RRT-6

FOSC DISPERSANT PRE-APPROVAL GUIDELINES and CHECKLIST

RRT-6 APPROVED JANUARY 10, 1995
VERSION 2.0 MAY 1, 1996
VERSION 3.0 January 19, 2000
VERSION 4.0, January 24, 2001

Purpose and Use of These Guidelines and Checklist

This document, and any internal procedures adopted for its implementation, is intended solely to assist the Federal On-Scene Coordinator in making the decision to approve or reject the use of dispersants. It does not constitute rulemaking by any agency and may not be relied upon to create a right or benefit, substantive or procedural, enforceable by law or in equity, by any person. Any agency or person may take action at variance with this guidance or its internal implementing procedures, however, if done so, the rule governing dispersant use at Section 300.910 of the National Oil and Hazardous Substances Pollution Contingency Plan (40 CFR Part 300) shall be in full force and effect. Mention of trade names, commercial products, or commercial companies does not constitute endorsement or recommendation for their use by any agency of the United States Government.

Regional Response Team

Regional VI Oil and Hazardous Substances Pollution Contingency Plan

July 17, 1996

FROM: Federal Region VI Regional Response Team

TO: Federal Region VI On-Scene Coordinators (OSC)

RRT

Environmental Protection Agency
United States Coast Guard
Department of Commerce
Department of Interior
Department of Agriculture
Department of Defense
Department of State
Department of Justice
Department of Transportation
Department of Health and Human Services
Federal Emergency Management Agency
Department of Energy
General Services Administration
Department of Labor
Nuclear Regulatory Commission
States of Arkansas Louisiana New Mexico Oklahoma Texas

The Federal Region VI Regional Response Team (RRT), in accordance with the "National Oil and Hazardous Substances Pollution Contingency Plan" [40 CFR Part 300, Section 300.910], grants preauthorization to the OSC for dispersant use as defined by the "RRT VI OSC Preapproved Dispersant Use Manual", Version 2.0, in responding to any oil pollution located in offshore waters of Texas and Louisiana which are no less than 10 meters in depth and at least three nautical miles from the nearest shoreline.

This preauthorization is based on RRT VI's initial approval of January 10, 1995 and Version 2.0, dated May 1, 1996, which authorizes the OSCs the use of dispersants on oil spills within the following area:

From the ten meter isobath or three nautical miles, whichever is farthest from shore, to 200 nautical miles offshore (Exclusive Economic Zone boundary), beginning from the Texas - Mexico border and extending through the States of Texas and Louisiana to the boundary between Federal Regions IV and VI. All previously identified exclusionary zones have been removed.

The provisions of the "OSC Preapproval Dispersant Use Manual" must be fully complied with in order to meet the requirements of this preapproval.

A copy of this letter should be retained in the front of this manual.

J. W. Calhoun
Captain, USCG
Region VI Co-Chair

Report Oil and Chemical Spills Toll Free (800) 424-8802

RRT VI APPROVAL SIGNATURES
FOSC DISPERSANT PRE-APPROVAL GUIDELINES AND CHECKLIST VERSION 4.0
January 24, 2001

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CONTENTS

PREFACE

This dispersant pre-approval is designed to provide for the timely use of dispersants along with mechanical techniques and *in-situ* burning for offshore oil spill response. No single response method is 100% effective, thereby establishing a need to consider the use of all available methods from the start of the spill response. Initially, the assumption needs to be made that all three methods (mechanical, *in-situ* burn, and dispersants) may be used and then adjustments are made to that assumption as information concerning the spill is received by the Federal On-Scene Coordinator (FOSC).

The objective of the Regional Response Team VI (RRT 6) FOSC Dispersant Pre-approval Guidelines and Checklist is to provide for meaningful, environmentally safe, and effective dispersant operation. The programmed checklist approach allows the FOSC to quickly arrive at a logical "GO/NO GO" decision. This gives the dispersant operation the opportunity to begin in a timely manner that is consistent with attempting to maximize the effectiveness of dispersant use as a countermeasure to reduce the impact of oil spills.

In this document the RRT 6 Dispersant Pre-approval Overview, the FOSC Dispersant Use Checklist and the FOSC Dispersant Use Flowchart define the dispersant pre-approval requirements. If the dispersant pre-approval requirements are not met, the request for use of dispersant must follow the approval process as specified in the RRT 6 Regional Contingency Plan Subpart H Authorization.

RRT 6 DISPERSANT PRE-APPROVAL OVERVIEW

In accordance with the National Contingency Plan, Regional Response Team VI (RRT 6) dispersant pre-approval authority is given only to the Federal On-Scene Coordinator (FOSC) and with the following guidelines:

- The FOSC must utilize the decision-making process as defined in this guidance to determine the applicability of dispersants as a response option for a specific spill response.

- The RRT will be notified by the FOSC of an approval to initiate dispersant operations as soon as practicable after the approval has been given to the Responsible Party (RP). Provided the dispersant application is successful and operational results are positive, no RRT approval will be required for additional sorties and passes. The RRT must be kept informed on the status of the dispersant application throughout the operation. Post-application information/results will be provided to the RRT within 24 hours of the dispersant application. Formal convening of the RRT, however, is not necessary. A final debrief will be given to the RRT by the FOSC/SSC and must include an "After-Action-Report" to the RRT.

- The pre-approved area includes offshore waters "from the ten-meter isobath or three nautical miles", whichever is farthest from the shore, to 200 nautical miles offshore (Exclusive Economic Zone boundary), beginning from the Texas-Mexico border and extending through the states of Texas and Louisiana to the boundary between federal Regions IV and VI.

- The only requirement for dispersant product selection is that the dispersant must be included on the NCP Product Schedule and considered appropriate by the FOSC for existing environmental and physical conditions.

- Dispersant spraying operations are conducted during daylight hours only. To achieve the intended results of this pre-approval, it is essential that every reasonable effort be made to make the first dispersant drop as soon as possible after the oil has been released into the marine environment.

- An appropriate contractual relationship with the dispersant application contractor must be established as part of the pre-spill planning process. Such contractual relationship can be with the RP, State or Federal Agency, or Spill Management Team.

- Contracted dispersant operations shall have the organization and capability to provide the first application of dispersant over the designated response zone as rapidly as possible.

- Pre-approval is not restricted to aerial application only. Other application techniques (e.g., boat) may be considered. In general, dispersant boat spray systems should be considered when a relatively small areal coverage of oil is involved. This is primarily due to the smaller swath widths and slower speeds of the surface vessels as compared to large aircraft. However, this could be especially useful if there is an unusually thick layer of oil to be dispersed, or when the geometry of the situation makes aerial application unfeasible.

- The general criteria for evaluating the approval for use of any dispersant system should be the ability of the party or parties that are requesting approval to demonstrate to the satisfaction of the FOSC, in addition to any other requirements of the RRT6 Dispersant Use Pre-approval Guideline and Checklist, the following:
  1) That the application system has been a) specifically designed for its intended purpose, or b) if not specifically designed for dispersant use, has been used previously and was deemed to be effective and appropriate, and will be used again in a similar manner, or c) by some other specific means, documentation or experience reasonably deemed to be effective and appropriate under the circumstances.
  2) That the design and operation of the application system can reasonably be expected to apply the chemical dispersant in a manner consistent with the dispersant manufacturers recommendation, especially with regard to dosage rates, and concentrations.
  3) That the operation will be supervised or coordinated by personnel that have experience, knowledge, specific training, and/or recognized competence with chemical dispersants and the type of system to be used.

- In case of Aerial Application of dispersants:
  1) The FOSC must ensure that the RP's dispersant operation provides for a dispersant controller who is over the spray zone(s) in separate aircraft from the dispersant aircraft. The controller must be qualified and be able to direct the dispersant aircraft in carrying out the offshore dispersant operation inclusive of avoiding the spraying of birds (by 1000 ft. horizontal distance), marine mammals and turtles that may be in the area.
  2) Aircraft spray systems must be capable of producing dispersant droplet sizes that provide for optimal dispersant effectiveness (generally 250-500 µm, but follow manufacturer and ASTM guidance).
  3) Additional guidance for aerial spray systems is provided in the Section entitled "AERIAL SPRAY GUIDELINES"

- In case of Boat Application of dispersants:
  1) If the system involves spray arms or booms that extend out over the edge of the boat and have fan type nozzles that spray a fixed pattern of dispersant, the following ASTM standards apply:
     a) **ASTM F 1413-92** "Standard Guide for Oil Spill Dispersant Application Equipment: Boom and Nozzle Systems
     b) **ASTM F 1460-93** Standard Practice for Calibrating Oil Spill Dispersant Application Equipment Boom and Nozzle Systems
     c) **ASTM F 1737-96** Standard Guide for Use of Oil Spill Dispersant Application Equipment During Spill Response: Boom and Nozzle Systems.
  2) If the system involves the use of a fire monitor and or fire nozzle to apply the dispersants, a straight and narrow "firestream" flow of dispersant directly into the oil is to be avoided. At this time there are no applicable ASTM standards for these types of systems.
  3) Fire monitor systems must meet the general criteria for approval specified above.

