizing monitoring resources

- It is imperative that monitoring teams and technical advisors are notified of possible dispersant use, and are mobilized as soon as possible (see **Box 1a).**
- Dedicated monitoring staff should be appointed and should not be expected to perform other operational functions.

Visual observation

- Visual observation from aircraft is the most reliable technique for detecting and mapping oil distribution.
- General aerial observation objectives include mapping the distribution and appearance of the oil, verifying the modeled forecast of oil movement, providing responders with an overview of the incident, and directing cleanup operations.
- Observations should be made using the General Observation Guidelines (Attachment III.f), Dispersant Observation Checklist (Attachment III.g) and Dispersant Observation Report Form (Attachment III.h).
- Observations should be photographed and/or videotaped for comparison and documentation.
- Oil close to the coastline is best viewed from a helicopter, ideally with a door or window removed allowing the observer to look straight down on the oil.

- For oil further offshore, multi-engine aircraft provide a longer range, higher speeds and wider margin of safety.
- As a minimum, the aircraft should have space for two observers (excluding the pilot), visibility from both sides, pilot-observer communications, and sufficient navigational aids to follow the proposed flight path.
- Prior to take-off, the observer should be aware of aircraft safety procedures, be familiar with the general spill area, have appropriate maps or nautical charts to record spill details, and know the environmental conditions likely to be encountered.
- Visibility, surface wind speed and direction, and sea state are all important for predicting oil movement and interpreting visual observations. Poor viewing conditions (*e.g*., fog, rain, or overwashing in rough seas) can prevent observers from seeing the entire spill. Strong winds could indicate emulsification rates may be more rapid than anticipated.
- Advanced sensing instruments (*e.g*., infrared thermal imaging, side-looking airborne radar, laser fluorescence, microwave radiometer, infrared-ultraviolet line scanner, LANDSAT satellite systems) can provide a high degree of sensitivity in determining dispersant effectiveness. Problems associated with each of these systems preclude their exclusive use during oil spills. Visual observations cannot always confirm that the oil is dispersed, and physical sampling of water beneath the slick may also be required.

Water column fluorometry and water samples

- Dispersant effectiveness can be confirmed in real-time by monitoring hydrocarbons in the water column using fluorometry.
- For medium and large spills, on-site monitoring is the preferred method for determining whether there is a significant difference between natural and chemical dispersion, and for deciding when dispersant operations should cease. It also provides the best means for determining the volume of chemically dispersed oil.
- Samples should ideally be collected at multiple depths from:
  - Water free of oil contamination (reference or control sites)
  - Water beneath the oil spill before dispersant application (pre-treatment)
  - Water beneath the oil spill after dispersant application (post-treatment)
- The time of sampling, instrument readings, and relevant observations at selected time intervals and the exact position of each reading (preferably using Global Position System) must be recorded. Documentation of fluorometer calibration and verified instrument response should also be available.
- The sampling regime will depend on the availability of monitoring resources, the spill size and the logistical constraints of the response. At a minimum, sufficient samples are needed to characterize pre- and post-treatment differences relative to reference sites.
- As fluorometry measures natural fluorescence and not just oil, water samples should also be collected to allow fluorometry results to be related to measured oil concentrations. Fluorometry measures should be made using a continuous flow fluorometer. Water samples should be collected at the outlet port of the flow-through water duct, past the fluorometer cell. Water samples should be kept in a cool dark place prior to laboratory analysis.

Fate of dispersed oil

- Monitoring the track of the dispersed oil plume at several depths allows the dilution rate for the dispersed oil to be assessed, and the determination of the rate that hydrocarbon levels in the water column return to background levels.
- Trajectory models should be used where available to assist in tracking the plume. Dye markers can also be used.
- Oil fate monitoring requires:

- Simultaneous monitoring from a single vessel using independent set-ups from at least two depths.
- Collection of water samples to validate the fluorometer readings.
- Wherever possible, measurement of water quality parameters (*e.g.*, temperature, conductivity, dissolved oxygen, pH, turbidity) to help explain the behavior of the dispersed oil.

Using and interpreting monitoring results

- Fluorometry readings will vary widely, reflecting the patchiness and inconsistency of the dispersed oil plume.
- Real-time data are essential if monitoring results are being used to guide dispersant operations and to determine when a response is no longer effective.
- An increase in the fluorometer signal trend beneath chemically dispersed oil of five times or greater than that of readings beneath untreated oil and reference sites is a good indication of dispersion occurring.
- It is important that actual oil concentrations are also measured so that the rate of natural dispersion can be compared to the rate of chemically enhanced dispersion, to determine the actual effect of dispersant use.

From Cawthron, 2000

III.f General observation guidelines

- Wherever possible, use observers trained and experienced in identifying and quantifying oil floating on the sea;
- Use standard reporting terms (see below) and common guidelines to maintain consistency among observers.

STANDARD TERMS TO DESCRIBE OIL FLOATING ON THE WATER		
1	**Light sheen**	A light, almost transparent layer of oil. Sometimes confused with windrows and natural sheen resulting from biological processes.
2	**Silver sheen**	A slightly thicker layer of oil that appears gray, silvery or shimmers.
3	**Rainbow sheen**	Sheen that reflects colors
4	**Brown oil** (heavy or dull sheen)	Water-in-oil emulsion. Thickness typically 0.1 to 1.0 mm. Can vary depending on wind and current conditions.
5	**Mousse**	Water-in-oil emulsion. Colors can range from orange or tan to dark brown.
6	**Black oil**	Sometimes with a latex texture. Can look like kelp and other natural phenomena.
7	**Windrows** (fingers, stringers, streamers)	Oil or sheen oriented in lines or streaks. Brown oil and mousse can be easily confused with algal scum collecting in convergence lines, algae patches, or kelp.
8	**Tar balls**	Oil weathered into a pliable ball up to 30 cm. Sheen may or may not be present.
9	**Tar mats**	Non-floating mats of oily debris (usually sediment and/or plant matter) found on beaches or just offshore in shallow water.
10	**Pancakes**	Isolated patches of mostly circular oil (size range a few centimeters to 100s of meters in diameter). Sheen may or may not be present.

Oil on the water

- Oil is best viewed with the sun behind the observer, flying at a 30-degree angle to the slick.
- Mid-morning or mid-afternoon viewing is generally best, avoiding midday glare off the water and the limited contrast encountered in early morning or early evening.
- Overall spill dimensions are generally best viewed from an altitude of 1000-2000 feet.
- Estimating oil coverage and color are best from an altitude of 200-300 feet or less.
- Oil surface slicks and plumes can appear different for many reasons including oil or product characteristics, sun angles, viewing angles, type of observation platform, weather, light conditions, sea state, and dispersion rate.
- Waves, kelp beds, natural organics, pollen, plankton blooms, cloud shadows, jellyfish and algae can all look like oil under certain conditions.
- Low-contrast conditions (*e.g.*, overcast, twilight, haze) make observations difficult.

Dispersant applications

- May have variable effectiveness where different oil concentrations (spill thicknesses) result in variable oil/dispersant ratios being applied.
- May cause herding, temporarily “pushing” the oil together and making the slick appear to shrink, or to disappear from the sea surface for a short time.
- May change the color of an emulsified slick by reducing water content and viscosity.
- May change the shape of the slick, due to the de-emulsification action of the dispersant.
- May modify the spreading rates of oils (treated slicks can cover larger areas).

Dispersed oil plumes

- May not form immediately after dispersant application, especially if the oil is emulsified or there is low mixing energy.
- May not form or be visible at all.
- May be masked by surface oil and sheen or hidden by poor water clarity.
- May be mistaken for other things such as suspended solids.
- Are often highly irregular in shape and concentration.
- Can range in appearance from brown to white or cloudy.

Dispersant effectiveness

- A visible cloud in the water column indicates the dispersant is working
- Differences in the appearance of treated and untreated slicks indicate dispersion is likely.
- Boat wakes may physically part oil, falsely indicating successful dispersion.

III.g Dispersant Observation Checklist

To be completed by dispersant observers on aircraft and vessels before departure

Incident name: _____ Report number:____

This report by:_____ Organization: _____ Date: _____ Time: _____

Observer name(s) and organizations: _____
_____

Observation platform: Helicopter / aircraft / boat / other (specify): _____
Application platform: Helicopter / aircraft / boat / other (specify): _____

COMMUNICATIONS

	VHF	UHF	Other
Air to air:			
Air to vessel:			
Air to ground:			
Ground to vessel:			
Vessel to vessel:			

	Aircraft/personnel names	Call sign	ETD to spill	ETA at spill
Sprayer 1:				
Sprayer 2:				
Spotter:				
Observer:				
Command Center:				

DISPERSANT

Name: _____ Dispersant : oil ratio: _____
Application altitude (ft): _____ Dilution prior to application (if any): _____
Observation altitude (ft): _____ Application rate: _____
Circle one: gallons/acre, gallons/km^2, liters/hectare

WEATHER ❑ Sunny ❑ Overcast ❑ Cloudy ❑ Rain ❑ Fog

Sea state: _____ Wind speed: _____ knots Air temp: _____ ºF
Wave height: _____ft Wind direction: _____ ºtrue/ºmagnetic Sea temp: _____ ºF
Water depth: _____ft Current speed: _____ knots Salinity: _____ ppt
Visibility: _____nm Current direction: _____ ºtrue/ºmagnetic Tide: _____(flood/ebb/slack)

DISPERSANT OBSERVATION EQUIPMENT AND SAFETY CHECKLIST

Observation
- Basemaps, charts
- Clipboard, notebook, reporting forms, checklists
- Pens, pencils
- GPS, spare batteries
- Job aids for visual observation
- Camera, spare film
- Video camera, spare batteries
- Binoculars

Personal safety
- Lifejacket (and exposure suit if required)
- Survival equipments (*e.g.*, flares, locator beacon)

Safety brief
- Safety brief with pilot/skipper
- Purpose of mission
- Operational constraints
- Area orientation, observation plan
- Trip duration
- Landing or mooring sites
- Radio frequencies and reporting schedule
- Safety features (*e.g.*, emergency locator beacon, fire extinguishers, first aid kit, radios)
- Emergency exit procedures
- Gear deployment (*e.g.*, current drogue, dye)

From Cawthron, 2000

III.h Dispersant Observations Report Form

For recording dispersant observations from aircraft and vessels

Incident name: _____ Report number:___

This report by:_____ Organization: _____ Date: _____ Time: _____

Application start time: _____(military time) Viewing difficulties (if any): _____
Application finish time: _____(military time) _____

VISUAL APPEARANCE OF SLICK (use standard definitions and visual guides of oil on water)

Before application	Immediately after application	20 minutes after application
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
Photo #s or file names: _____	Photo #s: _____	Photo #s: _____

Dispersion cloud observed? ❑ Yes ❑ No
Time taken for cloud to form:_____minutes

Did oil re-appear (re-coalesce)? ❑ Yes ❑ No
Time taken to reappear: _____minutes

% of slick treated: _____
% overspray: _____
Estimated % efficiency: _____

Describe any variation in effectiveness across slick:

Describe differences between treated and untreated areas:

Describe any biota present and any effects observed:

General comments/problems encountered:

Recommendations for future applications:

Start position
Latitude: _____north
Longitude: _____ west
Distance from shore: _____ miles

Finish position
Latitude: _____north
Longitude: _____ west
Distance from shore: _____ miles

From Cawthron, 2000

ENCLOSURE 4600 – ATTACHMENT IV

Wildlife Protocol Recommendations for Aerial Overflights during Dispersant Operations

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IV.a Accessing experienced/contracted wildlife observers for dispersant observations

The CDFW-OSPR maintains a list of experienced aerial wildlife observers already under contract to assist with wildlife surveys during an oil spill. Wildlife spotting before and after a dispersant application does not require that birds and mammals be identified to the species level, yet the aerial wildlife spotting experience that these observers can provide will offer more confidence in the data gathered. Contact the CDFW-OSPR Wildlife Operations Director to determine whether these experienced observers will be available, given their other primary wildlife survey responsibilities during a spill response, to assist with wildlife spotting during aerial dispersant operations. If not, other trained personnel, such as those from federal trustee agencies, may be able to assist.

IV.b Trustee agency wildlife monitoring during dispersant operations

The primary purpose of any wildlife spotter during dispersant operations, including a trustee wildlife spotter (TWS), is to monitor dispersant operations and provide confirmation that dispersant application operations are being conducted in accordance with the policies and procedures for wildlife protection outlined in the dispersant use plan. Specifically, the trustee wildlife spotter is to ensure that:

1) dispersants will not be applied directly to marine mammals within or outside of an oil slick;

2) dispersants will be applied in such a way as to avoid, to the maximum extent practicable, the spray of seabirds outside of the oil slick area being treated;

3) if sea birds and/or marine mammals are present in the dispersant application area, the application of dispersants will be dictated by the first two stipulations.

Although it is the commitment of the RRT that contracted/experienced spotters and/or trustee wildlife spotters (if contracted spotters are not available) be used when at all possible, dispersant operations will not be unduly delayed should a trained spotter not be available prior to dispersant application.

It is the role of the wildlife spotter to observe wildlife and assist the dispersant spotter (likely in a separate plane) and pilot of the dispersant application plane avoid spraying of wildlife, making notes as necessary and appropriate to document the operation. If inadvertent spraying of wildlife occurs, the wildlife spotter should make a note of this (including number of animals, species and location if possible) and include this

information in his/her report to the Unified Command at the end of each dispersant operation. If at any time dispersant operations are not being conducted in accordance with the California Dispersant Plan, a trustee wildlife spotter should report back immediately to the Unified Command.

A trustee wildlife spotter should be properly trained to fulfill the functions required. Such training shall include:

1) Identification of marine birds and mammals from an aircraft, with special emphasis on species of concern during a dispersant operation;

2) General knowledge of dispersant application policies and procedures and annual training and coordination with operational personnel tasked with dispersant spotting in California;

3) General knowledge and understanding of the Incident Command System; and,

4) General aviation and safety knowledge.

Wildlife spotting observations may be recorded on the following form (V.c), if no other form or format for recording observations is provided by the Wildlife Operations Director.

IV.c Sample Wildlife Aerial Survey Form

Incident name:		Flight #:	Survey #:
Date: Flight time period:		Survey page: of:	
Survey crew member:	Organization:	Survey equipment:	
Flight information:		Physical conditions:	
Aircraft type:		Winds (kts): From direction:	
Survey altitude range (ft):		Cloud cover (%):	
Survey start time:		Sea state:	
Survey end time:			
Overall sighting conditions: ☐ Excellent ☐ Very good ☐ Good ☐ Fair ☐ Poor			

Please note any observed wildlife in the grid below. Copy and use as many of this 2-pg form as necessary to cover the survey mission. Provide this information to the Resources at Risk Unit.

	Sighting specifics		
Sighting #	Number of animals:	Lat:	Taxa:
	Local time:	Long:	Species/ancillary ID info:
	Current altitude (ft):	General location:	
Sighting #	Number of animals:	Lat:	Taxa
	Local time:	Long:	Species/ancillary ID info
	Current altitude (ft):		
Sighting #	Number of animals:	Lat:	Taxa:
	Local time:	Long:	Species/ancillary ID info:
	Current altitude (ft):		
Sighting #	Number of animals:	Lat:	Taxa:
	Local time:	Long:	Species/ancillary ID info:
	Current altitude (ft):		
Sighting #	Number of animals:	Lat:	Taxa:
	Local time:	Long:	Species/ancillary ID info:
	Current altitude (ft):		
Sighting #	Number of animals:	Lat:	Taxa:
	Local time:	Long:	Species/ancillary ID info:
	Current altitude (ft):		

	Sighting specifics		
Sighting #	Number of animals:	Lat:	Taxa:
	Local time:	Long:	Species/ancillary ID info:
	Current altitude (ft):	General location:	
Sighting #	Number of animals:	Lat:	Taxa
	Local time:	Long:	Species/ancillary ID info
	Current altitude (ft):		
Sighting #	Number of animals:	Lat:	Taxa:
	Local time:	Long:	Species/ancillary ID info:
	Current altitude (ft):		
Sighting #	Number of animals:	Lat:	Taxa:
	Local time:	Long:	Species/ancillary ID info:
	Current altitude (ft):		
Sighting #	Number of animals:	Lat:	Taxa:
	Local time:	Long:	Species/ancillary ID info:
	Current altitude (ft):		
Sighting #	Number of animals:	Lat:	Taxa:
	Local time:	Long:	Species/ancillary ID info:
	Current altitude (ft):		

☐ Yes ☐ No Was the dispersant operations "box" broadly surveyed before spray operations began to determine where marine birds, mammals or turtles may have been?

☐ Yes ☐ No Did dispersant spraying subsequently focus on parts of the operational "box" that had fewest pre-spray wildlife sightings?

☐ Yes ☐ No Were wildlife sighted in the spray area during or immediately after spraying began? If so, of what type and roughly how many:

☐ Yes ☐ No Were videos/photos taken of the spray operation? If so, note video/image identification info and who is in possession:

☐ Yes ☐ No Per your observations, did it appear the dispersant spray operation met the RRT conditions of approval and/or observe all other best management practices related to minimizing wildlife disturbance or contact?

