OIL SPILL RESPONSE PLAN

JUN 1981

Virgin Island. Coastal Zone Management Plan

DCCA SPILLED OIL

RESPONSE PLAN

OPERATIONS MANUAL

JUNE 10, 1981

INTRODUCTION

The Department of Conservation and Cultural Affairs as mandated by Title 12, Chapter 17 Virgin Islands Code, has undertaken the implementation of an Oil Spill Contingency Plan for the Virgin Islands, with the technical assistance of National Oceanic and Atmospheric Administration (NOAA).

The Plan provides for (1) assignment of duties and responsibilities among government agencies; (2) identification and procurement of equipment and supplies; (3) system of possible notices of discharges of oil; (4) the establishment of Territorial Centers to provide coordination and direction for operations in carrying out the Plan; and (5) procedures to be employed in containing, dispensing, removal and disposal of oil.

This Plan is effective for the territorial waters of the Virgin Islands and adjoining shorelines and the continguous zone where a threat to Virgin Islands waters, shorefall or shelf-bottom exist.

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DCCA OIL SPILL RESPONSE PLAN

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Authority: The Department of Conservation and Cultural Affairs as mandated by Title 12, Chapter 17 Virgin Islands Code has formulated the Virgin Islands Oil Spill Response Plan. This plan is particularly designed to accommodate a light to medium spill of oil in the amount of 10,000 barrels.

Purpose and Objectives: The objectives of this plan are to provide for efficient coordinated and effective action to minimize damage from oil and hazardous substance discharges including containment, dispersal and removal. This plan (including annexes) along with the National and Regional Plan provides for:

a. Assignment of duties and responsibilities

b. Establishment and identification of local strike forces

c. A system of notification, surveillance and reporting

d. Establishment of the Territorial Center to direct operations in carrying out this plan

e. A schedule for the use of dispersants and other chemicals to treat oil spills

f. Enforcement and investigative procedures to be followed

g. Directions on public information releases

h. Instructions covering On-Scene Coordinators

Scope: The provisions of this plan are applicable to all related government agencies. Implementation of this plan will be within the framework of the National Oil and Hazardous Substances Pollution Contingency Plan and the Region Two (II) Coastal Regional Contingency.

DEPARTMENT AND AGENCY TITLE ABBREVIATIONS

DCCA - Department of Conservation and Cultural Affairs

NOAA - National Oceanic and Atmospheric Administration

USCG - United States Coast Guard

NRC - National Response Center

NRT - National Response Team

OSC - On-Scene Coordinator

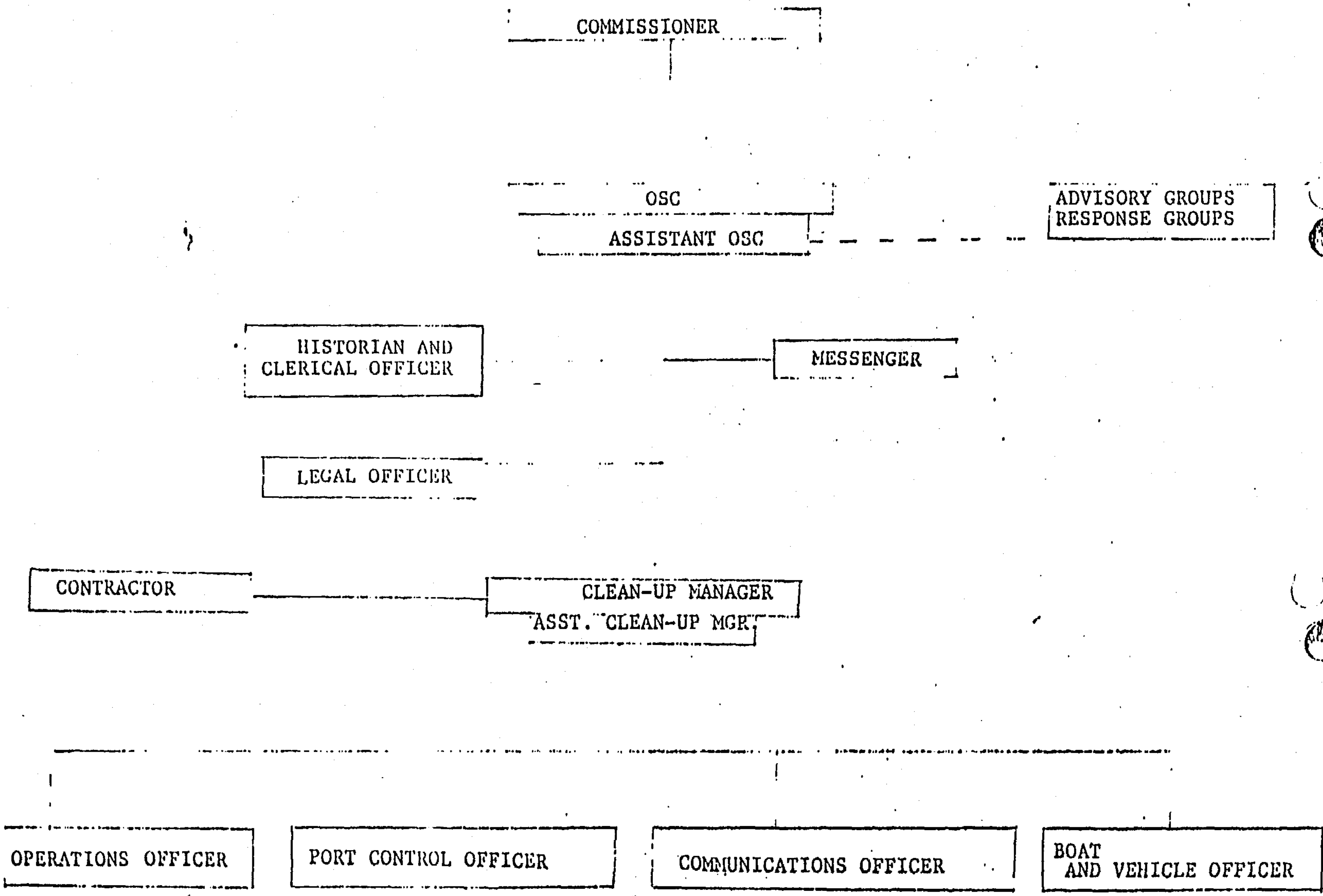
TC - Territorial Center

TC - Team Chief

DEPARTMENT OF CONSERVATION AND CULTURAL AFFAIRS

BUREAU OF ENVIRONMENTAL ENFORCEMENT

ORGANIZATIONAL CHART
OIL SPILL RESPONSE



DESCRIPTION OF STAFF FUNCTIONS

1. ON-SCENE-COORDINATOR (OSC) --CHIEF B.E.E.

a. Discussion: The On-Scene-Coordinator (OSC) is responsible for the coordination and direction of State pollution control efforts at the scene of a discharge or potential discharge. Under the National Oil and Hazardous Substances Pollution Contingency Plan he is charged with the direction and deployment of available resources to initiate and continue containment, countermeasures, clean-up, and disposal functions. The OSC is first and formost a decision maker. He must be able to select the "best" method from a number of alternatives presented to him. As such, he must be familiar with a variety of containment and clean-up measures, their availability, effectiveness and cost. Frequently, he will have to make such decisions under a great deal of pressure. Not only will time be working against him, but he will be faced with a myraid of suggestions and arguments from which he must make a decision. In this, he must combine both tact and strength, first to encourage the suggestions of others, and then later to be able to retain their confidence once he has made a decision. He must be able to work with many different individuals, all of whom he is dependent upon to some degree, to carry out his orders. In short, the On-Scene-Coordinator must combine all of the qualities of a leader. His decisions, to a large degree, will determine whether clean-up efforts are successful. He must be able to make decisions under pressure, and then have the necessary confidence to carry out these decisions in the face of criticism.

b. Specific Responsibilities:

(1) Determine pertinent facts about a particular spill, such as its potential impact on human health and welfare; the nature, amount, and location of material discharged; the probable direction and time of travel of the material; the resources and installations which may be affected and the priorites for protecting them.

(2) Determine the extent of the response necessary and to what extent this response Bill will be implemented.

(3) Determine the location of the OSC Command Post if one is to be established.

(4) Request participation of other forces and the Regional Response Team as needed through CCCGD13.

(5) Initiate and direct containment, countermeasures, clean-up, disposal, documentation and cost recovery actions taken in response to a pollution incident.

(6) Assu[illegible] timely release of information [illegible] to the spill. The OSC has final releasing authority on all such information, including POLREPS, Press Releases, requests for Notice to Mariners, Security Zones, Restrited Air Spaces, etc., however, Press Releases concerning a major policy shift should be cleared through the Regional Response Team.

c. Suggestions

(1) The OSC should remember that his primary job is to make the right decisions. He should have his staff do the necessary groundwork needed to prepare options from which he can choose. Also, it is suggested that he rely as much as possible on his Field Post Officer for recommended actions in their areas. They will have more time to study special problems faced by the OSC.

(2) In short, the OSC must be able to delegate responsinility wisely so as to allow himself the time necessary to make the critical decision which will determine the success or failure of cleanup efforts.

2. Assistant On-Scene-Coordinator-----Assistant to Chief.

a. Discussion: The Assistant On-Scene-Coordinator is responsible for assisting the OSC in the coordination and direction of State pollution control efforts at the scene of a discharge or potential discharge.

b. Specific Responsibilities:

(1) Insure a flow of information from/to the OSC, advisory groups, Cleanup Manager and the OSC staff.

(2) Act as the OSC representative in dealing with inquiries from the general public when the Public Affairs Officer requires assistance.

(3) Establish and maintain the OSC Command Post.

(4) Draft all Press Release insure their timely release. Press Release are required to be sent by priority message at the following times:

(a) At the beginning of the day's cleanup operations, but no later than 0800.

(b) At sunset each evening, or at the end of the day's cleanup operations, but not later than 2000.

(c) Whenever there is a change in the situation, as new developments occur.

(5) Organize daily OSC staff meetings to discuss progress and strategy of cleanup operations. Meetings should be held at 0800 and 1600 daily, and upon the OSC's request.

3. Cleanup Manager----Director of Parks and Recreation

a. Discussion: The Cleanup Manger is responsible for supervising cleanup operations when the spiller is unknown or is not taking adequate cleanup action. He is responsible for monitoring cleanup operations when the spiller is taking proper cleanup action.

b. Specific Responsibilities

(1) Translate the policy and direction of the OSC into an effective cleanup and disposal program.

(2) Mobilize cleanup forces as required and establish direct and close liaison with all contractors.

(3) Insure that the OSC is informed of all cleanup and disposal activities.

(4) Insure proper documentation of the cleanup and disposal activities by keeping the Historian/Clerical Officer advised.

(5) Serve as Safety Officer for all monitoring activities and contractor activities involving personal safety requirements.

(6) Maintain communications with Field Post Officers.

4. Assistant Cleanup Manager----Who Manager Desigate

a. Discussion: The Assistant Cleanup Manager is responsible for assisting the Cleanup Manager in supervising cleanup operations.

b. Specific Responsibilities

(1) Take direction from and pass information to the Cleanup Manager.

(2) Maintain the cleanup operation status board. This status board will show the current spill area, land areas affected, location and status of all equipment deployed, etc. The status board will serve to provide an immediate reference for staff personnel and will be maintained in the Command Post.

(3) Serve as the Assistant Safety Officer.

(4) Provide assistance to the Assistant OSC in establishing and maintaining the OSC Command Post.

5. Historian and Clerical Officer---BEE Administrative Secretary

a. Discussion: The Historian/Clerical Officer is responsible for maintaining the OSC's records of the spill.

b. Specific Responsibilities

(1) Maintain a chronological log of cleanup activities and serve as Administrative and Clerical Assistant to the OSC. Records kept of the response effort shall be complete enough to prepare the OSC final report of the incident.

(2) Compile all photographs taken of the spill and log them in a photograph log.

(3) Compile copies of all press releases and POLREPS issued.

6. Legal Officer---DCCA Attorney or Attorney from A.G.

a. Discussion: The legal Officer shall provide the OSC with legal assistance as required.

b. Specific Responsibilities

(1) Document incidents which may later be subject for litigation.

(2) Advise the OSC regarding "on the spot" financial settlements for property damage to private boats and shore facilities.

(3) Provide release forms for access and use of private property.

7. Port Control Officer---Enforcement Officer

a. Discussion: The Port Control Officer is responsible for the control of marine vessel traffic and vehicle traffic in the area of the cleanup operations.

b. Specific Responsibilities

(1) Establish security zones, restricted zones, speed limits, etc., as determined necessary by the OSC.

(2) Coordinate the Operations Officer to maintain and patrol security zones, etc., and enforce speed limits.

(3) Broadcast and publish appriate Notices to Mariners, and keep the Public information Officer informed of all developments involving port control.

8. Operations Officer----Enforcement Officer

a. Discussion: The Operations Officer is responsible to the OSC and will assit Cleanup Manager in providing an efficient communications net work, boats, vehicles and air surveillance of the spill area.

b. Specific Responcibilities

(1) Take direction from and pass information to the Cleanup Manager.

(2) Organize surveillance operations as needed to track movement of the spill and to evaluate containment and cleanup.

(3) Provide the Assistant Cleanup Manager with information for the cleanup operation status board, including the movement of the oil slick, projected movement of the oil slick, etc.

(4) Maintain a weather status board including on-scene weather observations, weather forecasts, tide, current and river conditions.

(5) Establish a sampling program to document responsibility for the primary and any secondary spills.

(6) Provide boats vehicles as required, and maintain a status board on their location and use.

(7) Provide an effective and efficient communications network for use in the cleanup operations.