4) Additional guidance for boat spray systems is provided in the Section entitled “BOAT SPRAY GUIDELINES”

- The FOSC must activate the Special Monitoring of Applied Response Technologies (SMART) Program monitoring team. Every attempt should be made to implement the on-water monitoring component of the SMART monitoring protocols in every dispersant application. At a minimum, Tier 1 (visual) monitoring must occur during any dispersant operations approved in accordance with the Dispersant Pre-approval Guidelines and Checklist. The SMART controller/observer should be flying over the response zone to visually assess effectiveness of the dispersant applications, and to look out for marine animals. When possible DOI/DOC will provide a specialist in aerial surveying of marine mammals/turtles and pelagic/migratory birds who will accompany the SMART controller/observer (see Appendix A for contact information.)

The various forms, flowchart and graph used in this Dispersant Pre-approval Guidelines and Checklist are intended for use by the FOSC as working documents. Completed forms are to be sent to RRT 6 representatives from USCG District 8, EPA, DOI, DOC, and Louisiana and/or Texas both during and after (i.e., with the After-Action-Report) the pre-approved dispersant operation.

DISPERSANT OPERATIONS DECISION PROCESS

The dispersant operations decision-making process consists of the following guides:

1 Dispersant Pre-Approval Initial Call Checklist (page 5)

2 FOSC Dispersant Use Checklist (pages 6-9) - The following are used to complete this checklist:

2-1 FOSC Dispersant Use Flowchart (page 10)
2-2 FOSC Dispersant Use Oil Table - General Dispersability Relative to API Gravity and Pour Point (page 11)

In this dispersant pre-approval process there is no requirement for the Responsible Party (RP) to complete any forms. Instead, the information required from the RP is recorded by the FOSC's representative during the initial contact with the RP. For post-response reporting, the FOSC may require more detailed information from the RP at a later date. The FOSC needs to instruct operations personnel to record the appropriate information during initial contact for reported spills in order to ensure a timely decision by the FOSC when it is required.

Using the Decision Tools:

1 **Dispersant Pre-Approval Initial Call Checklist -** This checklist is for collecting the information necessary for the FOSC to complete the pre-approved dispersant use decision-making process. The checklist should be completed by MSO operations personnel when they make the first telephone contact with the Responsible Party's official representative. The areas that are boxed contain information that is necessary to complete the "FOSC Dispersant Use Checklist".

2 **FOSC Dispersant Use Checklist -** This checklist is designed to cover the details of the decision-making process. The initial list portion of the checklist should be provided to the operations staff to be completed and passed to the FOSC, or the FOSC's designated representative, immediately if the RP expresses a desire to use dispersants in the response. When the checklist is completed, the decision as to whether or not to disperse will be clearly defined. The following chart and table are used to complete this checklist. Make extra copies of each sheet so they can be written on during a response, and then sent to the RRT:

- **FOSC Dispersant Use Flowchart -** The flowchart is used as a general guide to aid in keeping track of the progress on the FOSC Dispersant Use Checklist. As each appropriate box related to the checklist is completed, check that box on the flowchart. The numbers and letters in brackets, [ ], on the checklist are keyed with the number or letter located on top of each box in the flowchart.

- **FOSC Dispersant Use Oil Table - General Dispersability Relative to API Gravity and Pour Point** - This table provides a general assessment of oil dispersability only. Given the wide range of dispersants, oil, and weather conditions, the FOSC should use what information is available as well as feedback from the monitoring team.

The checklists and the flowchart and table are designed to be written on, and at the end of the process can be sent to the RRT.

Dispersant Pre-Approval Initial Call Checklist

Boxes denote essential Information

CALLER

Time of Initial Call: Date: ____/____/____ Time:_____CT
(Month / Day / Year / 24 hour clock)

Name of Caller:_____

Telephone #: (__ __ __) __ __ __ - __ __ __ __

Name of Alternate Contact:_____

Telephone #: (__ __ __) __ __ __ - __ __ __ __

Company Name:_____

Address:

*Street:*_____

*City:*_____

*State:*_____ *Zip Code:*_____

SPILL

Initial Time of Spill: Date: ____/____/____ Time:_____CT
(Month / Day / Year / 24 hour clock)

Location of Spill: LAT: _____N LON:_____W

Block Name:_____ Block Number:_____

Type of Release: [Instantaneous ( ) or Continuous Flow ( )]

Oil: Name:_____

API:_____ Pour Point:_____(˚C or ˚F)
Circle One

Amount Spilled: _____ [GAL or BBLS (42 GAL/BBL)]
Circle One

Flow Rate if Continuous Flow (Estimate): _____

ON-SCENE WEATHER (Note: If not available contact SSC for Weather)

Wind Direction From (Degrees): _____ Wind Speed: _____Knots

Surface Current (Direction toward, Degrees): _____

(Speed): _____Knots

Visibility: _____ Nautical Miles

Ceiling:_____ Feet

Sea State (Wave height):_____ Feet

DISPERSANT SPRAY OPERATION

Dispersant Spray Contractor

Name: _____

Address:

Street: _____

City: _____

State: _____ *Zip Code:* _____

Telephone: (__ __ __) __ __ __ - __ __ __ __

Dispersant: Name: _____

Quantity Available: _____

Platform: Aircraft Type: _____

Multi-Engine ( ) or Single-Engine ( )

Boat Type: _____

Other: _____

Dispersant Load Capability (Gal): _____

Time to First Drop on the oil (Hours): _____

FOSC DISPERSANT USE CHECKLIST

(Items on the far left of this checklist are keyed to letter and numbers on the top of the boxes in the FOSC Dispersant Use Flowchart and apply to offshore pre-approval only. INFORMATION AVAILAIBLE IN THE DISPERSANT PRE-APPROVAL INITIAL CALL CHECKLIST, AND THE TABLE ON THE OTHER SHEET ARE NECESSARY TO COMPLETE THIS CHECKLIST.)

OIL SPILLED

A. FOSC completes and evaluates DISPERSANT PRE-APPROVAL INITIAL CALL CHECKLIST.
B. Ask spiller if dispersant spray operation is on alert pending completion of pre-approval use evaluation by the FOSC.

[1] DEPLOY SMART

A. Immediately Deploy USCG Strike Team SMART Team to the spill site if dispersant use is likely. Every attempt should be made to implement the on-water monitoring component of the SMART monitoring protocols in every dispersant application. At a minimum, Tier 1 (visual) monitoring must occur during any dispersant operations approved in accordance with this Dispersant Pre-approval Guidelines and Checklist
B. Immediately notify DOI/DOC survey specialist contact identified in Appendix A if dispersant use is likely.
C. Deploy mechanical and/or in-situ burn operations, weather allowing.

[2] PRE-APPROVED DISPERSANT OPERATIONS ACTIVATION EVALUATION

1. Do you expect the use of dispersants in this case to provide an environmental benefit? The NOAA SSC should be contacted for trajectory and environmental fate analysis.

YES	( )	GO TO SECTION 2 BELOW
NO	( )	GO TO SECTION 11 BELOW

2. Plot the position of the spill on the appropriate nautical chart, draw a circle about the spill source with a 10 nautical mile radius as a worst-case scenario for surface movement. Hash mark any area within the circle that is in waters less than 10 meters deep or 3 nautical miles from shore. What is left is considered the dispersant operational area.
Is the dispersant operational area to be in offshore water that is no less than 10 meters deep and at least 3 nautical miles from the nearest shoreline?

YES	( )	GO TO SECTION 3 BELOW
NO	( )	GO TO SECTION 9 BELOW

3. Was a contractual relationship with a dispersant spray contractor established prior to the spill?

YES	( )	GO TO SECTION 4 BELOW
NO	( )	GO TO SECTION 9 BELOW

4. Dispersant Platform
Considering the amount of oil spilled, the location of the operational area, volume of available dispersants to be used, and the timeframe in which the required equipment can be on-scene, what is the most effective application platform? More than one platform type may be considered.

If Aerial	GO TO SECTION 5 BELOW
If Boat	GO TO SECTION 6 BELOW
If Other	GO TO SECTION 7 BELOW

5. Aerial Application Operational Conditions

[A] If on-scene weather was available from the spiller on initial telephone contact use that information to complete this section and assume for planning purposes that it will remain the same during the timeframe in which this decision is operating. At the earliest opportunity, contact the SSC for detailed weather, but do not delay this decision process for the SSC weather input (Note: All dispersant operations are carried out during daylight hours only).

Winds less than or equal to 25 knots, and
Visibility greater than or equal to 3 nautical miles, and
Ceiling greater than or equal to 1,000 feet?

YES	( )	GO TO SECTION 8 BELOW
NO	( )	GO TO [B] IN THIS SECTION BELOW

[B] Notify the spiller's representative that the dispersant use decision has been delayed until the weather improves, and that the Dispersant Spray Operation is to be placed on a standby status.