Any other comments or recommendations (related to avoiding or minimizing wildlife disturbance and/or contact with spray) that may improve future dispersant spray operations:

ENCLOSURE 4600 – ATTACHMENT V

PUBLIC COMMUNICATIONS PLAN

V.a Sample press releases

1. When dispersant use is under initial consideration

Date: Time:

To:

From:

Regarding: Why and how the use of chemical dispersants is evaluated

Incident Name:

In response to oil spill cleanup issues associated with the (*provide incident name*) oil spill incident, the Federal On-Scene Coordination for the (*provide FOSC agency*), in consultation with other members of the Unified Command for this response, is considering whether use of chemical dispersants may be appropriate in this case. Although no decision has be made yet about whether dispersants can or will be used, we want concerned citizens to know how the agencies and their partners go about making this difficult and complex decision.

Each oil spill is different, and our ability to respond to it in the safest and most environmentally responsible way may require the use of more than traditional mechanical response. Removing the oil from the water's surface using mechanical approaches (boats, containment boom, oil skimming systems) is always our first choice. However, if the spill is large and quickly spreading beyond the abilities of mechanical response, or sea and weather conditions are too rough to allow the vessels to safely and adequately contain and capture the oil, then we look at other response tools to see if they can play a strategic role in helping us minimize the impacts the spreading oil will cause, especially if it is coming toward shore where there are the highest wildlife numbers and the most sensitive habitat types.

There are relatively limited cases where dispersants will work for California marine oil spills. We do not generally recommend the use of dispersants if:

- The spill is over waters less than 60' deep;
- The spill is of gasoline, diesel, jet fuel, kerosene or other "light" oils that quickly evaporate;
- The oil spill is in a thin sheen;
- Use would be along shorelines or in fresh water;
- The spill is of heavy crude or fuel oils that are too dense for the dispersant to penetrate;
- The oil is more than about 50-60% emulsified (when water gets mixed into the oil and forms a "mousse");
- The spill is relatively small, and mechanical recovery can take care of most of it;
- The spill is on calm water (dispersants need a certain amount of wave chop to get them to mix).

Most of the oils that come from California are too heavy to disperse. The most commonly spilled oils are instead of refined products (gasoline, diesel, light fuel oils), but these are not the kind of spills dispersants should be used on. That leaves a relatively small set of oils and conditions for which we would consider dispersants to be at all feasible from an environmental standpoint – the mostly likely scenario would come from an offshore vessel coming to California, and for spilled oil that may be dispersible for up to 2-4 days after it spills.

We are also currently assessing whether it would be safe for personnel to apply the dispersants, and most important, whether there would be environmental benefits that outweigh the risks.

We are reviewing the California Dispersant Plan (*provide web site*), determining whether this is a dispersible oil, whether dispersants can be safely applied, and what wildlife and other resources are in the area right now that we need to consider. Our principal tasks right now are to:

- Know the oil type, whether it is chemically dispersible, and how long we would have;
- If we in the right spot (far enough offshore, in deep enough water), with relatively few wildlife or other resources that are in the potential spray path;
- Determine if weather and sea state conditions allow for safe operations;
- Determine if mechanical response capability is too limited in this case;
- If operations can be limited in time (just a few days) and within a very limited area;
- Know the research on the dispersant we would be using, and what happens once it (and the oil it breaks up) gets into the water;
- Know what is in the path of the oil slick on the surface, versus what is likely in the water column where the dispersed oil will go;
- Know both the benefits and the consequences of dispersant use. Do the trustee agencies think we will save more long-lived and sensitive species, and any environmental losses can be made up in a relatively short time?
- Determine whether dispersants could, in this case, provide some benefit. If so, how will we monitor for wildlife, seafood and human safety?
- Know when to stop.

Every one working on this problem understands fully that now that the oil has spilled, there will be environmental harm somewhere. Given the uniqueness of this spill, we will determine how to strategically minimize as much environmental harm as possible, and do it as intelligently, strategically and quickly as we can. Although we do need to work quickly, we are working very, very carefully.

It is the Regional Response Team IX and the (*note CG or EPA*) Federal On-Scene Coordinator that will ultimately make the decision about dispersant use for for this spill, and we are working diligently on their behalf to help them decide whether, in this incident, using dispersants could indeed do more good than harm. We will keep you posted.

Close the press release with information on any press conferences or public meetings that will be held, where to get additional information (Fact Sheets, web sites, etc.) and/or contact information that people can use.

2. For dispersant use in the California Pre-Approval Zone

Date: Time:

To:

From:

Regarding: Proposed Use of Chemical Dispersants

Incident Name:

In response to oil spill cleanup issues associated with the (*provide incident name*) oil spill incident, the Federal On-Scene Coordination for the (*provide FOSC agency*), in consultation with other members of the Unified Command for this response, has given approval for the use of the chemical dispersant (*provide dispersant name*) to promote rapid oil dispersion into the surrounding water column during this incident and under the following conditions:

The dispersant use meets the "pre-approval zone" criteria as set forth in the California Dispersant Plan – Pre-approval zone checklist and as approved by the Region IX Regional Response Team, ensuring:

- the application of dispersants will be in the off-shore waters off the state 3 – 200 miles and not within a National Marine Sanctuary;
- the application of dispersants is expected to provide an overall net environmental benefit for species at risk from this oil spill and/or of species of special concern: and,
- the application of dispersants can be done safely and in accordance with standard marine and aviation practices.

Even in the Pre-Approval Zone, the RRT IX does not allow use of dispersants on surface water oil spills for more than 5 days, or any sub-surface use. These exceptional dispersant use situations will require further review and approval from the RRT IX before use.

As a part of the FOSC decision for dispersant use, and in compliance with the approval authority previously delegated by the RRT IX to the FOSC, federal and State trustee agencies (*provide list of agencies, as necessary*) identified that (*provide list of species of special concern that dispersant use will potentially benefit*) are species of special concern and are at significant risk of injury from this oil spill, especially if conventional oil spill mechanical recovery tools are not able to address a significant portion of the slick, and the slick subsequently advances and impacts critically sensitive habitats and shorelines. The wildlife and resource agencies understand that chemical dispersant use provides its own set of risks and trade-off considerations, but upon review of this incident, believe that overall and long-term benefits to sensitive species and habitats will outweigh any localized and short-term harm to the less sensitive species and habitats. Monitoring of operations (for example, for dispersant effectiveness, wildlife in the area, water column effects, and seafood safety) are being planned for and will occur as appropriate.

Dispersants will only be used if, and for as long as, they are effective. Dispersant use operations will be monitored by (*list the agencies; contacts of necessary*) using the methodology developed by the US Coast Guard (1999) Special Monitoring of Applied Response Technologies (SMART) protocols and as specified in the California Dispersant Plan. These effectiveness data will be provided in a feed-back loop to the Unified Command. Operations will cease upon a determination that dispersants are no longer effective on the oil, cannot be safely applied in the prevailing weather or sea state conditions, or are leading to environmental consequences or effects that will lead to a conclusion by the trustee and response agencies that continued dispersant use will not provide an overall net environmental benefit to the most critically sensitive species and habitats.

Close the press release with information on any press conferences or public meetings that will be held, where to get additional information (Fact Sheets, web sites, etc.) and/or contact information that people can use.

3. For dispersant use outside the California Pre-Approval Zone

Date: Time:

To:

From:

Regarding: Proposed Use of Chemical Dispersants

Incident Name:

In response to oil spill cleanup issues associated with the (*provide incident name*) oil spill incident, the Federal On-Scene Coordination for the (*provide FOSC agency*), in consultation with other members of the Unified Command for this response, has determined that dispersant use may provide an overall environmental benefit in this response, they can be safely applied under existing conditions, that traditional mechanical oil response approaches may not recover enough of the oil slick in time to prevent more extensive wildlife and near shore impacts. The FOSC is therefore approaching the RRT IX to its review and approval for dispersant use. It is expected that the most effective and least damaging dispersant, (*provide dispersant name*), can be used to promote rapid oil dispersion into the surrounding water column during this incident and under the following conditions:

The dispersant use meets the "RRT Expedited Approval Zone" criteria as set forth in the appropriate checklist in the California Dispersant Plan, and ensuring:

- The application of dispersants will be over well-mixed waters that are a minimum of 60' in depth;
- Dispersants are being applied to a dispersible oil, but not to a spill of gasoline, jet fuel, fuel oil, kerosene, or other similar rapidly evaporating oil that forms a thin sheen;
- To the degree practicable, dispersants will not be sprayed over open water or on oil sheens;
- All wildlife avoidance measures suggested by the trustee agencies and/or the RRT will be observed, as have all appropriate emergency consultations under the Endangered Species Act, Marine Mammal Protection Act, etc.;
- All required and recommended monitoring of the dispersant operations will occur, including but not limited to monitoring for: worker safety, dispersant effectiveness, wildlife presence, sea food safety, general public safety, water column and air monitoring;
- The application of dispersants will only proceed if it is expected to provide an overall net environmental benefit for species at risk from this oil spill and/or of species of special concern;
- The application of dispersants can be done safely and in accordance with standard marine and aviation practices;

- Dispersant application will cease if no longer safe for workers, no longer effective, or not providing an overall environmental benefit.

As a part of the FOSC decision for dispersant use, and in compliance with the approval authority previously delegated by the RRT IX to the FOSC, federal and State trustee agencies (*provide list of agencies, as necessary*) identified that (*provide list of species of special concern that dispersant use will potentially benefit*) are species of special concern and are at significant risk of injury from this oil spill, especially if conventional oil spill mechanical recovery tools are not able to address a significant portion of the slick, and the slick subsequently advances and impacts critically sensitive habitats and shorelines. The wildlife and resource agencies understand that chemical dispersant use provides its own set of risks and trade-off considerations, but upon review of this incident, believe that overall and long-term benefits to sensitive species and habitats will outweigh any localized and short-term harm to the less sensitive species and habitats. Monitoring of operations (for example, for dispersant effectiveness, wildlife in the area, water column effects, and seafood safety) are being planned for and will occur as appropriate.

Dispersants will only be used if, and for as long as, they are effective. Dispersant use operations will be monitored by (*list the agencies; contacts of necessary*) using the methodology developed by the US Coast Guard (1999) Special Monitoring of Applied Response Technologies (SMART) protocols and as specified in the California Dispersant Plan. These effectiveness data will be provided in a feed-back loop to the Unified Command. Operations will cease upon a determination that dispersants are no longer effective on the oil, cannot be safely applied in the prevailing weather or sea state conditions, or are leading to environmental consequences or effects that will lead to a conclusion by the trustee and response agencies that continued dispersant use will not provide an overall net environmental benefit to the most critically sensitive species and habitats.

Close the press release with information on any press conferences or public meetings that will be held, where to get additional information (Fact Sheets, web sites, etc.) and/or contact information that people can use.

V.b General risk communication guidelines

Know the stakeholders

Identifying both external and internal stakeholders and finding out their diverse and sometimes competing interests and concerns is the first step to any successful risk communication effort. The best way to determine stakeholder interests and concerns is to ask them! Conduct interviews with key leaders both outside and inside your organization. Use the information gathered in this step to develop your risk communication program for establishing collaborative problem-solving and communication efforts.

Simplify language and presentation, not content

When trying to communicate the complex issues behind a health risk, it is easy to leave out information that seems to be overly technical. Risk communication research and studies have proven that all audience members can understand any technical subject if it is presented properly. This can be done, for example, through the use of visuals and diagrams and by defining all technical, medical and scientific jargon and acronyms.

Be objective, not subjective

It is often very easy to differentiate between opinions and facts. It can be difficult, however, to respond credibly to opinions without substantiating them or offending the individual asking the question. In order to maintain credibility, respond to both opinions and facts in the same manner.

Communicate clearly and honestly

To communicate clearly, present information at the audience's level of understanding. People can reject information that is too difficult for them or they can reject a communicator who is perceived to be dishonest or untrustworthy. As a result, they may refuse to acknowledge the information or become hostile. On the other hand, they may become hostile if they feel patronized. The bottom line is – know the audience! In addition, whenever possible, provide familiar examples and concrete information that can help put the risk in perspective.

Deal with uncertainty

When communicating health risks, results are not definitive. Discuss sources of uncertainty, such as how the data were gathered, how they were analyzed, and how the results were interpreted. This demonstrates that the uncertainties are recognized, which can lead to an increase in trust and credibility. However, when discussing uncertainty, the communicator should stress his or her expertise and knowledge of the subject. This will reinforce the leadership's ability to

handle the situation and could allay concerns and fears regarding the risk and the risk-management decision.

Be cautious when using risk comparisons

In order to put risks in perspective, comparing an unfamiliar risk to a familiar one can be helpful. However, some types of comparisons can alienate audience members. Avoid comparing unrelated risks, such as the risks associated with smoking versus those associated with air contamination. People rarely accept the comparison of unrelated risk.

Develop key messages

Key messages are those items of importance, the health risk information that needs to be communicated. They must be clear, concise, and to-the-point. No more than three messages should be communicated at one time. Repeat key messages as often as possible to ensure they are not misunderstood or misinterpreted.

Be prepared

Most questions and concerns can be anticipated if the audience is known. In fact, the communicator should know 70 percent of the possible questions that could be asked. Consider how to answer general questions and how to respond to specific inquiries.

V.c Risk communication guide for state or local agencies

Key risk issues often of interest to the community

- Consequences of worst-case and alternative scenarios and the likelihood of disaster.
- Local government and community emergency response actions, and how those have been factored into state and federal response actions.
- Community notification systems.
- Perceived risks as reported by the media.
- Use of standards and accepted practices.
- Safety thresholds and limits.
- Acceptance of the decision process and decisions by the technical, scientific and environmental communities
- Other potential considerations (*e.g.*, business (including commercial fishing and tourism) and recreation (including fishing and beach access) impacts.

- Pay as much attention to community outrage factors, and to the community's concerns, as you do to scientific data. At the same time, do not underestimate the public's ability to understand technical information**.**

General risk perception and communication issues

- Risks under individual control are accepted more readily than those subject to industry or government control.

  At the time of an actual spill response and/or a decision to use dispersants, response actions will be directed by the FOSC and Unified Command. It is important that during an oil spill emergency response, actions taken are quick, well-considered, yet nevertheless directive. To offset public unease at how heavy-handed this may seem, it will be helpful to briefly review how various stakeholder groups and the public were included in preceding dispersant response <u>planning</u> process, and how the current dispersant decision is being guided by real-time data gathering. Also include information on other agency consultations, and how particular concerns about living resources, fishery impacts, and socioeconomic impacts will be addressed.

- Risks that seem fair are more acceptable than those that seem unfair.

  It may be helpful to explain the Net Environmental Benefit Analysis process that was used in the response planning phase. At that time, it was determined that 1) harm would occur as a result of a spill, and 2) the goal is to minimize the overall harm and spare the most sensitive resources, and provide a <u>net</u> environmental benefit. However, the communicator will also need to address questions of impacts to business and coastal and ocean

access, as these were not considered at the time that net environmental benefits were being weighed during the planning process.

- Risk information that comes from trustworthy sources is more readily believed than information from untrustworthy sources.

  Use the guidance offered above in Attachment V.b.

- Exotic risks seem more dangerous than familiar risks.

  Use of dispersants in California is not a common oil spill response practice. The public will expect to see that all other means to recover oil using the more traditional mechanical means have been considered. They also need to understand the circumstances under which dispersants may cause less harm to the environment than would those more traditional mechanical recovery tools, and how all means to recover and/or re-locate the oil to less sensitive environmental "compartments" will be used.

- Risks that are "undetectable" are perceived as more dangerous.

  It is extremely likely that the public will interpret a decision to use dispersants as a decision to "hide" the oil. These concerns need to be addressed openly and honestly, drawing on the communication tools in Attachment V.b, as well as the resource impact information generated during the dispersant Net Environmental Benefit Analysis response planning process.

Possible objectives of a risk communication program

- Research the issues with stakeholders to gather sufficient information to identify the most important risk communication objectives to address.
- Identifying the stakeholders to anticipate or assess their varying interests, in order to design an effective risk communication program is a critical initial task.
- Stakeholders can include the residential, business, commercial or industrial communities, your agency and other agencies (local and state governments, special districts), environmental groups, and general interested members of the public. Media members may also be present.
- The level of stakeholder interest is a driving force in the assignment of risk communication priorities -- properly identifying and understanding all stakeholder objectives will enhance risk communication effectiveness.
- Communication objectives may include:
  - informing the community, seeking input or feedback, clarifying the probability and consequences of potential risks, addressing existing controversies or concerns, providing a forum for discussion, improving stakeholder understanding and support of government decisions, clarifying agency roles in controlling risk, coordinating federal and state emergency

response plans with local government and business emergency response plans, and satisfying regulatory requirements to communicate risk.

- Potentially important objectives during and after the incident include:
  - retaining credibility and trust, clarifying how the current incident compares to the previously assessed risk, identifying how lessons-learned will be used to decrease risks and consequences in the future, and providing enhancements to future community emergency response.

