

ERAWAN OIL SPILL  
ENVIRONMENT CANADA  
JANUARY, 1974



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ERAWAN OIL SPILL  
ENVIRONMENT CANADA  
JANUARY, 1974

Compiled by:

Environmental Protection Service ..... S. Hum

Contributions from:

Fisheries Service ..... O. Langer

Canadian Wildlife Service ..... R.D. Harris,  
E.W. Taylor, E.H. McEwan

Inland Waters Directorate ..... G. Tofte

Marine Sciences Directorate ..... A. Ages

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## SUMMARY OF CONCLUSIONS AND RECOMMENDATIONS

As individual conclusions and recommendations are included within each of the Service reports, this summary is not meant to repeat what has been written. It will only serve to highlight the key points which affect Environment Canada in the Pacific Region as a whole.

### a) Communications:

*The lack of an effective and adequate communications network is the most significant problem faced during the Erawan incident. It is recommended that the whole question of communications be urgently considered.*

The lack of an effective and adequate communications network between and within the various federal departments and organizations involved is isolated as the most significant problem faced during the Erawan incident. The problem may be broken down into at least two contributory causes. These include the known limitations due to inadequate communications hardware, coupled with an uncoordinated communications system.

From the onset, problems in communications were experienced. Environment Canada did not mobilize immediately; MOT and

(ii)

NHB had failed to alert the Department, even though the officials of both MOT and NHB were aware of the incident just one minute subsequent to the collision.

The Coast Guard Command Base at Kitsilano was designated the on-scene headquarters; but it lacked adequate telephone lines and office space. Also, the physical distance between the EPS Operations Centre and the on-scene headquarters made the immediate transferral of information virtually impossible. Communications with the Erawan accident scene were non-existent for the first two days following the accident. Direct Regional Environmental Emergency Team (REET) and Departmental Environmental Emergency Team (DEET) radio communications from ship to shore, and from one point on shore to another, were generally non-existent.

It is recommended that the whole question of communications be urgently considered. Under consideration should be the acquisition of compatible and adequate radio communications equipment, both fixed and mobile. While it is acknowledged that all organizations cannot be linked into a single communications network, the key groups involved should be linked. Further, it is recommended that an understanding be reached and adhered to regarding a prompt and accurate reporting system amongst the organizations



(iii)

involved. More discussions are necessary regarding the mutual selection and agreement of suitable operations rooms in the field.

b) The Chartering of Aircraft:

*Much difficulty was experienced in chartering an aircraft, as they had already been rented.*

*It is suggested that float planes be placed on retainer during the crucial days following a major accident, and be strictly designated for Federal Government use.*

c) Approval for Use of Dispersants:

*DOE was not consulted by NHB or MOT regarding the use of dispersants, as set out under the recent "Guidelines on the Use and Acceptability of Oil Spill Dispersants".*

*It is recommended that immediate agreement be reached regarding this issue, between Environment Canada and the other agencies.*

d) Requirement for DOE Representative On-Site:

*It is recommended that a DOE representative be on-site of the spill from the start of spill containment and*

(iv)

*clean-up, and remain on-scene until it can be assured that abatement action is complete and that no more environmental damage can be done. It would also be advisable to have DOE representatives on-scene at the various beach clean-up areas.*

e) Inquiry into Contents of Cargo:

*In any accident of major consequence, it is recommended that an immediate inquiry be made into the type and quantity of cargo on board.*

f) Research Needs:

*It is recommended that studies related to oil pollution in the region be undertaken, such as investigations into the effects of oil contamination and rehabilitation of polluted beaches in the region, effects of oil pollution on sea bird populations, to name a few. Oil spill containment and clean-up should also be assessed, and reviewed.*

g) Establishment of Bird Rehab Centre:

*It is recommended that plans for the bird rehab centre be acted upon immediately with the purchasing and assembling*

(v)

*of bird rehab equipment in a converted building.*

*Participation of local agencies and volunteer groups  
to assist in oiled bird recovery programmes should be  
encouraged.*

ERAWAN OIL SPILL  
ENVIRONMENT CANADA  
JANUARY, 1974

I. INTRODUCTION

On Tuesday, September 25, 1973 at 0319 hours, the British freighter, Erawan, and the Japanese container ship, Sun Diamond, collided near the Point Grey bell buoy. The night was apparently clear, though a stiff wind was blowing and a strong seas current running. Both vessels had fully licensed Canadian pilots on board.

The Erawan was a 10,000 ton freighter, owned by John Swire and Sons Limited of London, and represented in Vancouver by Furness Withy and Company Limited. She was inbound in ballast to Vancouver Harbour. The other vessel, the Sun Diamond, was a 12,300 ton container ship, owned by Nichia Line of Japan, and represented in Vancouver by Transpacific Transportation. She was outbound from Vancouver Harbour for Seattle with a general containerized cargo.

As a result of the collision, the Erawan received a 30-foot hole amidships on her starboard side. Approximately 206 long tons of oil, reported to be of the 950 Redwood grade,

was lost to the sea from the Erawan. She also carried a cargo of 1350 tons potash, but it was not known how much had actually been lost. One hundred tons of DDT, contained in paper sacks, was also on board. It remained intact, and untouched. The Sun Diamond suffered substantial damage to the bow. There were no injuries to the crew of both vessels.

The collision occurred at 0319 hours. At 0320 hours, the signalman located at the First Narrows Signal Station at Lions Gate Bridge received a call that a collision had occurred between the Sun Diamond and the Erawan. He then contacted Captain R. Holland, Vancouver Harbour Master, National Harbours Board (NHB), who in turn called officials from Clean Seas Canada Limited, and N. Sigsworth, and Captain Ian Young, both from the Ministry of Transport (MOT). In due course, MOT and NHB officials were on the spill site. More precise details and further information on the actual containment and clean-up activities involved during this initial response period prior to Environment Canada (DOE) awareness and arrival on scene, are currently not available from MOT pending release of a report submitted to Mr. J. Marchand, Minister of Transport. This report was the direct result of a closed hearing held soon after the collision to determine the facts surrounding the cause of the accident. DOE personnel were not notified by MOT or NHB of the accident.

Dispersants were used, under MOT authority, during the very early hours of the containment and clean-up activities.

By about 0900 hours, both ships were anchored in English Bay, and a triple ring of booms had been positioned around the Erawan to contain the oil. A surface pump was brought in to move the emulsion of oil and water from the Erawan's hold into an oil barge alongside, and a slicklicker worked inside the containing booms. This operation continued through the night and day.

Booms were placed across entrances to such inlets and beaches as Fishermans Cove and Eagle Harbour, off Ambleside, and Caulfeild, as well as located in reserve on shore at various vulnerable sites in the Harbour in the event of future need. In total, about 8000 feet of boom were either being used or kept in reserve. In addition, two slicklickers and a cleaning unit were brought in from Victoria. The Coast Guard slicklicker, as well as the Imperial Oil IOCO slicklicker were also engaged. A large skimmer from the United States was hired.

Over the next several days, major efforts were launched to confine and remove about 40 tons of loose oil in the harbour, and on the beaches and rocks. Clean-up of oiled beaches,

rocks and boats were also priority items.

Throughout the entire containment and clean-up period, Captain I. Young as the On-Scene Commander, stayed at the ship and supervised the containment and pump-out of oil from the ship area into barges. N. Sigsworth, as the On-Scene Coordinator, was located in the Coast Guard Command Base at Kitsilano, and assumed responsibility for advising Clean Seas Canada Limited on the clean-up of the water surface and beaches. C.T. Hatfield, as the On-Scene DOE Coordinator (or his alternate) was also located at the Coast Guard Command Centre throughout the critical few days following the spill. Clean Seas Canada Limited was the primary contractor for the physical containment and clean-up operations.

By Friday, September 28, 1973, Captain I. Young was satisfied that the Erawan was empty and was safe to be moved. He ordered her anchor up at 0900 hours. With a recovery barge in tow, a slow tour was made around English Bay to ensure that no oil was loose. The Port of Vancouver was then ordered closed from 1300 hours until 1500 hours. By 1400 hours, the Erawan under tow, passed beneath the Lions Gate Bridge, and was in Burrard Dry Docks at 1510 hours for repairs. The Sun Diamond underwent permanent repairs at the Esquimalt dry docks.

## II. ENVIRONMENTAL PROTECTION SERVICE

Tuesday, September 25, 1973

The first information received by the Environmental Protection Service (EPS) personnel that a collision and significant oil spill had occurred was through a telephone call from Vince Dugan, CBC news reporter, at 0630 hours to J. Watkins, Duty Officer for EPS. This came some three hours following the collision. Apparently the media were reporting that DOE officials were on scene. A quick check by J. Watkins showed that this was not the case. Indeed, those he called knew as little as or less than he did at that time.

At 0745 hours, J. Watkins met O. Langer, Biologist, Fisheries Service (FS) in West Vancouver. By 0815 hours, he arranged with D. Brothers, technician, EPS, to obtain an EPS boat from the North Vancouver warehouse. O. Langer, FS, subsequently joined up with D. Brothers; and J. Watkins returned to regional headquarters after reporting by telephone to R.E. McLaren, Pacific Regional Director, EPS.

At 0930 hours, A. Ages, Marine Sciences, Victoria, was advised by R.E. McLaren of the accident, and was asked, using current wind predictions and available current and tides information, to give a forecast on the movement of slicks



over the next little while.

A brief, informal meeting was held at 1000 hours to discuss and coordinate DOE involvement in the spill clean-up activities. In attendance were R.E. McLaren, J. Watkins, and S. Hum, EPS, and R. McIndoe, FS. C.T. Hatfield, Regional Environmental Emergency Branch Coordinator, EPS, was in the Yukon Territory and not expected back until very late in the day. L. Solsberg, EPS, was in Edmonton. Both were advised to return immediately. It was decided that J. Watkins would proceed to the Coast Guard Command Base at Kitsilano to tie in with N. Sigsworth, MOT. S. Hum would remain at regional headquarters to man the EPS operations centre and to deal with the numerous incoming calls; keep DOE officials informed, notably Commander R.A. Beach, EPS, Ottawa, R. McIndoe, FS, R. Harris, Canadian Wildlife Service (CWS), to name a few; and establish contact with F.P. Griffin, B.C. Pollution Control Branch, Victoria, G. Bell, FS, Nanaimo, and others. J. Rainey, Operations Clerk, EPS, would assist her.

At 1130 hours H.O. Buchanan, Regional Director, MOT, and R.E. McLaren conducted a helicopter survey of the Harbour.

At 1445 hours, another helicopter survey was conducted, this

time by O. Langer, FS, and officials from MOT. The extent of spill influence, and free slicks, were charted.

Shortly before this, R. Harris, CWS, was advised to anticipate the necessity for establishing a bird rehab. centre, and to make contact with the West Vancouver S.P.C.A. He was also advised to attend a briefing session being chaired by MOT at Coast Guard Command Base at Kitsilano at 1600 hours. Plane arrangements were being made by J. Rainey to enable A. Ages to attend the briefing session.

At 1600 hours, the briefing session convened under the chairmanship of N. Sigsworth, MOT. In addition to MOT, Coast Guard and Clean Seas officials, the following DOE personnel were present: O. Langer, B. Harris, A. Ages, S. Hum, J. Watkins. F.P. Griffin, B.C. Pollution Control Board, also attended. The day's efforts for containment and clean-up were reviewed, and plans for further tackling the problem at hand were discussed. F.P. Griffin was asked to look into identifying sites for the disposal of oiled wastes, and to obtaining permits to allow the burning of oiled logs in West Vancouver beaches. It was announced that MOT would conduct another aerial survey at 0700 hours the next morning. C.T. Hatfield was invited to accompany them.