9. Communications Officer----Enforcement Officer

a. Discussion: The Communictions Officer is responsible to the Operations Officer for providing an effective and efficient communications network.

b. Specific Responsibilities

(1) Provide a communications center for control of State Forces utilizing Annex G (Communications). This center will include both radio and telephone communications.

(2) Assit the Assistant OSC in maintaing the Command Post and Communications center.

(3) Issue COMPCO radios to appropriate personnel and institute a custody system to insure their physical security.

(4) Provide radio operators to man the communications center, and insure they properly operate radio communications equipment and maintain radio logs.

(5) Route incoming and outgoing messages.

10. Boats and Vehicles Officer ----Enforcement Officer

a. Dicussion: The Boats and Vehicles Officer is responsible to the Operations Officer for dispatching and maintaining control of boats and vehicles.

b. Specific Resopnsibilities

(1) Take direction from and pass information to the Operations Officer.

(2) Dispatch and maintain control of vehicles and boats.

(3) Maintain status boards with assistance of Support Officer of vehicles, boats and personnel deployment.

11. Surveillance Officer----Any Officer Available

a. Discussion: The surveillance Officer is responsible to the Operations Officer for organizing surveillance operations as needed to track movement of the spill and to evaluate containment and cleanup.

b. Specific Responsibilities

(1) Take direction from and pass information to the Operation Officer.

(2) Conduct sufficient surveillance flights to properly monitor the movement of the oil slick.

(3) Provide surveillance flights as required for the OSC.

(4) Serve as the Photography Officer for the spill and insure adequate photographs are taken to properly document the cleanup operation.

(5) Document photographs taken and forward to the Historian/ Cerical Officer.

INITIAL RESPONSE

WHEN NOTIFIED, TRY TO OBTAIN AS A MINIMUM THE FOLLOWING INFORMATION:

1. NATURE OF ACCIDENT (i.e., collission, grounding, etc.):

2. DATE AND TIME OF ACCIDENT:

3. NAME AND SIZE OF VESSEL OR FACILITY:

4. PRECISE LOCATION (LATITUDE-LONGITUDE, DISTANCE FROM SHORE, ETC.):

5. TYPE AND AMOUNT OF OIL OR HAZARDOUS MATERIAL:

6. WEATHER CONDITIONS AT SCENE, FORECAST IF AVAILABLE:

7. ACTION TAKEN TO DATE:

8. ON-SCENE COORDINATOR:

FEDERAL: Commanding Officer
Coast Guard Activities
U.S. Virgin Islands
P.O. Box 416
St. Thomas, V.I. 00801
774-7034

Lt. E. R. Morris

V.I. GOV'T.:

9. NAME, LOCATION AND PHONE NUMBER OF NOTIFYING CALLER:

II. INITIAL RESPONSE

A. Notification

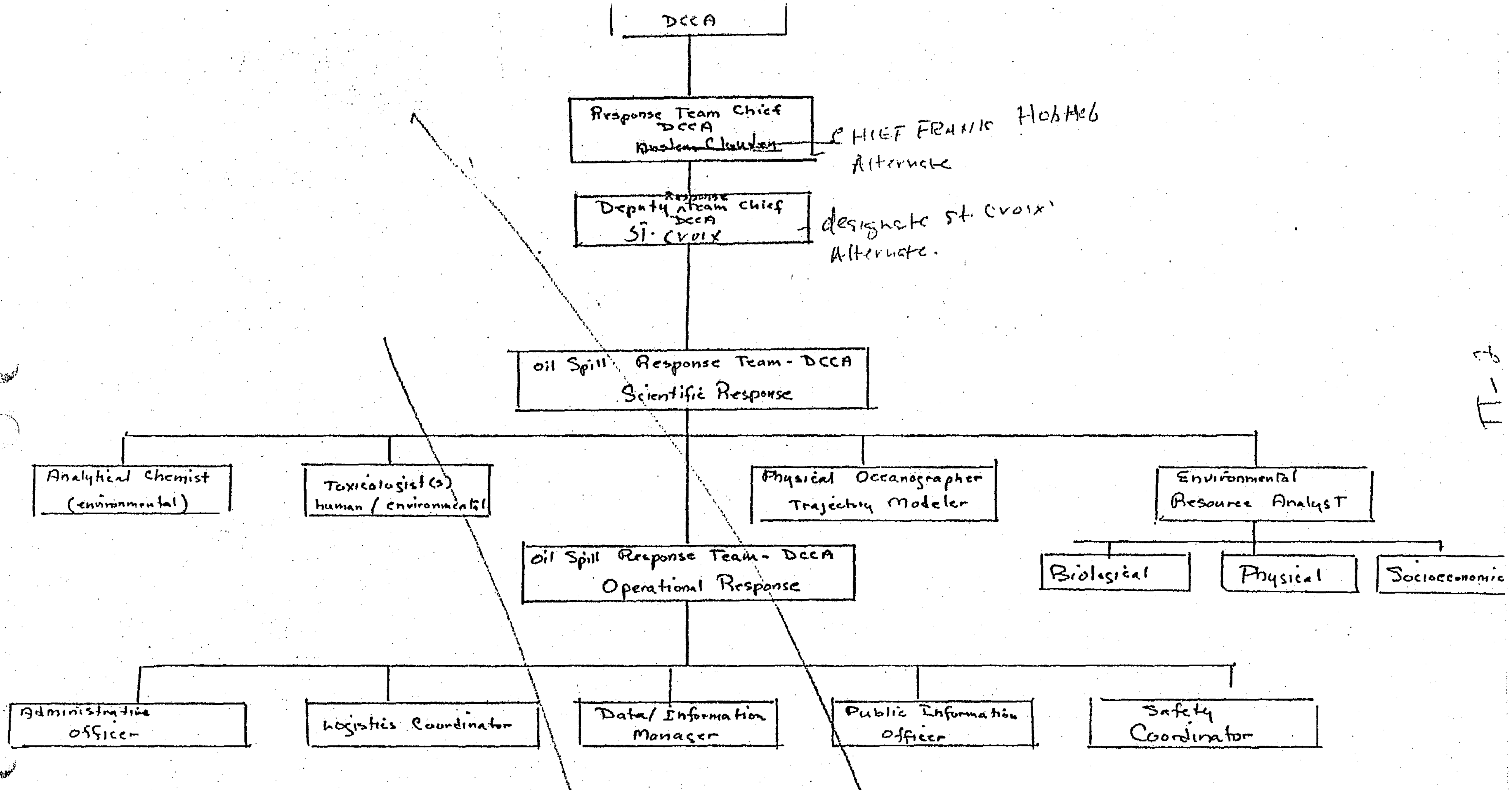
The initial response to a spill event will begin when information reaches one of the spill team members. This information can come through communications channels previously set up, from chance information obtained through the news media, or through phone calls from friends who have heard such reports.

After obtaining this information, the DCCA Team contact should call the appropriate USCG District headquarters for additional details (see Initial Response Sheet). This sheet will be filled out for each notification. The telephone numbers of the USCG Districts follow:

Island	USCG Headquarters	Phone
St. Thomas	Charlotte Amalie Lt. Morris	774-2121 774-8088
St. Croix	Christiansted Lt. Hardin	773-7614 773-8088
Puerto Rico	San Juan Cdr J.H. Parent	772-2697

The first DCCA Team member to contact the District should communicate with a Coast Guard officer who is familiar with the status of the spill, preferably the MEP officer or someone working with the On-Scene Coordinator (OSC). After establishing connection with an appropriate individual in the District line, the DCCA Team caller should exchange at least the following minimum information:

1) Tell the officer who is calling, and briefly outline what the DCCA Response Team is.


DCCA
Response Team Chief
DCCA
CHIEF FRANK Hobtteb
Alternate
Response
Deputy Team Chief
DCCA
ST. Croix
designate St. Croix'
Alternate.
Oil Spill Response Team - DCCA
Scientific Response
Analytical Chemist
(environmental)
Toxicologist(s)
human / environmental
Physical Oceanographer
Trajectory Modeler
Environmental
Resource Analyst
Biological
Physical
Socioeconomic
Oil Spill Response Team - DCCA
Operational Response
Administrative
officer
Logistics Coordinator
Data/ Information
Manager
Public Information
Officer
Safety
Coordinator

2) If the information was sketchy, attempt to fill in the missing details.

3) Note the name, rank, title and phone number of the USCG officer, so that subsequent calls can be made to that individual.

4) If a DCCA Team response appears likely, obtain information from OSC on potential logistic support, (i.e. procurement of planes, helicopters, trucks, boats, skimmers, booms).

It is the responsibility of the initial DCCA contact to telephone as many of the DCCA personnel listed below as possible, in order to begin the process of determining whether or not a DCCA response is to be launched.

DCCA NOTIFICATION NAMES AND NUMBERS

ST. THOMAS/ST. JOHN

Organization/Person	Office	Home	Other Communication
U.S. Coast Guard			
C.G. Base San Juan - 24 hrs.	725-0857	-----	VHF - CH. 16
Lt. Morris, Commanding Officer	774-2121	774-0955	----
Dept. Conservation & Cult. Affairs			
Darlan Brin, Commissioner	774-3320	774-4134	VHF - CH. A
Franke Hoheb, Chief BEE	775-0470	775-3754	VHF - CH. 16
Marc Crandall, Asst. Director CZM	774-6993	775-3753	VHF - CH. 16
Louis Penn, Deputy Commissioner	774-3502 774-5339	-----	----

Organization/Person	Office	Home	Other Communication
Alvin McBean	774-3502	775-1311	VHF - CH. A
Donald Francois (DNRM)	774-6420	-----	----

St. Croix

Assistant Commissioner David Benjamin.

Director CZM George Golden -

Roy Andrews - Dept Chief of Enforcement -

José Incarnacion - Director of Parks & Open Space.

St. John.

Rupert Marsh Enforcement officer.

Sprauve Recreation Officer.

NOAA | SCIENTIFIC SUPPORT TEAM | (SST)

Technically, the NOAA Scientific Support Coordinator (SSC) can be activated only by the Regional Response Team (RRT) or the USCG ON-Scene Coordinator (OSC).

The SSC for the V.I. and Puerto Rico is:

Dr. Nancy G. Maynard
Hazardous Materials Response Project
NOAA/OMPA RD MPF 29
325 Broadway
Boulder, CO 80303

(303) 497-6551 (office)
497-6582

494-5949 (home)

443-1414 24 hr. beeper
(ask for account #A-5)

Alternate:

John H. Robinson
All same phone numbers except home number. Ask operator for new home phone number--he just moved.

Another contact:

Karon Gleason
All same numbers
651-3640 (home)

B. <u>DCCA Response After Spill Notification</u>

The first stage in an actual DCCA Team response will begin with group notification. The DCCA Team member who gets the information should immediately call Chief Hoheb who will:

1. <u>First Stage</u>

a) check to find out who is already working on the specific spill; b) alert other team members to stand by for possible action; c) coordinate closely with Coast Guard OSC and start working with OSC; d) set up a phone communication schedule to complete the initial inquiry related to the spill and e) begin activating response center.

Further information on the spill should then be obtained by calling other information sources. Inquiry should begin with the Regional Coast Guard District where the spill occurred. Within the Coast Guard, information may be obtained from the Marine Environmental Protection Office, Search and Rescue Office and the On-Scene Coordinator or his delegate.

C. <u>Coordination with the US Coast Guard</u>

Go to USCG Command Post and coordinate closely with the USCG Federal On-Scene Coordinator:

1. Set up an efficient information exchange system to ensure that there is the most up-to-date data available on such subjects as the following:

   a. Biological Resource information

   b. Trajectory model information

   c. Shoreline protection priorities

   d. Updated overflight information

2. Arrange for joint DCCA/USCG overflight as soon as possible to help standardize overflight observations and information formats and to optimize use of aircraft. Be sure observers are experienced and briefed.

Coordinate overflights with oceanographers working trajectory modeling.

3. Set up daily meetings with USCG to exchange overflight and scientific information.

4. Arrange for National Weather Service special oil spill weather forecasts (issued four times a day) to be initiated, transmitted and posted in the DCCA command center.

2. Second Stage

In the second response stage, a reconnaissance team of two people designated by Chief & Enforcement Hoheb or his representative, will leave immediately for the spill site. In addition, all the local DCCA Response Team members and appropriate team members from other agencies, will be put on alert for a possible second stage build-up to support the response. This is envisioned as an in-place reconnaissance, and timing is essential. Light equipment including cameras, dye pellets, water sampler peripheral tape recorders, notebooks, etc., should be carried. Additional equipment, such as current probes, should be carried only if it does not delay the initial departure. Before its arrival on-scene, the reconnaissance team should contact local Coast Guard personnel including the on-scene coordinator or his representative, the Marine Environmental Coast Guard personnel including the on-scene coordinator or his representative, the Marine Environmental Protection Officer and local operations personnel to insure that DCCA and USCG have the opportunity for arriving on-scene and observing the spill. Based on these initial observations, the on-scene team members should report back via phone conference with DCCA Team principals. Based on their information and observations, a second conference should consider whether an increased build-up in the DCCA Team effort is required or not.

Upon this reevaluation, three options are possible: (1) the spill may be contained beyond observational or logistic limits, in which case, the initial team should return home; (2) the spill may be of interest but not require additional effort beyond a few overflights during a ~8 to 72-hour period, in which case, the intial two-person team can remain in place with a possible shipment of additional equipment; and (3) additional response may be considered appropriate.

3. Third Stage

The third option, that the spill event represents a potential opportunity, requires a more extensive observational program. In this case, a minimum six person, one to two-week response should be considered. By this time, additional DCCA Team members will have had ~4 to ~6 hours' notification for the potential build-up and should be prepared to move quickly with all the required additional equipment to the spill site. This third stage will result in the creation of an on-scene response center.