Defining effective risk communication activities during and after incidents

- If an incident was noticed by or impacted the public, time is of the essence in providing information to the community.
- Several communication media (*e.g*., newspapers, television, radio, technical journals) will be readily available, but not necessarily controllable.
- The community will gauge the success of the incident investigation efforts and control of causal factors by how much information is communicated to the community.
- If there is a high degree of uncertainty, focus the risk communication effort on what is being done to control the emergency. Keep the communication channels open.
- Contact news media to provide information. See "**Guidelines for meeting with the media**" below. If there is uncertainty with respect to event chronology or causes, release the information prudently and properly identify that the information is preliminary, but additional information will be provided as it becomes available.
- After an incident:
- Ensure that any preliminary information has been verified, clarified or modified so that future references to the incident will be factual.
- Follow-up with local and regional media to verify key information and provide a close-out mechanism for the spill response.
- Be honest and candid with the public and media, using the "**Guidelines for meeting with the media"** presented below

Choosing the right representatives

- Use field/community relations staff to relay community concerns within the agency.
- Choose carefully those who represent the agency, and provide appropriate support
- Technically-qualified people should have a major role in risk communication.
- For effective communication, representatives need to address technical, communication and authority issues.
- If possible, use the same agency representative throughout the life of the event.
- In some situations, a non-agency representative may be more useful than someone from inside an agency.

Responding personally

- When you speak at a public meeting, tell people who you are, what your background is, and why you are there.
- When speaking personally, put your views into the context of your own values, and urge your audience to do the same.
- If your personal position does not agree with agency policy, do not misrepresent yourself or mislead the community.
- Prepare responses to potential questions before the meeting.

Creating and maintaining trust and credibility during and after an incident

- Maintain open channels of communication.
- Provide critical information promptly.
- Ensure that the public receives a clear message that the emergency responders are taking appropriate actions to mitigate the event.
- Provide a resource for the public to call to secure additional information.
- Take appropriate steps to promptly investigate the cause of the event.
- Ensure that the public receives a clear message that an investigation of the incident was performed and appropriate actions to prevent a future incident were identified for implementation.
- Provide appropriate follow-up information and follow through with any commitments to the community.
- Recognize that people's values and feelings are a legitimate aspect of public health and safety issues and that such concerns may convey valuable information.
- When people are speaking emotionally, respond to their emotions. Do not merely respond with data.
- Be aware of your own values and feelings about an issue and the effect they have on you.
- Empathetic words will be effective only if your tone of voice, body language and demeanor reinforce what you are saying.

Guidelines for meeting with the media

- Be prepared. Plan what you want to say and anticipate reporter's questions.
- Take and keep control. You decide where to be interviewed. Bridge to your points or to turn negative questions into positive responses. Don't repeat negatives. Know when to exit the interview.
- Make your point. Bring your own agenda to the interview. Stress positive aspects of your operation.
- Keep your composure and watch your body language. Look and sound like you want to be there. Be cooperative, not combative. Avoid a defensive appearance.

- Don't speculate. If you do not have an answer, say so. Do not answer hypothetical questions. Do not feel all questions must be answered immediately.
- Never say "No Comment". Give sound reasons why you cannot answer a question (proprietary information, lack of authority, etc.).
- Never go "Off the Record". Anything you say may be reported. Do not be tricked into answering a question when a reporter says he has turned off a microphone or camera.

V.d Planning a public meeting: Checklist

As discussed in Attachment V.c, public meetings are one way to involve the community stakeholders in your agency's spill response communications plan. They can be organized in many different ways, depending on the goal, topic, audience and other factors. This checklist will help with general elements that would apply to most public meetings.

PUBLIC MEETING CHECKLIST

MEETING PURPOSE

Organizations and individuals identified?	❑Yes	❑ No
Interests identified and categorized?	❑Yes	❑ No
Meeting time: _____		
Date: _____		
Hours: _____		
Meeting place(s): _____		
Address: _____		
_____		
Central location?	❑Yes	❑ No
Public transportation access?	❑Yes	❑ No
Suitable parking?	❑Yes	❑ No
Safe area?	❑Yes	❑ No
Adequate space?	❑Yes	❑ No
Adequate facilities?	❑Yes	❑ No
Total expected:		
General session planned?	❑Yes	❑ No
Number of small groups/number in each:		
Agenda questions developed?	❑Yes	❑ No
Schedule developed?	❑Yes	❑ No
Stakeholder interest topics included?	❑Yes	❑ No
Speakers and speaker order identified?	❑Yes	❑ No

INFORMATION DEVELOPMENT AND PRESENTATION

Information to be provided:

Written information completed?	❑Yes	❑ No
Role for moderator identified?	❑Yes	❑ No
Moderator rehearsed?	❑Yes	❑ No

PUBLICITY

Methods selected: _____		
_____		
Material prepared?	❑Yes	❑ No
Number of copies: _____		
Material distributed?	❑Yes	❑ No
Personal follow-up?	❑Yes	❑ No
PIO/JIC contacted?	❑Yes	❑ No
Message developed?	❑Yes	❑ No
Message approved?	❑Yes	❑ No
Answers prepared?	❑Yes	❑ No
Press release issued?	❑Yes	❑ No

MEETING ARRANGEMENTS

Tables, chairs, lecterns obtained?	❑Yes	❑ No
Audio/visual equipment obtained?	❑Yes	❑ No
Registration table?	❑Yes	❑ No
Name tags?	❑Yes	❑ No
Refreshments?	❑Yes	❑ No
Heating & cooling OK?	❑Yes	❑ No
Sound & lights OK?	❑Yes	❑ No
Pens, pencils, flipcharts?	❑Yes	❑ No

RECORDING THE PROCEEDINGS

Methods:

Moderators:

Meeting evaluation tools:

Recommendations made?	❑Yes	❑ No
Recommendations taken?	❑Yes	❑ No
Post-meeting report to public made?	❑Yes	❑ No

V.e Dispersant Fact Sheet

1. Why are chemical dispersants used on an oil spill?

Dispersants are used to minimize the environmental impact of an oil spill.

Dispersants *do not eliminate the problem of an oil spill* but are intended as a means of reducing the overall environmental impact of an oil slick at sea. Oil spill dispersants accelerate the weathering and biological breakdown of oil at sea and *reduces the impact of oil on sensitive nearshore environments*.

Oil dispersants are also highly effective in *reducing exposure of sea birds and marine mammals to oil* as most sea birds are oiled by slicks on the surface of the sea or in near shore coastal habitats.

Undispersed slicks and residual oils are a persistent threat to nearshore, birds, mammals and intertidal communities due to the toxicity of, and contact with, the oil. Dispersed oil is less "sticky" than undispersed oil, therefore the adhesion and absorption onto surfaces and sediments of dispersed oil is greatly reduced compared with the original oil slick.

In a spill incident, environmental trade-offs of protection and sacrifice will occur. These decisions are not taken lightly by response authorities and will be based on the best available advice and scientific data to achieve a net environmental benefit.

2. What are oil spill dispersants?

Dispersants are chemical formulations with an active ingredient called surfactants. Surfactants are specifically designed chemicals that have both hydrophilic (water liking) and oleophilic (oil liking) groups in the chemical compound. These chemicals reduce the interfacial tension between the oil and water and helps create small oil droplets, which move into the water column and hasten the natural biological breakdown (biodegradation) and dispersion of the oil. By decreasing the size of the oil droplets, and dispersing the droplets in the water column, the oil surface area exposed to the water increases and natural breakdown of the oil is enhanced. Accelerating the rate of dispersion shifts more of the threat from the water surface to the water column. Generally, the longer-lived birds and mammals using the water surface will have a greater chance of being saved, in exchange for shorter-term or lesser impacts to the more resilient resources (plankton, small fish) in the water column.

Dispersion is a natural process that occurs in surface slicks as wind and wave action break up the surface slick. However, naturally dispersed oil droplets tend to recoalesce and return to the water surface and reform as surface slicks. The additional of chemical disprsants allows the wind and wave action to then carry the small oil drolets away and dilut the concentration of the droplets in the water colum; these dispersed oil droplets are then targeted by indigenous oil-consuming microbes wehre they are broken down into the ultimate components, carbon dioxide and water.

3. How is the decision made to use dispersants in a spill incident?

The main basis for decision making in determining whether oil spill dispersant will be used is:

"Will the application of the chemical dispersant to the spilled oil minimize the overall environmental impact of the oil spill?"

Except for the impact on marine birds and mammals, the most damaging effect of oil spills is when the oil strands on shorelines or enters restricted shallow waters like estuaries. Oil Spill Dispersants are a prime and vital response tool to stop oil coming ashore or from entering sensitive nearshore environments especially when weather and sea conditions do not allow the use of oil containment and recovery equipment.

Oil dispersants are usually not applied to oil spills close to shore where sea grass beds, kelp beds, oyster beds, mariculture operations or coral reefs are present. However, dispersant use may be authorized by the Region IX Regional Response Team in these circumstances when there is a possibility of an impact of oil on a more sensitive nearhore habitat, or wildlife impacts are possible, such as to keep an approaching oil slick from impacting sensitive mammal breeding areas, or threatened or endangered species such as sea otters or migratory birds.

4. What are the negative effects of dispersants on the environment?

The acute toxicity of dispersed oil generally *does not reside in the dispersant* but in the more *toxic fractions of the oil*. Dispersing oil into the water in situations where there is little water movement or exchange, such as shallow embayments, increases exposure of subsurface, benthic organisms and fish to the toxic components of the oil. This use of dispersant is not recommended, as it may not provide a net environmental benefit.

Fish and other marine life in the larval stage or juvenile stages are more prone to the toxic effects of oil and dispersants. Therefore it is unlikely dispersants will be used near commercial fisheries, important breeding grounds, fish nurseries, shellfish aquaculture etc., unless it is to protect a more important environmental resource.

Seagrasses and coral reef communities are particularly sensitive to dispersed oil because instead of the oil "floating over" the reefs and submerged seagrass beds the oil/dispersant mixture in the water colour will *come into direct contact with these sensitive ecosystems.*

Generally there is reluctance by spill responders to use dispersants in shallow waters less than 30 feet deep, although there may be situations where using dispersants could save nearshore impacts or wildlife. We are more protective in California, and suggest that dispersants not be used on waters less than 60 feet deep.

5. Who authorizes the use of dispersants during an oil spill response?

Under the Oil Pollution Act of 1990, the Region IX Regional Response Team is vested with the authority over dispersant use for marine oil spills. Subpart J of the National

Contingency Plan (NCP) provides that the Federal On-Scene Coordinator (FOSC), with the concurrence of the EPA representative to the Regional Response Team and the State with jurisdiction over the navigable waters threatened by the oil discharge, and in consultation with the U.S. Department of Commerce (DOC) and U.S. Department of the Interior (DOI) natural resource trustees, when practicable, may authorize the use of dispersants on oil discharges; provided, however, that such dispersants are listed on the NCP Product Schedule and licensed for use by the State of California.

The California Dispersant Plan outlines the process by which the Federal On-Scene Coordinator can undertake a dispersant use decision and provides the criteria to determine if a spill meets the requirements outlined by the RRT for pre-approval of dispersant use. If all the pre-approval criteria are met, the FOSC can authorize the use of dispersants. If it is determined that a spill does not meet the pre-approval zone or use criteria, then the final decision for a dispersant-use determination rests with the RRT

6. How effective are oil spill dispersants?

Chemical dispersants aid the natural dispersion of oil by reducing the oil/water interfacial tension and, along with the natural motion of the sea, allow the break up of oil on the water into very fine droplets.

Effectiveness of oil dispersion by chemical dispersants at sea is governed by a range of conditions and include the:

- Type and chemistry of the oil,
- Degree of weathering of the oil,
- The thickness of the oil slick,
- Type of dispersant,
- Droplet size and application ratio,
- Prevailing sea conditions (wave mixing energy), and
- Sea temperature and salinity.
-

7. Will dispersants work on all types of oils?

No, dispersants will not work on all oil spills.

The first rule in combating oil spills with dispersants is that the oil must be amenable to dispersant breakdown. It is also well understood by oil spill response agencies that *dispersants are only effective on certain types of oils* and the first priority is always to determine the spilled oil's physical and chemical properties in order to assess response and treatment options.

It has been generally accepted that non-dispersible oils are:

- Non-spreading oils (pour point is higher than sea temperature);
- Highly viscous oils (> 2000 Centistokes (cSt) - a measurement of the mobility of oil);
- Already emulsified (the oil has taken up water and formed a “mousse”.

Very generally speaking, dispersants may work if the spilled oil is still able to flow and spread (and not just sheen from the edges). However, this ability of the oil to spread will all depend on its qualities – specific gravity, pour point, and viscosity. Pour point and viscosity of spilled oil are the driving characteristics of a dispersible oil, and the California Dispersant Plan provides tables of oils and oil characteristics that can assist responders at the time of an oil spill incident

8. How quickly do we need to apply dispersants to an oil spill?

As quickly as possible!

There is only a limited "window of opportunity" to use chemical dispersant in an oil spill incident. This is primarily due to the changing properties of the spilt oil due to weathering of the oil, but is also governed by the location and speed of movement of the slick onto the foreshores or into estuarine environments.

This window of opportunity may be as little as only a few hours, or may extend to a few days. It is essential that the capability exists to quickly activate and deploy resources anywhere across California to deliver dispersant resources to marine oil spill.

9. What human health and safety Issues are associated with dispersants?

Response workers must be careful to ensure that personnel do not get sprayed by the dispersants, or come in contract with any of the overspray. Vessels must only be deployed under safe sea conditions.

10. Are there any waste disposal Issues associated with dispersants?

Effective use of dispersant agents should significantly reduce the amount of oily waste generated, and subsequent disposal requirements.

ENCLOSURE 4600 – ATTACHMENT VI

SEAFOOD SAFETY

(Please also see RCP Section 4520)

When a petroleum product is spilled into marine waters, the safety of consuming seafood that may be impacted by the spill is of paramount concern for public health and natural resource officials as well as the public. This Attachment will outline the general procedures for assessing seafood safety for spills occurring in California state and offshore (federal) marine waters. These procedures apply whether or not dispersants are also used as part of spill response.

The U.S. Food and Drug Administration (FDA) has jurisdictional authority over the safety of all food entering interstate commerce. The California Department of Public Health (CDPH) has jurisdictional authority over certain commercial seafood operations in California. In the event of a spill in California state waters where FDA and/or CDPH also have jurisdiction over commercial product, all responsible agencies will coordinate to facilitate a unified seafood safety plan and re-opening protocol.

Listed below are some general understandings of seafood exposures and the potential for contamination from oil (whether the oil is a surface slick, or naturally or chemically dispersed into the water):

- Wild finfish are unlikely to become contaminated or tainted because they typically are either not exposed or are exposed only briefly to the spilled oil and because they rapidly eliminate petroleum compounds taken up. Exceptions may occur if a large amount of fresh, light oil is mixed into the water column or if bottom sediments become contaminated. If nearshore sediments are contaminated, species that spawn in nearshore and shallow waters are more likely to be exposed to spilled oil than pelagic and benthic species.
- Penned finfish are more susceptible to tainting and contamination because they are not able to escape exposure.
- Shellfish are more likely than finfish to become contaminated from spilled oil because they are more vulnerable to exposure and less efficient at metabolizing petroleum compounds once exposed.
- Among crustaceans, species that burrow are at the highest risk of exposure at spills where bottom sediments are contaminated, followed by species that use nearshore and estuarine benthic habitats.
- Bivalves are at high risk of contamination because they are attached to their substrates, are filter-feeders or deposit-feeders, and occur in substrates in shallow subtidal and intertidal areas that are more likely to become contaminated.
- It is generally accepted that uptake and elimination rates both increase with temperature, though study results are somewhat contradictory.
- Polycyclic aromatic hydrocarbons (PAHs), one of the most problematic components of oil, tend to accumulate to higher concentrations in lipid-rich tissues and

organisms. Seasonal differences in tissue lipid content associated with spawning may influence uptake and elimination rates of PAHs in some marine species.

- Chronic exposure to hydrocarbons in water and sediments may reduce elimination capacity.

VI.a Seafood safety in California federal offshore marine waters

1. Notification and determination of the threat to public health

The National Oceanic and Atmospheric Administration (NOAA), National Marine Fisheries Service (NMFS) has jurisdiction over fisheries in federal waters and operates the Seafood Inspection Program and National Seafood Inspection Laboratory (NSIL). The U.S. Food and Drug Administration (FDA) has jurisdiction over all fish and fishery products entering interstate commerce and operates a mandatory seafood safety program. In the event of a spill in federal waters, the Unified Command Environmental Unit Leader (EUL) will typically be responsible for notifying NOAA/NMFS and FDA if conditions suggest that consuming seafood from the spill area may pose a threat to human health. The EUL will also provide NOAA/NMFS and FDA information on the spill. NOAA/NMFS, in consultation with FDA, will decide whether fisheries in federal waters should be closed to protect public health.