About 1730 hours, the Honourable Jack Davis, Minister of the Environment, arrived at the Coast Guard Command Base. He was greeted by R.E. McLaren and H. Buchanan. Following an aerial survey of the spill scene, Mr. Davis met briefly with the press.

Prior to C.T. Hatfield's arrival at 1090 West Pender, J. Watkins attempted to charter a float plane for A. Ages to conduct an aerial reconnaissance flight the next day. S. Mahannah, B.C. Fish and Wildlife Branch, and F.P. Griffin, B.C. Pollution Control Branch, were to accompany him. However, all float planes in the area were chartered by the press. At 2230 hours, J. Watkins, S. Hum, A. Ages met with C.T. Hatfield for a briefing session in the EPS operations Centre.

Wednesday, September 26, 1973

Heavy fog prevented the joint MOT/EPS aerial survey until much later in the morning.

After the survey C.T. Hatfield remained at the Coast Guard Command Base until L. Solsberg arrived in the early afternoon to relieve him.

Beginning Wednesday, and continuing through until late Saturday, J. Watkins became actively involved in an inspection, by boat, of the various areas affected by the spill. He also spent several days in Caulfeild Cove in West Vancouver.

S. Hum continued to man the EPS Operations Centre at regional headquarters, with the assistance of L. Bremer. C. McNeil, EPS (Ottawa) arrived at Ops. Centre, then set out for the Coast Guard Command Base and for the Ambleside Beach where clean-up activities were occurring. Reports began to come in of oiled beaches on Bowen Island, particularly Snug Cove in Deep Bay, and on Passage Island.

At 1700-1840 hours, C.T. Hatfield conducted an aerial survey. He made the following observations:

- a) South side of Harbour: Light pollution on water along False Creek to Kitsilano Yacht Club beach. Nil pollution from Yacht Club to Point Grey.
  
- b) Bowen Island: Spotty pollution on cove beaches from Cowans Point to Snug Cove. Black oil on water surface of Snug Cove and Deep Bay.

- c) Howe Sound/North Shore: Horseshoe Bay clear of oil. Spotty pollution in some coves and on water surface from Whytecliff Marina to Eagle Harbour. Some oil outside of booms protecting Fishermans Cove and Eagle Harbour. Moderate pollution at Point Atkinson to Cypress Creek, with heavy pollution in Caulfeild and adjacent coves. Spotty pollution in beaches to Ambleside.
- d) Inner Harbour: Relatively little oil pollution at Stanley Park, around inner harbour to Second Narrows and along city waterfront to the First Narrows. Some oil traces, however, off Second and Third Beaches in Stanley Park.

At 1730 hours, L. Solsberg arrived on Bowen Island to assess the extent of contamination. He spent several hours inspecting Snug Cove and adjacent areas, then met briefly with the community before returning to Vancouver.

Thursday, September 27, 1973

L. Solsberg returned to Snug Cove, arriving at 1000 hours. At low tide, the beach was heavily oiled. With the total assistance of the local community and the cooperation of a

local construction firm and a B.C. Highways crew, which provided additional manpower and equipment, beach clean-up began in earnest and carried on late into the night. Equipment used included 1 large dump truck, 1 fork lift, empty oil drums, 150 bags of peat moss, 10 rakes, 10 shovels, 1 water taxi, and log booms. Lengths of Bennett booms arrived at 2300 hours and were in place by 0100 hours Friday morning. L. Solsberg also observed that Millers Landing, north of Deep Bay, was badly contaminated. Once again, he effected a clean-up by involving the local community.

At 0930-1210 hours, C.T. Hatfield conducted an aerial survey. He made the following observations:

- a) South side of Harbour: Light pollution from Kitsilano Coast Guard Base to Kitsilano Yacht Club. Nil pollution from Kitsilano Yacht Club to Point Grey.
  
- b) Bowen Island: Nil pollution in Georgia Strait to Bowen Island. Some pollution in small coves along south side of Bowen Island to Cowan Point, and moderate pollution in most coves from Cowan Point to Snug Cove. Some slicks in Snug Cove and Deep Bay. Pollution being cleaned up along Snug Cove shoreline. Some coves polluted north

of Deep Bay. North and south end of Passage Island polluted.

- c) Howe Sound/North Shore: Nil pollution in Horseshoe Bay. Some pollution in Whytecliff marina. Spotty pollution from Whytecliff marina to Fishermans Cove, with moderate pollution outside booms at Fishermans Cove. Moderate pollution on rocks and coves from Eagle Harbour to Lighthouse Park. Heavy pollution on beaches at Lighthouse Park, Caulfeild Cove, and Pilot Cove. Light pollution from Pilot Cove, through to the Pacific Environment Institute, Ambleside and First Narrows.
- d) Inner Harbour: Light slicks in inner harbour. Brown slicks offshore Second and Third Beaches in Stanley Park.

C.T. Hatfield remained at the Coast Guard Command Base until the early afternoon. Upon his return to regional headquarters, S. Hum left for the spill site along the North Shore.

The first complaint regarding an oiled boat was received. Several reports of oil appearing on Kitsilano Beach were also received.

At 2000-2300 hours, the Honourable Jack Davis, Minister of

the Environment, R.E. McLaren, EPS, C.T. Hatfield, EPS, and P. Stocker, MOT, met in West Vancouver with approximately 200 residents of Caulfeild Cove.

Friday, September 28, 1973

C.T. Hatfield coordinated DOE operations from the Coast Guard Command Base at Kitsilano. During the day he also participated in several aerial surveys by helicopter.

L. Solsberg remained overnight on Bowen Island. Bowen Island beach clean-up was resumed again at 0630 hours, and finally completed by 1800 hours. L. Solsberg then returned to Vancouver.

CWS officials arrived on Bowen Island early in the morning, and remained for most of the day inspecting the area for oiled birds.

S. Hum made arrangements with D. Goodman and H. Burrows, FS, to assess complaints of oiled nets, corks and boats being received from fishermen. EPS would continue to deal with reports of oiled pleasure craft.

In the early afternoon, during low tide, S. Hum, assisted



by G. Thompson, Technician, EPS, began an extensive shoreline survey from Point Atkinson to Ambleside Beach in West Vancouver.

Saturday, September 29, 1973

An early morning aerial survey was conducted by MOT. By noon, with that completed and the observations favourable, the on-scene headquarters located at the Coast Guard Command Base officially closed down. C.T. Hatfield and other EPS personnel, however, continued to remain on standby for the remainder of the weekend.

S. Hum and G. Thompson resumed the shoreline survey at 1000 hours, completing it about 1800 hours.

J. Rainey remained in the EPS Operations Centre for the day to attend to information and complaint calls.

In the weeks that followed:

1. Bowen Island was re-visited three additional times, and advice was given to the community as to further clean-up of the area.
2. A survey of the Sunshine Coast was conducted to investigate reports of contamination. None was found.

3. Passage Island was inspected and judged to be very heavily oiled. Clean Seas Canada Limited was dispatched to effect a clean-up. They remained there for several days.
4. A further survey was conducted October 23, 1973 of the shoreline between Point Atkinson and Ambleside in West Vancouver, the southern tip of Bowen Island, all of Passage Island and Worlcombe Island, and the shoreline from Horseshoe Bay to Point Atkinson.

Significant traces of oil still exist along sections of the West Vancouver shoreline, Worlcombe Island, Bowen Island and areas adjacent to and including Whytecliff Park and Kettle Point. Caulfeild Cove and Passage Island are considerably better.

5. Oiled pleasure craft, fishing vessels and nets are being dealt with.
6. By 1900 hours on October 23, 1973, Clean Seas withdrew from further Erawan spill clean-up activities.

#### Conclusions and Recommendations

1. Reporting System:

The viability and strength of the Pacific Regional Environmental Emergency Team as such is only possible

through communication and cooperation between members of the team.

Neither EPS, nor FS, indeed DOE was not able to mobilize because they were not informed of the accident by MOT, or NHB. Further, permission for the use of dispersants which were used during the initial stages of spill containment was not given by DOE as required.

The on-scene headquarters at the Coast Guard Command Base did not have adequate telephone lines or adequate office space. Communications with the Erawan accident scene were non-existent for the first two days of the incident.

These, along with the matter of physical distance between EPS Operations Centre and on-scene headquarters worked to make the immediate transferral of information virtually impossible.

2. Radio Communications:

A FS boat was on standby and available for our use throughout the first day. But we could not readily communicate with those on board.

Ideally, we should have the capability of direct radio contact with FS. It would also be advantageous for us to have the necessary channels to join up with MOT, as well as the Marine open channel.

3. Emergency Telephone Number:

The emergency number was in frequent use during the few days following the accident by people using the line seeking information on the spill, or selling a product. It should be made clear to the public that this line is for emergency use only.

4. Chartered Aircraft:

We experienced much difficulty in obtaining a chartered aircraft for our use, as the media and other interested parties had already rented them. We should have float planes on retainer during the crucial days following an accident strictly for DOE use.

### III. FISHERIES SERVICE

The following is a brief description of Fisheries Operations Southern Operations Branch involvement in the recent Erawan oil spill (September 25, 1973) in English Bay. Comments relating to spill containment and contingency response have also been included.

#### Notification and Initial Response

First indication of a spill was received from the 0630 AM CBC radio news. The news reported that two freighters had collided in English Bay and a substantial quantity of spilled oil was heading for West Vancouver beaches. It also mentioned that the DOE had contracted Clean Seas for the clean-up.

O. Langer could not make contact with the EPS emergency number because it was busy. Telephone contact was made with J. Watkins and both O. Langer and J. Watkins made plans to check West Vancouver beaches.

O. Langer first checked the Stanley Park beaches (0715-0730 hours) and found no oil. A check was then made of the Ambleside and Dundarave beaches (0745-0815 hours). A skim of oil

and oil coated debris was found gathered at the high water mark of the seaward corner of the Dundarave Breakwater. A sample of this oil was collected.

At 0815 hours, O. Langer met J. Watkins at the Dundarave Breakwater. Up to this point there was no sign of any mitigation action in the West Vancouver area. Several attempts were made to contact FS and EPS offices for details via telephone. No contact could be made with anyone in Fisheries who had details of the spill or who would act as Fisheries coordinator. EPS informed us that spill headquarters would be the Kitsilano Coast Guard Station.

At 0830 hours a Fisheries boat (RD 101 - Taylor, Lochbaum, Pearce) was on its way to Howe Sound when it came upon the scene of the accident. The Clean Seas barge was on site but oil booms had not been deployed around the Erawan. They attempted to call Fisheries and EPS headquarters to lend a hand but could not make contact. They remained on site until about 1100 hours to observe abatement attempts and also document the use of dispersants.

Also on site from about 0800 hours was the Fisheries patrol vessel, Chilko Post. It was ordered to the accident scene

from its position at Sand Heads, where it was policing a fishery opening. The captain advised the on-scene tugboats against using dispersants. The boat's radio was used to make on-scene/headquarters Fisheries contact for the first time that day (1130 hours). The patrol boat stayed on site until late afternoon.

#### Involvement and Observations

At 1435 hours O. Langer helped map the spill aboard a Coast Guard helicopter. Generally slicks were evident over much of northern English Bay, and the entrances to Burrard Inlet and Howe Sound. Oil was on the beaches at Ambleside and Dundarave Beach; clean-up was in progress at these areas.