III. ESTABLISHMENT OF RESPONSE CENTER (HEADQUARTERS)

Upon the decision to escalate the DCCA response to a spill, a "response center" will be created to be manned by a minimum of six people recruited from trained DCCA personnel. Additional escalation will typically be by pairs of trained people to create additional field teams. Volunteers, locally recruited or supplied by government agencies, will be used at the discretion of the Team Chief as supplemental manpower, but they will not replace critical positions. Cross-training of DCCA personnel will allow them to occupy any of the critical positions and rotations are expected. The following items should be considered and implemented when establishing the response center.

A. Personnel

Two of the personnel have responsibilities which cannot be delegated, the Team Chief (TC) and his deputy. Typically, the TC will have no routine duties preassigned and is expected to fill in where needed during the course of the response. The deputy will typically perform the duties of one of the other five critical positions. The responsibilities of these two people are as follows:

1. Team Chief (TC) - This person is the Chief Scientist for the response. He is responsible for manpower requirements, scheduling of operations and assignment of personnel to positions. He is the spokesman for the DCCA Team and is responsible for coordination with the USCG, OSC and other outside groups including the news media. He is also responsible for the production of the final report. The TC is responsible for coordinating all of his activities with the Commissioner of DCCA.

2. Deputy Team Chief (DTC) - Serves as the deputy to the TC. He is responsible for the daily debriefings and the set up of the data management system. No specific duties are assigned to this person, however, he normally would occupy one of the five critical positions and be responsible for the normal duties of that position.

3. The duties and associated responsibilities of the five critical DCCA Team positions are as follows: It is expected that these positions will be rotated so that field team will be able to reduce the data they collect.

a) Data Management (DM) - These duties include documentation of response and collected data, filing of data, slide labeling, generating the daily summary, as well as logging resource locations including personnel and equipment borrowed by DCCA, sample tracking, etc.

b) Logistics (LOG) - These duties include the pickup and delivery of equipment, supplies, and personnel. He also assists DM in documentation.

c) Administration (AD) - These duties include arrangement of lodging for people, travel, communications (phone and telefax), maintaining phone logs, proper filing of fiscal matters (bills and receipts). He also assists DM in documentation.

d) Field Team - pairs of people - (F1, F2, etc.) - These duties include carrying out the experiment schedule, collecting data, returning and repairing used equipment, maintaining mission logs, and reducing data collected, as well as participating in debriefings.

C. <u>DCCA Response Center Procedures</u>-

Once the DCCA Command Center and associated lodging facilities have been secured, the following arrangements should be made:

1. Command Center Room:

   a. Three outside telephone lines

   b. Personnel to answer phones

   c. Put up Bulletin Boards (updated daily or as necessary)

      1.) On-scene personnel tracking board

         a.) Name
         b.) Arrival/Departure dates
         c.) Agency/Affiliation
         d.) Job or reason for attendance
         e.) Room number
         f.) Phone number if different

      2.) Daily POLREP and overflight map board

      3.) Meeting notice board

      4.) Message board

      5.) Rental car key and room key depository

      6.) National Weather Service special oil spill weather forecasts

   d. Set up tables for FAX, phones, confer system, and rented typewriter.

2. Obtain an equipment storage room with secure access.

3. Set up refrigerated and/or secure sample storage area for chain of custody samples.

D. <u>Administrative Affairs</u>-

Set up organized system for fiscal/administrative affairs.

1. Facility/motel conference/meeting room rental

2. Phone installation
   and locate Xerox services (in motel or nearby)

3. Typewriters, office supplies and stationary

4. Rental cars

5. Air craft charter

6. Purchase orders/contracts, shipping, GTR's

E. Command Center Operation-

All DCCA staff members should maintain individual activity logs. Use bound books only, use date and time on all entries and be as complete as possible. To be carried out by DCCA staff responsible for command center operations:

1. Maintain a phone log. Enter time, date, callers and substance of conversation.

2. Update bulletin boards daily or as necessary

3. Prepare daily summary of the day's activities and spill situation and enter it into the confer system. Include as a minimum, the following information:

   a. Office phone numbers and address
   b. Situation at well site/wreck site
   c. Pollution situation (amount of oil)
   d. Movement of oil
   e. Location and degree of impact onshore
   f. Daily activities
   g. Personnel on-scene

F. Data Management-

Set up system for data management to ensure:

1. Adequate supply and distribution of data management and custody forms and tags

2. That all individuals involved in field work are thoroughly instructed in chain-of-custody procedures

3. That all samples are taken and handled by approved chain-of-custody procedures

4. That a sample tracking system is established so that a field work is properly and immediately documented

5. That a system for developing and handling photographs taken at spill is in place and operational for thorough and current photographic documentation

6. That a field personnel and equipment tracking system is established.

G. Response Center Procedures

1. Duty/Phone Log Book - Each team member will carry a log book and all telephone conversations should be recorded in it as well as notes of daily activities. The book should be turned in at the termination of the spill response.

2. Message File - A message pad with carbons should be set up in the conference room for all incoming calls. A file of all messages should be kept.

3. Key, Message, Sign In/Out Board - A board should be set up in a visible area of the Conference Room. It should have designated space for all rental car keys, messages, and sign in/out with a list of all team members. It is the responsibility of data managers to see that this board is kept current.

4. Security and Property Control - A separte room should be obtained for equipment with only one or two members (TC, AD) assigned keys. As equipment arrives, it should be inventoried and stored in this room. Thereafter, a nightly inventory should be made in conjunction with an equipment readiness check. The readiness check should include batteries, film, meters, and possible damage.

5. Situation Reports - Daily status reports should be submitted to the Commissioner's Office, etc.

6. Formal Debriefing - Each evening after all activities are terminated, all team members should get together for a debriefing. Activities of the day should be reviewed, plans and schedules for the following day set up, and a scientific review held.

7. Pull Out Check List - Throughout the operation, the TC should keep a record of events and activities, e.g., rental cars, equipment leased or loaned, outstanding bills, etc., which can be used as a checklist for shutting down the operation. Should the TC have to leave prior to pullout, he must see that this information is relayed to one of the remaining team members.

H. Response Center Duty Assignments

Specific responsibilities and duties involved with the conduct of the Response Center are assigned as follows:

1. Phone logs kept (all team members).
2. Individual duty logs kept (TC, DTC).
3. Personnel status: who, room number and where to be reached (DM or AD).
4. Cars - labeled with stickers, unloaded when not in use, papers in the glove compartment and keys hung on the board (AD).
5. List of equipment brought in (DM).
6. List of equipment borrowed from whom: address and telephone number (DM).

7. Special Items to Check (DM/F):

   a. Batteries - do not open until needed, date them when installed, and replace them every third dya.

   b. Cameras - clean lenses, check light meters, make sure they are set right, and make a label for film

   c. Current probes - check timing and mark the set up.

8. Headquarters Equipment List

   a. Typewriter

   b. Pencils, pencil sharpener

   c. Map tacks

   d. Telefax machine and 1 ream of paper

   e. Notebooks for logs, 10 spiral, 10 field

   f. Expanding files, 1 minimum, 30 compartments

   g. Drafting equipment, mechanical set, parallel rules, triangles, rulers

   h. Typewriter paper (bond and letterhead)

   i. Marking pens, 1/2 dozen black (water proof)

   j. Felt tip pens, 1 dozen

   k. Ball point pens, 1 dozen retractable

   l. Lanier tape transcriber

   m. Phone message logs

   n. Pads of messager paper

   o. Slide holder sheets (25) and loose leaf binders

   p. Projector

   q. Slide sorter

IV. RESOURCES

Any significant spill that occurs in coastal waters generates a great deal of interest and response from Federal and state agencies, scientific organizations, and public interest g groups. SOR Team members should be aware of as many of these groups as possible. Interaction and information exchange as well as a general awareness of other participants at a spill improve the efficiency and quality of our response.

Diverse areas of operation coupled with continually changing personnel make an accurate Resource listing almost impossible. This operatioh plan will not attempt to make such a lsit, but individual members should make an attempt to appendix and continually update this document with at least some of the following suggested items:

1. DCCA Headquarters Phone Directory
2. Coast Guard Directory
3. Regional Universities and key scientists ("expertise list")
4. Logistic contacts, i.e., aircraft, boat charters, etc.
5. Shipping, i.e., Federal Express, Emery, etc.

V. FIELD PROCEDURES

Once team members have arrived at the spill site and a response center has been set up, there are a series of standard procedures that should be followed in the field.

When Preparing to Sample

Meet with the data tracker/manager for assignment of codes, etc.

Sample for biological specimens simultaneously with the samples collected for chemical fingerprinting in order to allow point in space and time correlation.

Consult the Spilled Oil Research Team Manual appendix to review procedures before entering the field. Use only sterile sample containers. Prevent accidental sample contamination by finger oils and jar lid or aluminum foil coatings.

Immediately after sampling, close the container, seal the lid with tape and sign your name across the tape so that any tampering will appear obvious. Once sealed and adequately labled, deposit the sample in an ice chest for temporary storage until locked freezer space is available.

Report sampling information and return completed paperwork to the data tracker/manager at the conclusion of each day.

A. Aircraft Operations - General

Many of the DCCA Team observations can be obtained from aircraft both fixed-wind and helicopter. When working from these platforms a number of considerations should be kept in mind: 1) The pilot will probably not be experienced in the type of operations that DCCA requires; 2) Working from an aircraft with an open door introduces a great deal of background noise and normal communication will generally not be possible; 3) The aircraft may have other assignments (i.e., SAR) with DCCA Team activity taking a secondary role. As a standard procedure, the DCCA Team person should be ready to brief the pilot in some detail about what measurements need to be taken and what procedures are necessary. This pre-flight communication is very important to minimize potential misunderstandings that could threaten safety and inhibit effective completion of the research mission.

The following sequences are a brief description of the observation procedures that should or could be carried out during aircraft operations. A more detailed procedures manual will be used to describe the actual theory and rationale behind the measurements.

General Flight Preparation for Aerial Observations, Physical Oceanography and Beach Reconnaissance

Arrange for air support through the Coast Guard if possible.

While arranging for aircraft, request as many communication head sets as possible. Obtain noise suppressors or ear plugs.

Inquire about navigational equipment and the ability to locate a position whether by coordinates or by ground speed and heading.

Discuss the available aircraft emphasizing the mission's purpose and speed, loading, range, window visibility and maneuverability requirements.

When a suitable aircraft is obtained, brief the pilot prior to flying. Discuss the mission trackline and desired speed, altitude and bearing characteristics. Explain the purpose of your work until the pilot understands and is able to provide the best service possible.

Bring clipboards, maps/charts, paper clamps, extra pencils, adequate clothing, etc. A pocket calculator is also useful. Maintain a photo log using a tape recorder and a rehearsed system of reference shots (plane interior) and dialogue.

1. Aerial Observations

Prior to any work, confer with the Coast Guard and other aerial observers and coordinate flight plans and recording techniques. Use the following Surface Oil Identification Guide, terminology and Overflight Worksheet.

Study the following figures to prepare for actual oil coverage estimates.

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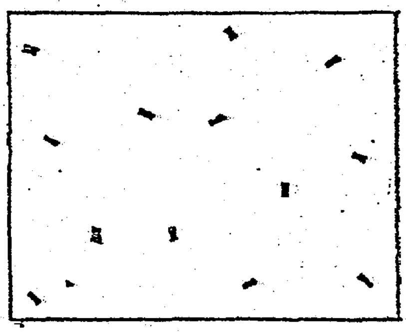

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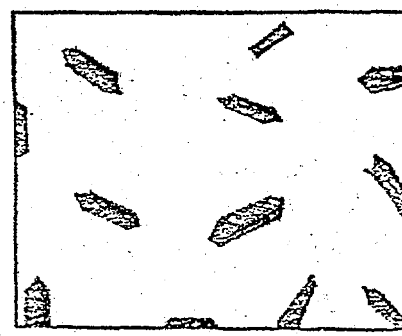

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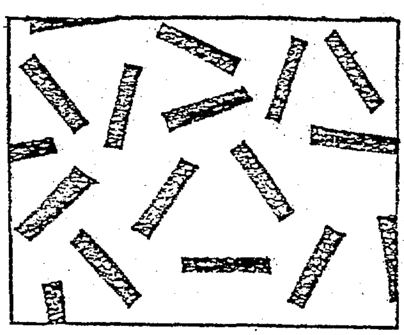

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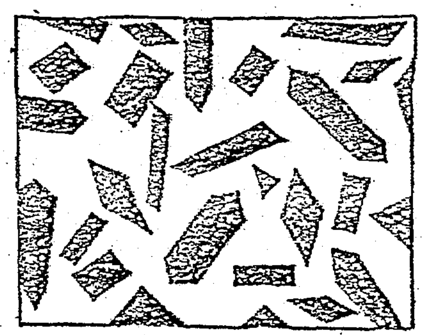

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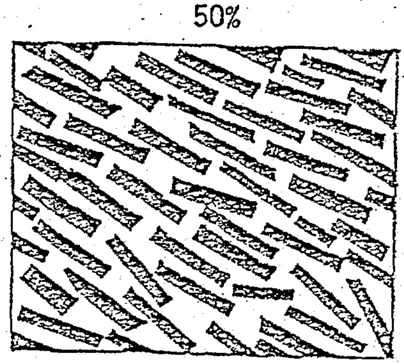


ll_____ D_____ Flight Altitude_____

server_____ Wind: Direction_____T, M Speed_____kn, mph Ground Speed_____kn

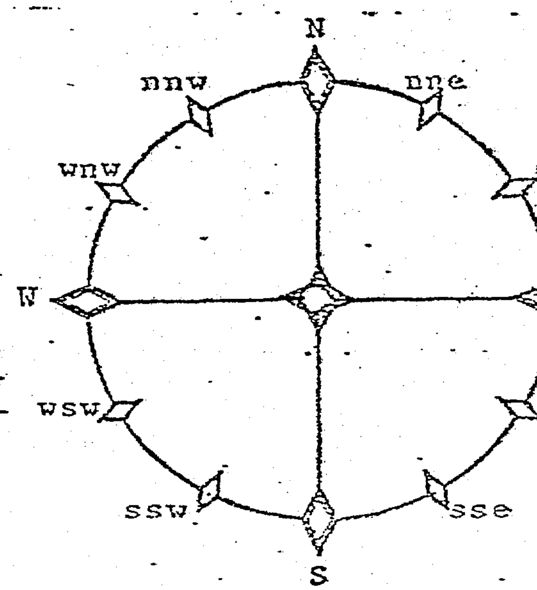
me(local)_____ Flight Track(leg & direction)_____

rence Point(Lat, Long, other)_____

I Type_____ / _____ / _____ (1, 2, 3) Oil Coverage_____ / _____ / _____ (1, 2, 3)

ientation & Size of Slick
to reference point)_____

ographs: Roll#_____
Frame#_____



servations:

(local)_____

ight Track(leg & direction)_____

ference Point(Lat, Long, other)_____

Type_____ / _____ / _____ (1, 2, 3) Oil Coverage_____ / _____ / _____ (1, 2, 3)

ntation & Size of Slick
to reference point)_____

ographs: Roll#_____ Frame#_____

rvations:

SURFACE OIL IDENTIFICATION GUIDE

Using the Overflight Work Sheet:

1. Record the latitude and longitude, or the distance from a known point, of the oil sighting. Note the time and flight track leg.