2. Fisheries closure process

If the size of the spill and other considerations indicate that a fisheries closure should be implemented, NOAA/NMFS and FDA will follow the general procedures exemplified in the "Protocol for Interpretation and Use of Sensory Testing and Analytical Chemistry Results for Re-Opening Oil-Impacted Areas Closed to Seafood Harvesting Due to the Deepwater Horizon Oil Spill" (FDA, 2010b), described in this and subsequent sections. Specifically, if oil (exceeding a light sheen) is observed on the surface, fisheries will likely be closed until oil is no longer visible. Trajectories may be used to predict surface oil movement and thus inform closure decisions. Closure areas may include a precautionary buffer zone around oiled waters.

3. Seafood monitoring following fisheries closure

Once a fisheries closure has been implemented, NOAA/NFMS and FDA will develop a seafood sampling and analysis plan to detect the presence of oil (and potentially dispersant, if dispersants have been applied to the spill) constituents and taint in edible tissues. Factors evaluated to develop the sampling and analysis plan, as well as items included in the plan, will be similar to those described in section VI.a.3. An analytical laboratory will be selected to receive and analyze the samples for specified oil (and potentially dispersant) constituents according to established laboratory methods that meet minimum detection limits and designated performance standards.

Sensory analysis will be likely be conducted by a U. S. Department of Commerce Seafood Inspection Program Laboratory.

NOAA/NFMS and FDA will evaluate the findings of the analytical and sensory tests.

4. Re-opening or maintaining fisheries closures

Post-closure risk assessment

Following receipt of validated analytical results for selected oil (and potentially dispersant) constituents, FDA will conduct a human health risk assessment by comparing tissue concentrations to risk-based criteria developed to establish the safety of fish and shellfish consumption, following the same general considerations as described in section VI.b.2.

Re-opening fisheries

If oil did not enter an area that was closed as a precaution, the area may be re-opened without subjecting seafood samples to testing for taint or chemical contamination. Specific re-opening criteria include (quoted from FDA, 2010b):

- Low threat of exposure – Threat of exposure will be based on past observation and the status of the spill and conditions
- Evaluation of oil movement – Confirmation that the closure area is free of fresh oil on the surface by visual observation and/or aerial reconnaissance (allowing for consideration of background conditions), or the presence of oil in the water column through visual observation or water testing.
- Assessment of seafood contamination by sensory testing – Determine if the seafood is contamination by tissue collection and sensory testing. The acceptable condition is that all specimens must pass sensory testing conduction by a NOAA-FDA expert sensory panel.
- Assessment of seafood contamination by chemical analyses – Chemical analyses are performed on samples that pass sensory assessment to confirm that PAH concentrations are below the applicable FDA levels of concern for human health. Final determinations may take into consideration what is known regarding relevant background information for specific harvest areas.

NOAA, in consultation with FDA, will review the data generated, including the accuracy and quality of the data. Based on this assessment, NOAA may re-open a closed fishery with FDA concurrence.

Maintaining fisheries closures

If samples from an area fail sensory or chemical testing, a determination will be made as to when to retest, based on the condition of the fishery and the failure results.

VI.b Seafood safety in California state offshore marine waters

1. California Fish and Game Code Section 5654

The California Department of Fish and Game (DFG) has jurisdiction over fisheries in California state waters. Following the 2007 Cosco Busan oil spill in San Francisco Bay, the state of California enacted Fish and Game Code Section 5654, dictating certain responses to a spill or discharge involving ≥ 1 barrel (42 gallons) of a petroleum product into state marine waters in areas where any fishing, including all commercial, recreational, and non-licensed subsistence fishing, may take place, or where aquaculture operations are taking place.

In response to this law, DFG Office of Spill Prevention and Response (OSPR) and OEHHA developed the "California Fisheries Closure Joint Protocol for Marine Oil Spills." This internal document outlines the respective functions of each agency during a spill response and provides contact information for supporting local, state and federal agencies. The protocol is a living document that will be updated or amended as circumstances warrant. Major elements of the protocol are discussed below, as well as a summarization of the risk assessment process utilized to determine the safety of seafood consumption following an oil spill.

Initial 24 hours: Notification and determination of the threat to public health

Once DFG/OSPR has been notified of a spill of ≥ 1 barrel of petroleum product into California marine waters, and determines that fishing or aquaculture may take place in the area impacted by the spill, the OSPR Seafood Safety Technical Specialist (SSTS) notifies the OEHHA Staff Toxicologist serving as the Technical Specialist (TS) for oil spills. The OSPR SSTS also notifies the National Oceanic and Atmospheric Administration (NOAA) Scientific Support Coordinator (SSC) for Region IX. The OSPR SSTS, in consultation with the Field Response Team and/or Unified Command, provides the OEHHA TS with spill-specific data, if available, including:

- Product type and Material Safety Data Sheet
- Estimated quantity of spill product
- Location of spill
- Size of impact (*i.e*., areal footprint of spill and potential plume)
- Potential fisheries impacted
  - Sport versus commercial (including aquaculture)
  - Finfish vs. shellfish
  - Open seasons; quarantines
  - Shoreline types (piers/jetties; rocky intertidal; sandy beaches)
- Whether spill is likely to dissipate or be cleaned up within 24-48 hours
- Estimated spill trajectory

The OEHHA TS will compile and evaluate the available spill information to determine the likelihood of the following, to the extent feasible:

- Danger to the public from dermal and inhalation exposures while fishing in the area where the spill occurred or spread
- Danger to the public from consuming fish and shellfish caught in the area
- Danger to the public from consuming fish and shellfish that have been contained in recirculating tanks on board vessels that may have become contaminated by the spill.

Within 24 hours of DFG notification of the spill, OEHHA will notify the DFG Director or designee, in writing, of their recommendation regarding fisheries closure. If a closure is deemed appropriate, the recommendation will include OEHHA and OSPR's joint determination of the fisheries closure boundaries. Whenever possible, a map will be produced with the assistance of a GIS specialist and attached to the DFG closure declaration. A narrative description of the closure boundaries will also be provided to support radio announcements to fishermen in the affected area. If OEHHA determines that a public health threat does not or is unlikely to exist, the OSPR SSTS will communicate these findings to the Unified Command.

2. Fisheries closure process

If OEHHA determines that a public health threat is likely, or does not yet have enough information to make that determination, the OSPR SSTS will coordinate with the OSPR Administrator and the DFG Director or designee to initiate the Fisheries Closure Process within 24 hours of the initial spill notification to OSPR. A Closure Declaration document will be prepared and signed by the DFG Director or designee. The OSPR SSTS will notify the State On-Scene Coordinator (SOSC) and the DFG Public Information Officer (PIO). The fisheries closure will be communication to the public as described in section VI.b.3 below.

Post-closure: Within 48 hours after incident notification

If a closure is implemented, the OSPR SSTS will continue to collect and transmit spill and fisheries information to the OEHHA TS and OSPR management. Within 48 hours of notification of a spill or discharge, OEHHA will evaluate the updated spill information to determine whether a human health threat is still likely to exist or still cannot be determined. The OEHHA TS reports to the OSPR SSTS and/or OSPR administrator (or designee) confirming the presence/absence of a significant risk to human health. If OEHHA determines that there is no likely significant risk to the public, the DFG Director or designee may immediately re-open closed areas. If a public health threat is still present or still cannot be determined, the OSPR SSTS and OEHHA TS will review spill trajectory and surface oiling information and determine any necessary new closure boundaries and the likely closure period. This information is communicated to the DFG Director and the public, including commercial, recreational and subsistence fishing representatives.

If a closure is maintained beyond 48 hours after notification of the spill, but in no event more than seven days from notification of the spill or discharge, the DFG Director will order expedited testing of fish and/or shellfish that would have been open to take were it not for the closure. Testing is conducted to determine concentrations of oil (and potentially dispersant, if dispersants have been applied to the spill) constituents in edible tissues and whether the fish or shellfish are safe for human consumption. In order to facilitate expedited testing, OEHHA will convene a Seafood Safety Technical Advisory Group (SSTAG) to develop the sampling and analysis plan and initiate emergency contracting. The OEHHA TS serves as Project lead and Sampling Coordinator and the OSPR SSTS serves as the Field Sampling Lead. Other members of the SSTAG may include representatives from OEHHA and DFG – Marine Region, DFG/OSPR, CA Department of Public Health (CDPH), Regional Water Quality Control Boards, NOAA/National Marine Fisheries Service, and Native American tribal governments. Planning activities may include:

- Evaluation of the potential seafood resources impacted by the spill
- Feasibility of collecting specimens
- Geographic extent of the spill
- Environmental fate of the spilled product
- Data needs of the risk assessment
- Availability of background seafood analytical data for the area

The OEHHA TS will author the sampling and analysis plan, including:

- Study area
- Sampling locations
- Target species
- Number of samples
- Timing of initial and repeat sampling
- Sampling collection methods
- Handling/shipping procedures
- Analyses to be conducted

Guidelines for seafood sampling and chemical analyses are available (OEHHA, 2006; U.S. EPA, 2000; Yender et al., 2002).

With input from the SSTAG, the OSPR SSTS will identify field sampling team members, including a sampling team lead. The SSTAG will identify the analytical laboratory that will receive and analyze the samples, while the OSPR SSTS will coordinate shipment of samples from the field sampling leads to the analytical laboratory. The analytical laboratory will report to a designated SSTAG representative to verify that samples were received in acceptable condition. Samples will be analyzed for specified oil (and potentially dispersant) constituents according to established laboratory methods that meet minimum detection limits and designated performance standards. The analytical laboratory will provide the analytical data, including laboratory quality assurance/quality controls results, and completed chain of custody forms to a designated SSTAG

representative. DFG Water Pollution Control Laboratory staff will review the laboratory results and provide the data and a report summarizing the data quality to the OEHHA TS.

After an oil spill, seafood may become "tainted" with an abnormal odor or flavor of petroleum (or dispersant) product. Taint may affect the palatability, marketability and economic value of seafood. Although taint is not necessarily harmful to human health, tainted seafood is considered "adulterated" and, by law, cannot enter interstate commerce (U.S. FDA, 2010a; Yender et al., 2002). In the event that the SSTAG determines that testing for seafood tainting is needed, the SSTAG will incorporate these data needs into the seafood consumption sampling and analysis plan. Detailed guidance on sampling for sensory evaluation is available (Reilly and York, 2001).

Sensory analysis will likely be conducted by the U.S. Department of Commerce, Seafood Inspection Program Laboratory, Long Beach CA, using standardized operating procedures (Reilly and York, 2001). However, other approved sensory testing laboratories may be used. The sensory testing laboratory will report to a designated SSTAG representative to verify that samples were received in an acceptable condition. The laboratory will provide the results of the sensory evaluation and the completed chain of custody forms to the designated SSTAG representative(s).

OEHHA will evaluate findings and make recommendations to the DFG Director or designee, as appropriate.

Re-opening or maintaining fisheries closures

The U.S. Food and Drug Administration (FDA) has jurisdictional authority over the safety of all food entering interstate commerce. CDPH has jurisdictional authority over certain commercial seafood operations in California. In the event of a spill in California state waters where FDA and/or CDPH also have jurisdiction over commercial product, all responsible agencies will coordinate to facilitate a unified seafood safety plan and re-opening protocol.

OEHHA post-closure risk assessment

Following receipt of validated analytical results for selected oil (and potentially dispersant) constituents, the OEHHA TS will conduct an expedited human health risk assessment by comparing tissue concentrations to risk-based criteria developed to establish the safety of commercial and recreational fish and shellfish consumption. Higher molecular weight polycyclic aromatic hydrocarbons (PAHs) are the oil constituents most likely to result in seafood contamination, particularly in species such as bivalve mollusks that are not mobile and do not rapidly metabolize these compounds as do finfish and some other shellfish (Yender et al., 2002; Meador et al. 1995). While not generally considered acutely toxic, several of these higher molecular weight PAHs are extremely potent carcinogens, most notably benzo[a]pyrene (BaP). Thus, cancer is generally considered the health effect of concern for contaminants found in seafood

following an oil spill. Nonetheless, the non-carcinogenic hazards of selected oil (and potentially dispersant) constituents will also be assessed, as deemed relevant.

Specific factors and assumptions used to set public health protective concentrations for carcinogenic risk and non-cancer hazards will be reviewed and potentially updated with current scientific and population-based information at the time of a fishery closure.

After examining the results of the human health risk assessment, OEHHA will determine whether a threat from consuming fish or shellfish existed in the closure area at the time of the sampling and whether post-sampling oiling conditions may have increased or decreased the threat. If OEHHA determines that a threat continues, OEHHA will also determine:

- Whether the boundaries of the closure should be changed
- Whether any fisheries can be excluded from the closure
- Whether and what further sampling is required to continue to monitor human health risk

Immediately after completion of findings above, OEHHA shall inform the DFG Director or designee of OEHHA's recommendations regarding human health. As soon as practicable, OEHHA will issue a report describing its evaluation/ assessment, testing protocols, findings, and recommendations.

Re-opening fisheries

Within 24 hours of receipt of OEHHA's finding of no likely health threat to human health in the closed area, the DFG Director or designee will re-open the closed area.

Maintaining fisheries closures

Within 24 hours of receipt of OEHHA's finding of significant threat to human health in the closed area, the DFG Director or designee may issue a modified Closure Declaration or notice, as appropriate, including re-definition of closure boundaries, if applicable; reduction of types of fisheries closed, if applicable; and anticipated duration of closure. Testing of affected fish and/or shellfish and the risk assessment process will continue, as described above, until OEHHA finds that there is no likely threat to human health from consumption of fish and/or shellfish.

3. Public communication protocol

Information on fisheries closure and re-openings will be jointly prepared by DFG and OEHHA PIOs and released through established agency channels, including press releases, list serve announcements and website postings. Pre-printed signs indicating closure of all fisheries will be posted at the direction of the Unified Command at piers and other appropriate locations. Signs will be removed as soon as practicable upon re-opening. Immediately following fisheries closures that affect fishing from boats, the

OSPR SSTS will initiate a NOAA Weather Forecast Office (WFO) broadcast of a Coastal Waters Forecast Alert to notify sport and commercial anglers.

References

Reilly, T.I.; York, R.K. 2001. Guidance on Sensory Testing and Monitoring of Seafood for Presence of Petroleum Taint Following an Oil Spill. NOAA Technical Memorandum NOS OR&R 9. http://response.restoration.noaa.gov/book_shelf/964_seafood.pdf (accessed November 28, 2011). Seattle: Office of Response and Restoration, National Oceanic and Atmospheric Administration. 107 pp.

Yender, R., Michel, J., Lord, C. 2002. Managing Seafood Safety after an Oil Spill. Seattle: Hazardous Materials Response Division, Office of Response and Restoration, National Oceanic and Atmospheric Administration. Available: http://response.restoration.noaa.gov/book_shelf/963_seafood2.pdf

U.S. FDA, 2010a. Overview of testing protocol to re-open harvest waters that closed in response to the Deepwater Horizon Oil Spill. http://www.fda.gov/Food/ucm217598.htm (accessed October 11, 2011).

U.S. FDA, 2010b. Protocol for Interpretation and Use of Sensory Testing and Analytical Chemistry Results for Re-Opening Oil-Impacted Areas Closed to Seafood Harvesting Due to the Deepwater Horizon Oil Spill. http://www.fda.gov/food/ucm217601.htm (accessed November 17, 2011).

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ENCLOSURE 4600 – ATTACHMENT VII

NATIONAL CONTINGENCY PLAN (NCP) PRODUCT LIST

and

STATE LICENSED OIL SPILL CLEANUP AGENTS (OSCA)

Within the U.S. only dispersants that have met the approval criteria set by the U.S. Environmental Protection Agency (EPA) and that are listed on the EPA National Contingency Plan (NCP) Product Schedule can be legally sprayed. As of July 2014, the NCP Product Schedule includes the dispersant products shown in the table below. There are frequent updates to the NCP Product Schedule, and it is advised that it be reviewed at the time of a possible OSCA/dispersant use to determine what is currently listed.

In addition to meeting the approval criteria set by the EPA, dispersants used in California must be a California state-licensed Oil Spill Cleanup Agent (OSCA). The two dispersants currently meeting the state-licensing requirements are also shown below.

Dispersants on NCP Product Schedule	Dispersants licensed in California
ACCELL CLEAN DWD	
BIODDISPERS	
COREXIT EC9500B	
DISPERSIT SPC 1000	
FFT-SOLUTION	
FINASOL OSR 52	
JD-109	
JD-2000	
NEOS AB 3000	
MARE CLEAN 200	
MARINE D-BLUE CLEAN	
SAF-RON GOLD	
SEA BRAT #4	
SUPERSPERSE WAO2500	
ZI-400	
COREXIT EC9527A	**COREXIT 9527A**
COREXIT EC9500A	**COREXIT 9500A**
NOKOMIS 3-AA	**NOKOMIS 3-AA**
NOKOMIS 3-F4	**NOKOMIS 3-F4**

Updated NCP Product Lists can be accessed via the EPA representative on the RRT (Appendix A), by calling the Emergency Response Division of the U.S. EPA (202-260-2342) or accessing the Internet at http://www2.epa.gov/emergency-response/ncp-product-schedule-products-available-use-oil-spills

Additional information on California state-licensed dispersants may be obtained by contacting the OSPR ART Technical Specialist/State OSCA Licensing representative at ellen.faurot-daniels@wildlife.ca.gov.