At 0800 hours, September 26, 1973, O. Langer met with Fisheries EQ personnel (Taylor and Froese) at the Kitsilano Station. Together with EPS (J. Watkins) they were to survey various beach areas including Snug Cove on Bowen Island. While on this survey, their boat was disabled by a deadhead. O. Langer visited the scene of the accident on the CCG Hovercraft and checked the beaches from Point Grey to the Lions Gate Bridge. No fouled beaches were noted. In the evening a check was made of Ambleside. It was noted that all oil soaked peat moss and sand had been buried in the beach area.

On September 27, 1973, Fisheries remained in contact with the CCG Station and checked reports of fish kills and serious beach pollution on Bowen Island. A review of all the information available indicated that productive beach areas from Ambleside to the Bowen Island area were polluted to varying degrees. The Minister had made commitments concerning the clean-up of beaches at all cost. It was thought that dispersants may be considered and to protect the fishery, we considered it necessary to describe all affected beaches prior to allowing any type of clean-up that might do more damage to the marine environment than good.

On September 28, 1973, five Fisheries teams made an extensive survey of the fouled beaches in question. The beaches were described in terms of substrate type, beach life, oil coverage, etc. Their reports and map of the areas examined has been attached. (Figures 1 and 2)

Basically the survey indicated that the intertidal life in most areas was covered by oil to some degree. Most of the areas that were affected were inhabited by barnacles and mussels and also supported growth of Fucus and Ulva. In many areas the entire intertidal area was covered by a film of oil of varying thickness. The effects of this covering upon survival are not known but they are expected to cause



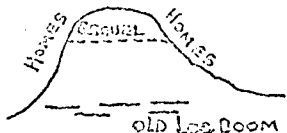
NUMBER	LOCATION	TIME	SUBSTRATE TYPE	EXTENT OF COVERAGE	ORGANISMS	DAMAGE TO ORGANISMS	REMARKS
1.	Lookout Point	10:45	Rock cliff and small cove	Film of Oil from 5' to 13' Tide level.	Fucus, Barnacles, Mussels (all covered)	Heavy film covering all organisms.	Lookout point first area of oil.
2.	White Cliff	11:00	Rock face	Film of oil from 5' to 13' Tide level.	Fucus, Barnacles, Mussels (all covered)	Heavy film covering all organisms.	Skim on water - men working on oil spill in Whyte Cove (peat, burning).
3.	White Cove	11:00	Pebble beach-Moored boats.	Film south end of beach, worst area. Film on all boats-rock breakwater heavily filmed.	Fucus, Barnacles, Mussels (all covered)	Heavy film covering all organisms.	Film extends to high tide mark on cliffs and beach - thickest on southern exposure on rock faces.
4.	Bachelor Cove	11:00	Beach	Very light film - patchy on rock faces on either side of cove.	Fucus, Barnacles, Mussels, Seaweeds, Starfish (all covered)	Light film on all organisms.	Coverage to high tide level.
5.	Garrow Bay	11:15	Rock faces	Light film	Fucus, Barnacles, Mussels, Seaweeds, Starfish (all covered)	Light film on all organisms.	Film on water - thick streaks.
6.	Kettle Point	11:20	Rock face	Medium film, heavy in patches	Fucus, Mussels, Barnacles, Starfish	All covered in medium film	Southern facing rock faces have heaviest coverage.
7.	Kettle Point Cove	11:30	Rock face-Wharf - logs	Very heavy dripping off rocks at high tide mark $\frac{1}{4}$ " thick 50' stretch	Barnacles, Mussels, Fucus, Starfish	Very heavy film on all organisms.	Evidence of a heavy slick in this area at a high tide.

Figure 1

## SECTION

NUMBER	LOCATION	TIME	SUBSTRATE TYPE	EXTENT OF COVERAGE	ORGANISMS	DAMAGE TO ORGANISMS	REMARKS
8.	Larsen Bay	11:35	Sand and rock beach	Light, none on sand or logs above sand beach	Barnacles	No film on beach area but light film on surrounding rock faces.	
9.	Bachelor Point	11:40	Rock face	Light film	Barnacles, Mussels, Fucus, Starfish	Light film.	Heavier in crevices facing south.
10.	Bachelor Point Cove	11:45	Rock beach	Light to medium (in patches) at high tide mark - light film over all rocks	Barnacles, Mussels	Light film covering all organisms.	
11.	Eagle Islets	11:45	Rock and boulders	From splash mark to 3'-4' - light scum to moderate.	Barnacles, Fucus, Mussels, Cottids in pools.	Nothing appears obviously dead - Gulls covered with some oil.	Cottids appear unharmed - most oil scum concentrated in upper barnacles - Eagle Island rather clean.
12.	Fishermans Cove	11:50	Placed rock- rock (natural)	Light to moderate- heaviest on rock wall north side of entrance.	3 Norwegian Rats- Barnacles	Rats had oil on fur and feet.	Relatively free of oil.
13.	Eagle Island	12:00	Rock - Vertical	High water 1'-2" outside booms	Barnacles, Fucus, etc.	As above fucus covered in film;	Good job of keeping oil out of harbour with boom.

## SECTION

NUMBER	LOCATION	TIME	SUBSTRATE TYPE	EXTENT OF COVERAGE	ORGANISMS	DAMAGE TO ORGANISMS	REMARKS
14.	South Entrance to Eagle Harbour and to Erwin Point	12:20	Rock vertical and sloping - some sand beach - Rock wall	4' in places.	Fucus, Mussels, Starfish	Covered Fucus and Mussels with moderate to heavy oil and oil scum - Starfish with oil scum.	<p>Heavy oil covering band of 1'-2½' in places (high water mark). This area has lesser degree of oil present. However there is some oil - upon digging into gravel found many organisms. - Oil scum present on everything from high water to low water at the time.</p> 
15.	Southern side of Erwin Point	12:30	As above #14	Light in density - strip at high tide approx. 2"-4" - very light to nil in South section of #15	As above Starfish, Mussels, Barnacles, Fucus and other algae	Some oiled birds - one mallard in very bad shape.	Light to nil - still traces of oil on surface of water.
16.	Eastern shoreline opposite Grebe Island	12:35	As above #15	Small strips at high tide approx. 2" light band.	As above Starfish, Mussels, Barnacles, Fucus and other algae.	Very slight.	Trace to nil.
17.	Indian Bluff south to part of Lighthouse Park.	12:50	Vertical and sloped rock	2" - 1" light to moderate	Fucus, Barnacles, Mussels, Encrusting algae.	Not too extreme - band mostly concentrated on high tide and splash line	Patches found in clefts of rocks at high tide mark - in clefts, oil present - moderate. Weather sides of rock face are relatively free.

## SECTION

NUMBER	LOCATION	TIME	SUBSTRATE TYPE	EXTENT OF COVERAGE	ORGANISMS	DAMAGE TO ORGANISMS	REMARKS
18.	Lighthouse Park to Point Atkinson Light- house.	13:00	Vertical to sloping rock.	Moderate to heavy 1'-2' bands at high tide - tapers off towards lighthouse- except for lighthouse crevices	Fucus, Mussels, Barnacles, Birds.	Encrusting algae, Barnacles and Mussels- heavily coated in places- Birds- pitiful	Heavy areas - oil drippy - running - heavy spotting - spots of oil heavy on surface of water - corners where oil $\frac{1}{4}$ " and thicker - at Point Atkinson light- house pools up to 6"-12" - logs heavily covered.
19.	East side of Passage Island	1400	Rock slope- some cobble beaches	Patchy - spotty light patches- south end rel- atively clear.	Fucus, Barnacles, Mussel.	Birds - Harlequin or Old Squaw, Gulls, Cormorant covered in oil.- organ- isms on rocks relatively untouched compared to mainland.	Oily sheen on water therefore some on organisms - likely to be affected- N.E. quarter in isolated niches quite heavy - most oil appeared in light strips on high tide mark.
20.	Starboat Cove	1400	Vertical rock face - large boulders.	Moderate - heavy, be- coming lighter as it approaches Point Atkinson Lighthouse.	Barnacles, Mussels, Fucus, Sea Lettuce, Lemnaria, Starfish	Partially covered with oil.	No apparent cleanup- light oil film on surface - driftwood and rocks coated with a layer of oil - oil cover on rocks between tide line- patches of oil at Point Atkinson.
21.	Caulfied Cove West	1325	Vertical rock face - large boulders.	Moderate ie. oil covering entire rock surface, sometimes in patches - not thick.	Barnacles, Mussels, Fucus, Sea Lettuce, Lemnaria, Starfish.	Partially covered with oil	No cleanup - solid oil cover on rocks below tide line - light oil film on surface.

## SECTION

NUMBER	LOCATION	TIME	SUBSTRATE TYPE	EXTENT OF COVERAGE	ORGANISMS	DAMAGE TO ORGANISMS	REMARKS
22.	Caulfield Cove -East	1305	Vertical rock face approx. 100'	Moderate - heavy	Barnacles, Mussels, Fucus	Covered with Oil - some on peat moss	Cleanup operations: boom in place - debris on beach being cut and burnt - peat moss applied - rocks being washed.
23.	Pilot Cove - West	1240	Proceeding westward shore becomes large boulders and 20-40' vertical rock face and sand beach.	Light to moderate	Barnacles, Mussels, Fucus ←	Oil layered on Barnacles Moderate coating of oil	-Boulders moderately covered. -Oil on sand. -No apparent clean-up
			100' West of sand beach to a boulder beach	Moderate	Barnacles and Starfish	Moderate and with a coating of oil on Barnacles/Mussels.	-No clean-up.
24.	(East of Caulfield) Pilot Cove	1225 1235	Sand beach with pebble beaches-tidal pools	Light	Amphipods, Barnacles, Mussels, Fucus		(Oil appears to be concentrated on inside of coves) Clean-up complete (peat moss) - burning of beach debris.
25.	100 yards either side of Cypress Creek	1220	Cobble beaches	Nil	Starry flounders, Barnacles, etc.	Nil	Clean.

## SECTION

NUMBER	LOCATION	TIME	SUBSTRATE TYPE	EXTENT OF COVERAGE	ORGANISMS	DAMAGE TO ORGANISMS	REMARKS
26.	West of P.E.I.	1200	4" cobble beach proceeding westward, beach becomes more rocky approx. 8" rocks.	Very, very light - proceeding westward to no oil covering - overall virtually clean	Amphipods, Shore crabs, Barnacles, Mussels, Fucus		No apparent cleanup necessary or taken.
27.	Sandy Cove - West P.E.I.	1130	Rock face - large boulders.	Light layered oil to tide line - and below tide, very light.	Barnacles	Oil covering approx. 1/5 of Barnacles.	Oil on rocks - not on water surface.
28.	Sandy Cove (center)	1115	Gravel beach - vertical rock face 10'-30'	Negligible on beach - light oil - covered debris in water.	Fucus - approx. 3' Dogfish found floating in water between (4) (5)		Park/beach area - no clean-up required - oil may have missed this area due to: -tidal action, oil drift -size of pebbles may have caused oil to be soaked up - however, no oil on rocks either.
29.	Sandy Cove - East	1108	Rock face - large boulders.	Very light - logs with light coverage.	Fucus/Barnacles/Mussels, stickleback, herring - gulls on rocks, not in water - large flounder sighted - many starfish.	Oil on Fucus, Gulls.	Oil to tide line - very light oil on surface - probably no cleanup necessary - v-notch area - oil concentrated - to moderate.