2. Describe the appearence and coverage of the oil using the terms listed below.

3. Describe the orientation, size and shape of the slick relative to the latitude-longitude, a fixed reference point, or points of the compass.

4. Record any photographs taken and note special observations.

Oil appearence and coverage terms:

Oil Coverage

A. Very Light(VL): 1-10% oil coverage. — areas where the surface coverage appears to be more water than oil.

B. Light(LT): 11-30% oil coverage. — (same as A)

C. Moderate(MD): 31-60% oil coverage. — areas where the surface coverage is equally oil and water.

D. Heavy(HV): 61-100% oil coverage. — areas where the surface coverage appears to be more oil than water.

Oil Color

A. Silver-gray sheen (SS).

B. Rainbow sheen (RS).

C. Blue-black unemulsified oil (BB).

D. Red-brown mousse (RM).

E. Copper mousse (CM).

F. Brown-black mousse (BM).

Definitions of descriptive terms:

Mousse: a water in oil emulsion which forms as a result of mechanical mixing.

Pancakes: patches of weathered oil .15-3 meters, or greater, in diameter. Weathering causes a skin to form on the top of the slick. May be orange to brown in color, with a well defined edge bleeding littl sheen.

Sheen: an oil film on the water surface thinner than 10^{-4}in.. May contain silver-gray or rainbow bands of color.*

Slick: a smooth area on the water surface resulting from an oil film.*

Tarballs: agglomerations of very weathered, semi-soild to solid oil, generally with a thick outer crust and a thin, more viscus, center. May range in size from millimeters to 20 centimeters in diameter. Differes from pancakes in that the oil is more weathered, with a thicker crust.

Tarballs are generally smaller than pancakes.

Windrows: parallel bands of floating material on the water surface (slicks, sargassum, etc.) with the long axis aligned in the wind direction. May be caused by Landmur circulation cells.

Wind slicks: patches of calm sea surface. Caused by localized areas of wind shear where wind conditions change so rapidly that capillary waves do not have time to develope.** Wind slicks do not concentrate material on the water surface as do windrows.

* National Contingency Plan

** Assessment of the Use of Space Technology in the Monitoring of Oil Spills and Ocean Pollution. 1/80 General Electric Space Division. Philidelphia,PA.

1. Photography

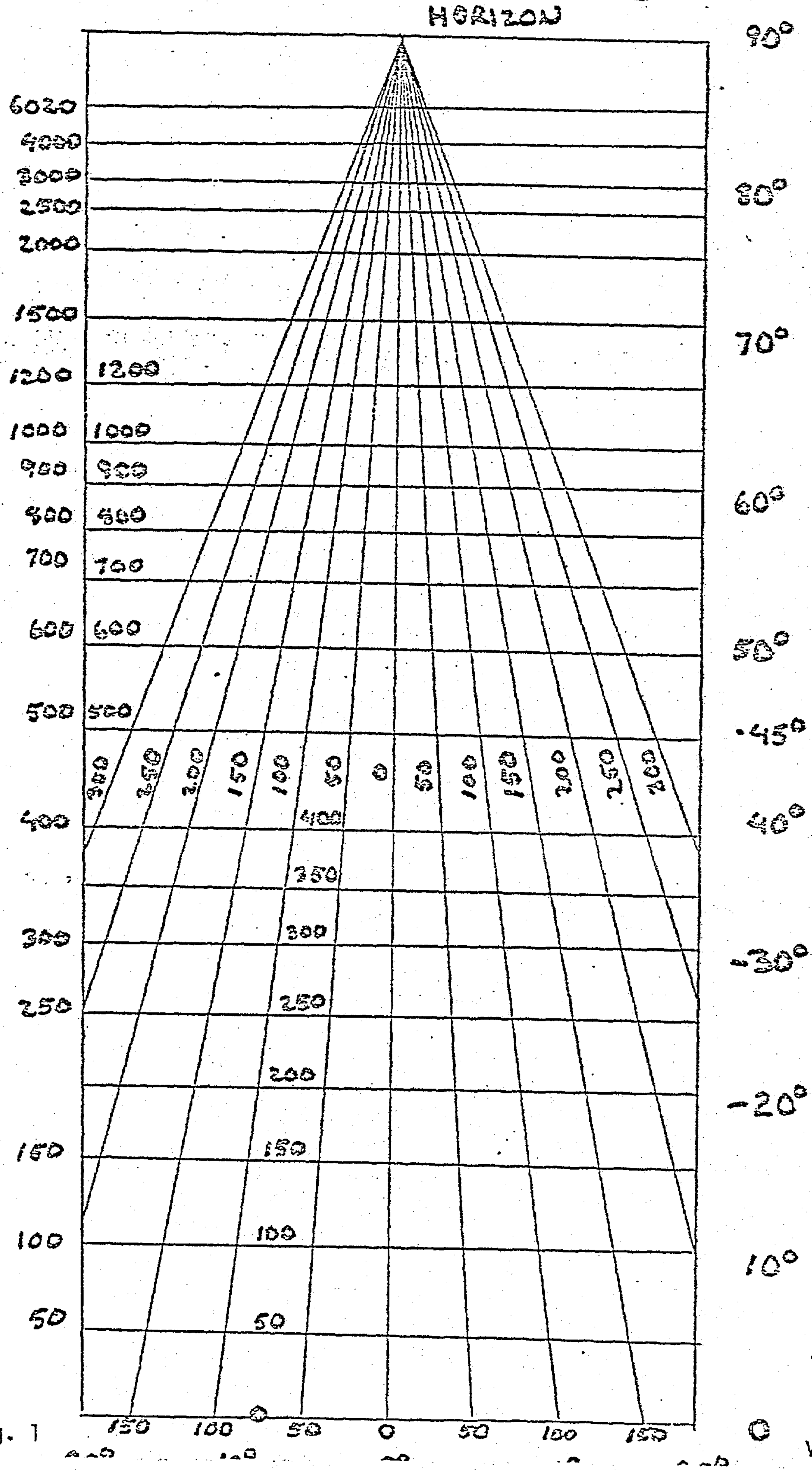
Much of the useful information obtained from aircraft operations comes from "well-documented" photographs. When photographing oil slicks or environmentally interesting phenomena, a number of things should be kept in mind. The first is that the film is the least expensive part of the entire operation, so entensive use of the camera is recommended. Bracketing of the exposure as indicated by the light meter is important and should be practiced regularly. However, it should be realized that without times actually recorded on the film, it can be difficult to resolve which photos were taken at what time if too many are taken in sequence. It is very easy to lose count of photos taken, especially by the time the slides are processed. When possible, shoot pictures down sun to reduce glitter from the water and glare effects from the windows, lenses, etc. Shoot vertically as much as possible to reduce errors in length estimates. The attached diagram (see Fig. 1) gives the amount of distortion caused by the camera axis not being vertical. Unless the camera is either vertical or the horizon is included, it is almost impossible to determine the oblique angle from the resulting photograph. Thus, it is important to measure (an estimate is better than nothing) the oblique angle of the camera axis. Always measure it from the vertical for consistency. Finally and most important, carefully document all the pictures that are being taken. For long rolls of film it is easy to lose track of where you are in the roll and thus it is useful to break the sequences with a reference shot (i.e., inside the aircraft). It is then a simple matter to restart the count from the reference picture.

50 MM LENS

OBL[illegible]E ANGLE DISTORTION IN PHOTOGR[illegible]S

HORIZONTAL LINES

$\measuredangle = TAN^{-1}\left(\frac{D}{ALT}\right)$



50 MM LENS COVERS $27^{\circ} \times 40.5^{\circ}$

26

Fig. 1

In order to get useful measurements and information out of photos (other than pretty pictures) the following data are needed for each photo:

- Time taken
- Lens used (note at beginning to tape log for each camera
- Altitude
- Direction camera pointed
- Angle from vertical
- Description of what is in photo (kept in real time on tape)
- "Wasted photos" (interior of plane) to positively identify which frame is which until data backs are on all cameras.

2. Wave Observations

Observations of the sea state and wave conditions from a air-craft are generally only possible in a qualitative sense. These can best be obtained by careful photographs of the general sea surface and annotations on the flight log of the direction of the major swell or sea. Once these pictures are obtained they can be compared with standard Beaufort Scale pictures, for example, Page 774, H.O.#9, Bowditch.

3. Mapping

A major requirement of SOR Team research is to obtain position data on the distribution of the spilled oil. This will normally be obtained during aircraft overflights of the spill. A variety of aircraft is likely to be encountered so no one procedure is going to work in all instances. An essential starting point is to have a discussion with the aircraft commander prior to takeoff so you can explain to him what is needed and ask questions as to what sort of navigation system and navigation system read-outs are available on the aircraft. It should also be determined if the pilot is planning to fly a predesignated grid or if the flight will be determined by what is observed. In any case, key reference or turning points should be identified and it should be determined whether time ticks, or event marks can be entered into the navigator's record for post flight detailed map construction. Prior to the flight, it is also to be established how the observer is to hook into the internal communication system of the aircraft and how he should obtain position information during the flight as well as what protocol should be used during these communications. During the flight a flight observation log should be maintained. It should include such information as spill identification data, observer, and aircraft identification. A typical example of such a log is included (see Fig. 2). This log should include an identification of events, the position the events were observed at, annotation of how the positions were obtained, and remarks about the events. This log should form the master record for each flight and indicate when other photographic or current probe data were obtained and whether additional samples were collected. In the event that position control of the flight observation log was keyed relative to the aircraft's flight track, all auxiliary information necessary to convert absolute positions should be obtained immediately after the flight and added to this log.

FLIGHT OBSERVATION LOG   Spill Identification

Date:

Observer:

Aircraft:

Event ID	Time	Position		Position Remarks	Remarks or Observation
1		5.6	245	Range &	Edge of Slick
2		6.2	260	bearing from	"
3		7.5	275	ship using	"
4		8.0	290	TACAN	"
5		9.0	310	"	Time mark 1423
					Oil in stringers pictures taken and diff oil/ water vel
6		9.0	280	"	Series - alt. 500 ft. speed 40 kts- 4 sec Drop intervals 1442 (2 photos) 1445 (1 photo) 1449 (2 photos) 1451 (1 photo)
7		15.0	295		Flock of ducks on water 70
8		20.0	300		Time mark 1505

Fig. 2

29

4. Wind Observations

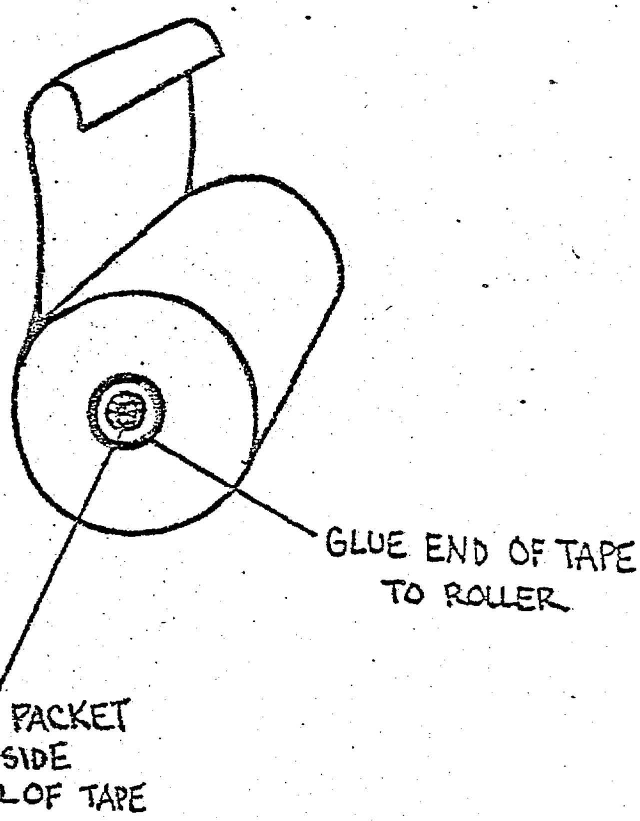
Wind direction observations can be obtained from an aircraft in two ways. The first is to use a floating smoke grenade which, when dropped to the surface, gives a plume downwind. When smoke grenades are not available, a roll of paper tape attached to a dye pellet will give an excellent indication of wind direction (see Fig. 3). Wind speed measurements are more difficult. Possible techniques are: wind sondes, ship reports, etc.