ENCLOSURE 4600 – ATTACHMENT VIII

DETERMINATION PROCESS FOR CALIFORNIA OFFSHORE DISPERSANT ZONES

The use of dispersants in marine waters off California requires detailed foresight and planning. In an effort to expedite a decision to use dispersants and reduce first strike response time, the RRT IX in August of 2000 adopted formal changes to the planning and operations sections of the Regional Contingency Plan (RCP). These sections detailed a dispersant use planning process to be undertaken by each of the six California marine Area Committees (AC). Specifically, each AC was tasked with designation of approval zones for dispersant use within its area of operation and the development of a dispersant use plan to include at least the following: 1) Incident Command System (ICS) protocols and forms, 2) Federal On-Scene Coordinator Checklist, 3) dispersant monitoring plan, and 4) wildlife spotting protocols. Finally, each committee was asked to review training and drill requirements for plan implementation as well as dispersant response equipment assuming a 4-hour response time.

Beginning in February 2001, each Area Committee (North Coast, San Francisco-Bay Delta, Central Coast, Los Angeles-North, Los Angeles-South, and San Diego) designated a dispersant subcommittee to develop their regional dispersant use zone recommendations. Los Angeles subsequently combined LA-north and LA-south efforts under one subcommittee. San Diego developed an additional Sea Bird Task Force that compiled sea bird information primarily for the Southern California Bight area, and reported their results to the San Diego dispersant subcommittee for their particular consideration in developing recommended zones. All subcommittees initiated the planning process by gathering the pertinent resource data for the region and becoming familiar with the effects of dispersants and dispersed oil in the marine environment. Based on the information reviewed, each subcommittee developed a Net Environmental Benefit Analysis (NEBA) to aid them in constructing the area's dispersant use zone recommendations. Based on the results of the NEBA, each subcommittee ultimately concluded that in the case of dispersible crude and fuel oils, dispersing the spilled oil into the water column may, on balance, be less harmful to the environment than letting the oil remain on the ocean's surface for extended periods of time.

Each subcommittee and Area Committee drafted their dispersant zone recommendations, along with some general dispersant application guidelines, and forwarded those through the U.S. Coast Guard to the RRT IX. All zone recommendations were approved by the RRT IX between February 2002 and July 2003. Parallel to the RRT IX dispersant zone review and approval process, the Los Angeles subcommittee was continuing to meet in workgroups to develop drafts of the other elements (updated FOSC checklist, Wildlife Observation Protocols, Public Outreach Plan, dispersant shortfall analysis, and incorporation of dispersant effectiveness monitoring) necessary to make a complete area dispersant plan. In doing

so, there was a recognition that much of the Los Angeles effort would not only be useful as a starting point for similar efforts by other Area Committees in developing their individual dispersant plans, but would in fact mature into an overarching California Dispersant Plan that would serve all six marine Area Committee regions in the state and save them the need to develop five other, largely redundant, dispersant plans. This California Dispersant Plan (CDP) includes the zones for each area, as well as an updated Federal On-Scene Coordinator (FOSC) checklist and all appendices needed to implement the CDP.

The Net Environmental Benefit Analysis (NEBA) Process

Once oil is spilled to the ocean there will be inevitable impacts to the environment within the geographical area of the spill no matter how much effort is put into spill response.

The primary goal of any oil spill response is to minimize the area of impact and remove the spilled oil from the water's surface as fast as possible, thus minimizing the impact to the organisms inhabiting the terrestrial, estuarine, intertidal, shallow subtidal and ocean surface environments. This response goal is not meant to overlook the potential for impacts to the organisms found immediately below the ocean surface, but instead provides a mechanism for discussion of the environmental trade-offs associated with any response option.

Each regional dispersant subcommittee assessed and compared the impacts of an oil spill and associated cleanup activities on the biological resources of their area. This examination was conducted using a Net Environmental Benefit Analysis (NEBA), modeled on an Ecological Risk Assessment previously conducted for the San Francisco Bay. In each case, the NEBA examined and compared the risk to the environment associated with available oil spill response options. Spill response options evaluated were 1) no on-water response, 2) mechanical cleanup, 3) *in situ* burning, and 4) dispersant use. The risks of these cleanup options were examined using a NEBA risk matrix, which qualitatively combined the risk to the biological resource resulting from both the magnitude (percentage) of the population impacted with the expected time for the population to recover from the impact.

The NEBA in each area was conducted using an assumed spill of Alaska North Slope crude oil, a dispersible crude oil commonly transported along the coast of California. The approach was a "what-if" analysis in that all sensitive species that could be found in a region, regardless of time of year, were incorporated. This approach was undertaken to eliminate the need to conduct the multiple NEBAs necessary to address spatial and temporal differences found each region. By using this approach, each dispersant subcommittee had all the pertinent resource information at their disposal at one time and could examine and incorporate temporal and spatial differences in their single analysis.

Each regional NEBA had the same general findings:

1) In average or worse-than-average offshore response settings, and/or where spill distance from shore significantly increases the response time, mechanical cleanup techniques and *in situ* burning may, by themselves, provide very little improvement over the no response option. When this is the case, these response techniques will not significantly reduce the risk of spilled oil contacting biological resources at the sea surface or in more inshore (*e.g*., intertidal) regions.

2) When used in an appropriate and timely manner, dispersants can remove a significant amount of oil from the surface water. Appropriate and timely application includes a number of decision factors, included in this CDP.

3) While dispersants may measurably reduce the risk of oil to surface and coastal biological resources, there may be a temporally limited increase in risk to the plankton community in the upper several meters of the water column.

4) Shoreline cleanup methods may not be available or appropriate for use in some sensitive coastal habitats (*e.g*., rocky intertidal, marshes, wetlands); their inappropriate use may pose a greater risk to these sensitive habitats and dependent species than the oil itself. The goal in this case shifts to keeping the oil from ever reaching sensitive coastal and inland areas.

In the NEBA process, the benefits and risks of each cleanup option were evaluated separately. However, an effective spill response may use a combination of several available response options. Oceanographic conditions permitting, it is expected that dispersants would be used in combination with mechanical cleanup equipment and response strategies.

NEBA results suggested that the appropriate and timely use of dispersants (on oil spills characterized as “dispersible”) could greatly enhance the ability to remove significant quantities of oil from the offshore water surface. This may greatly reduce the risk of spilled oil reaching the more abundant and sensitive habitats and species found in the more inshore, coastal areas. While dispersing oil into the water column can pose a short-term risk to the plankton community inhabiting the upper few meters of the water column, the impacts will be to a much more geographically limited area, and the temporal duration will be relatively very short. The environmental “trade-off” decision-making at the time of a response – weighing the impacts associated with oil on the surface for weeks to months versus the short term toxicity (minutes to hours) resulting from dispersed oil in the water column – can and will be made by the response agencies on a case-by-case spill response basis.

The detailed NEBA matrices developed by each regional dispersant subcommittee are not part of this report, although information about particular resources of concern is summarized in Attachment I .

Environmental "Trade-off" Decisions

The proposed area dispersant zone recommendations acknowledge that weighing of environmental "trade-offs" is not as easy as it may seem, even when information on sensitive resources has been gathered ahead of time. Information on species occurrences and distributions is still very incomplete, as is our knowledge of how they may be affected by prevailing oceanographic conditions.

No resource can be categorized as always being of greater or lesser value than another. For instance, while spill impacts on seabirds, mammals and sensitive communities are more "apparent" to scientists, responders and the general public, other more "hidden" resources (such as the seasonal plankton community in the upper water column) are at potentially greater risk from oil dispersed into the water. This community may contain the larvae of important sport, commercial, and/or ecologically significant (*i.e*., primary or important animal prey) species.

The following were understandings regarding the plankton communities at risk from a dispersed oil plume:

- In most imaginable response settings, it may be better to disperse the oil into the water column (where there may be short-term toxicity to larvae in the upper few meters of the water column) than to leave the undispersed and unrecoverable oil on the water surface (where it could reside long-term, spread, and potentially impact a wider range of sensitive coastal species and habitats).

- Due to the spatial and temporal distribution of larval species, the dispersed oil from any one oil spill response was expected to impact a very limited portion of the overall community. Many constituent plankton species would quickly replenish their numbers through reproduction or immigration from surrounding waters. It was therefore considered unlikely that there would be population-level affects to the plankton community.

- The concentration of dispersed oil in the open ocean can decrease rapidly through natural dispersion and biodegradation processes. The dispersed oil plume can spread and thin quickly in the three-dimensional space of the water column, and natural biodegradation processes work quickly to break the small droplets of oil in the plume into carbon dioxide and water. In areas where the dilution potential is the greatest (*i.e*., open ocean), concentrations of dispersed oil high enough to cause adverse effects are unlikely to persist for more than several hours. Oil concentrations are typically less than 50 part per million (ppm) below dispersed slicks, although different authors report slightly different upper levels. Field data indicate that concentrations of dispersed oil are usually less than 1 ppm at depths below 10 meters. Within a matter of weeks to months, dispersion and biodegradation processes can remove much of the plume of oil droplets from the upper water column, and/or reduce concentrations of oil in the water column and at depth to scientifically non-detectable levels.

- In contrast, undispersed and unrecovered oil left on the water's surface in the open ocean can drift for weeks to months, where it can continue to impact pelagic birds, mammals and perhaps sea turtles. If the oil moves toward shore, it can strand in sensitive coastal habitats (especially intertidal areas) and pose a persistent threat, on a time scale of months to years, to those sensitive coastal habitats and their dependent species and communities.

- Emulsification of the oil remaining at the water surface increases the oil-in-water volume, and hence the contamination risk to marine and coastal plant and animal communities.

Oil spill impacts to marine birds and mammals can threaten the existence and persistence of whole colonies and perhaps the entire population of some species. This is especially true for colonies and populations of common murres, the endangered marbled murrelet, shorebirds (including the endangered western snowy plover) and the southern sea otter.

Stakeholder involvement and outreach efforts

The regional Area Committees, which developed the pre-approval dispersant zone recommendations, and from those this document, are mandated by the Oil Pollution Act of 1990 to include any interested member of the public. Given the sensitivity that dispersant use issues can raise, each regional Area Committee made special and repeated efforts to bring interested stakeholders onto the dispersant subcommittees even if they had not shown previous or consistent interest in other Area Committee response planning work. Generally, in spite of these efforts, most dispersant subcommittees came to include those who were already the most active in their respective Area Committees. Statewide information-sharing and continuity was provided by the Office of Spill Prevention and Response (OSPR), California Coastal Commission (CCC) and the National Oceanic and Atmospheric Administration (NOAA).

In early 2001, a team of RRT IX representatives made a presentation at a public meeting of the California Coastal Commission; another presentation of the same material was later made at the Gulf of the Farallons Research Symposium. Throughout 2001 and 2002, there were several "Stakeholder Meetings" to distribute the dispersant response planning information to other agencies and interested members of the public. The OSPR and NOAA staff also provided the materials for the U.S. Fish and Wildlife Service and National Marine Fisheries Service reviews, and regularly briefed the RRT IX on progress of each dispersant subcommittee. OSPR and CCC staff regularly briefed the state Oil Spill Technical Advisory Committee.

Further public outreach was offered in public information sessions at several coastal locations in California and at a public meeting of the California Coastal Commission. The U.S. Coast Guard will also publish a Federal Register Notice of this plan once it is finalized, on which the public could comment.

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ENCLOSURE 4600 – ATTACHMENT IX

RESULTS OF REVIEWS WITH OTHER AGENCIES

IX.a U.S. Fish and Wildlife Service (Endangered Species Act)

Underway. Insert when completed.

IX.b National Marine Fisheries Service (Endangered Species Act, Marine Mammal Protection Act, Essential Fish Habitat)

Underway. Insert when completed.

IX.c California Coastal Commission (Coastal Zone Management Act)

Occurs at end of process (after above two consultations completed). Insert when completed.

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ENCLOSURE 4600 – ATTACHMENT X

SUPPLEMENTAL RESOURCES

X.a UNIT CONVERSIONS

Volume

1 U.S. Gallon (gal) = 231 in^3 = 0.1337 ft^3
1 barrel(s) (bbl) = 42 U.S. gal = 5.615 ft^3
1 bbl = 158.97 liter (L) = 0.159 m^3
1 U.S. gal = 3.785 L
1 L = 0.26 gal
1 tonne of oil = 1000 L = 1m^3 = ~ 264 gal
1 m^3 = 6.29 bbl = 264.2 gal
1 ft^3 = 0.0283 m^3 = 7.48 gal
1 m^3 = 10^6 cm^3 = 10^3 L
1 Imperial gal = 1.2 U.S. gal
1 U.S. gal = 0.83 Imperial gal

Length

1 inch = 2.54 cm
1 ft = 30.38 cm
1 ft = 0.3048 m
1 m = 3.2808 feet
1 statute mile = 0.87 nautical mile nm)
1 mile = 1610 m = 5280 ft
1 nm = 6076 feet
1 km = 0.54 nm
1 nm = 1.852 km = 1852 m
1 nm = 1.15 statute miles
1 micron = m x 10^{-6} = mm x 10^{-3}
1 fathom (6 ft) = 1.829 m
1 m = 0.547 fathoms

Volume Rate

L/hr x 0.0063 = bbl/hr
L/hr x 0.0044 = gpm
tonnes/hr (or m^3/hr) x 4.4 = gpm
tonnes/hr x 6.3 = bbl/hr
bbl/hr x 0.7 = gpm
L/sec x 15.9 = gpm

gpm x 34.29 = bbl/day
m^3/hr x 16.7 = L/min
L/min x 0.06 = m^3/hr
gpm x 3.78 = L/min
bbl/day x 0.11 = L/min
bbl/day x 0.0292 = gpm

Distance Rate

1 knot = 1.69 ft/sec
1 knot = 1.94 m/sec = 1.13 miles/hr
ft/sec x 0.593 = knots
m/sec x 1.94 = knots
miles per hour (mph) x 1.5 = ft/sec
knots (kts) x 51.4 = cm/sec

Area

1 hectare = 10000 m^2 = 100m^2
1 acre = 43560 ft^2 = 0.4047 hectares = 247 km^2
1 acre = 4047 m^2
1 hectare = 2.471 acres
1 ft^2 = 0.0929 m^2
1 $mile^2$ = 2.59 km^2
1 nm^2 = 847 acres

Weight

1 pound (lb) = 0.45 kilograms (kg)
1 kg = 2.2 lb
lb/ft x 1.48 = kg/m
kg/m x 0.672 = lb/ft
1 metric ton = 1000 kg (~ 1 long ton)

From ExxonMobil , 2000

X.a , continued ABBREVIATIONS AND ACRONYMS

AC	Area Committee
ACP	Area Contingency Plan
ADP	Area Dispersant Plan
ADIOS	Automated Data Inquiry for Oil Spills
API	American Petroleum Institute
ASTM	American Society for Testing and Materials
AZ	Arizona
CA	California
CDNMS	Cordell Bank National Marine Sanctuary
CCC	California Coastal Commission
CDFG	California Department of Fish and Game
CDP	California Dispersant Plan
CINMS	Channel Islands National Marine Sanctuary
COTP	Captain of the Port
CZMA	Coastal Zone Management Act
DOC	Department of Commerce
DOI	Department of Interior
DUP	Dispersant Use Policy
EADC	Emergency Aerial Dispersant Consortium
EFH	Essential Fish Habitat
EPA	Environmental Protection Agency
ESA	Endangered Species Act
ETA	Estimated Time of Arrival
ETD	Estimated Time of Departure
FOSC	Federal On –Scene Coordinator
GFNMS	Gulf of the Farallons National Marine Sanctuary
GIS	Geographic Information System
GPS	Global Positioning System
HCPB	Habitat Conservation Planning Branch
LA	Los Angeles
MBNSM	Monterey Bay National Marine Sanctuary
MMPA	Marine Mammal Protection Act
MSDS	Material Safety Data Sheet
NCP	National Contingency Plan
NEBA	Net Environmental Benefit Analysis
NMFS	National Marine Fisheries Service
NMS	National Marine Sanctuary
NOAA	National Oceanic and Atmospheric Administration
NRC	National Response Center or National Response Corporation
OCS	Outer Continental Shelf
OWCN	Oiled Wildlife Care Network
OSCA	Oil Spill Cleanup Agent
OSPR	Office of Spill Prevention and Response
OSRO	Oil Spill Response (or Removal) Organization
PPE	Personal Protective Equipment
PST	Pacific Standard Time
RCP	Regional Contingency Plan
RRT	Regional Response Team
SCB	Southern California Bight
SMART	Special Monitoring of Advanced Response Technologies
SSC	Scientific Support Coordinator
UHF	Ultra High Frequency

X.a, continued GLOSSARY

ADIOS

Automated Data Inquiry for Oil Spills. A NOAA computer database listing the characteristics of crude oils and refined products, and predicting expected characteristics and behavior of oil spilled into the marine environment.