## SECTION

NUMBER	LOCATION	TIME	SUBSTRATE TYPE	EXTENT OF COVERAGE	ORGANISMS	DAMAGE TO ORGANISMS	REMARKS
30.	West Bay- West	1100	Rock face	Very light - occasionally moderate.	Fucus/Barnacles Fry - probably Herring - several Gulls	Some oil in patches - several Gulls sighted with oily feathers.	Oil to tide line - light layer of oil/scum on surface.
31.	West Bay- East	1050	Rock face	Very light.	Fucus/Barnacles	Some oil on Fucus patches	Oil to tide line on rocks - oil on Bay surface.
32.		1330	Cliff and gravel beach	50 sq. yards light partial coverage - peat moss used	crabs, amphipods, isopods, snail, barnacles, mytilus, limpets, oysters, starfish.	None visible	2 Cormorants seen to be distressed
33.		1300	Cliff -end of rock and cobble	Approx. 300 sq.yards medium to heavy coverage - 100 sq. yds. light partial covering covered with peat moss.	As above #32		
34.		1200	Cobble and boulders	100 yds x 10 yds. medium coverage - covered with peat moss	As above #32	Oil on Molluscs	Fresh oil from morning - rings of oil around boulders

## SECTION

NUMBER	LOCATION	TIME	SUBSTRATE TYPE	EXTENT OF COVERAGE	ORGANISMS	DAMAGE TO ORGANISMS	REMARKS
35.		1135	Cobble	3000 sq. yd dry coating- med. after cleanup -- 1000 sq. yds med. - heavy- balance lightly covered with partial covering on boulders.	As #32	Oil on Molluscs	Clean-up progress -large areas with peat moss.
36.		1115	Sand- gravel	Approx. 50x1 yd. strip light partial coverage- 1700 sq. yds. light-med. residue on cobble 500 sq yds. med. residue cleaned with peat moss	crabs, amphipods, isopods, snails, barnacles, mytilus, limpets.	Oil on Molluscs.	Peat moss seems to be effective.
37.		1105	Sand-gravel	Approx. 200 sq. yds. (5yds wide) very light partial coverage	As abqve #36	No visible damage.	
38.		1045	Sand-gravel- cobble.	90 sq. yds. light residual- 150 sq. yds. medium partial deposit.	As above #36	Oil on Molluscs	
39.		1030	Sand-large gravel	1300 sq. yds. med. coverage on gravel and cobble - partial coverage	As above #36	Oil on Molluscs	Large gravel and cobble to 3' - could be covered with peat moss - first 100 yds. cleaned.



## SECTION

NUMBER	LOCATION	TIME	SUBSTRATE TYPE	EXTENT OF COVERAGE	ORGANISMS	DAMAGE TO ORGANISMS	REMARKS
40.		1000	Sandy	Light residual after clean-up.	Crabs, amphipods, isopods		Large gravel and cobble to 7" - some rocks with oil spots - not serious.
41.		1130		Nil			
42.		1130		Nil			
43.		1135		Nil			
44.		1140		Nil			
45.		1145		Nil			
46.		1145		Nil			
47		1150	Rock - cobble beach.	Light- 1/8" at high tide.	Mussels/barnacles- fucus.	30% coverage	North exposure from high tide (hit twice) - 4-5' band above tide to 3' below.
48	Deep Bay	1200		Very light - scattered high tide.	Mixed gravel bead- rock		
49.	Snug Cove	1215	Rock/boulders, small gravel bead, mud.	Heavy	Mussels, Fucus, Clams.	50%-90% coverage at head of cove.	

## SECTION

NUMBER	LOCATION	TIME	SUBSTRATE TYPE	EXTENT OF COVERAGE	ORGANISMS	DAMAGE TO ORGANISMS	REMARKS
50.		1230	Rock boulder	Heavy	Fucus, ulva, barnacles, mussels.	90% coverage	6-7' swath depth
51.		1235	Rock	Medium			
52.		1235	Rock	Light			
53.		1240	Rock - gravel beads	Light		30% coverage	
54.		1250	Rock boulders	Light and scattered	Mussels - barnacles- fucus/ulva.	10% coverage	Mainly at high tide
55.		1300	Rock	Light - moderate in crevices	Ulva/fucus, Mussels	20% coverage	In crevices- 4-5' below high tide.
56.		1330	Rock	Light - moderate in crevices	Mussels, Ulva/ fucus	20% coverage	In crevices- 4-5' below high tide.
57.		1335	Gravel - cobble beach	Moderate	Little - Mussels/ barnacles		Globules in water- surface deposition - gulls observed with starfish.

## SECTION

NUMBER	LOCATION	TIME	SUBSTRATE TYPE	EXTENT OF COVERAGE	ORGANISMS	DAMAGE TO ORGANISMS	REMARKS
58.		1345	Rock	Light/crevices			
59.	Trinity Bay	1335	Rock face Pebble beach	Heavy slick washing on rocks at water level Medium film on rocks at high tide level	Barnacles, mussels, green seaweed, fucus Barnacles, mussels, fucus, green seaweed	Medium film over all organisms	3 pr 4 patches - 30'-50' in length and 4' in height.
60.	Cowans Point	1335	Rock face	Nil		Nil	
61.	Alder Cove	1325	Rock beach	Nil		Nil	
62.	Arbutus Bay	1320	Rock face	Nil		Nil	Skim and streaks on water and on small boat and buoy.
63.	Echo Cove- Bowen Is.	1310	Rock face	6' above water 2 patches in cove only at high water.	Mussels, barnacles		

## SECTION

NUMBER	LOCATION	TIME	SUBSTRATE TYPE	EXTENT OF COVERAGE	ORGANISMS	DAMAGE TO ORGANISMS	REMARKS
64.	Grebe Is.	1100	Rock	2' at this time - S.E. side - s. side spotty - heavy concentrations in crevices - moderate	Barnacles, fucus, mussels, oysters, cormorant, harlequin, encrusting algae	Coated to covered - surf scoters rather sickly - seagulls untouched to covered.	Moderate coverage splashed in small amounts to high splash mark - small crevices heavily covered. - cottids in tide pools appear alright - bird parts fresh, likely torn up by crows after death from oil - wings and feathers of dead birds soaked in oil
65.	Passage Is. West	1430	Rock walls approx. 50'	Light	Barnacles, fucus, mussels, starfish, sea lettuce	Approx. 1/10 covered in oil  Sighted two with oily patches	Light on southwest coast to negligible on mid-north west coast.

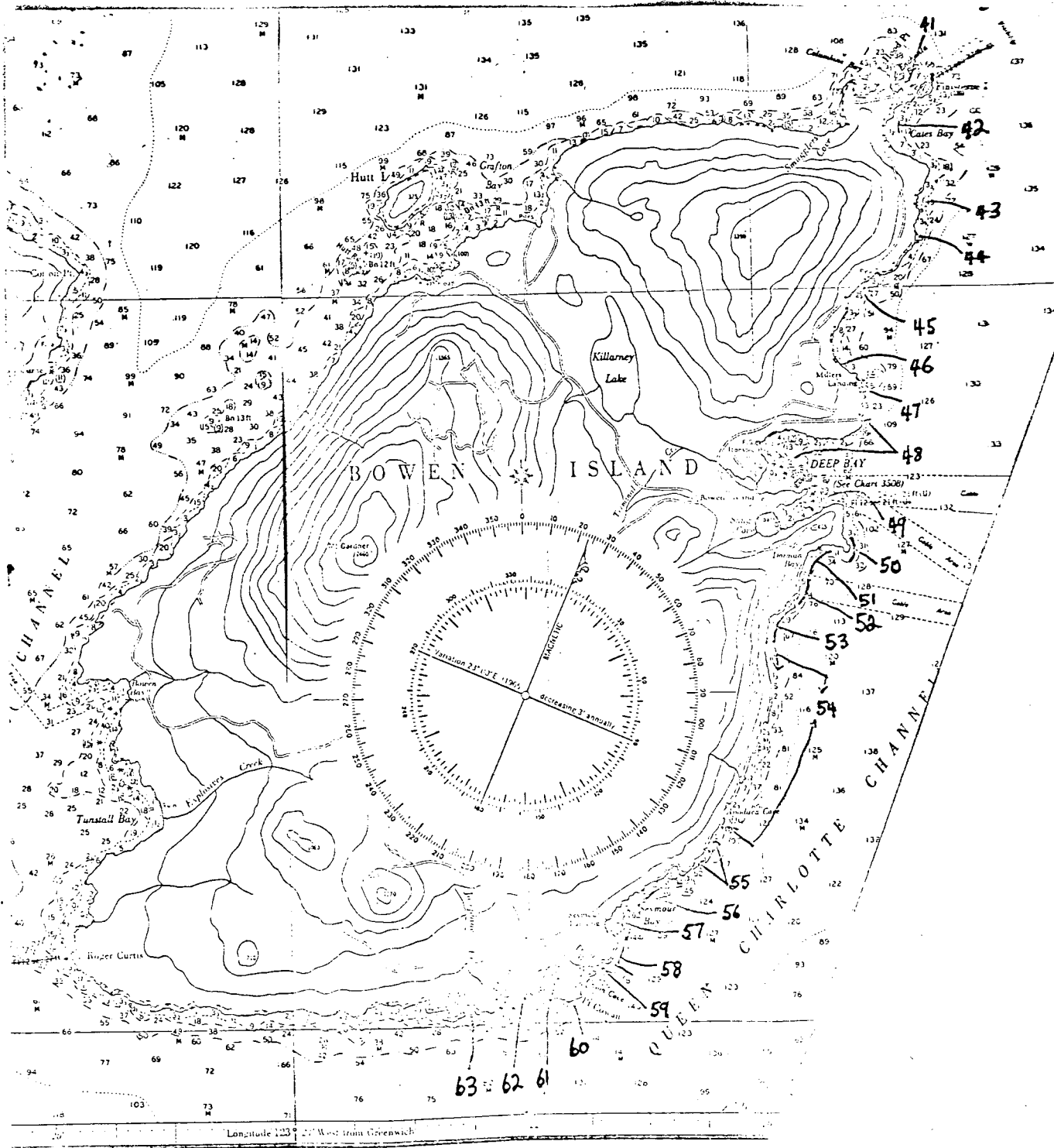


Figure 2

PUBLISHED BY THE CANADIAN HYDROGRAPHIC SERVICE  
 MARINE SCIENCES BRANCH  
 DEPARTMENT OF ENERGY, MINES AND RESOURCES, OTTAWA



PATHS	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
FEET	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42	44
METERS	4	4.3	4.6	4.9	5.2	5.5	5.8	6.1	6.4	6.7	7.0	7.3	7.6	7.9	8.2	8.5	8.8

Information concerning Canadian National Charting Service, including the names and other particulars of the vessels employed, is available on application to the Hydrographic Service, Department of Marine and Fisheries, Ottawa.

Canadian Notices to Mariners published weekly, and containing information on changes in the chart, are available on application to the Hydrographic Service, Department of Marine and Fisheries, Ottawa.

Chief Aids to Navigation, Department of Transport.



BRITISH COLUMBIA  
 APPROXIMATE

# VANCOUVER

Surveyed by the Canadian Hydrographic Service

Point Grey, B.C., Lat. 49° 15' N.

Bearings refer to the True Course.

SOUNDINGS  
 in fathoms  
 reduced to mean low water

Water depths in fathoms  
 Underlined figures on dry ground  
 express heights in feet above  
 mean low water  
 For complete list of Symbols see back of this chart

LOCATION	Height in feet
Pt Atkinson	163.5
Vancouver	162.4

The datum of this chart is Point Atkinson, set in the first rocky point south of the chart. The datum of this chart at Vancouver is 42.15 the Customs Examining Warehouse.



mortality. Areas where oil contamination was greater than a film, mortality of all life is expected to be very high.