5. Current Measurements

Richardson current probes can be deployed from an aircraft to obtain estimates of surface currents. The easiest way to deploy these is to have the aircraft fly a racetrack pattern with a repeat interval of approximately two minutes (see Fig. 4). The racetrack should be oriented so that photography does not occur towards the sun, typically down sun-up sun axis. The probe should be deployed on the down sun leg and photographed on subsequent returns on the down sun leg. Elevations of approximately 300-500 feet are typical. Photographic as well as visual observations with an optical protractor (look-see) should be recorded on the log. Some models of the Richardson current probes do not have a dye packet that is released on the initial point of impact. For these models it is often difficult to relocate the dye released from the timed dye packets, so when using these it is often useful to throw out a dye pellet or smoke grenade with the probe just to mark its initial location.

6. Differential Oil/Water Velocity Measurements

Differential oil/water velocity measurements are essential to determine the wind and wave interaction with the oil slick.


GLUE END OF TAPE
TO ROLLER
DYE PACKET
INSIDE
ROLL OF TAPE

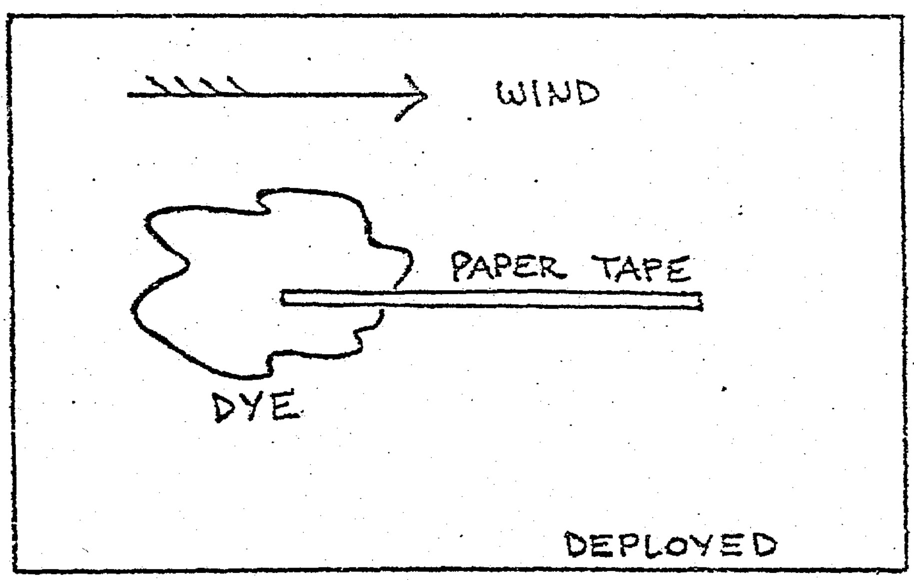

WIND
PAPER TAPE
DYE
DEPLOYED

Fig. 3

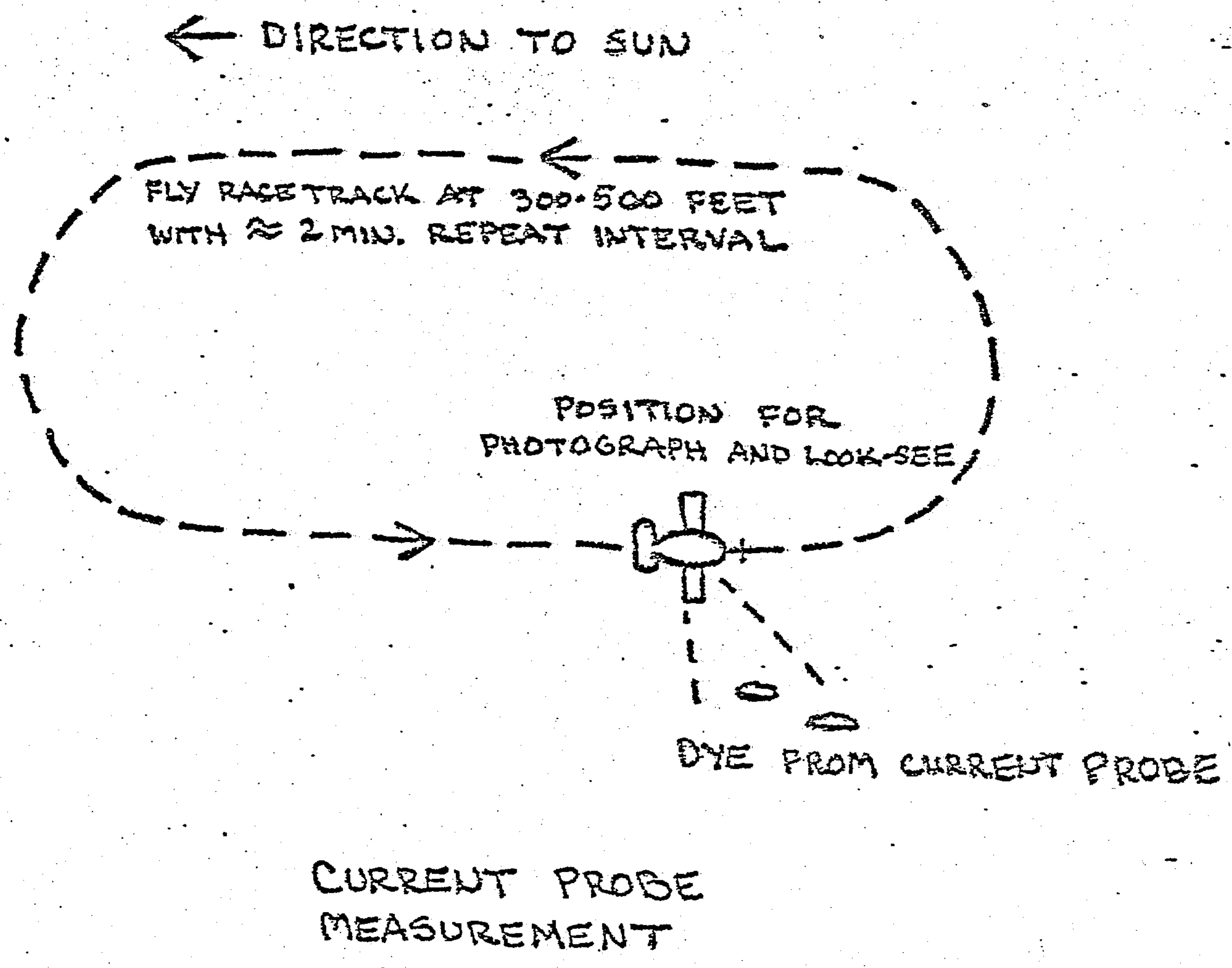
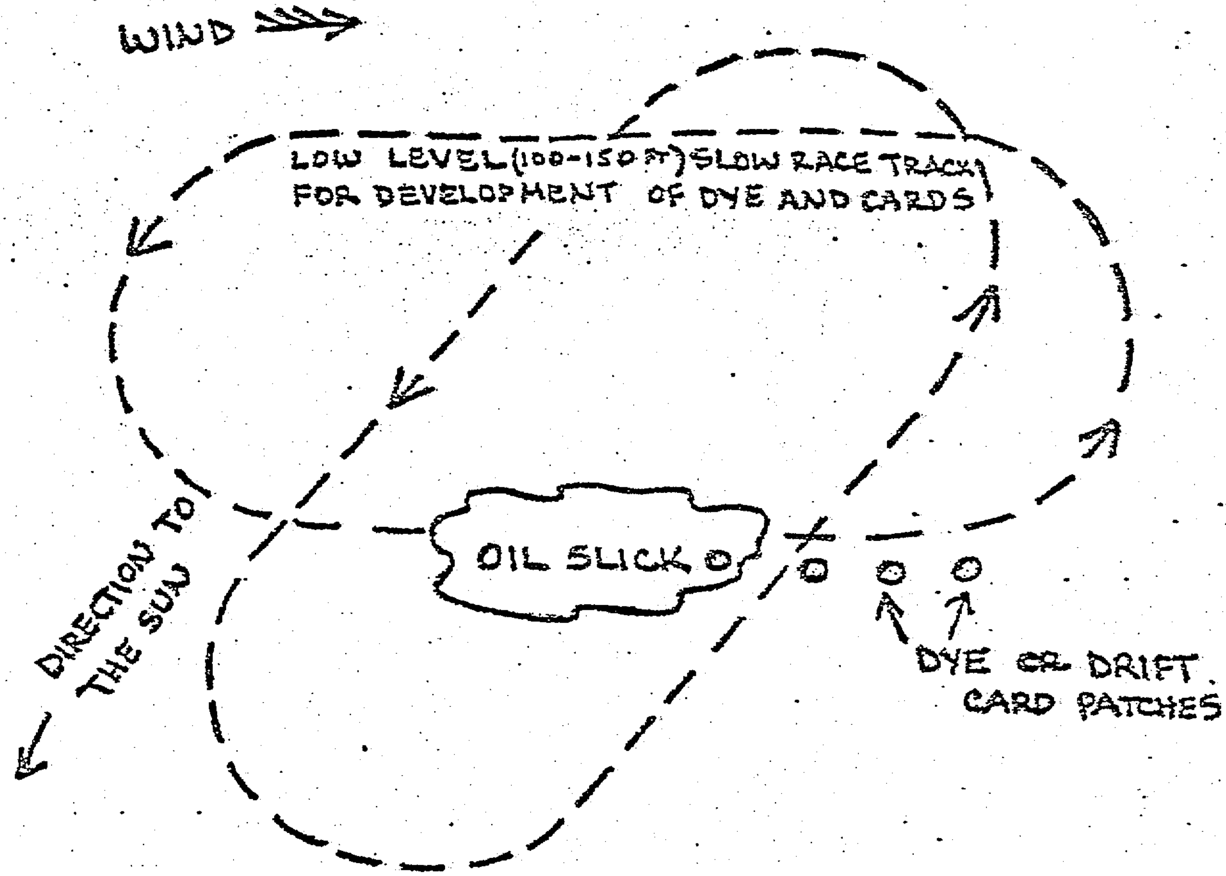

← DIRECTION TO SUN
FLY RACETRACK AT 300-500 FEET
WITH ≈ 2 MIN. REPEAT INTERVAL
POSITION FOR
PHOTOGRAPH AND LOOK-SEE
DYE FROM CURRENT PROBE
CURRENT PROBE
MEASUREMENT

Fig. 4

To make these measurements a relatively thick section of the slick must be identified. The initial part of this procedure is to fly a racetrack pattern at low level with minimum speed (see Fig. 5). The axis of the racetrack should be oriented upwind - downwind. On the up wind leg a series of dye pellets and drift card packets imately 50 meters. (Air speed in knots divided by 2 gives approximate meters per second.) The first dye pellet drift card deployment should be in the slick with subsequent drops in a line down- wind leading away from the slick. Once this line has been deployed, the aircraft should climb to approximately 500 feet and establish a racetrack pattern oriented up sun - down sun with a repeat interval of approximately 2 minutes. On each subsequent down sun pass over the patches they should be photographed and documented.

7. Water Samples

Water samples can be obtained when a helicopter is being used as the observation platform. For thick oil concentrations a weighted bucket attached to the hoist of the helicopter or hand line can be used. For thinner oil slick concentrations a Teflon rake sampler can be used. For subsurface samples a sterile bag sampler can be deployed (see Fig. 6). In all cases water samples will require that the helicopter go into a low-level hover and the operation should be carefully coordinated with aircraft personnel. In any of these collections a number of throw-away gloves and plastic garbage sacks should be available to put the samples in so that you do not get oil all over the helicopter (and you). The sampling location and condition of the oil slick should be documented and photographed.



HIGHER LEVEL RACE TRACK PATTERN FOR PHOTOGRAPHY WITH REPEAT INTERVAL OF APPROXIMATELY 2 MIN. - ELEVATION ≈ 500 FT. TAKE PHOTOGRAPHS ON DOWN SUN LEG OF LEADING EDGE OF THE SLICK AND DYE PATCHES.