API gravity

A scale for measuring fluid specific gravities based on an inverse relationship with specific gravity.

Black oil

A black or very dark brown layer of oil, sometimes with a latex texture. Depending on the quantity spilled, oil tends to quickly spread out over the water surface to a thickness of about 1 millimeter (0.04 inches). Can look like kelp and other natural phenomena. From the air, it is impossible to tell how thick a black oil layer is.

Brown oil

Water-in-oil emulsion. Thickness typically is 0.1 to 1.0 millimeters, but will vary depending on wind and current conditions. Usually has a heavy or dull sheen. Brown oil can be easily confused with algal scum collecting in convergence lines, algae patches, or kelp.

Centistoke (cSt)

A unit of measurement used in defining the kinematic viscosity of a fluid.

Chemical dispersant

A chemical formulation containing surface active agents (surfactants) that lower the surface tension between oil and water, promoting the formation of oil droplets and reducing the tendency of oil to stick to other droplets or surfaces, thereby enhancing dispersion into the water column.

Clean up

Actions taken to prevent further oil releases, protect areas from oil damage, mitigate oil effects (*e.g.*, through deflection, containment, collection, chemical dispersion, or bioremediation), and clean up of oil-contaminated areas and wildlife where monitoring shows a net environmental benefit in doing so.

Coastal waters

The territorial sea from the shoreline high water mark and then offshore to 12 nautical miles.

Continental waters

The coastal waters (high water mark to 12 nautical miles offshore) and the Exclusive Economic Zone (12 to 200 nautical miles offshore), and all water over the continental shelf.

Contingency plan

An action plan prepared in anticipation of an oil spill for a site or region, containing guidelines and operating instructions to facilitate efficient and effective clean up operations, and to protect areas of biological, social and economic importance. Contingency plans affecting response planning and response in California include Area Contingency Plans (federally directed by the Oil Pollution Act of 1990, covering marine response in federal waters (3 – 200 nautical miles from shore) throughout California, and with the greatest regional detail), the State Contingency Plan (California state directed by the Lempert-Keene-Seastrand Act, covering California response in state waters (0-3 nautical miles from shore), the Regional Contingency Plan (federally directed and managed by the Region IX Regional Response Team, covering marine and inland response in several western states), and the National Contingency Plan (federal directed and covering national response in marine and inland waters).

Convergence line

A line on the water surface where floating objects and oil collect. A convergence can be the interface between two different types or bodies of water, or it can be caused by a significant depth change, tidal changes, or other common phenomena. Convergences are common in the marine environment.

Dispersion

The breaking up of an oil slick into small droplets that are mixed into the water column by breaking waves and other sea surface turbulence.

Emulsification

The formation of a water-in-oil mixture. Different oils exhibit different tendencies to emulsify, and emulsification is more likely to occur under high energy conditions (strong winds and waves). An emulsified mixture of water in oil is commonly called “mousse”; its presence indicates a spill that has been on the water for some time.

Entrainment

The loss of oil from containment when it is pulled under a boom by a strong current. Entrainment typically occurs from booms deployed perpendicular to currents greater than 1 knot (0.5 meters per second).

Flash point

(see volatility)

Mousse

An emulsified mixture of water in oil. Mousse can range in color from dark brown to nearly red or tan, and typically has a thickened or pudding-like consistency compared to fresh oil. Incorporation of up to 75 percent water into the oil will cause the apparent volume of a given quantity of oil to increase by up to four times.

Pancakes

Isolated, roughly circular patches of oil ranging in size from a few feet across to hundreds of yards (or meters) in diameter. Sheen may or may not also be present.

Persistent oil

Oils and petroleum products such as crude oils, fuel oils and lubrication oils that, when spilled, remain in a residual form in the environment for an appreciable period.

Plume

Oil that is dispersing into the water column as a cloud of small droplets.

Pour point

The temperature below which oil will not flow.

Recoverable oil

Oil in a thick enough layer on the water to be recovered by conventional techniques and mechanical equipment. Only black or dark brown oil, mousse, and heavy sheens (which are dull brown in color) are generally considered to be thick enough to be effectively recovered by skimmers.

Sheen

A very thin layer of oil floating on the water surface. Sheen is the most commonly-observed form of oil during the later stages of a spill. Depending on thickness, sheens range in color from dull brown for the thickest sheens to rainbow, gray, silver and near-transparent in the case of the thinnest sheens.

- A light sheen is almost transparent, and is sometimes confused with windrows and natural sheen resulting from biological processes.
- A silver sheen is a slightly thicker layer of oil that appears silvery or shimmers; occasionally called gray sheen.
- A rainbow sheen reflects colors.

Slick

Oil spilled on the water, which absorbs energy and dampens out surface waves, making the oil appear smoother – or slicker – than the surrounding water.

SMART

Special Monitoring of Applied Response Technologies. A cooperatively designed monitoring program for *in situ* burning and dispersants. SMART relies on small, highly mobile teams to collect real-time data, which are subsequently channeled to the Unified Command to address critical questions, such as whether dispersants are effective in dispersing the oil.

Specific gravity

The ratio of the mass of oil to the mass of freshwater, when both are of the same volume and temperature.

Streamers

A narrow line of oil, mousse, or sheen on the water surface, surrounded on both sides by clean water. Streamers result from the combined effects of wind, currents, and/or natural convergence zones. Often, heavier concentrations of mousse or sheen will be present in the center of a streamer, with progressively lighter sheen along the edges. Streamers are also often called “fingers” or “ribbons”.

Tarballs

Weathered oil that has formed pliable balls or patches that float on the water. Tarballs can range in diameter from a few millimeters (much less than an inch) to a foot (0.3 meters). Sheen may or may not be present, depending on how weathered or hardened the outer layer of the tarball is.

Tarmats

Non-floating mats of oily debris (usually sediment and/or plant matter) that are found on beaches or in shallow water just offshore.

Unified Command

Representatives of the spiller, the federal government, and state government, who are collectively in charge of the spill response. For California marine spills, the federal representative is the U.S. Coast Guard and the state representative is the California Department of Fish and Wildlife Office of Spill Prevention and Response.

Viscosity

An oil’s internal resistance to flow. Highly viscous oil will not flow easily.

Volatility

A property of a liquid that has a low boiling point and a high vapor pressure at ordinary pressures and temperatures.

Water-in-oil emulsion

(see mousse)

Weathering

A combination of physical and environmental processes, such as evaporation, dissolution, dispersion, and emulsification, which act on spilled oil to change its physical properties and composition.

Window of opportunity

The period of time available for undertaking a particular response. For example, the application of dispersant before the oil emulsifies to a stage where dispersant becomes ineffective.

Windrows

Streaks of oil that line up in the direction of the wind. Windrows typically form early during a spill when the wind speed is at least 10 knots (5.1 meters per second). Sheen is the form of spilled oil that most frequently forms windrows.

X.b MATERIAL DATA SAFETY SHEETS (MSDSs) for the DISPERSANTS COREXIT EC9527A AND EC9500A

NALCO/EXXON ENERGY CHEMICALS, L.P.

MATERIAL SAFETY DATA SHEET

PRODUCT

EC9527A COREXIT 9527

Emergency Telephone Number
Medical (800) 462-5378 (24 hours) (800) I-M-ALERT

SECTION 01 CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

TRADE NAME: EC9527A COREXIT 9527
DESCRIPTION: A blend of oxyalkylate polymers, organic sulfonic acid salt, substituted fatty ester, and glycol ether

NFPA 704M/HMIS RATING 2/2 HEALTH 2/2 FLAMMABILITY 0/0 REACTIVITY 0 OTHER
0=Insignificant 1=Slight 2=Moderate 3=High 4=Extreme

SECTION 02 COMPOSITION AND INFORMATION ON INGREDIENTS

Our hazard evaluation has identified the following chemical ingredient(s) as hazardous under OSHA's Hazard Communication Rule, 29 CFR 1910.1200. Consult Section 15 for the nature of the hazard(s).

INGREDIENT(S)	CAS #	APPROX.%
2-Butoxyethanol	111-76-2	20-40

SECTION 03 HAZARD IDENTIFICATION

EMERGENCY OVERVIEW:
WARNING! Causes irritation to skin and eyes. Combustible. May be harmful if inhaled, swallowed or absorbed through the skin. Avoid prolonged or repeated breathing of vapor. Do not get in eyes, on skin, or on clothing. Wear goggles and face shield when handling. Use with adequate ventilation. Do not take internally. Keep away from heat and open flame. Keep container closed when not in use.

Empty containers may contain residual product. Do not reuse container unless properly reconditioned.

PRIMARY ROUTE(S) OF EXPOSURE: Eye, Skin, Inhalation

EYE CONTACT:	Can cause moderate to severe irritation.
SKIN CONTACT:	May cause irritation with prolonged contact. Can be harmful if absorbed.
INGESTION:	Can cause central nervous system depression, nausea, dizziness, vomiting or unconsciousness depending on the length of exposure and on the first aid action given. Can cause liver, kidney damage. May cause red blood cell hemolysis.
INHALATION:	May cause irritation to the respiratory tract and lungs.

SYMPTOMS OF EXPOSURE:
ACUTE: Inhalation of high concentrations of 2-butoxyethanol can cause nausea, dizziness, vomiting, stupor or unconsciousness.

CHRONIC: Repeated or prolonged exposure to 2-butoxyethanol can result in injury to liver, kidney or red blood cells (hemolysis).

NALCO/EXXON ENERGY CHEMICALS, L.P.
P.O. BOX 87 • Sugar Land, Texas 77487-0087 • (281) 263-7000

Prolonged skin contact with oxyalkylated organic ester may cause dermatitis.

AGGRAVATION OF EXISTING CONDITIONS: Skin contact may aggravate an existing dermatitis.

SECTION 04 FIRST AID INFORMATION

EYES:	Immediately flush with water for at least 15 minutes while holding eyelids open. Call a physician at once.
SKIN:	Wash thoroughly with soap and rinse with water. Call a physician.
INGESTION:	Induce vomiting. Give water. Call a physician.
INHALATION:	Remove to fresh air. Treat symptoms. Call a physician.

NOTE TO PHYSICIAN: Based on the individual reactions of the patient, the physician's judgment should be used to control symptoms and clinical condition.

CAUTION: If unconscious, having trouble breathing or in convulsions, do not induce vomiting or give water.

SECTION 05 FIRE FIGHTING MEASURES

FLASH POINT: 163 Degrees F (TCC)

UEL 10.6% LEL 1.1%

EXTINGUISHING MEDIA: Based on the NFPA guide, use dry chemical, foam, carbon dioxide or other extinguishing agent suitable for Class B fires. Use water to cool containers exposed to fire. For large fires, use water spray or fog, thoroughly drenching the burning material.

UNUSUAL FIRE AND EXPLOSION HAZARD: Containers exposed in a fire should be cooled with water to prevent vapor pressure buildup leading to a rupture.

SECTION 06 ACCIDENTAL RELEASE MEASURES

IN CASE OF TRANSPORTATION ACCIDENTS, CALL THE FOLLOWING 24-HOUR TELEPHONE NUMBER (800) I-M-ALERT or (800) 462-5378.

SPILL CONTROL AND RECOVERY:

Small liquid spills: Contain with absorbent material, such as clay, soil or any commercially available absorbent. Shovel reclaimed liquid and absorbent into recovery or salvage drums for disposal. Refer to CERCLA in Section 15.

Large liquid spills: Dike to prevent further movement and reclaim into recovery or salvage drums or tank truck for disposal. Refer to CERCLA in Section 15.

For large indoor spills, evacuate employees and ventilate area. Those responsible for control and recovery should wear the protective equipment

specified in Section 8 .

SECTION 07 HANDLING AND STORAGE

Storage : Keep container closed when not in use.

SECTION 08 EXPOSURE CONTROLS AND PERSONAL PROTECTION

RESPIRATORY PROTECTION: Use either a chemical cartridge respirator with a black cartridge or supplied air.

For large spills, entry into large tanks, vessels or enclosed small spaces with inadequate ventilation, a positive pressure, self-contained breathing apparatus is recommended.

VENTILATION: General ventilation is recommended. Additionally, local exhaust ventilation is recommended where vapors, mists or aerosols may be released.

PROTECTIVE EQUIPMENT: Wear impermeable gloves, apron and chemical splash goggles. Examples of impermeable gloves available on the market are neoprene, nitrile, PVC, natural rubber, viton and butyl (compatibility studies have not been performed). A full slicker suit is recommended if gross exposure is possible.

The availability of an eye wash fountain and safety shower is recommended.

If clothing is contaminated, remove clothing and thoroughly wash the affected area. Launder contaminated clothing before reuse.

HUMAN EXPOSURE CHARACTERIZATION: Based on Nalco's recommended product application and our recommended personal protective equipment, the potential human exposure is: MODERATE.

SECTION 09 PHYSICAL AND CHEMICAL PROPERTIES

COLOR:	Clear to slightly hazy amber
FORM:	Liquid
ODOR:	Mild
DENSITY:	8.2-8.5 lbs/gal.
SOLUBILITY IN WATER:	Soluble
SPECIFIC GRAVITY:	0.98-1.02 @ 60 Degrees F
VISCOSITY:	160 cst @ 32 Degrees F, 65 cst @ 60 Degrees F, 22 cst @ 100 Degrees F
POUR POINT:	Less than -40 Degrees F
BOILING POINT:	340 Degrees F
FLASH POINT:	163 Degrees F (TCC)
VAPOR PRESSURE:	Less than 5 mm Hg (Less than 0.1 psi) @ 100 Degrees F ASTM D-445
EVAPORATION RATE	

(BuAc = 1): 0.1

NOTE: These physical properties are typical values for this product.

SECTION 10 STABLILITY AND REACTIVITY

INCOMPATIBILITY: Avoid contact with strong oxidizers (eg. chlorine, peroxides, chromates, nitric acid, perchlorates, concentrated oxygen, permanganates) which can generate heat, fires, explosions and the release of toxic fumes.

STORAGE: Prevent contact with zinc, magnesium, and galvanized metals.

THERMAL DECOMPOSITION PRODUCTS: In the event of combustion CO, CO2, may be formed. Do not breathe smoke or fumes. Wear suitable protective equipment.

SECTION 11 TOXICOLOGICAL INFORMATION

TOXICITY STUDIES: Toxicity studies have been conducted on this product along with toxicity studies of the ingredient(s) in Section 2. The results are shown below.

ACUTE ORAL TOXICITY (ALBINO RATS):
2-Butoxyethanol LD50 = 470 mg/kg

ACUTE DERMAL TOXICITY (ALBINO RABBITS):
2-Butoxyethanol LD50 = 222 mg/kg
Product LD50 = Greater than 1,000 mg/kg

ACUTE INHALATION TOXICITY (ALBINO RATS):
2-Butoxyethanol LC50 = 700 ppm (7-hour exposure)

SECTION 12 ECOLOGICAL INFORMATION

If released into the environment, see CERCLA in Section 15.

SECTION 13 DISPOSAL CONSIDERATIONS

DISPOSAL: If this product becomes a waste, it does not meet the criteria of a hazardous waste as defined under the Resource Conservation and Recovery Act (RCRA) 40 CFR 261, since it does not have the characteristics of Subpart C, nor is it listed under Subpart D.

As a non-hazardous liquid waste, it should be solidified with stabilizing agents (such as sand, fly ash, or cement) so that no free liquid remains before disposal to an industrial waste landfill. A non-hazardous liquid waste can also be incinerated in accordance with local, state and federal regulations.

SECTION 14 TRANSPORTATION INFORMATION

PROPER SHIPPING NAME/HAZARD CLASS MAY VARY BY PACKAGING, PROPERTIES,

AND MODE OF TRANSPORTATION. THIS PRODUCT IS REGULATED IN THE U.S. ONLY WHEN SHIPPED IN CONTAINERS EXCEEDING 119 GALLONS OR 882 POUNDS CAPACITY OR WHEN THE PACKAGE EXCEEDS THE REPORTABLE QUANTITY. TYPICAL PROPER SHIPPING NAMES FOR THIS PRODUCT ARE:

ALL TRANSPORTATION MODES (UNLESS SPECIFIED BELOW)	:	COMBUSTIBLE LIQUID, N.O.S.
AIR TRANSPORTATION (IATA/ICAO)	:	PRODUCT IS NOT REGULATED DURING TRANSPORTATION
MARINE TRANSPORTATION (IMDG/IMO)	:	PRODUCT IS NOT REGULATED DURING TRANSPORTATION
UN/ID NO	:	NA 1993
HAZARD CLASS - PRIMARY	:	3 - COMBUSTIBLE LIQUID
PACKING GROUP	:	III
IMDG PAGE NO	:	N/A
IATA PACKING INSTRUCTION	:	CARGO: N/A
IATA CARGO AIRCRAFT LIMIT	:	NO LIMIT (MAX NET QUANTITY PER PACKAGE)
FLASH POINT	:	163 F 72.7 C
TECHNICAL NAME(S)	:	GLYCOL ETHER
RQ LBS (PER PACKAGE)	:	NONE
RQ COMPONENT(S)	:	NONE

SECTION 15 REGULATORY INFORMATION

The following regulations apply to this product.