Comments

Fisheries Service is, of course, very annoyed that MOT did not notify DOE as soon as the accident happened. EPS should at least have been notified of the accident prior to the two ships being separated. The initial accident only caused a small oil release as indicated by the earlier presence (0800 hours) of oil on the Dundarave Beach area.

Prior to separating the ships, all efforts should have been made to enclose the ships in booms and investigate the cargo. MOT indicated that the boats had to be separated to prevent grounding. This was most unlikely because a large tug was on site and could have maintained the wrecks in any position in English Bay.

Upon separation of the ships (approximately 0600 hours) the bulk of the oil was released. Booms were not in place to contain oil loss until after 0830 hours. In addition to not attempting to properly contain the oil on site, the Fisheries Service was very annoyed with the carefree use of

dispersants. A Seaspan tug was washing oil off the side of the Sun Diamond while the ship sat in a pool of oil (photos available). In addition, 30 tons of dispersant was used to clean up the Erawan in drydock.

Oil booms and peat moss sat on the Dundarave breakwater for about four hours prior to being deployed due to a lack of boats. Meanwhile the oil drifted up onto the beaches. Simple booms could have gathered much of the oil on the calm open waters and/or much of the oil could have been absorbed prior to it reaching the shore.

Generally, communications between and within MOT, FS and EPS was poor or non-existent until about noon of the day of the spill (i.e. when representatives met at the CCG Station).

For instance:

- the spill was not reported to DOE
- DOE had no input into setting abatement priorities especially prior to the separation of the boats.
- FS could not contact EPS via the emergency number.



- Fisheries representative (O. Langer) could not get in contact with anyone in headquarters concerning the spill until 1200 noon. The EMO, Fraser River Chief and DS, EQ Head and EQ Senior Biologist were all away. A FS spill coordinator should have been appointed immediately for headquarters FS-EPS-MOT communications.
- it took over an hour to establish FS headquarters-on scene contact via the Chilco Post radio (1030-1130 hours) on the morning of the accident.
- on site Fishery personnel could not get information on Fraser River fishery openings.

There was a great deal of confusion concerning costs of surveys, clean-up, and damage expenses. A policy for dealing with fouled nets, etc. should have been available. Recovery of costs incurred by the Fisheries Service is also of concern. Fisheries EQ costs related to this spill approximate \$6000. Our total oil spill investigation budget for this fiscal year is \$900. This great overspending results in cuts in other important projects.

It is also unfortunate that no long term studies could be conducted on the effects of the oil on marine life, and the

rehabilitation of beach life. The Pacific Environment Institute has collected samples (pre and post) but do not have the resources to pursue the subject. Such a group is better equipped to conduct such research than Fisheries Operations.

#### Recommendations

1. Fisheries must be made aware of an EPS unlisted emergency number. The present number (666-6100) is tied up by the media whenever there is a spill.
2. EPS must improve its liaison and spill reporting with MOT and such authorities.
3. Prior to taking salvage action (separation of ships, refloating, etc.) that could increase the probability of oil spill, all precautions should be taken to contain oil (e.g. placement of booms, securing supplies of moss, etc.).
4. In such an accident, an immediate inquiry must be made into the contents of the cargo. A release of a portion of the DDT cargo of the Erawan could have caused catastrophic effects.

5. Control of the use of dispersants must be improved.  
Every tug on the spill site had barrels of dispersant aboard. Without restrictions on its sale and without punitive action for its use, dispersants will continue to be applied to many such spills. Approximately 200 gallons of dispersant was used on site and 30 tons in the ship clean-up.
  
6. A DOE committee should be set up to directly study the effects of oil contamination and rehabilitation of polluted beaches in this region. It could also review abatement techniques.
  
7. A DOE representative should remain on the site of the spill and/or clean-up area until it can be assured that abatement action is complete and no more environmental damage can be done. Such precautions could have prevented the wholesale use of dispersants in the clean-up of the Erawan and the burial of oiled peat moss on the beach.
  
8. Better communication equipment must be provided to the on scene DOE team.
  
9. The time between the spill and initiation of clean-up

must be reduced. This spill was not large, occurred in good weather, and was in Vancouver. Failure to contain spills under less ideal conditions will ensure maximum environmental damage.

10. Fisheries should put more thought into ensuring that a headquarters spill coordinator is appointed to handle Fishery liaison, inquiries, and dictate Fishery policy. This contact is essential for reporting on-scene representatives.
11. Fisheries and the OSET must have better mobile communications systems (portable 2-way radios) that will tie into radios on patrol boats, FO offices, etc.
12. EPS should make arrangements for the interim financing of oil spill surveys and/or abatement programs. The present budgeting system under which Fisheries operates is unacceptable.

IV. CANADIAN WILDLIFE SERVICE - Part A

On September 25, 1973, CWS was advised by EPS that a collision had occurred between two vessels in the harbour and that a major spill of oil had resulted. CWS was later informed that the West Vancouver Ambleside S.P.C.A. had been instructed by MOT to be prepared to take care of oiled birds. As of 1345 hours, no birds had yet been turned in to that group.

R.D. Harris discussed the entire situation with Dr. W.D.G. Stephen, who was in Vancouver that day, and with G. Staines, Edmonton. G. Staines advised that the Lands Section should carry on, and in fact, set up a bird rehab. centre at Alaksen if deemed necessary. Land Section initially became involved as Dr. E. McEwan was in Victoria, and B. Morris was already occupied.

At 1400 hours, CWS was asked by EPS to send a representative to attend a briefing at the Coast Guard Command Base at Kit-silano. EPS further suggested that a rehab. centre for oiled birds be set up.

At 1600 hours, R.D. Harris, CWS, met with J. Watkins and S. Hum of EPS; O. Langer, FS; N. Sigsworth and H. Buchanan of

MOT, and A. Ages, Marine Sciences. N. Sigsworth advised the meeting of the situation. A map showing the extent of the spill as of a helicopter survey at 1645 hours was made available. West Vancouver beaches, particularly Dundarave and Caulfeild Cove, were receiving oil. It had also been noted that Second and Third Beaches off Stanley Park had some 400-500 waterfowl, chiefly scoters. These beaches were still free of oil. As yet, no reports of oiled birds have been received.

At the time of the aerial survey, several of the media had been told that Ambleside S.P.C.A. would serve as a collecting station for oiled birds. By 1700 hours, R.D. Harris left Coast Guard Command Base for home.

At 0900 hours, September 26, 1973, Ambleside S.P.C.A. advised that they had received three oiled birds. CWS would pick them up at a later time.

At 1015 hours, R.D. Harris and M. Noble attended an 1100 hours briefing at the Coast Guard Command Base. The briefing was for the Honourable J. Davis, Minister of the Environment, and R. Perrault, Executive Assistant to the Minister of the Environment. Also in attendance were H. Buchanan, N. Sigsworth and D. Allard of MOT; R.E. McLaren, C.T. Hatfield, and

J. Watkins of EPS; and O. Langer, FS. Following the briefing, R.D. Harris was invited by R.E. McLaren to accompany the Minister, R. Perrault, H. Buchanan and himself on a hovercraft survey. The hovercraft circled the ship, then followed the West Vancouver shoreline from Point Atkinson to the mouth of the Capilano River and finally returned to the Base. Some photographs were taken of the clean-up operations in Caulfeild Cove. One partly oiled gull, and one diver which appeared to be slightly oiled, were noted. The survey took about 40 minutes.

After lunch, R.D. Harris and M. Noble picked up the three horned grebe (possibly eared grebes) from the Ambleside S.P.C.A. and delivered them to Dr. E. McEwan by 1500 hours. The Ambleside S.P.C.A. had wrapped the birds, leaving the head and feet protruding. The birds appeared reasonably healthy, but well oiled.

That evening, R.D. Harris was informed by C.T. Hatfield that reports of oiled birds at Bowen Island were being received. R.D. Harris then made arrangements for E.W. Taylor and M. Noble to proceed to Bowen Island the next day. (Figure 1)

At noon on September 17, 1973, E.W. Taylor and M. Noble arrived at Snug Cove on Bowen Island. The following observations were made:

Figure 1



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 MAP...  
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 NAMES...  
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Snug Cove:

No sign of oil or oiled birds was noted at the entrance of the Snug Cove harbour waters. Some 10 or 12 persons were engaged in clean-up activities on the beach and the exposed intertidal flat at the head of the cove.

Lagoon Sanctuary:

At the dock, CWS was met by D.A. Prowd of Bowen Island, who took E.W. Taylor and M. Noble to the "Lagoon Sanctuary" on nearby Deep (or Hotel) Bay. The lagoon is an impoundment at the mouth of Killarney Creek, separated from the waters of Deep Bay by a concrete dam. Water can flood over this structure into the lagoon on any tide higher than about 14.5'. This level was not reached in the period between the spill and the CWS current visit, hence no oil was present in the lagoon at that time. About 6 or 8 mallard ducks were seen, of which two showed only slight evidence of oil on the breast feathers. Some 15 gulls, mainly Bonaparte's and California gulls, were washing and resting further up the lagoon. Although three of them were oil-stained on the underbody, none was heavily soiled or incapacitated. The two birds most oiled in this area were glaucous-winged gulls - both were active and well able to fly.

Deep Bay:

An examination was made of the pebbly-rocky beach on the west side of Deep Bay from the lagoon to the point east of the C.N.I.B. beach. Mixed flocks of gulls were seen on the beach at the edge of the rising tide-line in the following numbers:

	<u>Group A</u>	<u>No. Oiled</u>	<u>Group B</u>	<u>No. Oiled</u>
California gulls	30	0	26	0
Bonaparte's	20	0	16	1
Glaucous-winged	<u>10</u>	<u>6</u>	<u>5</u>	<u>4</u>
Total	60	6	47	5

Of those in Group A, six, all glaucous-winged, were slightly to moderately oiled. In Group B, five gulls (four glaucous-winged and one Bonaparte's) were partly oiled. Except for one moderately-to-heavily coated glaucous-winged, all gulls appeared to be managing well.

One American merganser was seen on a floating log but did not appear to be contaminated. A western grebe, heavily oiled on the underbody, was seen sitting ashore on the tide-line but was able to get into the water and swim away when CWS officials approached. This bird was believed to be the same one captured later in the day on the seaward side of the lagoon impoundment. It was turned over alive to Dr. E. McEwan, CWS.

One small patch (about one square yard) of a light oil film was seen on the water about five feet from the beach near the C.N.I.B. wharf. Scattered patches ranging from about  $\frac{1}{4}$  square inch to two square inches were seen on the crest of the rocky point east of the C.N.I.B. beach, and an oil line was noted on a small stand of sedge-like vegetation near high water mark on the beach further west.

Millers Landing:

This site is located on the northeast shore of Bowen Island and is a small bay scarcely more than 100' in width and about the same in length. The small, pebbly-rocky beach bore scattered patches of oil ranging from  $\frac{1}{2}$  square inch to about 6 square inches over the upper 25' of the beach zone. Ground coverage was not complete and the consistency of the oil coating was not heavy. The presence of oil was more evident here than in any of the previous sites examined on the island. This could possibly be due to the very contained nature of the basin. The waters of the bay were clear of any sign of oil.

No birds were seen at or in the vicinity of Millers Landing at the time of the visit (1400 hours).