GO TO SECTION [C] IN THIS SECTION BELOW

[C] Consult with RRT 6 members. Contact the USCG Co-chair at USCG District 8, EPA, DOI, DOC, and Louisiana and/or Texas RRT representatives to notify them that dispersants are being considered, but delayed due to weather. When the weather is beginning to improve:

BEGIN AGAIN IN SECTION 2 ABOVE

6. Boat Application Operational Conditions

[A] If on-scene weather was available from the spiller on initial telephone contact use that information to complete this section and assume for planning purposes that it will remain the same during the timeframe in which this decision is operating. At the earliest opportunity, contact the SSC for detailed weather, but do not delay this decision process for the SSC weather input (Note: All dispersant operations are carried out during daylight hours only).

Wave height such that the boats to be used for the dispersant application can conduct an effective and safe spray operation?

YES	( )	GO TO SECTION 8 BELOW
NO	( )	GO TO [B] IN THIS SECTION BELOW

[B] Notify the spiller's representative that the dispersant use decision has been delayed until the sea state improves, and that the Dispersant Spray Operation is to be placed on a standby status.

GO TO SECTION [C] IN THIS SECTION BELOW

[C] Consult with RRT 6 members. Contact the USCG Co-chair at USCG District 8, EPA, DOI, DOC, and Louisiana and/or Texas RRT representatives to notify them that dispersants are being considered, but delayed due to sea state. When the sea state is beginning to improve:

BEGIN AGAIN IN SECTION 2 ABOVE

7. Immediately consult with the Scientific Support Coordinator (SSC) to evaluate potential alternatives to the Aircraft and Boat Platforms.
   [A] After a briefing on the spill response situation from the FOSC, does the SSC recommend aerial application of Dispersants?

YES	( )	GO TO SECTION 5 ABOVE
NO	( )	GO TO [B] IN THIS SECTION BELOW

   [B] After a briefing on the spill response situation from the FOSC, does the SSC recommend boat application of Dispersants?

YES	( )	GO TO SECTION 6 ABOVE
NO	( )	GO TO [C] IN THIS SECTION BELOW

   [C] After a briefing on the spill response situation from the FOSC, does the SSC recommend an alternative platform?

YES	( )	DEVELOP A PLAN AND GO TO SECTION 8 BELOW
NO	( )	GO TO SECTION 11 BELOW

8. Is the dispersant to be used listed on the NCP Product Schedule and considered appropriate for existing environmental and physical conditions?

YES	( )	GO TO SECTION 10
NO	( )	GO TO SECTION 9

9. **GO NO FURTHER** IN THIS FOSC DISPERSANT USE CHECKLIST. The request for dispersant use does not qualify under the guidelines for pre-approval use of dispersants in Region 6. Contact your SSC and begin the dispersant use approval process as specified in the RRT 6 Regional Contingency Plan Subpart H Authorization (Authorization for Use of Dispersants in Non-Life Threatening Situations)

10. Dispersability
    Refer to the Dispersant Pre-Approval Initial Call Checklist
    Does the available technical information suggest that dispersion is likely given the spilled oil, anticipated oil weathering, and selected dispersant? Use the FOSC Dispersant Use Oil Table and any technical sources such as the SSC to make this assessment.

YES	( )	GO TO 12 BELOW
NO	( )	GO TO 11 BELOW

11. **GO NO FURTHER** IN THIS FOSC DISPERSANT USE CHECKLIST. In this case dispersant use is either inappropriate for this response or will probably not be considered to be effective relative to the effort required.
    Concentrate your efforts on Mechanical and/or in-situ burn operations
    Note: You may want to consider dispersant pre-approval use at a later time if the field situation changes (i.e., becomes a continuous spill or has a new instantaneous release.) In such an event, make sure the Initial Call Checklist has been updated and return to the start of this checklist (OIL SPILLED ON PAGE 6.)

12. INITIATE APPLICATION OF DISPERSANTS WITHIN THESE RRT GUIDELINES.
    - Water depth ≥ 10 meters and no less than 3 nautical miles from nearest shoreline.
    - 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 survey specialist will accompany the SMART observer, but the operation will not be delayed for that individual (see Appendix A for contact information).
      Note: The purpose of SMART monitoring is to confirm best professional advice related to the potential success of dispersant use. Given the uncertainty involved relating to physical and environmental condition, oil weathering, and dispersant and oil interaction, we must rely on positive feedback from the monitors to continue dispersant application.
    - Personal protective equipment for personnel on-site will conform to the appropriate dispersant's MSDS
    - If dispersant platform is an aircraft, spray 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.
    - If dispersant platform is a boat:
      - If the system involves spray arms or booms that extend out over the edge of the boat and have fan type nozzles that spray a fixed pattern of dispersant, the following ASTM standards apply:
        - **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.
      - If the system involves the use of a fire monitor and or fire nozzle to apply the dispersants, a straight and narrow "firestream" flow of dispersant directly into the oil is to be avoided. At this time (May 2000) there are no applicable ASTM standards for these types of systems.
    - If an alternative dispersant platform is used, the Operation Plan should include dispersant application guidelines.

    - The FOSC is to notify the RRT as soon as practicable after the approval is given to the RP.

    GO TO SECTION 13 BELOW

13. The RRT (EPA, DOI, DOC, and the State of Louisiana and/or the State of Texas) must be kept informed on the status of the dispersant application throughout the operation. Provided the dispersant application is successful and operational results are positive, no RRT approval will be required for additional sorties and passes.

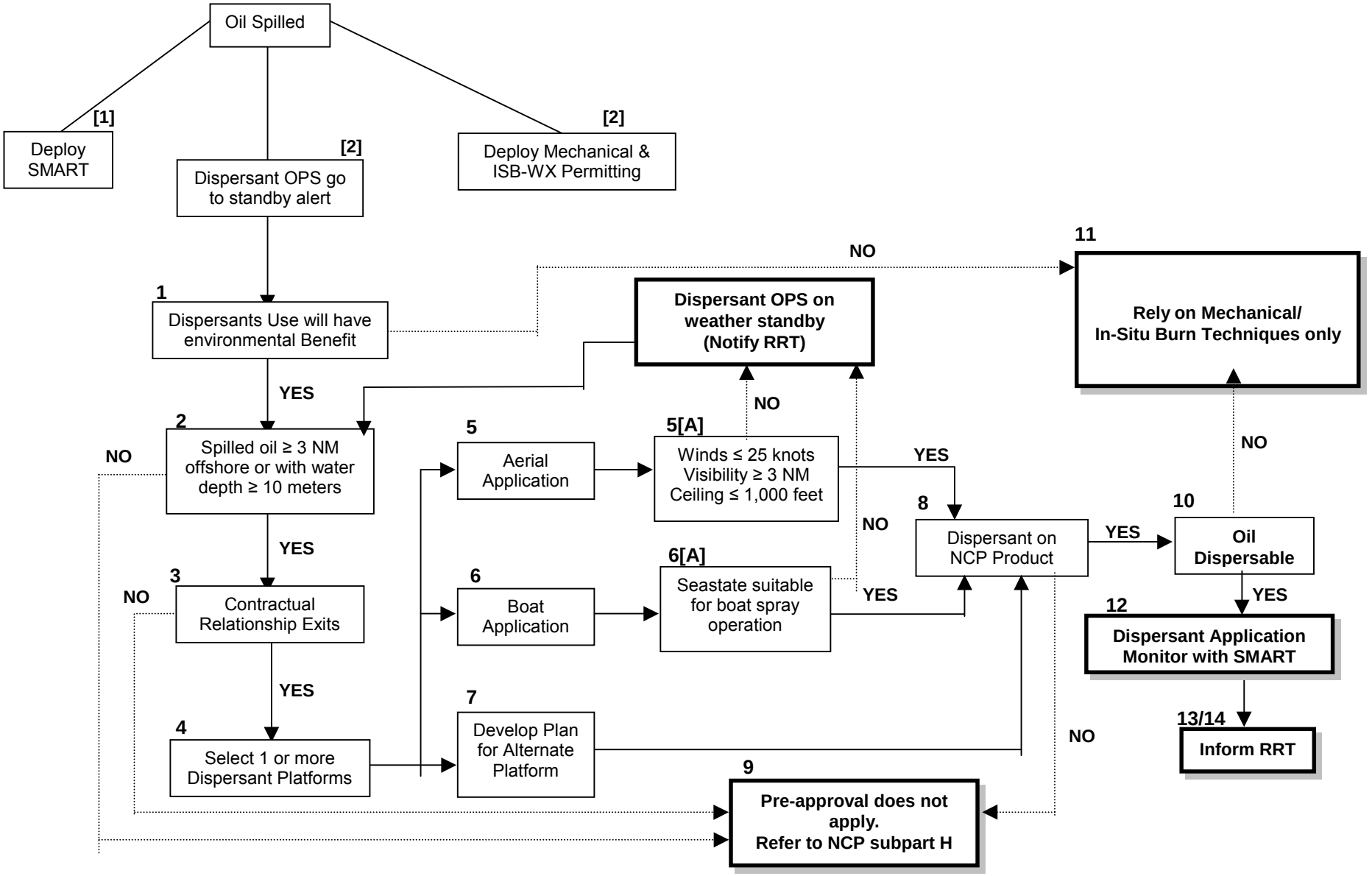
    GO TO SECTION 14 BELOW

14. At the completion of the dispersant operation, send the following to the RRT representatives:
    1. This completed Checklist
    2. The Dispersant Pre-Approval Initial Call Checklist
    3. A one page summary of the operation to date
    4. Other information as necessary

    Provide the RRT post-application information/results within 24 hours of the dispersant application. Formal convening of the RRT, however, is not necessary

    Follow-up operation by insuring that flight logs and SMART team logs are secured should RRT members request additional documentation.