DIFFERENTIAL OIL/WATER MOVEMENT MEASUREMENT

Fig. 5

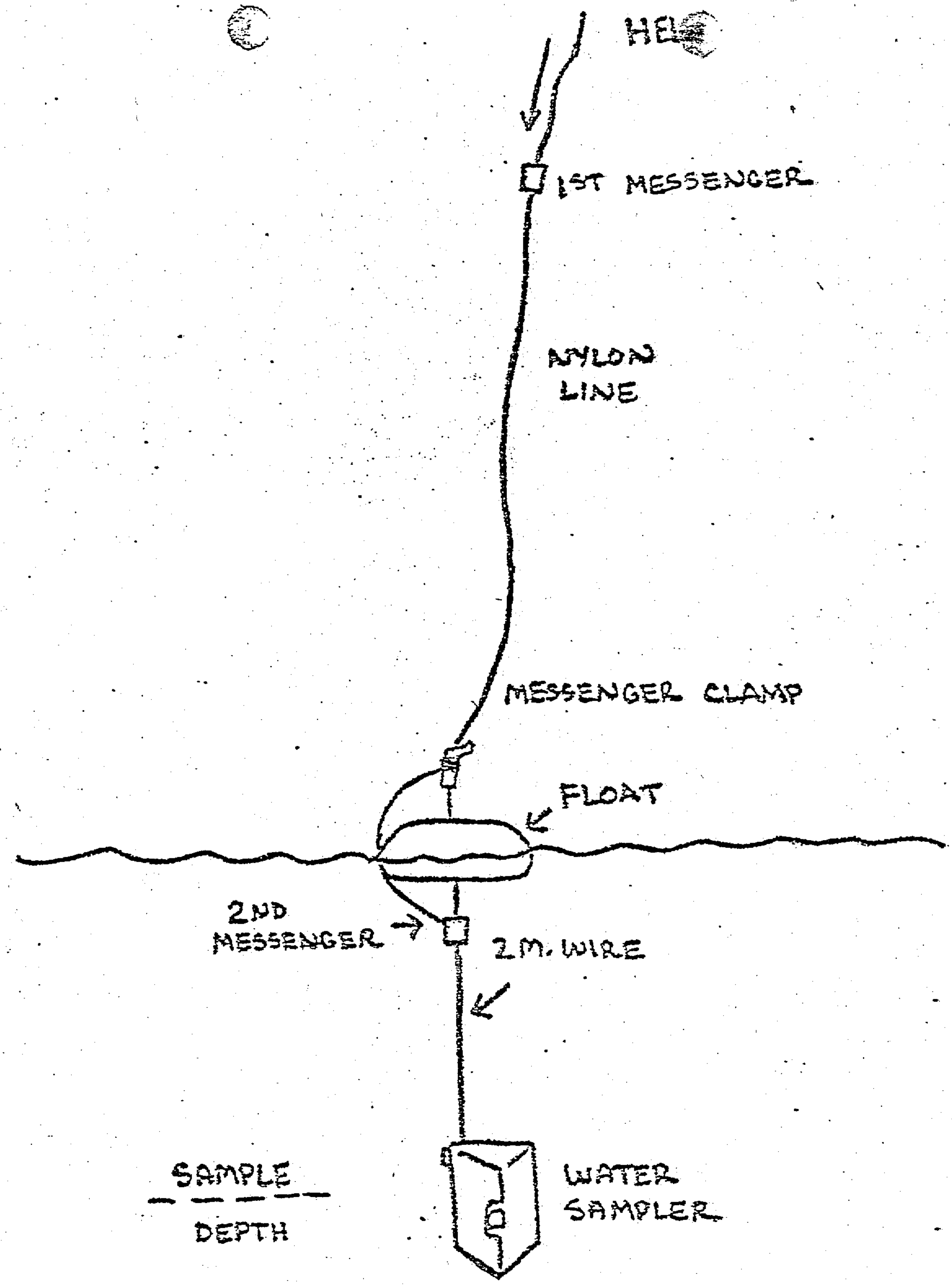

HELI
1ST MESSENGER
NYLON
LINE
MESSENGER CLAMP
FLOAT
2ND
MESSENGER
2M. WIRE
SAMPLE
DEPTH
WATER
SAMPLER

Fig. 6

8. Physical Oceanography

a. In the development of spill response, experts may be contacted and summoned to the scene for the purpose of oil plotting and trajectory modeling support. To prepare for the arrival of physical oceanography experts, the SSC must arrange for some or all of the following:

Helicopter for specific days and times at a defined pick-up point.

Smoke bombs (through the OSC) used to mark Richardson current tube transects.

Adequate numbers of Richardson tubes and timers, drift cards, dye capsules, etc.

b. Those first at the scene, however, may be required to conduct field work prior to the arrival of the experts. As this is a possibility, response personnel should be familiar with the Spilled Oil Research Team Manual included as an appendix to this operations review.

As a minimum, practice the use of Richardson current tubes and become familiar with data requirements and reporting formats. Navigation techniques and chart use will also be important knowledge.

Finally, being properly equipped for the wind and noise of an overflight will allow the recorder to maximize note taking so that results are immediately available and the work is nearly over when the flight terminates.

9. Shoreline Reconnaissance

a. Experienced field teams will typically conduct this line of work but again, the Scientific Support personnel first reporting to the scene may be required to do a preliminary shore survey. Participants should, therefore, be prepared to sample the substrate for replicate chemical and biological samples, to photograph extensively, and to determine volumes of beached oil (by trenching if necessary).

IF THE SPILLED MATERIAL HAS NOT YET CONTACTED THE SHORE, THIS SURVEY AND SAMPLING WORK BECOMES HIGH PRIORTY. With air or other transportation presumably arranged, the following checklist will permit completion of rudimentary but adequate work.

Bound notebook, non-smearing pen
prewashed jars/viles and surgical gloves if possible

Marking pens, sealing tape, tags, and an ice cooler or a liquid preservative
Any means to marking or recording exact sampling locations (e.g., map/chart or sufficient detail, stake or object using a tape measure and compass bearing, etc.)
Camera and scale
Shovel
Adequate footwear
Plastic bags (for large organism samples), spray paint and survey tape.

b. Economically developed shorelines require a different type of reconnaissance. The camera and the logbook are the best tools for documenting damage by soiling of ships, boats, private and public docks and moorages. If oil or other hazardous materials have contacted such property, collect a sample in a sterile jar/vile for later finger printing. Note the sample location and the extent of all property damage. If the spilled substance is not visible, it is still important to note that fact by recording boat numbers, etc. and the date and time of your observations.

10. The Enviropod - An Aerial Photography Module

The Enviropod weighing 150 pounds was designed to be strapped to the belly of a Cessna 172 - an aircraft found at most airports. Two camara housings - one forward looking, one vertical looking - are operated remotely from the cockpit. Self-contained battery packs provide power able to shoot thousands of frames.

Maintenance and operation procedures for the Enviropod are included in this manual as an appendis. As prior experience with this tool is necessary for use in the field, this section is intended only to introduce this capability to the scientific response effort.

NOAA OMPA HMRP has developed this capability in-house. In addition, with relatively short notice, each EPA region has available the complete Enviropod package including contractual arrangements with aircraft and pilots. When activiated for spill response through the proper channels, this resource can greatly augment spill monitoring and modeling activities.

B. Field Chemistry Procedures

The DCCA Team is equipped to be able to take both subsurface water samples and surface oil samples. Subsurface water samples are obtained using "sterile bag" samplers, and surface samples are taken with Teflon plumbers' tape, or by any other simple procedure that lends itself to surface slick sampling. If it becomes necessary, the SOR Team should be prepared to assist the OSC in taking reference oil samples from a tanker or other vesse.

One step that is common to all of the sampling procedures is cleanliness. Since water samples will rarely exhibit more that 2 ppm oil, it is imperative that contamination of samples be avoided. The primary sources of contamination are: i) dirty glassware, ii) plasticizers extracted from plastic containers and scre-cap liners, iii) impure organic solvents, and iv) poor sampling technique. All glassware that will come into contact with water or oil samples must be prerinsed with spectroquality hexand (either Matheson, Coleman and Bell or Burdick and Jackson solvent), and only glass or Teflon labware used for all procedures. Sample containers (vials, bottles) need to be capped with Teflon liners under the caps. Teflon plumbers' tape is good for lining vial caps, but the tape must be actual du Pont Teflon, not a substitute. Some substitutes are contaminated with plasticizers. Commercial aluminum foil is not a satisfactory lining material as it is contaminated with oil from the rollers used in the manufacturing process.

1. Water Samples

The present SOR Team method for obtaining subsurface water samples required the use of General Oceanics' sterile bag samplers, a messenger-actuated device which allows the taking of subsurface water samples while avoiding contamination from a surface slick. Samplers are available from General Oceanics, Inc., 5335 N.W. 7th Avenue, Miami, FL 33127, (305) 754-6658 (Model 1030, 1976 GSA price $305.00). Sample bags are also obtained from General Oceanics

(Model S1030-TB (transparent) or Model S1030-OB (opaque)), and cost about $2.50 a peice ($356.40/gross). Messengers can be obtained from General Ocenaics (M5000-MG "Go-Devil Messenger") for line sizes up General Ocenaics (M5000-MG "Go-Devil Messenger") for line sizes up to 1/4" diameter, for $27.00 a peice.

The samplers themselves weigh 2.7 kg (6 lbs), and 144 sample bags weigh 11.1 kg (24.4 lbs). The sampler is about 10" wide by 11" long. The sterile bag samplers take an uncontaminated water sample of one to one and one-half liters, in one to five minutes. The samplers can be arrayed on a line to take samples at several depths, and they are constructed to "pass" messengers.

The sampler consists of two-hinged plates held by a torsion spring. A sealed, sterile, polythylene bag fits over and between the wings. When the sampler is struck by a messenger, a filling tube is cut open, the wings are forced apart by the torsion spring, and water enters the bag. When the bag is about one-third to one-half full, the tube is sealed shut by a clamp.

There is a copy of the instruction manual at each logistics center, and the instructions contained therein are to be followed for loading and setting the samplers.

Before every use, check the knife blade adjustment - the point should be 2 mm (1/16") above the top of the guillotine slot. To adjust the blade - loosen the set screw on the messenger release disc. Position the disc up or down the shaft as required and re-tighten the set screw. After each day's use, flush the wings and mechanism thoroughly with fresh water.

Water samples should be taken in pairs, lowering two samplers simultaneously to a single depth, and triggering the samplers at the same time. When the samples are returned to the surface, two aliquots will be taken from each bag, thus yielding four samples from each sampling location/depth. If a sampling bag breaks or leaks, the team should salvage what it can from the remaining bag, or the remainder left in a leaking bag. All water samples should be extracted in the field as soon as possible after they have been taken, but in no event more than three to four hours afterwards. The following step-by-step procedure has been tested and found quite satisfactory.

1) Prerinse some 20 ml vials, a 10 ml graduated cylinder, and two 500 ml speparatory funnels with spectroquality hexane, either directly from the hexane bottle or using a Teflon wash bottle to hold the hexane. Three rinses are required for the separatory funnels, three rinses, each with ca. 20 ml of hexane, will do. The separatory funnels should have two marks engraved on them with an electric engraver, one at 20 ml and one at 500 ml. The sample vials can be rinsed prior to going into the field; likewise, the 10 ml graduate needs to be rinsed only prior to going into the field. The separatory funnels will be rinsed before each extraction. If the separatory funnels are wet with water, they should be rinsed with high-quality acetone prior to rinsing with hexane. The acetone will remove the water droplets adhering to the inside. The glass stopcocks of the separatory funnels should be lightly greased with silicone stopcock grease before starting, being careful to avoid getting any grease near the hole in the stopcock.

2) Load two sterile bag samplers with transparent sterile bags. Attache 15-pound weights (use bricks) to the end of two 1/4"

polypropylene lines. The lines should be premarked, using flu-rescent paint, at 1-meter intervals. Attach the samplers to the lines, so that the 1-m interval markings are correct with respect to the position of the sampling tube of the sterile bag. Put the samplers over the side, snap a messenger onto the line, hold the line so that the appropriate depth marking is at the water surface, and drop the messengers simultaneously. The lines can then be fastened to a cleat for the time it takes the bags to fill (1-5 minutes). Recommended depths for sampling are 1, 2, and 5 meters. If only a single depth will be possible at a given location, it should be relatively shallow; i.e., 1 or 2 meters.

3) When the bags have been sealed off by the sampler, bring them to the surface. Have the deck covered by a painter's drop cloth and some newspapers. Set the samplers down on the deck and remove the bags. Clamp the surgical rubber tubing with a hose clamp, if available. If possible, proceed to step 4. If not, set the bags upright in a safe place so that they will be protected until their contents can be extracted.

4) Pour 500 ml of a sample into each of two separatory funnels, filling the funnels to the engraved line at 500 ml. Pour 10 ml of hexane into the top of each separatory funnel, using the 10 ml graduated cylinder to measure the hexane. Shake each funnel for 1 1/2 to 2 1/2 minutes, venting occasionally by inverting the funnel and rotating the stopcock 180°. After shaking, allow the sample to stand until the hexane forms a clear layer at the top (1 to 2 minutes), then remove the stopper and drain off the water. Watch the hexane layer as it approaches the stopcock, and allow a drop or two of hexane to go through the stopcock before stopping the flow.

Place a 20 ml vial under the funnel and drain the hexane extract into the vial. Cover the vial with Teflon tape, then screw the cap on. Label the vial.

5) Rinse the separatory funnels with acetone, then with three 20 ml aliquots of hexane, and extract the next sample.

Sampling Notes: i) The polypropylene lines will foul with oil if the surface slick is heavy; use a gasoline-soaked rag to clean the line, or have spare lines all marked and ready. Too much oil on the line will retard the messenger so much that it will not trigger the sampler; ii) Use baby oil to clean your hands; iii) Carry several pairs of cheap cotton gloves for handling the oily lines andUsamplers; only real (Du Pont) Teflon; v) A short-stemmed Teflon funnel will make it easier to pour the water sample into the separatory funnel.

6The samples, once placed into Teflon-capped glass vials, are stable indefinitely, and can be analyzed at one's leisure. As they are in hexane, they can be directly analyzed by UV-fluorescence spectrometry, according to the procedure outlined below. They can also be analyzed by gas chromatography, or gc-ms.

UV-fluorescence procedure - from R. Jadamec, USCG R&D Center:

Set excitation and emission monochromators of synchronous-scanning UV-fluorometer at 255 and 280 nm, respectively. Record the emission spectrum continuously until the monochromators reach 475 and 500 nm respectively. Use a sample of the surface oil slick as as reference. Report the concentration of oil in water in ppb relative to the whole oil.