Hood Point:

Only the beach on the east side of the point was examined. It was found to be virtually free of oil contamination at that time (1425 hours), as were the waters fronting the beach. No birds were seen.

Dorman Bay:

The beach in this area bore scattered small deposits of oil along the upper zone, similar to the situation at Millers Landing. The vertical faces of some large rocks at the north end of the beach were covered almost completely with a black oil film. In one instance, the film was about two square yards in area. The waters were clear in the shoreline zone. Two western grebes seen offshore were apparently uncontaminated at that time (1505 hours).

Tunstall Bay:

This region, on the southwest coast of Bowen Island, was examined in the company of the manager of the Tunstall Bay subdivision. The gentleman reported that in the late afternoon of the previous day (September 26) many seabirds and some gulls came into the bay and some were fairly heavily oiled. Two different mixed flocks of California and glaucous-winged gulls totalling some 60 birds were seen at short distances offshore but none

appeared to be oiled at this time (1530 hours). No sign of oil was noted along the beach.

#### Birds Collected

One completely and heavily coated dead murrelet found in Dorman Bay was received from Mrs. Taylor, a teacher at the Bowen Island School.

One heavily oiled western grebe was taken alive from the beach at Deep Bay, as already mentioned.

Both birds were given to Dr. E. McEwan for laboratory examination.

Provisions for further collecting of birds reported or picked up by residents were made with Mrs. Taylor and Mrs. Stanfield of the Bowen Island General Store. Birds found alive or dead were to be turned in to Mrs. Taylor and held at the school until picked up by CWS.

#### Polluted Areas

In the polluted areas mentioned above, none were as heavily coated as were the beaches of Alert Bay with the oil spill of January, 1973.

Recommendations

To cope with the effects of possible future oil spills, CWS strongly recommends:

1. That responsibility for the handling of the various aspects of the wildlife involvement in pollution situations be clearly outlined and assigned by Western Region Headquarters of CWS.
2. That CWS formally approach the Fish and Wildlife Branch to assist in directing information to the Service from areas affected by contamination within their various detachments.
3. That CWS prepare for a bird salvaging operation now by acquiring equipment such as wash tubs, heat lamps, paper towelling, peat moss, detergent, shipping boxes, catching nets, etc. for use in cleaning of recovered oiled birds.
4. That CWS convert a portion of No. 1 Barn and the grounds adjoining at Alaksen, to house bird cleaning and holding facilities.

IV. CANADIAN WILDLIFE SERVICE - Part B

The first oil-soaked birds were received at the Vivarium, U.B.C. on September 26, 1973 from the S.P.C.A., West Vancouver. By October 2, 31 birds, mostly grebes and murrelets, were collected and cleaned (Table 1). Of the 8 marbled murrelets, only 1 survived. It was noted that some of the 14 oiled birds were thin and emaciated and died soon after washing. Numerous gulls were observed with oil patches on their plumage without apparent ill effects. From aerial observations made by EPS, it appeared that most of the birds avoided oil-contaminated areas along the north shore of Burrard Inlet and Snug Cove. On September 27, 1 oiled grebe was found by CWS personnel on a beach survey of Deep Bay and Snug Cove (Bowen Island). On September 30, 1 oiled scoter was found by EPS personnel during a shore survey of the Caulfeild area.

Fortunately, weather conditions were favourable for the containment of the spill and the survival of oil-soaked birds. If the spill had occurred in January instead of September, the number of birds affected could have been 3000 instead of 30, since large numbers of winter migrants utilize the coastal areas of Burrard Inlet and Point Grey. The effects of the present spill on the bird populations was negligible compared with oil pollution incidents in the U.S. and Britain.

TABLE 1. Composition of oiled birds from spill on  
September, 1973

Date	September					October		Total/ Survived
	26	27	28	29	30	1	2(?)	
Western grebe		1						1/1
Rednecked grebe		4						4/2
Eared grebe	3	3	2	3				11/6
Surf scoter			1	2	2			5/2
Glaucous-winged gull						1	1	2/2
Marbled murrelet		7				1		8/1
	3	15	3	5	2	2	1	31/14



The total loss of birds attributed to the Santa Barbara Channel spill in January, 1969 was 3,686. The number of birds treated was 1,575, of which 1,406 (89.3%) died and 169 (10.7%) survived. Loons and grebes constituted the major part of the kill. From aerial surveys, the avian population was estimated to be about 12,000 (gulls, shorebirds, waterfowl, loons and grebes, cormorants and pelicans, and other waterbirds in order of abundance).

In Table 2, the composition of the bird kill in some British oil pollution incidents are listed. Following the Torrey Canyon spill, Bourne (1968) reported that 7,815 birds were affected by oil, 7,746 of them being auks. These are highly sociable species which breed in dense colonies and congregate in favoured areas offshore to feed. In the Medway disaster 1,700 tons of oil was pumped accidentally into the estuary at night on a rising tide with an onshore wind at the height of the autumn migration. Gulls and waders were caught in the oil during the night. The most serious damage was to the habitat, since it was found that the number of birds present during the following winter declined between 20 and 100% for different species.

Laboratory studies on the effects of ingestion of weathered crude oil by seabirds are being conducted. The objectives

TABLE 2. Composition of the bird kill in some British oil pollution incidents (\*)

Areas	1	2	3	4	5	6	7
Divers	22	18	3	50	-	9	15
Grebes	1	40	7	21	1	4	1
Wildfowl	44	103	46	37	58	64	7
Waders	-	194	-	-	540	15	1
Gulls	4	103	2+	154	2,131	62	127
Auks	7,746	11	22	331	5	86	627
Miscellaneous	1	12	-	71	5	11	-
Birds affected	7,815	487	83+				
Reported dead	7,372	148	53	685	2,772	264	805

\* Bourne, K.L. 1968. Oil pollution and bird populations.

Field Studies Council, London. Proc. Symp. Orielton  
Field Centre, Pembroke, Wales.

1. Torrey Canyon - Cornwall. April, 1967.
2. Poole Harbour - Dorset. January, 1961.
3. Pagham Harbour - Essex. January, 1967.
4. Dover Beach - Kent. 1963-67.
5. Medway Estuary - Kent. September, 1966.
6. Lowestoft Beach - Suffolk. Early 1940.
7. N.E. Coast. January, 1966.

of these studies will be to determine if petroleum hydrocarbons accumulate and persist in avian tissues.

Recommendations:

1. Purchase of equipment and facilities to cope with the cleaning and rehabilitation of oiled birds should be considered. Participation of local agencies and volunteer groups should be encouraged to assist in the oiled bird recovery programs.
2. Compilation of data on bird distribution and numbers using estuarian, littoral and pelagic regions, for both resident and migrants along major shipping routes is essential.
3. Beach and aerial surveys of oil-contaminated areas should be coordinated so that information on the effects of oil pollution on seabird populations can be compiled.

V. INLAND WATERS DIRECTORATE

At 1530 hours on September 27, C. Hatfield, Coordinator, Environmental Emergency Branch, EPS, telephoned G. Tofte to request sampling assistance for the Erawan oil spill. C. Hatfield provided him with the designated areas where samples should be taken. He noted that samples should be obtained in accordance with standard water quality sampling procedures. The samples obtained should be recorded and analyzed so that they would withstand legal verification at a later date.

Technical staff from the Water Quality Branch and the Water Survey were contacted immediately. A four-man sampling party was organized and sent to the spill area at 0800 hours on September 28. Field samples were obtained from:

- a) inside the boom area surrounding the boat
- b) the beach area in Caulfeild Cove
- c) the beach area at Snug Cove on Bowen Island
- d) the beach area along Ambleside in West Vancouver.

Further field samples of the oil and sea water mixture were obtained on September 29. The Erawan was at the Burrard Dry Dock at this time. The type of analysis that the Inland Waters Directorate laboratory would run on the samples was

modified after discussions between C. McBratney and C. Hatfield. This discussion resulted in modification of Appendix C of the submission to C. Hatfield dated May 31, 1973, on "Oil and Chemical Spills - Emergency Measures". That part of Statement 2 that refers to fingerprinting of oil samples was deleted.

No analyses of any of the samples obtained on September 28 and 29 have yet been done. They are available for release to research organizations that are recommended by EPS.

No emergency reaction program develops without a number of problem areas being identified. This spill was no exception. A few problem areas came to light.

1. The need for distribution of the EPS Emergency Measures Action Plan. This should help define who is doing what, what the Emergency Measures organization does, and how it is structured, and how the Inland Waters Directorate fulfills its role in that organization.
2. Descriptions of specific sampling techniques are needed, techniques that will meet participating DOE agency requirements. For example:

Fingerprinting oil - sampling technique should be  
specified by EPS

Biologic effects on fish - specification by Fisheries

Water quality - by Inland Waters Directorate

VI. MARINE SCIENCES DIRECTORATE

On September 24, 1973 at 0930 hours, Marine Sciences Directorate at Victoria was advised by R.E. McLaren, Pacific Regional Director, Environmental Protection Service at Vancouver, that two ships, the Sun Diamond (Osaka, 1972) and the Erawan (London, 1971) had collided off Point Grey during the night and that bunker fuel was escaping from a ruptured tank and flowing into Burrard Inlet. Reports on the amounts of oil spilled varied between estimates of 100 and 400 tons.

After wind predictions for the Point Grey area were obtained from the Victoria weather office and the available tide and current information was consulted, A. Ages gave the following forecast to R.E. McLaren over the telephone:

1. The bulk of the spill would be slightly west of the entrance to Burrard Inlet. It would have moved west because of the distinct ebb bias between the time of the spill and the following midnight, particularly during the morning when the westerly wind was not expected to be sufficiently strong to push the oil into the inlet against the ebb current;
2. The predicted 20 mph NW wind would drive part of the oil onto the beaches at Point Grey during the afternoon, after

the tide had turned from ebb to flood at noon;

3. Some oil would enter First Narrows with the flood during the afternoon;
4. If the wind persisted, English Bay might also be affected.

In accordance with a previous agreement with EPS in the case of an emergency (e.g. the Alert Bay spill in January of last year), Marine Sciences Directorate remained on standby and made arrangements with Victoria Flying Services for a charter flight to Burrard Inlet if EPS would require their assistance on the site of the accident. However, when reports on the extent of the spill continued to be rather vague, a VFS aircraft was chartered and a reconnaissance flight made by a Marine Sciences team consisting of S. Tabata, J.F. Garrett and A. Ages. The weather was sunny, with excellent visibility and much less wind than forecast.