FOSC DISPERSANT USE FLOWCHART



FOSC DISPERSANT USE OIL TABLE

GENERAL DISPERSABILITY RELATIVE TO API GRAVITY AND POUR POINT

Probably difficult or impossible to disperse	Medium weight material. Fairly persistent. Probably difficult to disperse if water temperature is below pour point of material.	Lightweight material. Relatively non-persistent. Probably difficult to disperse if water temperature is below pour point of material.	No need to disperse. Very light weight material. Oil will dissipate rapidly
	Medium weight material. Fairly persistent. Easily dispersed if treated promptly.	Lightweight material. Relatively non-persistent. Easily dispersed.	

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.

After-Action-Report Requirements

- **Incident Overview**
- **Oil Slick Trajectory and Behavior**
- **Justification for Dispersant Use**
- **Chronology (Date and Time) of Dispersant-Related Events**
- **Overview of Dispersant Operations**
- **Completed Dispersant Pre-Approval Initial Call Checklist and FOSC Dispersant Use Checklist**

Suggested outline for report requirements:

Incident Overview

- Description of initial report (date, time, source, etc.)
- Spill source
- Spill location
- Estimated quantity & potential quantity
- Environmental conditions

Oil Slick Trajectory and Behavior

- Expected movement of slick
- Expected weathering and behavior of product
- Observations of same

Justification for Dispersant Use

- Potential impact areas and their respective sensitivities to impact
- Within pre-approval zone for RRT VI
- Potential for use of other recovery methods (e.g., mechanical recovery, in-situ burning)
- Weather and seastate

Chronology (Date and Time) of Dispersant-Related Events

- FOSC notification of spill
- Reconnaissance aircraft requested
- Reconnaissance aircraft "wheels up"
- Gulf Strike Team alerted for SMART
- SMART en-route
- Reconnaissance aircraft on-scene and reports
- RP requested use of dispersants
- Source and field sample requested by USCG
- Dispersant use approved under pre-approval guidelines
- Dispersant contractor notified
- Dispersant stock requested
- Dispersant stock en-route
- Dispersant stocks arrive at airport/dock
- Spotter aircraft "wheels up"
- Dispersant aircraft/boat "wheels up"/left dock
- SMART vessel launch
- Spotter aircraft on-scene
- Dispersant aircraft/boat on-scene
- SMART vessel on-scene

- Source and "in-water" sample collected
- SMART sampling begins
- First application
- Spotter aircraft opinion of efficacy
- SMART sampling results (go/no go)
- SMART sampling begins, again
- Second application
- Spotter aircraft opinion of efficacy
- SMART sampling results (go/no go)
- Additional applications, Spotter aircraft opinions, and SMART sampling (as required)
- Termination of dispersant operation

Overview of Dispersant Operations

- Amounts and times of dispersants applied
- Any extenuating circumstances affecting the deployment of any element (spotters, dispersant, SMART, etc.)
- Estimates and observations of efficacy
- Any discrepancies between estimates
- Any discrepancies between observations
- Any sightings of pelagic/migratory birds, sea turtles, or marine mammals

Completed Dispersant Pre-Approval Initial Call Checklist and FOSC Dispersant Use Checklist

Request for Additional Information

- Parties may request additional information (e.g., pilot's logs, SMART logs, and SMART data) by contacting the FOSC for the particular spill/release response activity
- Information requested will be provided within 30 to 60 days following the request.

Boat Spray Guidelines

The implementation of the RRT pre-approval and actual use of chemical dispersants applied from aircraft has been demonstrated successfully on several occasions. Although the thought process related to the benefits and trade-offs for the use of chemical dispersants remain the same, there are some differences in the operational, logistical, and dosage parameters when considering the application of dispersants from a vessel mounted system. Chemical dispersants applied from a boat has the potential to be a very effective technique under the appropriate circumstances. The intent of this guideline is to very briefly address issues that may be of concern with respect to the approval of dispersant application from a surface vessel.

Generally, there are two different types of systems envisioned for applying chemical dispersants to an oil spill from a boat. The first type is a system involving spray arms or booms that extend out over the edge of the boat and have fan type nozzles that spray a fixed pattern of dispersant. The following ASTM standards apply to these types of systems: **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. The second, and more recent type of system, involves the use of a fire monitor and or fire nozzle to apply the dispersants. At this time (May 2000) there are no applicable ASTM standards for these types of systems.

The perceived advantage of the fire monitor type system is the simplicity of operation and the potential for obtaining greater swath width than spray boom systems, and thereby increasing potential "areal" coverage rates. A straight and narrow "firestream" flow of dispersant directly into the oil is to be avoided. For either of these types of systems, depending on pump rates, swath widths, vessel speed and the amount of oil to be dispersed, the dispersant may either be sprayed neat (i.e. undiluted) or diluted with seawater. For the purposes of this document, both of these types of systems will be collectively referred to as "boat spray systems."

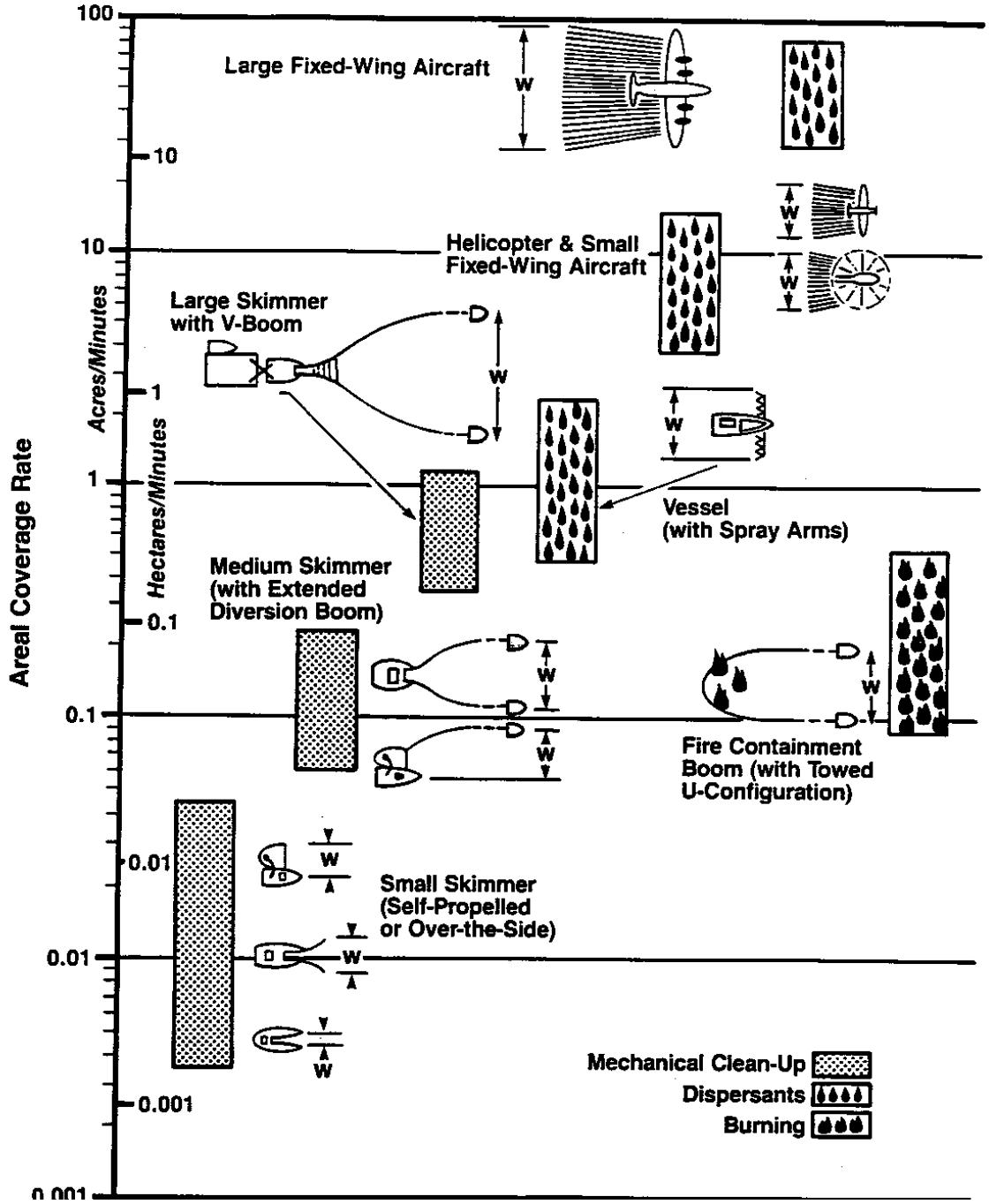
With respect to the application of chemical dispersants, areal coverage rate is the rate at which area is being covered by the dispersant. That is, the swath width times the speed of the delivery platform. In general, dispersant boat spray systems should be considered when a relatively small areal coverage of oil is involved. This is primarily due to the smaller swath widths and slower speeds of the surface vessels as compared to large aircraft. However, this could be especially useful if there was an unusually thick layer of oil that needed to be dispersed, or when the geometry of the situation makes aerial application unfeasible. The chart on page 16 compares the areal coverage rates, in acres per minute, of various spill response systems including small and large aircraft dispersant spray systems and conventional boat spray systems. Note that the acres per minute axis is scaled logarithmically. The chart was developed by Al Allen of Spilltec, and is included in this document with his permission.