Team members responsible for sampling should read and follow the chain-of-custody notes in this section.

for research purposes. Samples can be kept in wide-mouth 8 or 16 oz glass containers, prerinsed with hexane where possible, and capped with Teflon, if possible.

4. Density of oil samples

In order to ascertain whether or not a given cargo of oil will readily sink in seawater, field tests can be carried out. The density test is a simple one, and it needs to be conducted on both the original oil and the "residual" remaining after some of the volatiles have been removed.

To remove volatiles, place a sample of oil in a glass container with a large surface-to-volume ration, i.e., putting a layer of oil 2 or 3mm deep in the bottom of a regular motel drinking glass. Suspend this container in boiling water for 15 to 20 minutes until the oil has stopped giving off volatile components.

To crudely test the densities of both the fresh and the "cooked" oil, place a drop of oil on the surface of a sample of seawater in a test tube and observe whether the oil sinks. Seawater has a density of about 1.025. If both samples float, make the same test with tap water (density 1.000). If a sample floats in seawater but sinks in fresh water, an approximate of sample density may be made by combining fresh water and seawater) in appropriate proportions until the oil appears to be neutrally buoyant. The following tables can be used to prepare the appropriate solutions. With the aid of a refractometer, the exact salinity, or Na Cl concentration for pure salt soultions, can be calculated, and the density obtained from the table. Refractometers are to be included with SOR equipment kits. They are calibrated in "Degrees Brix" (= % dextrose, grape sugar), and Table II gives the conversion factors to refractive indes and density.

Table I

Seawater Solutions

Salanity	Chlorinity	Density @ 20^{o}C	Refractive Index @ 20^{o}C
0.00	0.00	1.0000	1.3330
5.00	2.76	1.0037	1.3339
10.00	5.52	1.0073	1.3348
15.00	8.28	1.0110	1.3357
20.00	11.04	1.0148	1.3366
25.00	13.78	1.0185	1.3375
30.00	16.56	1.0222	1.3384
35.00	19.32	1.0260	1.3393
40.00	22.08	1.0299	1.3402
45.00	24.84	1.0337	1.3411
50.00	27.60	1.0375	1.3420
55.00	30.36	1.0413	1.3429

Table II

Sodium Chloride Solutions

Na Cl, Wt %	Density @ 20 C	Refractive Index @ 20 C	Na Cl Wt %	Density @ 20 C	Refractive Index @ 20 C
0.00	1.0000	1.3330	7.50	1.0541	1.3461
0.50	1.0035	1.3339	8.00	1.0578	1.3470
1.00	1.0071	1.3347	8.50	1.0615	1.3479
1.50	1.0107	1.3356	9.00	1.0652	1.3488
2.00	1.0143	1.3365	9.50	1.0689	1.3496
2.50	1.0178	1.3374	10.00	1.0726	1.3505
3.00	1.0214	1.3382	11.00	1.0801	1.3523
3.50	1.0250	1.3391	12.00	1.0876	1.3541
4.00	1.0286	1.3400	13.00	1.0952	1.3558
4.50	1.0322	1.3409	14.00	1.1028	1.3576
5.00	1.0359	1.3417	15.00	1.1105	1.3599
5.50	1.0395	1.3426	16.00	1.1182	1.3612
6.00	1.0431	1.3435	17.00	1.1260	1.3630
6.50	1.0468	1.3444	18.00	1.1339	1.3648
7.00	1.0504	1.3453	19.00	1.1418	1.3666

Table III

Brix/Density/Refractive Index

0.50/1.0019/1.3337	3.00/1.0115/1.3372	5.50/1.0213/1.3409
1.00/1.0038/1.3344	3.50/1.0134/1.3380	6.00/1.0233/1.3416
1.50/1.0057/1.3351	4.00/1.0154/1.3387	6.50/1.0252/1.3423
2.00/1.0076/1.3358	4.50/1.0173/1.3394	7.00/1.0272/1.3431
2.50/1.0096/1.3365	5.00/1.0193/1.3401	7.50/1.0292/1.3438

5. "Mousse" Formation Test

Oil often forms a water-in-oil emulsion referred to as "mousse" because of its resemblance to that chocolate dessert. To test for possible mousse formation, it is necessary to heat an oil sample to 60° C or greater, in order to "break" the emulsion. Adding salt to the water phase during this testing procedure will speed the breaking of the emulsion.

This procedure should be carried out by putting a sample of the mousse "suspect" in a graduated, Pyrex test tube, and immersing the test tube in boiling water. If the temperature of the oil exceeds 50° C, use a screw cap on the test tube to avoid significant losses of volatile fraction of the oil.

Water contents of 60% or more are not unusual in mousses, so it is important to make sure that the sample has had sufficient time to separate into two phases.

C. Chain-of-Custody Procedure

In the event that testimony is ever required, either in an administrative adjudication procedure or in a court of law, where the hydrocarbon content of a sample is a key fact, or where the "fingerprint" of an oil sample is being used to associate a "mystery" spill with an alleged spiller, there will be a need to establish an unbroken "chain-of-custody" for each sample referred to. This chai will have to be testified to, and continuous custody established, by one or more witnesses at the trial or hearing, and must extend from the moment the sample was taken through the analytical procedure, to the instant of testimony.

Establishing a chain-of-custody is not difficult. It is purely a matter of common sense. Whoever takes the witness stand must be able to state, from first-hand knowledge, that he or she is certain that the sample introduced in court is the same sample that was analyzed, and that the sample analyzed was in fact the sample taken at the scene. It may require more than one witness to establish the chain-of-custody; i.e., the SOR Team person who took the sample, the analyst, and whoever retained custody of the sample after it was analyzed.

The pitfalls are obvious. Placing a sample bag in the kitchen freezer of a hotel, where hotel employees have access to the freezer, could break the chain. However, by placing the sample bag in a cardboard box, taping the box shut with brown paper tape, and placing one's signature across the seals in such a way that opening the box would disrupt one or more signatures, one could place the box in an unsecured freezer without the risk of breaking the chain-of-custody.

Where samples can be kept in the possession of one person at a time, and the transfers to others can be kept to an absolute minimum, the chain is easy to maintain. Where, for example, a third party is employed to transport samples from one person to the next, the tape-signature method above can be used, or a combination-locked box could be used, and the transferror could telephone the lock combination to the transferee. Such precautions make it possible to avoid calling the third party as a witness at a later hearing or trial.

For SOR Team samples of oil, or extracts of water samples, the chain-of-custody procedures described above will suffice. For other legal reasons, complete identification needs to be associated with each sample as soon as possible after it is collected, and this identification must remain associated with the sample throughout its "travels." The individual taking the sample must describe the sampling location, procedure, and surrounding circumstances in as much detail as possible, and place an unmistakable identifying number or brief description on the sample container itself, so that the sample can always be paired up with its description. While doing this, the sampling individual should be aware of any bias he or she might be guilty of in selecting this particular sample. The "representativeness" of each sample, with regard to the entire surrounding circumstances, will be an issue in any subsequent trial, hearing, or scientific paper. Thus, it is only good practice to attempt to eliminate obvious bias, and to seek a high degree of "representative" sampling.

The American Society for Testing and Materials (ASTM) is developing a chain-of-custody "standard practice," and the following hints are taken from their April 1977 draft.

1. Preparation. Determine quantity of samples and approximate locations (depths, etc.) prior to going into the field. Prepare chain-of-custody record tags prior to fieldwork, to the extent possible. Mark containers prior to fieldwork. Carry sample logbook into field; plan, discuss, and follow rigid chain-of-custody procedures, so that all survey participants know exactly what procedure is to be followed.

2. Sample collection. Minimize number of people handling samples; do not attempt to "spread the load." Follow field techniques as described in this operation manual; do not "improve" or improvise unless absolutely necessary. Take planned "blank" samples. Attach chain-of-custody tag to sample container, or group of containers as soon as sample is collected. Fill tag out completely at

that time; do not wait to enter datails later. Secure individual samples, or groups of samples, with tamper-proof seal before dispatching to lavoratory (brown tape/signature, lock, etc.) Fill out field logbook as you go, field sampler is to sign all pages where sample entries are made. Field sampler is to maintain sole custody of samples until dispatched to lab or tunred over to assigned custodian. Films, charts and tape recordings are to be handled as though they were samples, going through entire chain-of-custody procedure.

3. Transfer of custody. Transferrer and transferee both sign and date (and time) the reverse side of chain-of-custody record at time of transfer. A record is made of the "dispatch of sample" in the field logbook. Samples should not be transferred without documentation which indetifies contents. If sent by mail, send by registered mail, return receipt requested.

4. Laboratory custody. Minimize number of people handling samples, preferably to one. Store samples in a secured area or container. All analysis notes and results must be signed and dated by the person performing the analysis (not his boss). If that person is not available as a witness at time of trial, his notes may be admissible under the Federal Business Records Act.

Designation: D 3325 – 74T

Tentative Method for PRESERVATION OF WATERBORNE OIL SAMPLES[1]

This Tentative Method has been approved by the sponsoring committee and accepted by the Society in accordance with established procedures, for use pending adoption as standard. Suggestions for revisions should be addressed to the Society at 1916 Race St., Philadelphia, Pa. 19103.

1. Scope

1.1 This method covers the preservation of waterborne oil samples from the time of collection to the time of analysis. Information is provided to ensure sample integrity and to avoid contamination and microbial degradation.

1.2 The standard procedure is for controlled field or laboratory conditions and specifies thorough preparation of equipment and precise operation. Where these details must be compromised in a field emergency, nonstandard simplifications are recommended that will minimize or eliminate consequent errors.

NOTE 1—Procedures for sampling waterborne and deposited oils are not being developed. Procedures for the analysis of oil spill samples are described in Method D 3326, Test for Preparation of Sample for Identification of Waterborne Oils,[2] ASTM Methods D 3327, Analysis for Selected Elements in Waterborne Oils,[2] and ASTM Method D 3328, Tests for Comparison of Waterborne Petroleum Oils by Gas Chromatography.[2]

2. Summary of Method

2.1 Special types of sample containers and shipping containers are recommended. Samples may be of several types: tar balls, collected oil, oil-water mixtures, emulsions, and oil and water on collecting devices such as silanized glass cloth or other materials. Instructions are given for the care of samples to minimize changes due to autoxidation and microbial attack between the time of sampling and the time of analysis. Services available for transportation of samples are described.

3. Sampling

3.1 Collect a representative sample. Sample containers should be carefully chosen as described under Section 4.1.

4. Apparatus

4.1 *Sample Containers*—Borosilicate glass containers that have been thoroughly cleaned are preferable. All glass containers, new or used, must be thoroughly cleaned and washed prior to use. The cleaning steps consist of an initial wash with a warm aqueous detergent mixture followed by six hot tap water rinses, two rinses with distilled water, a rinse with reagent-grade acetone, and a final rinse with chloroform followed by drying in a clean oven at 105°C or hotter for 30 min. Narrow-mouth, tightly closed bottles are required to protect against loss of volatiles. Glass jars are satisfactory for high-boiling or heavily weathered samples. However, lower-boiling components may be lost in a glass jar. If the glassware need be prepared in the field under the pressure of an emergency, it should be washed with warm aqueous detergent followed by extensive water rinsing. A solvent rinse with acetone should be made, if possible, followed by lengthy air drying to remove residual solvent.

4.1.1 Plastic containers are not acceptable since volatile hydrocarbons diffuse readily through many commercial plastic containers or may be absorbed into the plastic. In addition, the plasticizer may dissolve in the sample, causing misleading results.

4.1.2 Metal containers should usually be avoided because the critical nickel and vana-

[1] This method is under the jurisdiction of ASTM Committee D-19 on Water.

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[2] *1974 Annual Book of ASTM Standards*, Part 31.

dium analyses could be invalidated by introduction of metal from the can. With certain materials such as hard beach samples, an unused tin-coated paint can may be used. Rusted cans, resin-coated cans, or plastic containers should never be used.

4.1.3 When field expedients must be employed, an empty container of each type used should be included in the shipment to the laboratory, to be used as a blank to measure inadvertent contamination.

4.2 *Closures*—Proper choice of closures is critical to avoid contamination and to preserve sample. For wide-mouth bottles, use caps with aluminum-coated or TFE-fluorocarbon-coated cardboard inserts. Aluminum foil sheet should not be used.

4.3 *Insulated Shipping Containers*, for use in shipping frozen samples of material subject to biological decomposition. Commercial containers molded from expanded polystyrene foam are available from suppliers with capacities from 0.5 to 5 ft.^{3} When packed with samples and slab dry ice, a frozen product will be held safely for at least 48 h.

4.4 *Freezer*, chest type, operable at −10°C, or lower, and equipped with an accurate temperature-measuring device.

4.5 *Noninsulated Shipping Containers*—Under emergency field conditions where standard conditions cannot be followed, sturdy cartons or wooden boxes should be used. These should be sufficiently large so that the sample containers are adequately surrounded by absorbent packing material, such as vermiculite.

5. Preservation of Samples

5.1 *Protection Against Autoxidation*—Treat the sample container to displace air and store in a dark area in a refrigerator. Nitrogen or carbon dioxide can be used as inert gases to displace air. If dry ice is available, put a small piece into the sample container. As soon as gas evolution has ceased, seal the container.