The largest concentration of oil could still be seen in the immediate vicinity of the anchored Erawan, with oil leaking from a large hole in her starboard side. No oil seemed to spill from the Sun Diamond, anchored nearby with a crushed bow. Some oil had reached First Narrows. While several large streaks and patches of heavy black oil were washing ashore on the northern beaches west of First Narrows, little oil

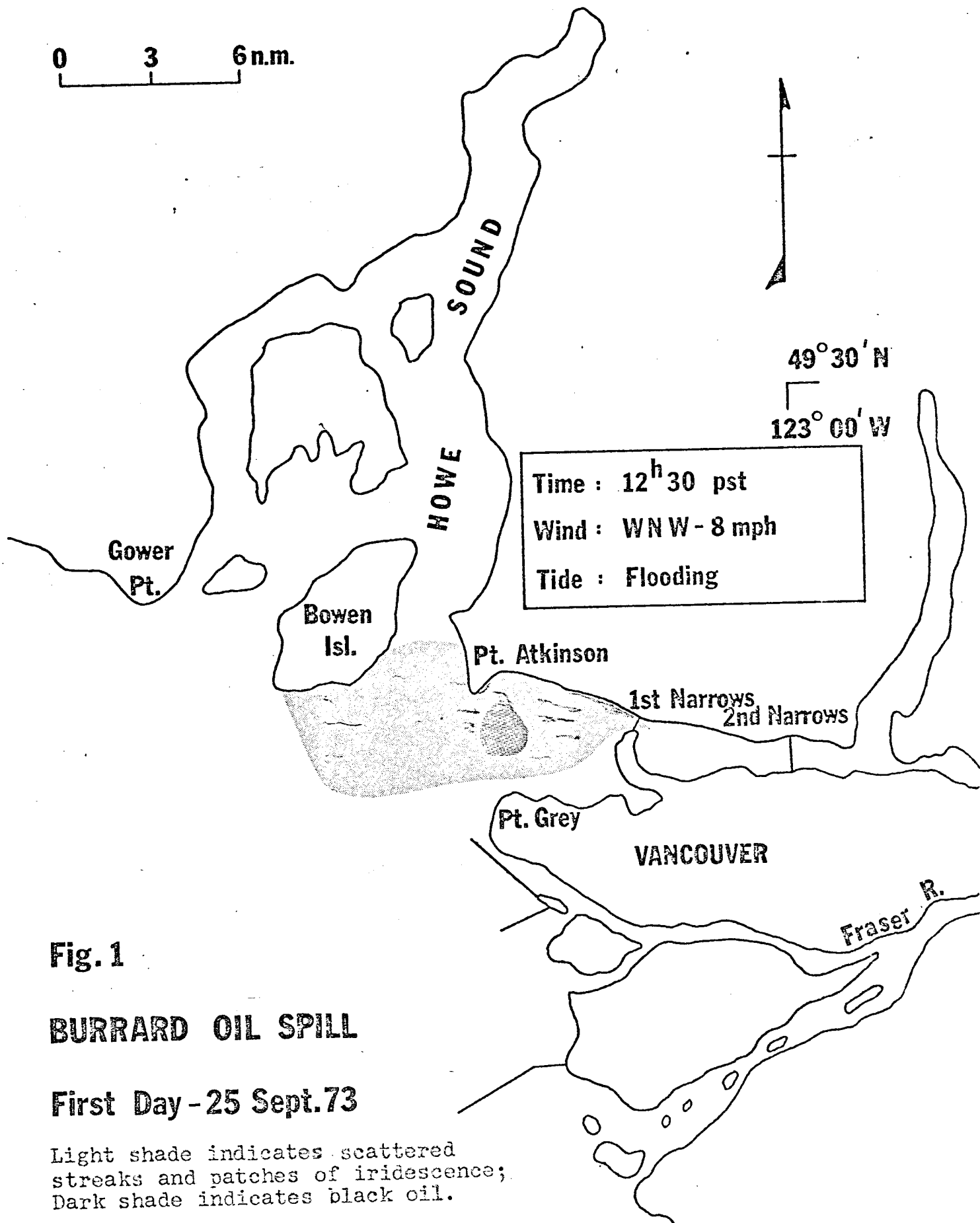


near Point Grey or in English Bay was observed. Much oil seemed to concentrate around Point Atkinson, and thin iridescent streaks could be observed south of Bowen Island.

Figure 1 is a sketch of the observations during this first flight.

Although in the past the amount of oil spilled has been estimated by aerial reconnaissance, the Burrard spill consisted of too many irregular patches and bands of various concentrations to justify such an estimate.

Upon returning to Patricia Bay, A. Ages informed EPS of their findings and, at the request of R.E. McLaren, departed by chartered aircraft to Vancouver to the site of the spill. He arrived at the Canadian Coast Guard Kitsilano base in the evening and attended a meeting called by N. Sigsworth of MOT, on-scene commander. Containment and clean-up measures and the next day's predicted movement of the spill derived from wind and current predictions and aerial reconnaissance were discussed. A. Ages subsequently joined the EPS staff at West Pender Street and awaited the arrival of C.T. Hatfield from the Yukon. C.T. Hatfield arrived at 2200 hours. Discussions were completed shortly before midnight.



**Fig. 1**

**BURRARD OIL SPILL**

**First Day - 25 Sept. 73**

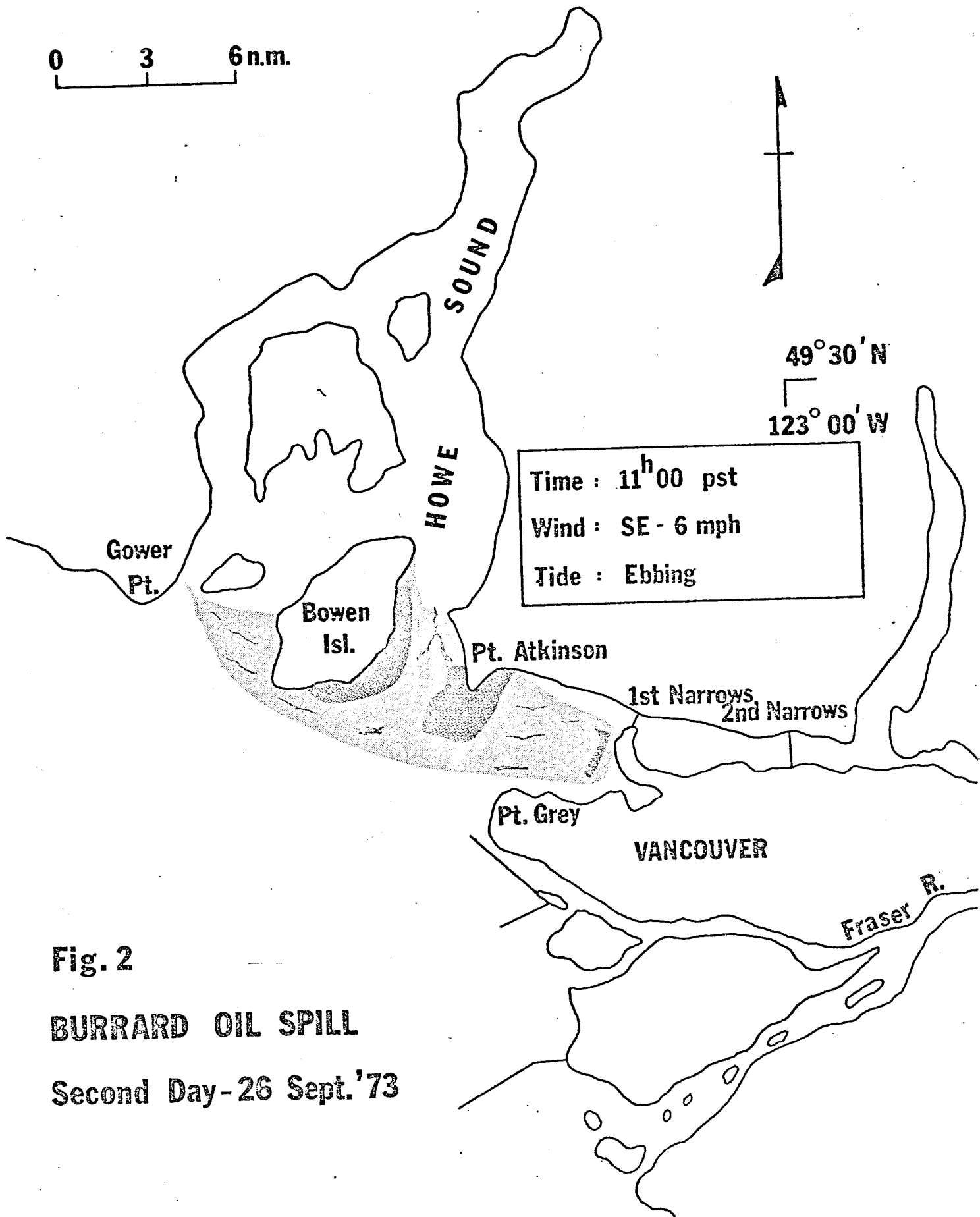
Light shade indicates scattered streaks and patches of iridescence;  
Dark shade indicates black oil.

A. Ages returned to the Kitsilano Coast Guard base at 0600 hours the following morning to go on a reconnaissance flight with the MOT helicopter at daybreak. When poor weather conditions prevented the MOT helicopter from flying, he chartered a private float plane in Vancouver harbour and departed on a reconnaissance flight, accompanied by S. Mahannah and F.P. Griffin, respectively of the Provincial Fish & Wildlife Branch and the Pollution Control Branch. The two-hour flight in light rain concentrated on Howe Sound and the waters around Bowen Island, to supplement the planned MOT and EPS survey of Burrard Inlet.

Much oil was observed along the east shore of Bowen Island and again in the Point Atkinson area. However, there was little oil left on and off the beaches west of First Narrows. Both shores of Howe Sound including the head of this fjord (Squamish) were covered to check rumors that oil had been found as far as Squamish. No slicks beyond Bowen Island (see figure 2) were observed.

He reported his observations to C.T. Hatfield and N. Sigsworth and returned to Victoria during the evening.

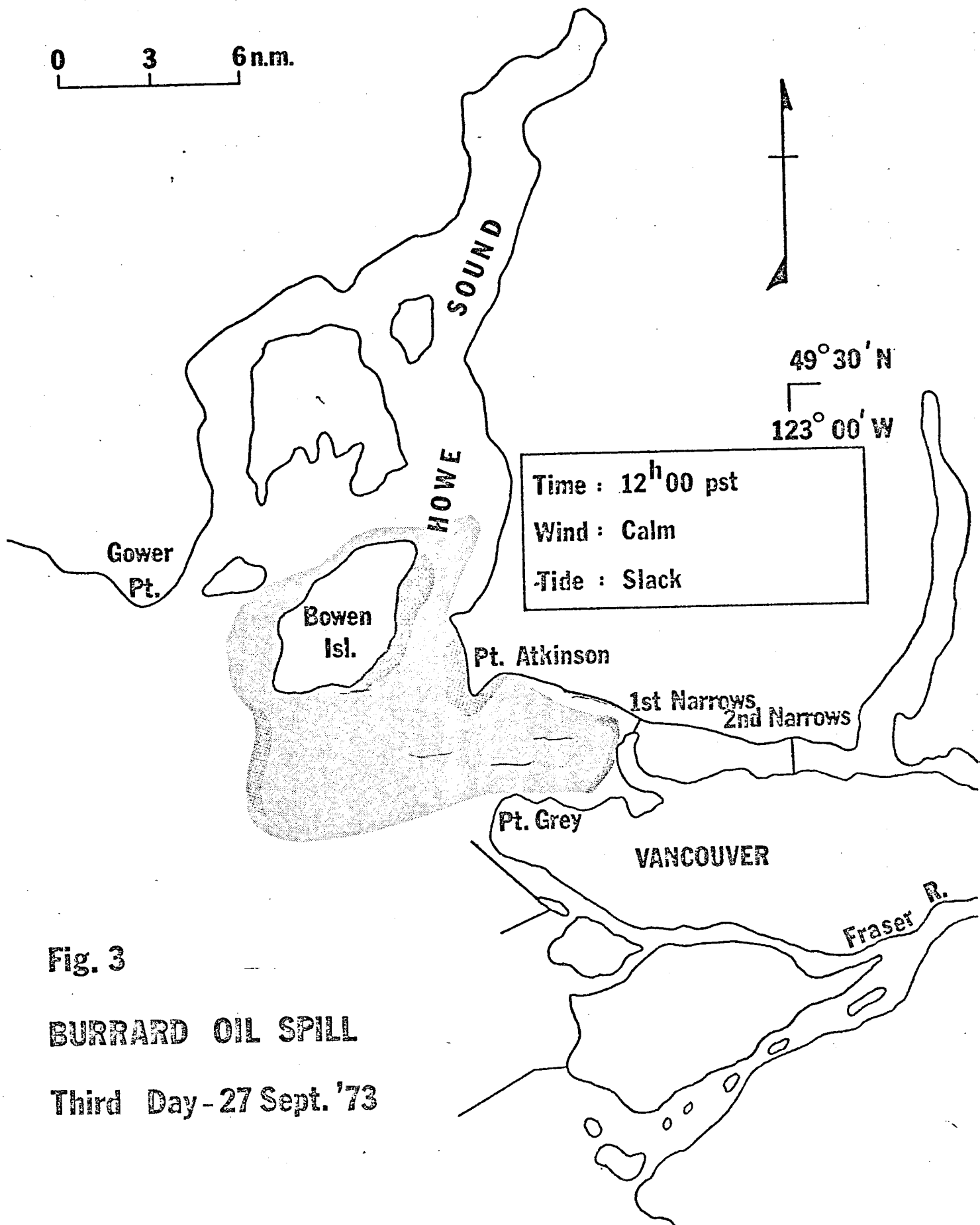
The next morning, A. Ages carried out a reconnaissance flight with a VFS aircraft from Patricia Bay, accompanied by Messrs. Herlinveaux (Ocean Physics) and McNeil (EPS, Ottawa). There