FEDERAL REGULATIONS:

OSHA HAZARD COMMUNICATION RULE, 29 CFR 1910.1200:
Based on our hazard evaluation, the following ingredient in this product is hazardous and the reason is shown below.

2-Butoxyethanol - Irritant, systemic effects, combustible

2-Butoxyethanol = TWA 25 ppm, 121 mg/m3 (skin) ACGIH/TLV

2-Butoxyethanol = TWA 25 ppm, 120 mg/m3 (skin) OSHA/PEL

CERCLA/SUPERFUND, 40 CFR 117, 302:
Notification of spills of this product is not required.

SARA/SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT OF 1986 (TITLE III) - SECTIONS 302, 311, 312 AND 313:

SECTION 302 - EXTREMELY HAZARDOUS SUBSTANCES (40 CFR 355):
This product does not contain ingredients listed in Appendix A and B as an Extremely Hazardous Substance.

SECTIONS 311 and 312 - MATERIAL SAFETY DATA SHEET REQUIREMENTS (40 CFR 370):
Our hazard evaluation has found this product to be hazardous. The product should be reported under the following EPA hazard categories:

XX Immediate (acute) health hazard
XX Delayed (chronic) health hazard
XX Fire hazard
-- Sudden release of pressure hazard
-- Reactive hazard

Under SARA 311 and 312, the EPA has established threshold quantities for the reporting of hazardous chemicals. The current thresholds are: 500 pounds or the threshold planning quantity (TPQ), whichever is lower, for extremely hazardous substances and 10,000 pounds for all other hazardous chemicals.

SECTION 313 - LIST OF TOXIC CHEMICALS (40 CFR 372):
This product contains the following ingredient(s), (with CAS # and % range) which appear(s) on the List of Toxic Chemicals.

Glycol ethers	20-40	No CAS #

TOXIC SUBSTANCES CONTROL ACT (TSCA):
The chemical ingredients in this product are on the 8(b) Inventory List (40 CFR 710).

RESOURCE CONSERVATION AND RECOVERY ACT (RCRA), 40 CFR 261 SUBPART C & D:
Consult Section 13 for RCRA classification.

FEDERAL WATER POLLUTION CONTROL ACT, CLEAN WATER ACT, 40 CFR 401.15/ formerly Sec. 307, 40 CFR 116/formerly Sec. 311:
None of the ingredients are specifically listed.

CLEAN AIR ACT, Sec. 111 (40 CFR 60), Sec. 112 (40 CFR 61, 1990 Amendments), Sec. 611 (40 CFR 82, CLASS I and II Ozone depleting substances):
This product contains the following ingredients covered by the Clean Air Act:

2-Butoxyethanol - Section 111
Glycol ethers (2-Butoxyethanol) - Section 112

STATE REGULATIONS:

CALIFORNIA PROPOSITION 65:
This product does not contain any chemicals which require warning under California Proposition 65.

MICHIGAN CRITICAL MATERIALS:
This product does not contain ingredients listed on the Michigan Critical Materials Register.

STATE RIGHT TO KNOW LAWS:
The following ingredient(s) are disclosed for compliance with State Right To

Know Laws:

2-Butoxyethanol 111-76-2

INTERNATIONAL REGULATIONS:

This is a WHMIS controlled product under The House of Commons of Canada Bill C-70 (Class D2B and Class B3). The product contains the following substance(s), from the Ingredient Disclosure List or has been evaluated based on its toxicological properties, to contain the following hazardous ingredient(s):

Chemical Name	CAS #	% Concentration Range
2-Butoxyethanol	111-76-2	20-40

SECTION 16 OTHER INFORMATION

Internal number F102962

SECTION 17 RISK CHARACTERIZATION

Due to our commitment to Product Stewardship, we have evaluated the human and environmental hazards and exposures of this product. Based on our recommended use of this product, we have characterized the product's general risk. This information should provide assistance for your own risk management practices. We have evaluated our product's risk as follows:

* The human risk is: MODERATE.

* The environmental risk is: LOW.

Any use inconsistent with Nalco's recommendations may affect our risk characterization. Our sales representative will assist you to determine if your product application is consistent with our recommendations. Together we can implement an appropriate risk management process.

This product material safety data sheet provides health and safety information. The product is to be used in applications consistent with our product literature. Individuals handling this product should be informed of the recommended safety precautions and should have access to this information. For any other uses, exposures should be evaluated so that appropriate handling practices and training programs can be established to insure safe workplace operations. Please consult your local sales representative for any further information.

SECTION 18 REFERENCES

Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices, American Conference of Governmental Industrial Hygienists, OH.

Hazardous Substances Data Bank, National Library of Medicine, Bethesda, Maryland (CD-ROM version), Micromedex, Inc., Englewood, CO.

IARC Monographs on the Evaluation of the Carcinogenic Risk of Chemicals to Man, Geneva: World Health Organization, International Agency for Research on Cancer.

Integrated Risk Information System, U.S. Environmental Protection Agency, Washington, D.C. (CD-ROM version), Micromedex, Inc., Englewood, CO.

Annual Report on Carcinogens, National Toxicology Program, U.S. Department of Health and Human Services, Public Health Service.

Title 29 Code of Federal Regulations, Part 1910, Subpart Z, Toxic and Hazardous Substances, Occupational Safety and Health Administration (OSHA).

Registry of Toxic Effects of Chemical Substances, National Institute for Occupational Safety and Health, Cincinnati, Ohio (CD-ROM version), Micromedex, Inc., Englewood, CO.

Shepard's Catalog of Teratogenic Agents (CD-ROM version), Micromedex, Inc., Englewood, CO.

Suspect Chemicals Sourcebook (a guide to industrial chemicals covered under major regulatory and advisory programs), Roytech Publications (a Division of Ariel Corporation), Bethesda, MD.

The Teratogen Information System, University of Washington, Seattle, Washington (CD-ROM version), Micromedex, Inc., Englewood, CO.

PREPARED BY: William S. Utley, PhD., DABT, Manager, Product Safety
DATE CHANGED: 11/06/1997 DATE PRINTED: 03/28/1999

NALCO/EXXON
ENERGY CHEMICALS, L.P.

MATERIAL SAFETY DATA SHEET

PRODUCT

EC9500A COREXIT 9500

Emergency Telephone Number
Medical (800) 462-5378 (24 hours) (800) I-M-ALERT

SECTION 01 CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

TRADE NAME: EC9500A COREXIT 9500
DESCRIPTION: A blend of oxyalkylate polymers, organic sulfonic acid salt, substituted fatty ester, glycol ether, and aliphatic hydrocarbon

NFPA 704M/HMIS RATING 1/1 HEALTH 1/1 FLAMMABILITY 0/0 REACTIVITY 0 OTHER
0=Insignificant 1=Slight 2=Moderate 3=High 4=Extreme

SECTION 02 COMPOSITION AND INFORMATION ON INGREDIENTS

Our hazard evaluation has identified the following chemical ingredient(s) as hazardous under OSHA's Hazard Communication Rule, 29 CFR 1910.1200. Consult Section 15 for the nature of the hazard(s).

INGREDIENT(S)	CAS #	APPROX.%
Hydrotreated light distillate	64742-47-8	20-40

SECTION 03 HAZARD IDENTIFICATION

EMERGENCY OVERVIEW:
CAUTION! May cause irritation to skin and eyes. Avoid contact with skin, eyes, and clothing. Avoid prolonged or repeated breathing of vapor. Use with adequate ventilation. Do not take internally.

Empty containers may contain residual product. Do not reuse container unless properly reconditioned.

PRIMARY ROUTE(S) OF EXPOSURE: Eye, Skin, Inhalation

EYE CONTACT: Can cause mild, short-lasting irritation.
SKIN CONTACT: May cause irritation with prolonged contact.

SYMPTOMS OF EXPOSURE:
ACUTE: Inhalation of high concentrations of hydrotreated light distillate can cause nausea, dizziness, vomiting, stupor or unconsciousness.

CHRONIC: Prolonged skin contact with hydrotreated light distillate can cause dry skin and defatting resulting in irritation and dermatitis.

AGGRAVATION OF EXISTING CONDITIONS: A review of available data does not identify any worsening of existing conditions.

SECTION 04 FIRST AID INFORMATION

EYES: Flush with water for 15 minutes. Call a physician.
SKIN: Wash thoroughly with soap and rinse with water. Call a physician.
INGESTION: Do not induce vomiting. Give water. Call a physician.

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P.O. BOX 87 • Sugar Land, Texas 77487-0087 • (281) 263-7000

INHALATION: Remove to fresh air. Treat symptoms. Call a physician.

NOTE TO PHYSICIAN: Based on the individual reactions of the patient, the physician's judgment should be used to control symptoms and clinical condition.

CAUTION: If unconscious, having trouble breathing or in convulsions, do not induce vomiting or give water.

SECTION 05 FIRE FIGHTING MEASURES

FLASH POINT: 210 Degrees F (PMCC) ASTM D-93

EXTINGUISHING MEDIA: Based on the NFPA guide, use dry chemical, foam, carbon dioxide or other extinguishing agent suitable for Class B fires. Use water to cool containers exposed to fire. For large fires, use water spray or fog, thoroughly drenching the burning material.

UNUSUAL FIRE AND EXPLOSION HAZARD: May evolve SOx under fire conditions.

SECTION 06 ACCIDENTAL RELEASE MEASURES

IN CASE OF TRANSPORTATION ACCIDENTS, CALL THE FOLLOWING 24-HOUR TELEPHONE NUMBER (800) I-M-ALERT or (800) 462-5378.

SPILL CONTROL AND RECOVERY:

Small liquid spills: Contain with absorbent material, such as clay, soil or any commercially available absorbent. Shovel reclaimed liquid and absorbent into recovery or salvage drums for disposal. Refer to CERCLA in Section 15.

Large liquid spills: Dike to prevent further movement and reclaim into recovery or salvage drums or tank truck for disposal. Refer to CERCLA in Section 15.

For large indoor spills, evacuate employees and ventilate area. Those responsible for control and recovery should wear the protective equipment specified in Section 8.

SECTION 07 HANDLING AND STORAGE

Storage : Keep container closed when not in use.

SECTION 08 EXPOSURE CONTROLS AND PERSONAL PROTECTION

RESPIRATORY PROTECTION: Respiratory protection is not normally needed since the volatility and toxicity are low. If significant mists are generated, use either a chemical cartridge respirator with a dust/mist prefilter or supplied air.

For large spills, entry into large tanks, vessels or enclosed small spaces with inadequate ventilation, a positive pressure, self-contained breathing apparatus is recommended.

VENTILATION: General ventilation is recommended.

PROTECTIVE EQUIPMENT: Use impermeable gloves and chemical splash goggles when attaching feeding equipment, doing maintenance or handling product. Examples of impermeable gloves available on the market are neoprene, nitrile, PVC, natural rubber, viton and butyl (compatibility studies have not been performed).

The availability of an eye wash fountain and safety shower is recommended.

If clothing is contaminated, remove clothing and thoroughly wash the affected area. Launder contaminated clothing before reuse.

HUMAN EXPOSURE CHARACTERIZATION: Based on Nalco's recommended product application and our recommended personal protective equipment, the potential human exposure is: MODERATE.

SECTION 09 PHYSICAL AND CHEMICAL PROPERTIES

COLOR:	Clear to slightly hazy amber	
FORM:	Liquid	
ODOR:	Hydrocarbon	
SOLUBILITY IN WATER:	Completely	
SPECIFIC GRAVITY:	0.95 @ 60 Degrees F	ASTM D-1298
VISCOSITY:	177 cst @ 32 Degrees F, 70 cst @ 60 Degrees F, 27 cst @ 100 Degrees F	
POUR POINT:	Less than -71 Degrees F	ASTM D-97
BOILING POINT:	296 Degrees F @ 760 mm Hg	ASTM D-86
FLASH POINT:	210 Degrees F (PMCC)	ASTM D-93
VAPOR PRESSURE:	15.5 mm Hg (0.3 ps8) @ 100 Degrees F	ASTM D-323

NOTE: These physical properties are typical values for this product.

SECTION 10 STABLILITY AND REACTIVITY

INCOMPATIBILITY: Avoid water contamination which may cause gelling.

Avoid contact with strong oxidizers (eg. chlorine, peroxides, chromates, nitric acid, perchlorates, concentrated oxygen, permanganates) which can generate heat, fires, explosions and the release of toxic fumes.

THERMAL DECOMPOSITION PRODUCTS: In the event of combustion CO, CO2, SOx, may be formed. Do not breathe smoke or fumes. Wear suitable protective equipment.

SECTION 11 TOXICOLOGICAL INFORMATION

TOXICITY STUDIES: No toxicity studies have been conducted on this product.

SECTION 12 ECOLOGICAL INFORMATION

If released into the environment, see CERCLA in Section 15.

SECTION 13 DISPOSAL CONSIDERATIONS

DISPOSAL: If this product becomes a waste, it does not meet the criteria of a hazardous waste as defined under the Resource Conservation and Recovery Act (RCRA) 40 CFR 261, since it does not have the characteristics of Subpart C, nor is it listed under Subpart D.

As a non-hazardous liquid waste, it should be solidified with stabilizing agents (such as sand, fly ash, or cement) so that no free liquid remains before disposal to an industrial waste landfill. A non-hazardous liquid waste can also be incinerated in accordance with local, state and federal regulations.

SECTION 14 TRANSPORTATION INFORMATION

PROPER SHIPPING NAME/HAZARD CLASS MAY VARY BY PACKAGING, PROPERTIES, AND MODE OF TRANSPORTATION. TYPICAL PROPER SHIPPING NAMES FOR THIS PRODUCT ARE:

ALL TRANSPORTATION MODES : PRODUCT IS NOT REGULATED DURING TRANSPORTATION

SECTION 15 REGULATORY INFORMATION

The following regulations apply to this product.

FEDERAL REGULATIONS:

OSHA HAZARD COMMUNICATION RULE, 29 CFR 1910.1200:
Based on our hazard evaluation, the following ingredient in this product is hazardous and the reason is shown below.

Hydrotreated light distillate - skin irritant

Hydrotreated light distillate = TWA 5 mg/m3 ACGIH/TLV

Hydrotreated light distillate = TWA 5 mg/m3,
STEL 10 mg/m3, OSHA/PEL

CERCLA/SUPERFUND, 40 CFR 117, 302:
Notification of spills of this product is not required.

SARA/SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT OF 1986 (TITLE III) - SECTIONS 302, 311, 312 AND 313:

SECTION 302 - EXTREMELY HAZARDOUS SUBSTANCES (40 CFR 355):
This product does not contain ingredients listed in Appendix A and B as an

Extremely Hazardous Substance.

SECTIONS 311 and 312 - MATERIAL SAFETY DATA SHEET REQUIREMENTS (40 CFR 370):
Our hazard evaluation has found this product to be hazardous. The product should be reported under the following EPA hazard categories:

XX Immediate (acute) health hazard
-- Delayed (chronic) health hazard
-- Fire hazard
-- Sudden release of pressure hazard
-- Reactive hazard

Under SARA 311 and 312, the EPA has established treshold quantities for the reporting of hazardous chemicals. The current thresholds are: 500 pounds or the threshold planning quantity (TPQ), whichever is lower, for extremely hazardous substances and 10,000 pounds for all other hazardous chemicals.

SECTION 313 - LIST OF TOXIC CHEMICALS (40 CFR 372):
This product does not contain ingredients on the List of Toxic Chemicals.

TOXIC SUBSTANCES CONTROL ACT (TSCA):
The chemical ingredients in this product are on the 8(b) Inventory List (40 CFR 710).

RESOURCE CONSERVATION AND RECOVERY ACT (RCRA), 40 CFR 261 SUBPART C & D:
Consult Section 13 for RCRA classification.

FEDERAL WATER POLLUTION CONTROL ACT, CLEAN WATER ACT, 40 CFR 401.15/ formerly Sec. 307, 40 CFR 116/formerly Sec. 311:
None of the ingredients are specifically listed.

CLEAN AIR ACT, Sec. 111 (40 CFR 60), Sec. 112 (40 CFR 61, 1990 Amendments),
Sec. 611 (40 CFR 82, CLASS I and II Ozone depleting substances):
This product does not contain ingredients covered by the Clean Air Act.

STATE REGULATIONS:

CALIFORNIA PROPOSITION 65:
This product does not contain any chemicals which require warning under California Proposition 65.

MICHIGAN CRITICAL MATERIALS:
This product does not contain ingredients listed on the Michigan Critical Materials Register.

STATE RIGHT TO KNOW LAWS:
This product does not contain ingredients listed by State Right To Know Laws.