5.2 *Protection Against Microbial Attack*—Especially critical to preservation of the detailed analytical pattern on which gas chromatography identification is dependent is the avoidance of bacterial attack. Bacteria attack normal paraffins more rapidly than they do isoparaffins or naphthenes and consequently can materially affect the gas chromatogram. This attack can take place both in the presence and the absence of oxygen, utilizing different bacterial species. In actual spill samples, anaerobic attack has been indicated by the presence of hydrogen sulfide in samples of high sulfur spilled oil which have not been maintained in a freezer. Samples most susceptible to microbial attack are intimate mixtures of oil and water, such as emulsions, solutions of oil-in-water, and thin layers of oil on water. Hard samples, such as tar balls, are more resistant to microbial attack. To protect against microbial attack, store the collected samples in a freezer at −10°C, or lower. Take precautions in freezing samples containing large amounts of water since water expands in freezing, causing breakage. With those samples containing much water, fill only two thirds full to allow sufficient air space above the sample for expansion.

5.3 *Protection Against Loss of Volatiles*—Although many samples of waterborne oils will have been extensively weathered and have only a small fraction of volatile components, these volatiles may be of importance in identification. Other samples collected shortly after a spill may have a higher concentration of volatiles which could be important for identification. Consequently, it is important to protect against loss of volatiles by using narrow-mouth bottles and by ensuring that the closure is well prepared and fits tightly. Use pliers to make a tight seal but do not turn with such force as to deform the cap.

5.4 *Field Emergencies*—When the sample cannot be frozen and stored at −10°C according to the standard procedure, fill the sample bottle nearly to the top. Prior to opening unrefrigerated samples containing volatile components, cool the sample bottles in ice water.

6. Shipment of Samples

6.1 Common carriers such as air express or air freight are usually employed for transportation of oil spill samples since the postal service will not ship those flammable materials which have a flash point lower than 80°F (27°C). Pack these samples as recommended in the containers described in 3.3 and 3.4 and notify the receiving laboratory of shipment arrangements so that proper preservation conditions will be maintained on receipt and continued until the analyses have been completed.

7. Procedures

7.1 The prescribed standard procedures for controlled field or laboratory conditions and recommended modification for "emergency conditions" are summarized in Table 1. Use this table together with the specific sections of this method, to choose the proper measures for preservation of the specific waterborne oils under consideration.

TABLE 1 Procedures for the Preservation of Waterborne Oil Samples

Recommended Operation	Procedure for "Emergency Conditions"	Procedure for Controlled Field or Laboratory
Sample containers	Borosilicate glass jars for high-boiling samples, narrow-mouth bottles for volatile samples. Paint cans for hard beach samples.	Borosilicate glass jars for high-boiling samples, narrow-mouth bottles for volatile samples. Paint cans for hard beach samples.
Cleaning containers	Wash with warm aqueous detergent followed by water rinsing. Rinse with acetone, if available, followed by air drying.	Wash with warm aqueous detergent, followed with tap water and distilled water rinses. Rinse with acetone, chloroform, and oven dry.
Closures	TFE-fluorocarbon- or aluminum-coated cardboard inserts.	TFE-fluorocarbon- or aluminum-coated cardboard inserts.
Protection against autoxidation	Store in dark.	Remove air with nitrogen or carbon dioxide. Store in dark in refrigerator.
Protection against microbial attack	Samples should be kept as cold as possible and shipped immediately.	Samples should be stored in laboratory freezer at −10°C.
Shipment of samples	Samples susceptible to microbial attack should be shipped in dry ice.	Samples susceptible to microbial attack should be shipped in dry ice.

VI. REPORTING

Without proper documentation, field efforts and conducted experiments are a waste of people's time. The purpose of SOR activities are to collect data that will improve oil trajectory and fate models. Unless these data are documented and presented in a useful format, the SOR program objectives will not be met. This section details the types and forms of documentation required for SOR activities and presents some of the ideas and thechniques to be considered in generating the documentation.

In general each response must be documented from the bottom up: each experiment, each mission, debriefings, daily activity summaries - all followed by a response report which draws on them all.

A. Notification

For each oil spill communicated to the SOR Team a log will be kept detailing the intial facts of the spill and coordination (Chapter 11). Included in these logs will be the reasons why a response is planned or why not. A copy of these logs will be forwarded to the SOR project manager to aid in the generation of the annyal report of the project to BLM. The attached form (Oil Spill Notification, see Fig. 7) should be used for this log.

B. Response

After each response to an oil spill, a report will be generated which documents the SOR response to the spill and the data collected by them. These reports are intended for internal OCSEAP use and will not be formally published. It is expected that a report will be filled

SPILLED OIL RESEARCH PROGRAM

OIL SPILL NOTIFICATION

Date ____________________ Prepared by ____________________

Vessel Name ____________________ Owner ____________________

Registry ____________________

Location of Spill:

Time of Spill:

Amount of Spill:

Potential of Spill:

OSC ______________________________ Phone No. ____________________

MEP ______________________________ Phone No. ____________________

NRC and RRT

Coordinations to: ____________________ ____________________

____________________ ____________________

Response planned Yes _____ No _____

Desirable data, or reason for no response:

Details of circumstances of spill:

Fig. 7

(Fig. 8a, b) within one month of the end of the response and copies distributed to each SOR logistics center (Washington, D.C., Seattle, Juneau), the Coast Guard Research and Development Center, BLM (Anchorage), and the OCSEAP Project Office (Boulder). The SOR program manager will receive a reproducible copy and make 50 copies for any additional distribution. In order to maintain consistency, the attached format will be used for all response reports. The appendices attached to the report will include copies of: daily response summaries, oil slick maps, work sheets from field experiments, transcripts of debriefings and other details as necessary.

C. Field Mission Logs

For each field mission, logs will be kept by one member of the field party. These logs will consist of tape records supplemented by written notes and sketches generated during the mission and experiment result forms completed either during or as soon after the mission as possible.

D. Tape Logs

Tape logs will be kept on small hand-held Lanier tape recorders supplied in the field kits. The general format should be as outlined in the tape log checklist (see Fig.(9). These tapes should be transcribed as soon as possible (same or next day) and the transcript reviewed by the field party who will fill in missing parts and add clarifications as required.

Several procedural techniques should be followed in using the tape recorders in the field. These techniques have been developed to maximize the data retrieved from the tapes:

SPILLED OIL RESPONSE PROGRAM

Report On

____________________ Oil Spill

____________ to ____________
(Date) (Date)

Compiled by

____

Date______________

This Research was partially funded by BLM contract, etc.

NOAA/OCSEAP

Fig. 8a

REPORT FORMAT

1. Introduction

   Time, date, and location of spill - ship involved - type of oil spilled and amount - apparent fate of oil - type of accident, weather conditions.

2. Response

   How notified - when - chronology of events including buildup in summary form.

3. Summary of Collected Data

   1. Distribution of oil and fate
   2. Motion measurements - water currents - oil and oil/water velocity
   3. Physical observations - behavior of oil - pancakes - stringers thickness - photo material
   4. Beaching of oil - how spread along beach
   5. Oil samples - cargo and slick - disposition
   6. Water column samples - disposition
   7. Benthic samples - disposition
   8. Intertidal samples

4. Problems encountered and recommendations for future experiments

   1. Problems and solutions
   2. Lab experiments
   3. Field experiments

5. Summary of important data collected

Appendices - Tables, maps - experiment descriptions - index of Tables, maps - experiment descriptions - index of photographs taken. Daily summaries and daily debriefings, etc.

Fig. 8b

FORMAT OF TAPE LOGS

Tape - (beginning) date, who flying, in what, destination, experiments proposed

When - time - where - location - what - Experiment Plan - results - data

Take-off time

Experiments

Photo Log (see below)

End

Time of landing - Summary of operations and results

CRITICAL DATA FOR PHOTOGRAPHS

- Lens used
- Altitude
- Direction camera pointed
- Angle from vertical or horizontal must be included
- Description of what is in photo, but kept in real time on tape with "wasted photos" (interior of plane) to positively identify which frame is which.

Fig. 9

1) Always use a new tape for each mission. If required the second side can be used if the tape runs out during a mission but in no case should a second mission be continued on a previously use tape.

2) Do not leave the recorder on when not talking. But at the same time do not start talking as soon as it is turned on. It takes about one second for the tape to come up to speed and anything said during that time period is unintelligible. A good practice is to wait one second after turn on and then say "the time is __:__" before entering observations or data. This also allows a better feeling for time intervals when reviewing the transcripts after the mission.

3) Speak clearly, slowly and directly into the top of the recorder. Remember the background noise in an aircraft is at high levels.

4) Avoid meaningless phases like: "There it goes," or "We're over it not." They are only confusing in the transcript, but remember to make descriptions in detail. In effect, generate a picutre with words.

5) Include time hacks as frequently as possible. Especially note the times of all events, and remember to also describe the event.

6) Repeat critical data so there is no chance of it being lost or misinterpreted.

7) Summarize frequently especially after experiments.

8) Remember to be as accurate and precise as possible. Do not change terminology during a mission.

The following are recommended phrases and examples:

- "Altitude is five hundred feet."
- "The time is twelve thirty-two."
- "The probe was armed at (when)."
- "The probe was deployed at (when) , (where)."
- "The look-see reading from III to III was zero point one seven."
- "The current is towards ____ degrees magnetic."
- "The visual estimate is ____."
- "The wind is from IIII degrees true."
- "The ____ experiment was completed at time."
- "Five dye pills were dropped at one second intervals downwing. The aircraft speed was sixty knots towards three hundred degrees true. The pills should be one hundred feet apart. The first pill is upwind of an egg-shaped pancake of oil. The remaining four pills are downwind. Wind speed is seven knots as measured by the doppler speed log. The time of the first photograph will be at about thirteen twenty seven. Subsequent times will be from the stopwatch relative to this time. First photo, frame number 7, taken at 12 seconds. Altitude is 500 feet. Camera was vertical."

E. Written Notes

It is worthwhile gotting down notes for each experiment including sketches of what should be in photo. Also noting down visual estimates, headings, and 'look-see' readings will be helpful in deciphering the tape logs.

F. Experiment Work Sheets

For each conducted experiment a written summary including a completed worksheet (see Fig. 10) should be completed as soon as

WORKSHEET FOR RICHARDSON CURRENT PROBES

DATE mo/ day/ yr/ ________ Experimenter ________________

Location Lat ____________ Long ____________

Relative Description

Water Depth ____________ Source ____________________

Probe Setting ____/____ ______ Seconds between Red and White

Times all LST

Armed __:__:____ Deployed __:__:__ Sighted __:__:__:__:__:__

Surface Red White

Direction from White to Red ______ True or Magnetic

Distance Red to White _______ feet Speed __________KTS

Wind Speed __________ Direction _________ True or Magnetic

Wave Height _________ Direction _________

Tidal current predicted ____________________ Source _____________

METHODS

Looksee Time __:__:__ Altitude(A)_____ Vert Angle _______

Reading(s)___:___ A S - cos = distance = __________

Photographic Focal Length _________ = fl in mm

Photo	Time	Altitude	Width	Separation	Vert Angle	Distance
		A	W	S	VA	A S 35 / W←fl VA

Fig. 10

possible. As a minimum, as much of the worksheet should be completed as possible on the same day of the experiment before the evening debriefing. This will allow possible completion of the data reduction by the office staff when the film is processed and tape logs transcribed. In any case it is the responsibility of the field team who conducted the experiment to see that it is written up in a completed and usable form.

G. Photograph Logs

A photograph log will be kept under the direction of the data manager. He/she will insure that film is properly labeled, processed and that the slides are labeled. The parties who performed the photography are responsible for completing the slide description work sheet (see Fig. 11) in a timely manner. No slides will ever be discarded so that there will never be any question as to what happened to missing slides. The slides will be kept in a slide file after being labeled with roll number and date taken. when possible, it is worth noting the time on the slide also. The labeling of slides shall be as follows:

- All labeling will be on the non-emulsion side and oriented so that it is right side up when the slide is properly oriented on a slide sorter.
- Roll number TOP RIGHT
- Date TOP LEFT
- Time TOP CENTER

Do not obscure the slide number. If necessary, remark it on lower edge. If necessary, roll, date, and time can be placed on the bottom instead of top, but top is preferred.

SLIDE DESCRIPTION WORKSHEET Roll #__________

Date taken __/__/__/ (mo da yr) Platform________ Photographer__________

slide	alt	dir	vert angle	time	description
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					

Fig. 11

Slides will remain in the custody of the Data Manager. No slides will be loaned to non-SOR personnel. If required the Data Manager will arrange for printing and duplication of slides as time allows and on a reimbursable basis for outside parties.

H. Debriefings

Debriefings will be held daily and compulsory attendance of all SOR Team members is required. If for some reason a member is unable to attend he should make sure all his inputs are submitted by being debriefed before the meeting by the Data Manager and as many other team members as possible. The time of the debriefing should be announced to team members the previous day and posted in a conspicuous place. Notes shall be kept of the debriefing and, if warranted, the debriefing can be recorded on tape for transcription. If this is done, the tape recorder should be passed to each person talking and he should identify himself before talking. In any case, taped or not, written notes will be kept under the direction of the Data Manager.

In addition to bringing everybody up to date on events, the debriefing should result in at least two written documents: 1) a DAILY SUMMARY and 2) the next day's schedule (See Fig. 12, 13). Additionally, a discussion should take place of scientific accomplishments to date and what is still required to do.

VII. OFFICE/ADMINISTRATIVE PROCEDURES

A. Procurement and Payment Documents

Selected team members have been given fiscal authority for SF 44 field purchase orders and some of the team members have a book of GTRs

DAILY SUMMARY

Spilled Oil Research
Prepared by

Vessel
Cond

Environ
Cond

Oiled
Area

USCG Activities — OSC — MEP

SOR Personnel — BIC — DM — AD — LOG
F1 — F2

Activities

Overflights

Cruises

Data
Collected

Meetings

Fig. 12