

ENVIRONMENT CANADA
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BRITISH COLUMBIA OFFSHORE/SHOREZONE RESOURCES INFORMATION:

A REVIEW OF SOURCES AND RESEARCH

Prepared by:

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March 15, 1982

Prepared for:

Lands Directorate, Pacific and Yukon Region
Environmental Conservation Service
Environment Canada
Vancouver, B. C.

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British Columbia
offshore/shorezone resources
information: a review of sources
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INTRODUCTION:

The area of study is the shorezone and offshore areas of B.C. north of Vancouver Island, i.e. the central and north coasts, the Queen Charlotte Islands, Queen Charlotte Sound, Hecate Strait and Dixon Entrance. This area, along with the west coast of Vancouver Island is affected by the 1971 federal moratorium on oil and gas exploration and drilling. The moratorium is still in effect, though some progress is being made towards lifting it. In October, 1976, Environmental Protection Service recommended that the Department of Environment position be, "The moratorium could be lifted provided that appropriate steps are first taken by the federal government with respect to environmental impact assessment, consultation with the provinces and consultation with the United States. This essentially means that the moratorium would continue to be in effect until after these steps are taken." (See DOE Position on West Coast Offshore Drilling Moratorium, copy in file number 17245). Since then the Pacific Region Screening and Coordinating Committee's West Coast Offshore Oil Task Force has been meeting and an I.E.E. has been prepared by Chevron and Petro-Can (the major permit holders) through Seaconsult Ltd. The I.E.E. is currently in Ottawa, but no firm distribution plans exist.

Existing biophysical resource information for the study area is of a general nature only. Except for isolated instances, detailed, large-scale resource inventories or baseline studies are lacking; certainly the area is not as intensively known as is, for example, the Georgia Strait region. The amount of current, ongoing research does not seem to be exhaustive, but effort is increasing at this time.

A complicating factor is the dispute between federal and provincial authorities regarding jurisdiction over the area. The federal government claims this as an offshore area over which it would hold permit issuing rights; the province claims the area as an inland sea under provincial jurisdiction. The Canada Oil and Gas Lands Administration (of E.M.R.) has issued exploratory permits for most of the offshore (see Offshore Oil and Gas Lands, Resource Management Branch, EMR). B.C. has not issued any permits, although the necessary legislation is being prepared.

The following report is organized into three sections and four appendices. Section one is a partially annotated listing of printed sources of current information - published and unpublished documents, maps, etc. This is not a complete listing, further bibliographic references are included in Appendix D. Section 2 summarizes data gaps and information deficiencies as they appear to exist at this time. Section 3 is a listing of agencies which are or have been involved in B.C. shorezone/off-shore research or data compilation and current ongoing research or projects associated with each, if any. The appendices include additional information of interest on drilling history and possible drilling sites, outlines and/or terms of reference for the industry I.E.E. and the provincial Ministry of the Environment Offshore Petroleum Preliminary Environmental Assessment, a listing of some co-operative, co-ordinating bodies, and related bibliographies.

SECTION I LIST OF PRINTED MATERIALS

This section is organized into four parts: a) a selected bibliography of published and unpublished documents further divided into i) general publications on North American or international coastal zone management, non-specific Canadian publications regarding the coastal zone or offshore petroleum exploitation and impacts, and miscellaneous but related publications generally available in the Lands Directorate office library, and ii) prime sources of British Columbia coastal/off-shore resource information; b) a brief listing of serial publications on coastal zone management or research; c) a listing of some available maps displaying resource distributions or other information; and d) additional bibliographies. Note that the one best current source of general B.C. coastal resource information, mapped distributions, inventories and bibliographic references is Trans Mountain Pipeline Ltd. 1980, particularly volumes 15, 16 and 17, possibly updated by Seaconsult, Ltd. n.d.

a) Selected Bibliography

i) General

American Society of Civil Engineers. Coastal Zone '78 Symposium on Technical, Environmental, Socio-economic and Regulatory Aspects of Coastal Zone Management. 4 volumes. New York. 1978.

- a symposium was also held in 1980.

Atmospheric Environment Service. Canadian Normals. Downsview: Environment Canada

- volumes for temperature, precipitation, wind and sunshine
- various years

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Canadian Council of Resources and Environment Ministers. Shore Management Symposium October 4 and 5, 1978. Victoria, British Columbia, Proceedings. Toronto: CCREM, 1979.

- "most complete statement to (1981), of coastal zone management issues in Canada".

Ditton, R.B. and M. Stephens. Coastal Recreation: A Handbook for Planners and Managers. Washington, D.C.: Office of Coastal Zone Management, National Oceanic and Atmospheric Administration, Dept. of Commerce. January, 1976.

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- Owens, E.H. Coastal Environments of Canada: The Impact and Clean-up of Oil Spills. Ottawa. Environmental Protection Service EPS-3-EC-77-13. 1977.
- Ray, G.C. A Preliminary Classification of Coastal and Marine Environments. Morges, Switzerland: IVCN Occasional Paper No.14. 1975.

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Atlanta: Georgia Dept. of Natural Resources. June, 1976.

Resource Planning Section. The Value and Vulnerability of Coastal Resources. Atlanta: Georgia Dept. of Natural Resources. May, 1975.