The exact operational parameters will depend on whether a spray boom or fire monitor type system is selected and the specific parameters of the particular system. Measurable quantities such as times, pressures, distances and volumes should be documented in the field during the operation whenever possible. The following are **some of the issues** that will need to be taken into consideration and documented when a boat spray system is used.

1. How will the actual swath width for a moving operation be determined?
2. Will the dispersant be sprayed neat or diluted? If diluted, what percent?
3. How will the oil be spotted, and how will the boat spray system target the oil to be dispersed?

4. How far offshore is the spill, and is this distance practical for the boat spray system(s) intended for use? The practicality of considering boat spray systems to apply dispersants to spills exceeding 20-40 miles offshore should be carefully considered.
5. How will the amount of dispersant actually applied and the area actually covered be documented? Is the area to be covered consistent with the practical capability of the boat spray system(s) intended to be used?
6. What are the operational constraints with respect to wind speed and sea state.
7. What safety precautions will be taken onboard the spray vessel to prevent crewmembers from coming in contact with the dispersant being sprayed?

Areal Coverage Rates for Selected Spill Response



Source: Al Allen, Spilltec

Aerial Spray Guidelines

The ASTM Guides should be referenced for appropriate dispersant application types and application requirements. There are no additional guidelines for aerial application of dispersants.

APPENDICES

APPENDIX A- DOI/DOC CONTACT NUMBERS

The DOI contact number is:	Regional Environmental Office after hours, Steve Spencer	(505) 766-3565; (505) 892-7305
The DOC contact is:	Jim Morris (Please note that this number will allow the caller to have Jim Morris paged)	(206) 526-6317

APPENDIX B- RELEVANT WEB SITES

http://resolute.gerg.tamu.edu/tglo/	Measured currents and winds
http://resolute.gerg.tamu.edu/Tglo/arl.html	Forecasted wind maps
http://hyper20.twdb.state.tx.us/tides.html	Tides (measured & predicted for Texas coast)
http://www.glo.state.tx.us/oilspill/	Access to the cd-rom toolkit (sensitivity maps) & the current version of RRT 6 pre-approval dispersant use manual (to be replaced with the newer one when available)
http://response.restoration.noaa.gov	SMART Protocol
http://www.epa.gov/oilspill	NCP Product Schedule
http://www.uscg.mil/d8/mso/nola/library/plans.htm	ACPs
http://lagic.lsu.edu	Louisiana GIS environmental, socio-economic and oil spill response database
http://opal.ga.lsu.edu	Wave-Current Information System
http://www.osradp.lsu.edu	Louisiana R&D Program

APPENDIX C- DISPERSANT USE POLICY OF THE FLOWER GARDENS NATIONAL MARINE SANCTUARY

On the condition that dispersant application is deemed appropriate and conducive by the On-Scene Coordinator (FOSC), and subject to the conditions below, the Flower Garden Banks National Marine Sanctuary approves of such use. Although the Sanctuary and vicinity would not be an oil dispersant exclusion area, if the decision is made to apply oil dispersants in that area, all efforts must be made to apply them in water as deep as possible and as far from the Sanctuary as possible, in order to promote dilution of dispersed oil and minimize the effects on shallow-water organisms. Conditions that should be considered in determining whether application of dispersants is appropriate include, but may not be limited to, weather, sea state, water temperature, oil characteristics, history of spill, and risk of spill contact for particular life forms.

In addition to whichever NOAA officials are routinely consulted in the event of an oil spill, the Sanctuary requests immediate notification of any decision to apply dispersants so that it may consider timely implementation of appropriate monitoring and assessment protocols. The Sanctuary may also be able to provide information to the RRT and FOSC that could affect the decision to apply dispersants. For example, in rare instances, such as during mass spawning periods for corals and other species, it may be advisable to avoid the addition of dispersants. The Sanctuary further requests that information relating to resource impacts or monitoring collected by the FOSC or other parties be made available to the Sanctuary.

APPENDIX D - BIOASSESSMENT OF THE POTENTIAL IMPACTS RESULTING FROM DISPERSANT USE IN OFFSHORE WATERS IN THE GULF OF MEXICO (DECEMBER 16, 1994)

INTRODUCTION

Region VI is considering the establishment of areas in the Gulf of Mexico for which dispersant use would be pre-approved, under specific conditions. These conditions include limiting the pre-approval to aerial application of dispersants, and the pre-approval area includes offshore waters beyond the 10-meter isobath or three miles from the shoreline, whichever is further offshore.

The intent of this paper is to briefly summarize the potential environmental impacts on living natural resources resulting from dispersant use in offshore waters of Texas and Louisiana under these conditions of use. The approach taken is to discuss the distribution and life history of key species for each major resource category of concern (e.g., lesser scaup are representative of diving ducks that are present in offshore waters). The resource categories and key species are as follows, listed in groups according to the risk of being directly affected by the use of dispersants in offshore water:

Resources at **Low Risk** of Being Directly Affected by Dispersant Use
(because of predominance of inshore or nearshore distribution)

- Colonial sessile shellfish: American oyster
- Solitary infaunal shellfish: Southern quahog clam
- Anadromous fish: Gulf sturgeon
- Dabbling duck: Mallard
- Wading bird: Whooping crane
- Shorebird: Piping plover
- Raptor: Bald eagle

Resources at **Medium Risk** of Being Directly Affected by Dispersant Use
(because of deep-water preference or low numbers likely to be offshore)

- Benthic-spawning fish: Red snapper
- Diving bird: Brown pelican
- Seabird: Herring gull
- Marine reptile: Kemp's Ridley; green; loggerhead; hawksbill; and leatherback sea turtles
- Marine mammal: Fin whale (baleen); sperm whale (toothed); and bottlenose dolphin

Resources at **High Risk** of Being Directly Affected by Dispersant Use
(because of water surface or upper water column preference in offshore waters)

- Free-swimming shellfish: Brown shrimp (buoyant eggs); white shrimp (sinking eggs); and blue crab
- Water column-spawning fish: Gulf menhaden
- Diving duck: Lesser scaup

DISTRIBUTION AND LIFE HISTORY OF KEY SPECIES

For each key species, the distribution and life history are briefly summarized below:

Resources at **Low Risk** of Being Directly Affected by Dispersant Use
(because of predominance of inshore or nearshore distribution)

American oyster (colonial sessile shellfish)
- important commercial and recreational species
- mainly found shoreward of the 10 m contour
- eggs/larvae are planktonic, present in nearshore waters during March-November
- juveniles/adults are attached to hard substrates, often forming reefs

Southern quahog clam (solitary infaunal shellfish)
- important commercial and recreational species
- mainly found in intertidal and subtidal areas of estuaries and bays
- eggs/larvae are planktonic, present in nearshore waters during March-December
- juveniles/adults found in sand or seagrass bottoms, mainly burrowed in the substrate

Gulf sturgeon (anadromous fish)
- protected (threatened) subspecies, formerly a commercial species (caviar)
- occurs in Louisiana, doubtful in Texas, generally in large rivers and Gulf waters (depths not known)
- eggs sinking and adhesive in rivers, larvae also in rivers
- juveniles stay in rivers for at least one year, reach maturity in 10-15 years
- older juveniles/adults annually migrate between Gulf of Mexico (fall and winter) and large rivers (spring and summer), spawn in rivers
- mainly bottom-oriented but may occur throughout the water column, even breaking the surface during aerial leaps

Mallard (dabbling duck)
- recreational/managed species, most hunted duck in North America
- primarily occurs inshore and in coastal fresh and brackish waters
- some are present nearly year-round in Louisiana, others winter along Texas and Louisiana coasts, breeds in spring in Louisiana, nesting in uplands and marshes near water
- floats and swims on the water surface, feeds on marsh and aquatic vegetation

Whooping crane (shorebird)
- protected (endangered) species
- occurs around tidal flats and marshes
- all individuals (110 total) winter along Texas coast (November-April)
- feeds on bottom invertebrates

Piping plover (shorebird)
- protected species
- primarily occurs around intertidal sand flats, beaches, and river mouths
- winters on Gulf Coast, Texas is most important wintering area
- may occur in large flocks of shorebirds during peak migration periods