INTERNATIONAL REGULATIONS:

This is a WHMIS controlled product under The House of Commons of Canada Bill

C-70 (Class D2B). The product contains the following substance(s), from the Ingredient Disclosure List or has been evaluated based on its toxicological properties, to contain the following hazardous ingredient(s):

Chemical Name	CAS #	% Concentration Range
Hydrotreated light distillate	64742-47-8	20-40

SECTION 16 OTHER INFORMATION

Nalco internal number F103745

SECTION 17 RISK CHARACTERIZATION

Due to our commitment to Product Stewardship, we have evaluated the human and environmental hazards and exposures of this product. Based on our recommended use of this product, we have characterized the product's general risk. This information should provide assistance for your own risk management practices. We have evaluated our product's risk as follows:

* The human risk is: MODERATE.

* The environmental risk is: LOW.

Any use inconsistent with Nalco's recommendations may affect our risk characterization. Our sales representative will assist you to determine if your product application is consistent with our recommendations. Together we can implement an appropriate risk management process.

This product material safety data sheet provides health and safety information. The product is to be used in applications consistent with our product literature. Individuals handling this product should be informed of the recommended safety precautions and should have access to this information. For any other uses, exposures should be evaluated so that appropriate handling practices and training programs can be established to insure safe workplace operations. Please consult your local sales representative for any further information.

SECTION 18 REFERENCES

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Hazardous Substances Data Bank, National Library of Medicine, Bethesda, Maryland (CD-ROM version), Micromedex, Inc., Englewood, CO.

IARC Monographs on the Evaluation of the Carcinogenic Risk of Chemicals to Man, Geneva: World Health Organization, International Agency for Research on Cancer.

Integrated Risk Information System, U.S. Environmental Protection Agency, Washington, D.C. (CD-ROM version), Micromedex, Inc., Englewood, CO.

Annual Report on Carcinogens, National Toxicology Program, U.S. Department of Health and Human Services, Public Health Service.

Title 29 Code of Federal Regulations, Part 1910, Subpart Z, Toxic and Hazardous Substances, Occupational Safety and Health Administration (OSHA).

Registry of Toxic Effects of Chemical Substances, National Institute for Occupational Safety and Health, Cincinnati, Ohio (CD-ROM version), Micromedex, Inc., Englewood, CO.

Shepard's Catalog of Teratogenic Agents (CD-ROM version), Micromedex, Inc., Englewood, CO.

Suspect Chemicals Sourcebook (a guide to industrial chemicals covered under major regulatory and advisory programs), Roytech Publications (a Division of Ariel Corporation), Bethesda, MD.

The Teratogen Information System, University of Washington, Seattle, Washington (CD-ROM version), Micromedex, Inc., Englewood, CO.

PREPARED BY: William S. Utley, PhD., DABT, Manager, Product Safety
DATE CHANGED: 01/06/1998 DATE PRINTED: 03/28/1999

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ENCLOSURE 4600– ATTACHMENT XI

Contact Numbers and Relevant Web Sites

Agency	Function	Web and/or email	Phone
National Response Center (NRC)	Spill Reporting (National); SMART call-out	http://www.nrc.uscg.mil/nrchp.html	800-424-8802
CA Emergency Management Agency (Cal-EMA)	Spill Reporting (State): Incident reports:	http://www.calema.ca.gov/hazardousmaterials/pages/hazardous-materials.aspx# http://w3.calema.ca.gov/operational/malhaz.nsf/$defaultview	800-852-7550
USCG	San Francisco Sector	http://homeport.uscg.mil/sanfrancisco	415-399-3547/ 415-399-3300
	Los Angeles-Long Beach Sector	http://homeport.uscg.mil/lalb	310-521-3600/ 800-221-8724
	San Diego Sector	http://homeport.uscg.mil/sandiego	619-278-7033/ 619-295-3121
	District 11	http://www.uscg.mil/d11/	510-437-3701
	Pacific Strike Team (for SMART team request)	http://www.uscg.mil/hq/nsfweb/docs/foscquadfold2077.pdf	415-883-3311 Can also contact NRC: 800-424-8802
Regional Response Team (RRT) IX	USCG Command Center (to convene incident-specific RRT)		510-437-3701
	USCG RRT Co-chair: USCG RRT Alt. Co-chair: USCG RRT Coordinator: Susan Krala	timothy.p.holmes@uscg.mil arthur.j.snyder@uscg.mil susan.e.krala@uscg.mil	510-437-2949 510-437-3316 510-437-2794
	USEPA RRT Co-chair: Dan Meer USEPA RRT Alt. Co-chair: Kathryn Lawrence USEPA RRT Coordinator: Lance Richman	meer.dan@epa.gov lawrence.kathryn@epa.gov richman.lance@epamail.epa.gov	415-972-3132 415-971-6792 (cell) 415-972-3022
	CA DFW-OSPR Primary: Yvonne Addassi CA DFW-OSPR Alternate: Ellen Faurot-Daniels Cal-EMA Primary: Brian Abeel Cal-EMA Alternate: Trevor Anderson	yvonne.addassi@wildlife.ca.gov ellen.faurot-daniels@wildlife.ca.gov brian.abeel@calema.ca.gov trevor.anderson@calema.ca.gov	916-445-9326 916-798-2158 (cell) 916-324-8829 (fax) 831-649-2888 831-233-0723 (cell) 831-649-2894 (fax)
	DOC/NOAA Primary: Jordan Stout DOC/NOAA Alternate: Doug Helton	jordan.stout@noaa.gov doug.helton@noaa.gov	510-437-5344
	DOI Primary: Patricia Port DOI Alternate: Susmita Pendurthi	oepcsfn@aol.com patricia_port@ios.doi.gov susmita_pendurthi@ios.doi.gov	415-296-3355 415-420-0524 (cell) 415-773-8334 (fax)

Contact Numbers and Relevant Web Sites, continued

Agency	Function	Web and/or email	Phone
NOAA	Scientific Support Coordinator (Jordan Stout)	jordan.stout@noaa.gov	510-437-5344 206-321-3320 (cell) 510-437-3247 (fax)
	Ocean Prediction Center	http://www.opc.ncep.noaa.gov/pac_tab.shtml	
	Tide Predictions	http://www.co-ops.nos.noaa/gov/tides11/tpred2.html#CA	
	Coastal Water Temperature Guide	http://www.nodc.noaa.gov/dsdt/wtg12/html	
	Nautical Charts	http://www.nauticalcharts.noaa.gov/mcd/onlineviewer.html	
	Physical, chemical and geological ocean data	http://www.nodc.noaa/gov	
	Trajectories, ESI maps, job aids, etc.	http://response.restoration.noaa.gov/	
	National Weather Service Eureka SF/Monterey Oxnard/Los Angeles San Diego Sacramento (CA HQ)	 http://www.wrh.noaa.gov/eka http://www.wrh.noaa.gov/mtr http://www.wrh.noaa.gov/lox http://www.wrh.noaa.gov/sgx http://www.wrh.noaa.gov/sto	 707-443-6484 831-656-1725 805-988-6610 858-675-8700 916-979-3051
	National Marine Fisheries Service Southwest Region Elizabeth Petras Santa Rosa Field Office Joe Dillon	 http://swr.ucsd.edu elizabeth.petras@noaa.gov http://swr.nmfs.noaa.gov/sroprd.htm joseph.j.dillon@noaa.gov	 562-980-4000 562-980-3238 206-619-1547 (cell) 562-980-4027 (fax) 707-575-6050 707-480-3496 (cell) 707-578-3435 (fax)
	National Marine Sanctuaries Headquarters Lisa Symons Cordell Bank Dan Howard Gulf of Farallones Maria Brown Monterey Paul Michel Channel Islands Chris Mobley	 http://sanctuaries.noaa.gov lisa.symons@noaa.gov http://cordellbank.noaa.gov dan.howard@noaa.gov http://farallones.noaa.gov maria.brown@noaa.gov http://montereybay.noaa.gov paul.michel@noaa.gov http://channelislands.noaa.gov chris.mobley@noaa.gov	 301-713-3125 415-663-0314 415-561-6622 831-647-4201 805-966-7107

Contact Numbers and Relevant Web Sites, continued

Agency	Function	Web and/or email	Phone
Other Key Federal Agency Contacts	USFWS Damian Higgins (Sacramento) John Henderson (Sacramento) Randy Brown (Arcata) Nancy Finley (Arcata) Jenny Marek (Ventura) Judy Gibson (Carlsbad) Nancy Ferguson (Carlsbad)	damian_higgins@fws.gov john_henderson@fws.gov randy_brown@fws.gov nancy_finley@fws.gov Jenny_marek@fws.gov judy_gibson@fws.gov nancy_ferguson@fws.gov	916-414-6548 916-414-6595 707-882-7201 707-825-5100 805-644-1766x325 760-431-9440x260 760-431-9440x244
Air Districts	North Coast AQMD Rick Martin, Jr. Mendocino AQMD Christopher Brown N. Sonoma AQMD Barbara Lee Bay Area AQMD Wayne Kino Monterey Bay Unified Richard Stedman San Luis Obispo County Karen Brooks Santa Barbara County Ron Tan Ventura County APCD Kent Field South Coast AQMD Mohsen Nazemi San Diego AQMD Jon Adams	rmartin@ncuaqmd.org browncd@co.mendocino.ca.us barbara.lee@sonoma-county.org wkino@baaqmd.gov rstedman@mbuapcd.org kbrooks_apcd@co.slo.ca.us tanr@sbcapcd.org kent@vcapcd.org mnazemi1@aqmd.gov jon.adams@adcounty.ca.gov	707-443-3093 707-443-3099 (fax) 707-463-4354 707-272-3572 (cell) 707-463-5707 (fax) 707-433-5911 707-953-1634 (cell) 707-433-4823 (fax) 415-749-4789 415-928-8560 (fax) 831-647-9411 (x206) 831-647-8501 (fax) 805-781-5912 805-781-1002 (fax) 805-961-8800 805-961-8801 (fax) 805-662-6960 805-645-1444 (fax) 909-396-2000 909-396-3340 (fax) 858-586-2653 858-586-2701 (fax)

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ENCLOSURE 4600 – ATTACHMENT XII

DISPERSANT USE DECISION FORMS

XII.a FOSC Pre-Approval Zone Plan Sign-Off

(on following page)

DISPERSANT USE: FOSC/UC RECORD OF DECISION

Spill Name: _____

RRT IX Pre-Approval Zone	Subpart J of the National Contingency Plan (NCP) provides that the FOSC, with the concurrence of the EPA representative to the Regional Response Team and the State with jurisdiction over the navigable waters threatened by the oil discharge, and in consultation with the U.S. Department of Commerce (DOC) and the U.S. Department of the Interior (DOI) natural resource trustees, when practicable, may authorize the use of dispersants on oil discharges; provided, however, that such dispersants are listed on the NCP Product Schedule. The EPA has been delegated authority to maintain a schedule of chemical countermeasures that may be authorized for oil discharges in accordance with procedures set forth in Section 300.900 of the NCP. *The Region IX Regional Response Team has established dispersant pre-approval zones within waters 3-200 miles along the California coast, as designated, and has provided policies and procedures for a FOSC to authorize the use of dispersants consistent with these pre-approval zones.* **For purposes of this record of decision, the Designated FOSC has completed the "California Dispersant Checklist" and has determined that the oil spill named above meets the pre-approval criteria as outlined and that dispersant use is authorized.**	_____ Signature, Federal On-Scene Coordinator, US Coast Guard _____ Printed Name _____ Date
	California statute requires that emergency response operations use the Incident Command System. For marine oil spill response, a joint Unified Command Structure is implemented consisting of the Federal On-Scene Coordinator, the State On-Scene Coordinator and the Responsible Party and as outlined in the Memorandum of Understanding between the United States Coast Guard and the California Department of Fish and Game, Office of Spill Prevention and Response. For purposes of this record of decision, the authorization of dispersant use as delegated by the Region IX RRT to the designated FOSC was completed within a Unified Command Structure and agreed upon by the State On-Scene Coordinator and the representative of the Responsible Party. **The joint Unified Command has completed the "California Dispersant Checklist" and has determined that the oil spill named above meets the pre-approval criteria as outlined and that dispersant use is authorized.**	_____ Signature, State On-Scene Coordinator, California Office of Spill Prevention and Response _____ Printed Name _____ Date _____ Signature, Responsible Party Representative _____ Printed Name _____ Date

XII.a, continued

DISPERSANT USE: FOSC/UC REQUEST OF RRT IX

Spill Name: _____

RRT IX Expedited Approval Zone	Subpart J of the National Contingency Plan (NCP) provides that the FOSC, with the concurrence of the EPA representative to the Regional Response Team and the State with jurisdiction over the navigable waters threatened by the oil discharge, and in consultation with the U.S. Department of Commerce (DOC) and the U.S. Department of the Interior (DOI) natural resource trustees, when practicable, may authorize the use of dispersants on oil discharges; provided, however, that such dispersants are listed on the NCP Product Schedule. The EPA has been delegated authority to maintain a schedule of chemical countermeasures that may be authorized for oil discharges in accordance with procedures set forth in Section 300.900 of the NCP. *The Region IX Regional Response Team has established dispersant expedited approval zones within State waters, any waters within a national marine sanctuary, and all waters within three miles of landfall. Dispersant use within these areas requires that the Federal On-Scene Coordinator request approval by the RRT. In addition, subsea application of dispersants, or surface application extending more than 5-7 days, requires approval of the RRT before use.* **For purposes of this record of decision, the Designated FOSC has completed the "California Dispersant Checklist" and has determined that the oil spill named above meets the criteria outlined in the checklist and formally requests a dispersant use decision from the RRT.**	_____ Signature, Federal On-Scene Coordinator, US Coast Guard _____ Printed Name _____ Date
	California statute requires that emergency response operations use the Incident Command System. For marine oil spill response, a joint Unified Command Structure is implemented consisting of the Federal On-Scene Coordinator, the State On-Scene Coordinator and the Responsible Party and as outlined in the Memorandum of Understanding between the United States Coast Guard and the California Department of Fish and Game, Office of Spill Prevention and Response. For purposes of this record of decision, the authorization of dispersant use as delegated by the Region IX RRT to the designated FOSC was completed within a Unified Command Structure and agreed upon by the State On-Scene Coordinator and the representative of the Responsible Party. **For the purposes of this record of decision, permission to use dispersants is formally requested by FOSC of the RRT. The "California Dispersant Checklist" was completed within a Unified Command Structure and agreed upon by the State On-Scene Coordinator and the representative of the Responsible Party.**	_____ Signature, State On-Scene Coordinator, California Office of Spill Prevention and Response _____ Printed Name _____ Date _____ Signature, Responsible Party Representative _____ Printed Name _____ Date

XII.b RRT Expedited Approval Zone Record of Decision

DISPERSANT USE: RRT IX RECORD OF DECISION

Spill Name: _____

RRT IX Incident-Specific Approval Zone	Subpart J of the National Contingency Plan (NCP) provides that the FOSC, with the concurrence of the EPA representative to the Regional Response Team and the State with jurisdiction over the navigable waters threatened by the oil discharge, and in consultation with the U.S. Department of Commerce (DOC) and the U.S. Department of the Interior (DOI) natural resource trustees, when practicable, may authorize the use of dispersants on oil discharges; provided, however, that such dispersants are listed on the NCP Product Schedule. The EPA has been delegated authority to maintain a schedule of chemical countermeasures that may be authorized for oil discharges in accordance with procedures set forth in Section 300.900 of the NCP. *The Region IX Regional Response Team has established dispersant expedited approval zones within State waters, any waters within a national marine sanctuary, and all waters within three miles of landfall. Dispersant use within these areas requires that the Federal On-Scene Coordinator request approval by the RRT. In addition, subsea application of dispersants, or surface application extending more than 5-7 days, requires approval of the RRT before use.* **For purposes of this record of decision, the Designated FOSC has completed the "California Dispersant Checklist" and has determined that the oil spill named above meets the criteria outlined in the checklist and formally requests a dispersant use decision from the RRT.**	_____ Signature, Federal On-Scene Coordinator, US Coast Guard _____ Printed Name _____ Date
	California statute requires that emergency response operations use the Incident Command System. For marine oil spill response, a joint Unified Command Structure is implemented consisting of the Federal On-Scene Coordinator, the State On-Scene Coordinator and the Responsible Party and as outlined in the Memorandum of Understanding between the United States Coast Guard and the California Department of Fish and Game, Office of Spill Prevention and Response. For purposes of this record of decision, the authorization of dispersant use as delegated by the Region IX RRT to the designated FOSC was completed within a Unified Command Structure and agreed upon by the State On-Scene Coordinator and the representative of the Responsible Party. **For the purposes of this record of decision, permission to use dispersants is formally requested by FOSC of the RRT. The "California Dispersant Checklist" was completed within a Unified Command Structure and agreed upon by the State On-Scene Coordinator and the representative of the Responsible Party.**	_____ Signature, State On-Scene Coordinator, California Office of Spill Prevention and Response _____ Printed Name _____ Date _____ Signature, Responsible Party Representative _____ Printed Name _____ Date