**Fig. 2**

**BURRARD OIL SPILL**

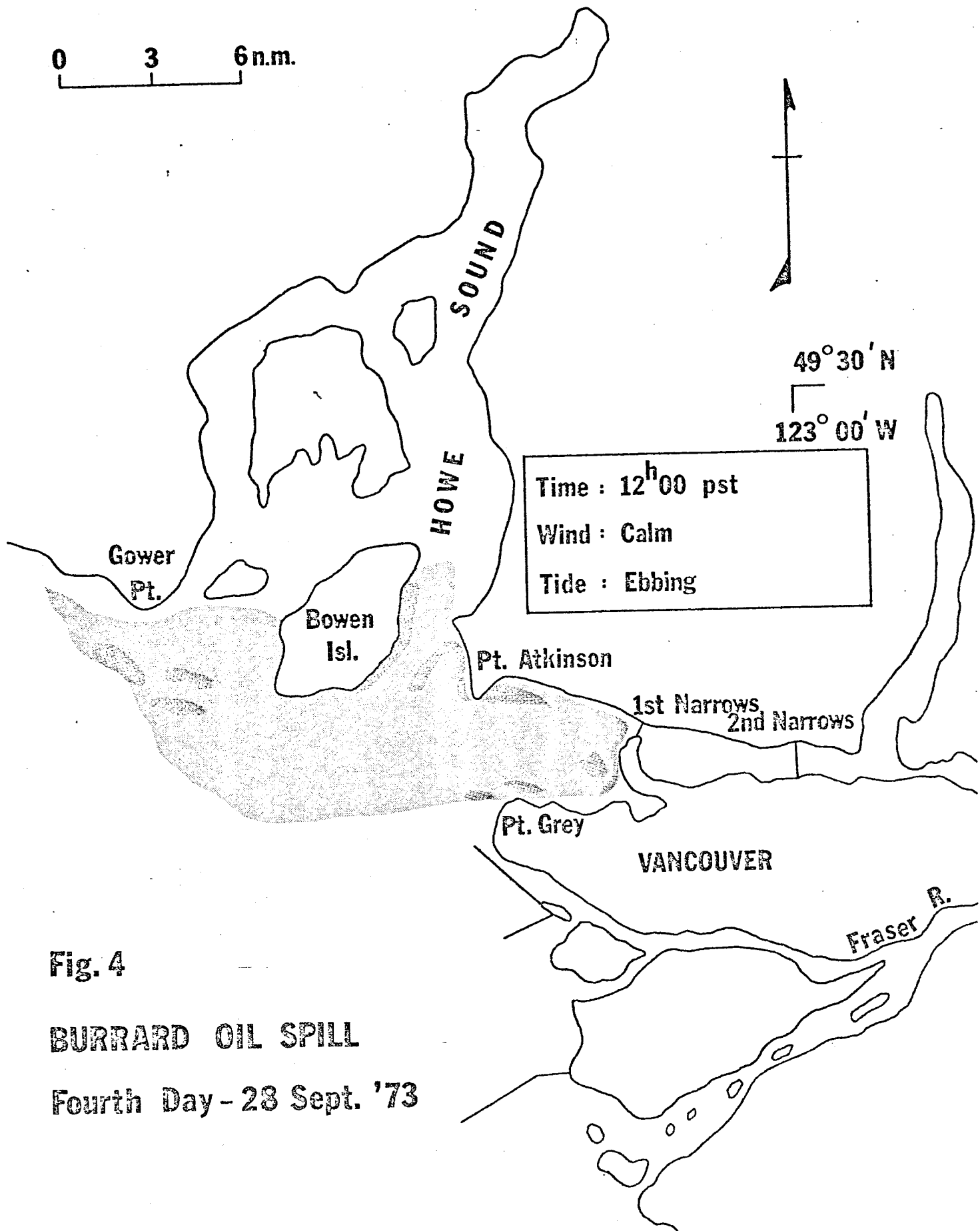
**Second Day - 26 Sept. '73**



**Fig. 3**

**BURRARD OIL SPILL**

**Third Day - 27 Sept. '73**



**Fig. 4**

**BURRARD OIL SPILL**

**Fourth Day - 28 Sept. '73**

was little wind and occasional fog patches impeded visibility. Apart from a few conspicuous streaks of oil still drifting about in the general vicinity of Bowen Island and Point Atkinson, there were no significant concentrations anywhere on the approaches to Burrard Inlet. However, some small slicks, mixed with debris, were encroaching the western beaches of Stanley Park and Kitsilano (see figure 3). Some patches had moved out further onto the Strait of Georgia, generally in a northwesterly direction.

He reported his observations to C.T. Hatfield from Patricia Bay by telephone.

During the fourth day, A. Ages carried out one more reconnaissance flight with a chartered VFS Beaver float plane. Some small slicks had moved out into the Strait of Georgia as far as Sechelt peninsula. However, in the western part of Burrard Inlet, the oil had virtually dispersed into light patches and sheers. His plane landed in Vancouver harbour and he reported to R.E. McLaren at EPS, West Pender Street and later to N. Sigsworth and C.T. Hatfield at Kitsilano. It was agreed that there would be no further need for any charter flights by Marine Sciences.

Burrard Oil Spill September 25, 1973

Chronology, A. Ages

September 25, 1973

0215 - Collision Erawan and Sun Diamond off Point Grey at entrance Burrard Inlet.

0930 - Advised by EPS, Vancouver, preliminary estimates between 100 and 500 tons fuel oil between Point Atkinson and Point Grey.

Collected wind and current data to predict the spill's movement and informed EPS. Made arrangements with Victoria Flying Services for a reconnaissance flight.

1230 - Departed Patricia Bay in chartered Cessna with S. Tabata and J.F. Garrett (Ocean Physics). Reconnaissance flight over Burrard Inlet, its western approaches and Vancouver Harbour, in clear weather.

1430 - Returned Patricia Bay.

1600 - Departed Patricia Bay for Vancouver with chartered Cessna to assist EPS at the site of the spill.



1700 - Arrived Kitsilano Coast Guard Base, via Vancouver International Airport. Attended meeting MOT/DOE regarding containment and clean-up of spill.

2200 - Briefing C.T. Hatfield at EPS Regional Headquarters.

September 26, 1973

0600 - Arrived at Kitsilano Coast Guard base for reconnaissance flight. Weather (rain) not suitable for MOT helicopter. Chartered fixed-wing aircraft (Airspan Ltd.).

1030 - Departed Vancouver Harbour for reconnaissance flight with Cessna aircraft, accompanied by S. Mahannah (Provincial Fish & Wildlife Branch) and F.P. Griffin (Provincial Pollution Control Branch). Improving visibility, light rain, light southeast winds. Covered Burrard Inlet and all of Howe Sound including Squamish.

1230 - Returned Vancouver Harbour.

1300 - Arrived Kitsilano Coast Guard Base and reported to MOT (N. Sigsworth) and EPS (C.T. Hatfield).

1600 - Departed for Victoria with S. Mahannah and provincial government vehicle, via B.C. Ferry.

2000 - Returned Victoria.

September 27, 1973

Unable to fly until 1030 due to low ceiling over Burrard Inlet.

1100 - Departed Patricia Bay in Beaver float plane, with Messrs. Herlinveaux (Ocean Physics) and McNeil (EPS, Ottawa). (The VFS aircraft was on a scheduled flight from Victoria to Vancouver but was transferred to charter upon arrival in Vancouver at 1230.)

1230 - Started reconnaissance; covered Burrard Inlet, southern portion of Howe Sound, and the approaches to Burrard Inlet as far as ten nautical miles west of Point Grey. Winds light, moderate visibility.

1400 - Returned Patricia Bay.

September 28, 1973

Unable to fly until 1050 due to low ceiling over Burrard Inlet.

1050 - Departed Patricia Bay for reconnaissance flight with chartered Beaver float plane. Covered Burrard Inlet, southern part of Howe Sound and approaches to Howe Sound as far as five nautical miles west of Grower Point, approaches to Burrard

Inlet as far as fifteen nautical miles west of Point Grey.

1230 - Arrived Vancouver Harbour (Bayshore Inn) and proceeded to EPS, Pender Street (brief R.E. McLaren) and Kitsilano Coast Guard Base to brief C.T. Hatfield and N. Sigsworth.

1500 - Returned Bayshore Inn and departed with Beaver float plane.

1530 - Arrived Patricia Bay.

Remarks:

The first day's forecast of the movement of the spill was outlined in some detail in this report to illustrate the difficulty in predicting the movement of an oil spill when the wind does not "behave".

Burrard Inlet is one of the few localities in the coastal waters of British Columbia where the flow pattern has been studied in more detail and where we can predict the tidal currents with more confidence than elsewhere.

The first day's prediction that the beaches of Point Grey were threatened was wrong. It was based on the expected strong northwesterly wind, which did not develop.

Due to the absence of any significant winds in Burrard Inlet during the first days, the oil was moved mainly by the currents and dispersed relatively slowly. It was remarkable that after two days a great deal of oil could still be found in the immediate vicinity of the accident, on the line Point Atkinson-Point Grey. The relatively dense oil slicks in the Point Atkinson area (Caulfeild Cove) during the second day had most likely been carried in by a westerly current from the vicinity of First Narrows. A future spill in Burrard Inlet in calm weather may well contaminate the same beaches.

Recommendations:

The importance of accurate wind information for a forecast of the behaviour of an oil spill was again demonstrated by the Burrard Inlet accident. Although the winds in the Strait of Georgia and Juan de Fuca are difficult to predict, we should be able to obtain local wind information immediately from lighthouses, marinas, radiostations, etc.: we are at present collecting a list of telephone numbers of reliable wind observers.

However, if the size of the oil spill and its potential danger to the environment warrant the expenditure, we should perhaps establish wind buoys in the area of the spill, and monitor the wind observations.

The new location of Marine Sciences at Patricia Bay and its close proximity to an aircraft charter service proved to be a good operational base for aerial reconnaissance. In future emergencies in the Central and South parts of the Strait of Georgia, we should again consider Patricia Bay as a base for reconnaissance flights.

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