Bald eagle (raptor)
- protected (threatened) species
- occurs in vicinity of nearshore coastal zone
- present year round, breeds in winter and spring
- feeds on fish mainly, also on waterfowl, shorebirds, and carrion, may be attracted to dying or injured prey

Resources at **Medium Risk** of Being Directly Affected by Dispersant Use
(because of deep-water preference or low numbers likely to be offshore)

Red snapper (benthic-spawning fish)

- commercial and recreational species, major fishing grounds between the 100- 200 m contours
- adults occur to the 200 m contour, possibly up to 1200 m, juvenile nursery areas occur from the shoreline to the 40 m contour
- eggs/larvae are planktonic in offshore waters from June-October
- juveniles are bottom-oriented in estuaries and nearshore waters, moving deeper with age
- adults occur offshore, are bottom/structure oriented displaying some site fidelity

Brown pelican (diving bird)

- protected species
- rarely ventures more than 20 miles offshore
- present year-round, colonial breeder in winter, nests on small coastal islands near salt/brackish water
- may form large flocks while resting on water surface or feeding, feeds by diving from the air for fish

Herring gull (seabird)

- common species
- generally found nearshore, common in harbors
- winters along Gulf coast, may be present in all seasons except summer
- scavenger, also feeds on intertidal invertebrates, may be attracted to concentrations of dead/dying fishes or invertebrates

Sea turtles (marine reptiles)

- protected species (includes Kemp's Ridley, green, loggerhead, hawksbill, and leatherback sea turtles)
- occur in nearshore and offshore waters, generally inside the 100 m contour
- present year-round, may sporadically nest on sand beaches in Louisiana and Texas
- juveniles may be more common within the 20 m contour, possibly associated with drifting rafts of marine algae at the water surface
- feed on variety of bottom organisms and marine plants, and/or jellyfish in the water column
- must surface regularly to breathe

Fin whale (baleen whale)

- protected species, occurring in offshore waters generally outside of the 200 m contour
- winters in Gulf of Mexico, including waters offshore of Texas and Louisiana, resident populations may exist but have not been verified
- feeds with baleen on crustaceans and fish at or near the water surface
- surfaces to breathe

Sperm whale (toothed whale)

- protected species
- inhabits deep waters at the edge of or beyond the continental shelf, generally outside the 200 m contour
- some evidence of a Gulf of Mexico population, little migration
- feeds on giant squid and deep-water fishes
- surfaces to breathe

Bottlenose dolphin (toothed whale)

- protected species (marine mammal conservation act)
- occurs to the 200 m contour, more common in nearshore waters

- present year-round, breeds year-round
- feeds on fish and surfaces to breathe

Resources at **High Risk** of Being Directly Affected by Dispersant Use
(because of water surface or upper water column preference in offshore waters)

Brown shrimp (free-swimming shellfish)
- commercial species, composes 60% of the Gulf of Mexico shrimp fishery, which is the most valuable commercial fishery in the continental U.S. (total $)
- major fishing grounds are within the 100 m contour east of the Mississippi River and between the 60-100 m contours west of the river
- a seasonal fishing ground during spring, summer, and fall occurs within the 20 m contour west of the Mississippi River
- eggs/larvae are planktonic, mainly occur in offshore waters during September-June, perhaps year-round
- post-larvae are planktonic, migrating toward estuaries where they become bottom-oriented; peak recruitment to estuaries occurs during February-April
- juveniles are bottom-oriented in estuaries, migrating offshore towards the 20m contour and beyond during May-August, becoming adults enroute
- during offshore migration juvenile/adults concentrate near the bottom during day and near the water surface at night

White shrimp (free-swimming shellfish)
- commercial species, compose 27% of the Gulf of Mexico shrimp fishery
- fishing grounds in Louisiana and Texas are within the 20 m contour during spring, summer, and fall, offshore life stages may occur as far as the 40 m contour
- eggs sink to the bottom, larvae are planktonic, mainly in offshore water during April-September
- post-larvae are planktonic, migrating toward estuaries, becoming bottom-oriented when recruited to estuaries during May-November
- juveniles occur mainly in low salinity marshes, migrate offshore during August-December, becoming adults as they reach deeper waters
- juveniles occur near the water surface during offshore migrations

Blue crab (free-swimming shellfish)
- commercial species, mainly fished in inshore waters (bay, estuaries, rivers)
- generally occur to the 100 m contour, adult concentration areas and juvenile nursery grounds mainly within the 30 m contour
- eggs attached to females, larvae are planktonic in open ocean waters, later stages move toward estuaries and shallow nearshore waters, year round
- juveniles are bottom-oriented in estuaries and shallow nearshore waters
- adults are bottom-oriented from estuaries to offshore waters

Gulf menhaden (water column-spawning fish)
- commercial species, largest commercial fishery in the U.S. (by weight)
- mainly found within the 120 m contour and throughout the water column
- eggs/larvae/post-larvae are planktonic in offshore waters from September to May
- juveniles in estuaries and shallow nearshore waters, schooling in the water column, juveniles migrate offshore during October-January becoming adults
- adults spawn in the water column offshore (to 120 m contour), may migrate back into estuaries during March-April following spawning

Lesser scaup (diving duck)
- recreational/managed species
- occurs on nearshore waters at least 10 miles offshore and 12 m depth

- winters in coastal Texas and Louisiana
- can aggregate in large rafts, floats and swims on water surface feeds by diving for bottom invertebrates

IMPACT ASSESSMENT

For those resources likely to be present in the proposed pre-approval zone, an assessment of the likely impacts resulting from the application of dispersants to an oil slick is made. Key to this assessment is evaluating the exposure pathway and dose to the resource. For resources present in the water column, the primary exposure pathway is via oil dispersed into the water column, and the dose can be calculated using the concept of the toxicity index reported in ppm-hours. For resources present on the water surface, the primary exposure pathway is via direct exposure to treated oil slicks. The appropriate assessment approach is to compare likely impacts from exposure to treated versus untreated slicks.

The primary ecological concerns with the use of dispersants are:

- Effects of dispersed oil on marine life in the upper water column; and
- Effects on water-surface organisms (direct contact with the dispersant and effects of expanded oil slicks).

Impacts to Marine Life in the Upper Water Column

A comparison of the relative toxicity of crude oil versus dispersant by the NRC (1989) showed that the acute lethal toxicity of most dispersants is low compared to the constituents and fractions of crude oils and refined products. It was considered unlikely that, at the recommended application rates, dispersants would contribute significantly to the lethal or sublethal toxicities of dispersed oils. Thus, toxicity test results for petroleum oils should be used to assess impacts to water-column organisms. Table 1 lists toxicity test results for select crude oils (South Louisiana, Nigerian, Arabian light, Prudhoe Bay, and Cook Inlet) for fish and shellfish species, with emphasis on those species present in the Gulf of Mexico and tests for which the actual exposure concentration in the water over the exposure period was measured rather than calculated based on the volume of oil added (referred to as nominal concentrations).

Exposures to dispersed oil in open water are characterized by rapidly changing concentrations as the dispersed oil mixes laterally and vertically in the water column. Mackay and Wells (1983) have modeled the concentrations of dispersed oil in the water column at selected depths, for an oil slick 0.15 mm thick (many spills of varying size tend to reach a similar average thickness of about 0.1 mm within the first several hours, so this amount of oil is slightly conservative), assuming that the dispersion was 65 percent effective (although the actual range of optimal effectiveness under operational conditions is 30-60 percent, so the model is again conservative).

TABLE 1 LC50 toxicities and toxicity indices of crude oils for marine organisms.

Organism	Life History Stage	Crude Oil Type[1]	LC50 (ppm)	Time (hrs)	Toxicity Index[2] (ppm-hr)	Ref[3]
Bivalves						
Am. Oyster	eggs	C. Gulf of Mexico (CD)	4.0	96	92	1
	eggs	W. Gulf of Mexico (CD)	11.2	96	288	1
Quahog clam	eggs	S. Louisiana (WSF)	5.7	48	96	2
	eggs	various crude oils (WSF)	0.23-12	48	4-202	2
	larvae	S. Louisiana (WSF)	6.0	48	101	2
	larvae	various crude oils (WSF)	0.25->25	48	4->420	3
Gulf of Mex. Bivalves	adults	Arabian light (CD)	>2,500	--	--	3
Decapods						
Brown shrimp	post-larvae	W. Gulf of Mexico (WAF)	59.9	96	291	1
	post-larvae	W. Gulf of Mexico (CD)	52.7	96	222	1
	post-larvae	S. Louisiana (OWD)	>1,000	24	>8,400	4
	post-larvae	S. Louisiana (WSF)	>20	24	>168	4
	post-larvae	S. Louisiana (WSF)	>19.8	96	>665	4
	juveniles	S. Louisiana	19.8	48	333	5
	adults	S. Louisiana	19.8	48	333	4
	adults	Arabian light (CD)	>18.8	96	>632	3
White shrimp	post-larvae	C. Gulf of Mexico (WAF)	30.2	96	10	1
	post-larvae	C. Gulf of Mexico (CD)	13.8	96	147	1
	post larvae	W. Gulf of Mexico (WAF)	>100	96	>486	1
	post-larvae	W. Gulf of Mexico (CD)	18.6	96	78	1
	adults	Arabian Light (CD)	>16	96	>537	3
Blue crab	late-larvae	C. Gulf of Mexico (WAF)	70.7	96	24	1
	late-larvae	C. Gulf of Mexico (CD)	19.8	96	210	1
	late-larvae	W. Gulf of Mexico (WAF)	>100	96	>486	1
	late-larvae	W. Gulf of Mexico (CD)	90.8	96	383	1
	adults	Arabian light (CD)	49	96	1,643	3
Fish						
Atlantic menhaden	eggs/larvae	C. Gulf of Mexico (WAF)	42.1	96	163	1
	eggs/larvae	C. Gulf of Mexico (CD)	64.6	96	1,014	1
	eggs/larvae	W. Gulf of Mexico (WAF)	64.1	96	267	1
	eggs/larvae	W. Gulf of Mexico (CD)	90.8	96	341	1
Pacific herring	adults	Cook Inlet (WSF)	1.22	96	22-41	6
Spot	eggs/larvae	C. Gulf of Mexico (WAF)	70.7	96	273	1
	eggs/larvae	C. Gulf of Mexico (CD)	50.3	96	790	1
	eggs/larvae	W. Gulf of Mexico (WAF)	>100	96	>417	1
	eggs/larvae	W. Gulf of Mexico (CD)	68.2	96	1,046	1

[1] WAF = water accommodated fraction, OWD = oil in water dispersion, WSF = water soluble fraction, CD = chemically dispersed oil or oil and dispersant mixture

[2] Toxicity index calculated by multiplying ppm-hrs by 0.35, a conservative correction factor which accounts for evaporative loss (McAuliffe, 1987), except for index values reported for reference 1, where ppm-hrs were calculated by integration over time (Fucik et al., 1994).

[3] References:

1 Fucik *et al.,* 1994
2 Byrne and Calder, 1977
3 Shuba and Heikamp, 1989
4 Anderson *et al.,* 1974
5 Neff et al., 1976
6 Rice *et al.,* 1979

Figure 1 shows the predicted concentrations for selected depths over time based on their calculations. The plot shows that dispersed oil concentrations are not predicted to exceed I ppm at depths greater than 10 m. This calculation is the basis for the guideline that dispersants are not to be applied in waters less than 10 m, with I ppm selected as the threshold oil concentration above which effects to bottom organisms may be of concern.

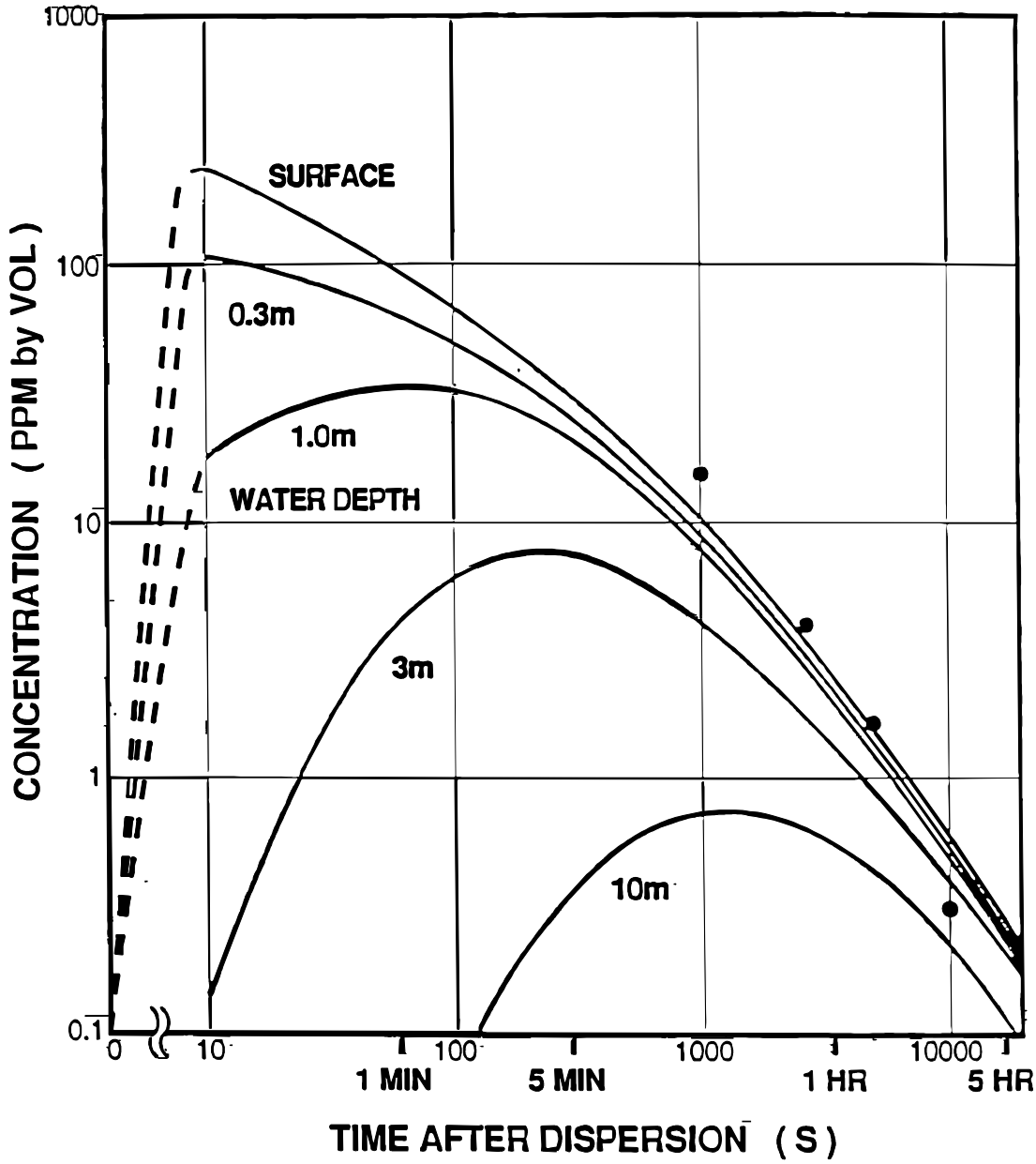


FIGURE 1: Predicted concentrations of dispersed oil under a slick 0.15mm thick, with a 65% dispersant effectiveness, for selected water depths and times after dispersant application. The dots are actual values from the California sea trial in 1979 (after Mackey and Wells, 1983).

The curves in Figure 1 show the speed at which dispersed oil concentrations are likely to decrease in open water, dropping to concentrations below I ppm after five hours. It is obvious that comparing laboratory toxicity test results based on a 24- or 96-hour test period to field conditions of exposure is a very difficult procedure. Anderson et al. (1982) used the concept of a toxicity index in ppm-hours as a means to express the exposure to water-column organisms. The ppm-hours are calculated using the mean exposure oil concentration in ppm multiplied by the test duration in hours. This same approach can be used to represent oil concentrations in the water column under a dispersed slick by integrating the oil concentrations over time. Thus, for the I m depth curve in Figure 1, the average concentration over the first minute is about 50 ppm, which would be about I ppm-hour (see Table 2). For the first 24 hours, the exposure is about 20 ppm-hours. Beyond 24 hours, there is little additional exposure because the concentrations are estimated to be much less than 0.1 ppm. Expressed in this manner (ppm-hours), exposure can then be compared with toxicity test results.

TABLE 2 Estimated exposure in the water column under a dispersed slick, based on the model results in Mackay and Wells (1983).

Time Interval	Oil Concentration (ppm)	Oil Exposure (ppm-hours)	Cumulative Oil Exposure (ppm-hours)
Water Depth 1.0 m			
1 minute	50	1.0	1.0
1-5 minutes	35	2.5	3.5
5-16.6 minutes	15	3	6.5
16.6-60 minutes	7	5	11.5
1-5 hours	1	4	15.5
5-24 hours	0.1	2	17.5
Water Depth 10 m			
1 minute	0	0	0
1-5 minutes	0.4	0.03	0.03
5-16.6 minutes	1.0	0.2	0.2
16.6-60	1.0	0.7	0.9
1-5 hours	0.4	1.6	2.5
5-24 hours	0.1	2.0	4.5

Based on the distribution and life history profiles of representative species, the organisms at greatest risk from the use of dispersants in waters greater than 10 m or at least 3 miles offshore are: young life stages of brown shrimp and white shrimp because their planktonic larvae occur in offshore waters; and blue crab and menhaden because of their planktonic larvae. Toxicity tests results for these species can be used as a guideline for the likely impacts to water-column organisms.

There are many problems associated with how toxicity tests are conducted for minimally soluble products such as petroleum, and the standard toxicity test conditions (static bioassays using nominal initial exposures) are not realistic in either the exposure concentration or duration of exposure. In spite of these problems, it is still useful to compare short-term toxicity data with likely exposures if both are expressed in ppm-hours. Table 1 lists LC50 data for oils and species of concern, reported in both ppm for a specific for a specific exposure period and as ppm-hours. The ppm-hours values have been multiplied by 0.35 (for 96-hour tests) or 0.75 (for 24-hour tests) following the suggestion of McAuliffe (1987) to correct for loss of the lighter components by evaporation. This correction factor increases the toxicity index for the 96- hour test by a factor of three. Nearly all of the values for the LC50 reported are much greater than 30-ppm-hours, the likely exposure in the top 1 m over the first 24 hours after dispersion. Essentially, the 24-hour

LC50 would have to be about 1.5 ppm to be equal to the calculated exposure I m under a treated slick over the first 24 hours.

There are very few toxicity tests for which the LC50 is reported for a 24-hour exposure. MMS recently completed dispersed oil toxicity tests with biological species indigenous to the Gulf of Mexico, using various test conditions (flow-through and static; acute and chronic), reporting LC50 and toxicity index data for 24- and 96-hour exposures (Fucik et al., 1994). Invertebrates have been shown to have high sensitivity to oil and oil-related compounds (NRC, 1986; Sprague et al., 1982), thus the early life stages of these organisms are likely to be the most sensitive of all water- column organisms. The toxicity indices for brown shrimp larvae and South Louisiana crude oil with a 24-hour exposure in Table I are all higher than the estimated exposure by a factor of five or more. For the toxicity tests recently sponsored by MMS, the toxicity of dispersed oils to the most sensitive life stages of shrimp and crabs, based on total hydrocarbon measured in the water, for a 24-hour exposure were all greater than 148 ppm-hours (Fucik et al., 1994). McAuliffe (1987) has compared the 24-hour exposures as measured during sea trials under actual slicks with 24-hour LC50 data (both expressed in ppm-hours), calculating the number of times that actual exposures would need to be increased to reach the LC50 value. This number ranged from a low of 115 for shrimp to a high of nearly 3,000 for herring larvae.

Figure 2 is a plot of the estimated oil exposure under a dispersed oil stick, based on the curve in Figure 1 and the data in Table 2. The cumulative oil exposure in ppm-hours was determined by summing the ppm-hours for each of the time intervals listed. Also shown on Figure 2 are the toxicity indices in ppm-hours for the 24-hour toxicity test results using dispersed oil from the MMS study, as reported in Fucik et al. (1994). This plot indicates that, for the assumptions in the Mackay and Wells (1983) model (listed above), the estimated oil exposure for the first 24 hours after dispersion at I meter under a dispersed slick is about an order of magnitude lower that the 24-hour toxicity index for the most sensitive species and life stages of concern in the Gulf of Mexico. At 10 meters, the difference is about two orders of magnitude.

Based on the comparison of the calculated and measured concentrations under a slick treated with dispersants with laboratory toxicity test results, a significant impact to water-column organisms is not expected to occur when dispersants are applied in offshore waters as specified in the pre-approval operations plan.

Effects on Water-Surface Organisms

There are two concerns with the use of dispersants related to organisms that use the water surface.- 1) effects from direct contact with the dispersant; and 2) increased risk of contact with the slick due to it's expansion after treatment. Direct contact is primarily of concern for birds because of the potential large numbers of individuals that could be Present and the preponderance of time they spend on the water surface. Of the key species listed above, brown pelican and lesser scaup are the types of birds at significant risk of direct impacts during dispersant application because they can be found in offshore waters. Regarding marine mammals and sea turtles, the National Marine Fisheries Service (NMFS) in a September 8, 1994 letter to the RRT VI in response to a request for a Section 7 consultation on dispersant use pre-approval determined that "the species under our purview are not likely to be adversely affected by the use of chemical countermeasures in response to an oil spill. Rather, the use of dispersants is expected to minimize adverse effects caused by the spill."

Most of the published data for birds were for tests conducted with oil and dispersed oil (NRC, 1989), rather than on the toxicity of dispersants alone. Thus, although the concern is always voiced that direct accidental spraying of birds with dispersants will cause negative effects, without data it is not possible to compare these effects with oil. To be accidentally sprayed, any birds would likely be in very close proximity to the targeted slick, thus they would be at a significant risk of being oiled. It is likely that being oiled would have greater consequences than being sprayed with dispersant. However, the guidelines in the pre-approval specify that dispersants are not to be applied where concentrations of birds are present.

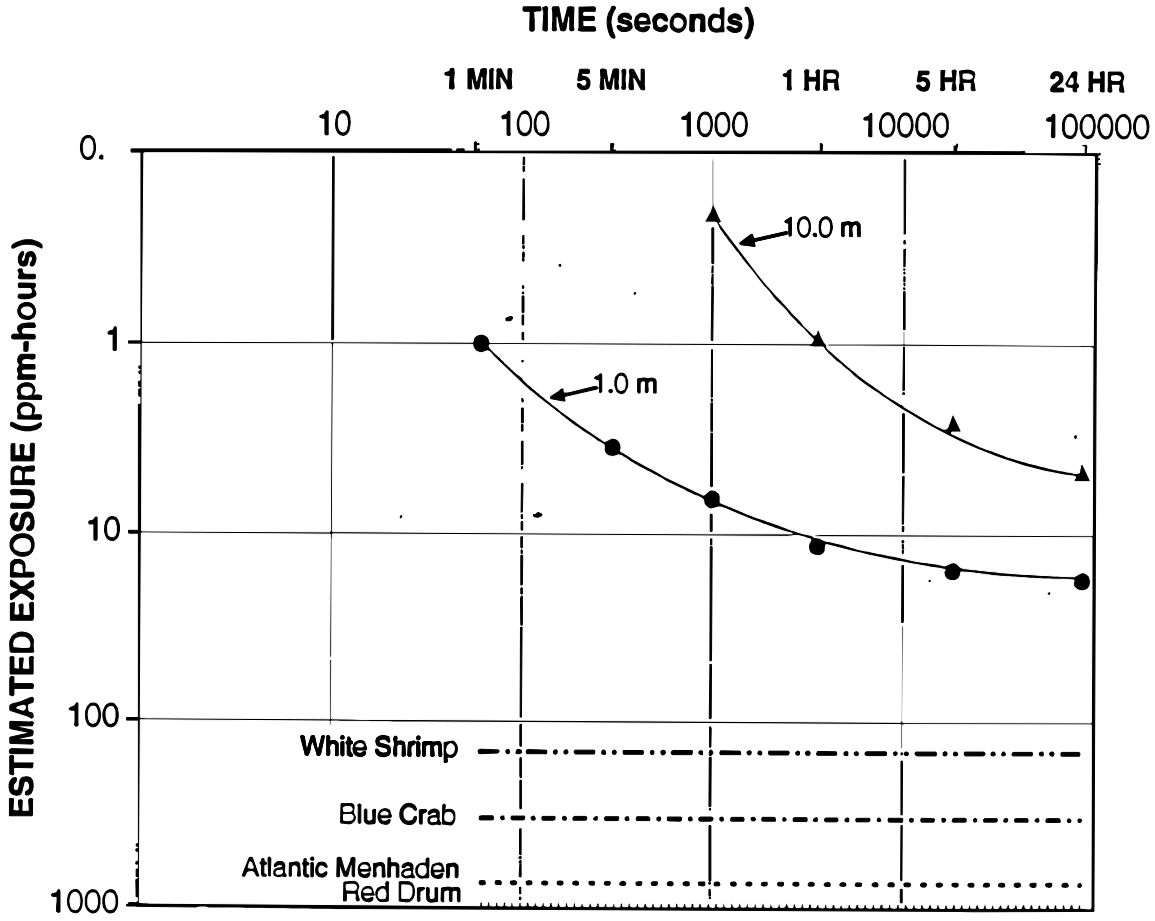


FIGURE 2: Estimated exposure in the water column under a dispersed slick, based on the data in TABLE 2. Also plotted are the toxicity indices for Gulf of Mexico species exposed to dispersed oil as reported in Fucik et al. (1994).

Increased risk of contact with expanding oil slicks after treatment is another concern. Treated slicks are likely to increase in size initially as the interfacial tension at the oil:water surface is reduced. In recent field trials in the United Kingdom, the treated slick increased in size, compared to the control slick, for the time period from 10 to 17 hours after treatment (Lunel, 1994). However, by 18 hours post- treatment, the treated slick had broken up and become smaller in area, compared to the control slick which remained as a coherent slick with thick areas of oil. This increased risk would be more of concern in enclosed bays or rivers where a large percentage of the surface area of a waterbody could be covered by an expanding slick. The actual times of expansion of a slick would be spill-specific, but the net effect of dispersant application is a reduction in the amount of oil on the water surface. Again, in an offshore setting, birds would have to be in close proximity to the oil slick with a high risk of being oiled anyway, for there to be a risk of contact with a dispersed slick.

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APPENDIX E- SECTION 7 CONSULTATION LETTER FROM THE UNITED STATES DEPARTMENT OF THE INTERIOR, FISH & WILDLIFE SERVICE

Letter to be inserted

APPENDIX F - CONCURRENCE LETTER FROM THE NATIONAL MARINE FISHERIES SERVICE

Letter to be inserted