Ricketts, E.F. and J. Calvin. Between Pacific Tides, 4th ed. Revised
J.W. Hedgpeth, Stanford University Press. 1978.

ii) British Columbia Coastal Resources

Bell, L.M. and R.J. Kallman. The Kitimat River Estuary: Status of Environmental Knowledge to 1976. Special Estuary Series #6, Estuary Working Group, Dept. of Environment. December, 1976.

Bornhold, B.D. Sedimentation in Douglas Channel and Kitimat Arm. Geological Survey of Canada. Unpublished Report, 1980.

British Columbia. Offshore Hydrocarbon Exploration and Development: A Preliminary Environmental Assessment for British Columbia. Victoria: Assessment Division, Assessment and Planning Branch, B.C. Ministry of the Environment. 1982.

- this report was in preparation at the time of writing. However, see Section 3 under the Assessments Branch, Ministry of Environment.

Clague, J.J. and B.D. Bornhold. "Morphology and Littoral Processes of the Pacific Coast of Canada". In: S.B. McCann (ed.) The Coastline of Canada. Geological Survey of Canada Paper 80-10. 1980. pp.339-380.

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 Volume 15 Physical and Chemical Oceanographic Report prepared by ESL Ltd. and Seakum Ltd.
 Volume 16 Marine Resource Inventory and Impact Assessment Report prepared by LGL Ltd. and ESL Ltd.
 Volume 18 Outer Waters Oil Spill Trajectory Analysis prepared by Oceanographic Institute of Washington, Seattle.
 Volume 22 Socio-Economic Inventory and Impact Analysis prepared by McNeal, Hilderand & Associates Ltd. Vancouver: 1979, 1980.
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- Report No.2 September, 1981

c) Maps

Air Photo Indices for the North Coast and Queen Charlotte Islands. Surveys and Mapping Branch, B.C. Ministry of the Environment. 1981.

Bald Eagle Census Maps. Unpublished. Victoria: Fish and Wildlife Branch. 1977.

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Biological Resources of Coastal and Offshore British Columbia:

Inventory and Analysis of Sensitivity to Oil Spills. Trans Mountain Pipeline Company, Ltd. Low Point Proposal, Volume 17. August, 1980. Map folio, various scales: North Coast, 1:1,000,000

- 1) Intertidal Habitat and Marine Plants and Plankton
- 2) Shellfish
- 3) Fish
- 4) Birds and Mammals
- 5) Sensitivity to Oil Spills

Canada Land Inventory of Forestry, Ungulates and Waterfowl. Lands Directorate, Department of Environment. 1:50,000 and 1:250,000; 103J only.

Hydrographic Charts of the B.C. Coast. Canadian Hydrographic Service. Dates vary. Scales vary.

Northern B.C. Coastal Wildlife Resources Map. B.C. Fish and Wildlife Branch. August, 1977. 1:575,000.

- water bird aggregations, seabird colonies, sea lion colonies, migration routes.

Oil Spill Countermeasure Map Series. Environmental Protection Service, Department of Environment. 1976.

- for Queen Charlotte Islands and Prince Rupert-Kitimat areas only.

Pacific Federal Oil and Gas Exploratory Rights. Resource Management Branch, Energy, Mines and Resources. Map No.100, January, 1982. 1:843,575.

- permits and index.

Potential Pacific Coast Oil Ports: A Comparative Environmental Risk Analysis Vol.II Supplementary Appendices. Fisheries and Environment Canada, 1978.

Appendix II Oceanographic features 1:2,000,000.

Appendix VI Nearshore Physical Classification 1:1,000,000

Seabird Colonies of the Queen Charlotte Islands. B.C. Provincial Museum, 1979. 1:204,000.

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Shellfish Distributions. Unpublished maps. Marine Resources Branch, B.C. Ministry of the Environment.

TERMPOL Submission re marine terminal at Kitimat. Vol.IV, Appendix XI, Environmental Maps. Kitimat Pipeline Ltd. 1976. Map folio.

West Coast Offshore Environment. Environmental Protection Service, Department of Environment. July, 1978. 9 maps, 1:1,000,000.

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| 1) Marine-Associated Birds | 6) Parks, Ecological Reserves & Sports Fisheries |
| 2) Marine Mammals | 7) Shoreline geomorphology and Marine Vegetation |
| 3) Commercial Salmon Fisheries | 8) Ocean Currents |
| 4) Ground fish & Herring Resources | 9) Winds |
| 5) Shellfish | |

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Bibliographies:
- Physical Oceanography section F-1, volume 15
 - Climate section F-2, volume 15
 - Chemical Oceanography section F-3, volume 15
 - Previous Oil Spills and Modelling section F-4, volume 15
 - Biological Resource Inventory section B-7, volume 16, pp.244-266
 - Impact Assessment section C-10, volume 16, pp.376-388
 - Map Folio References section 6, volume 17.

SECTION II DATA DEFICIENCIES

A fair amount of information does exist regarding offshore/shorezone resources in the study area. Relative to the amount of information that could be known, however, this is generally deemed inadequate. That is, gaps in the collected body of knowledge are frequently much larger than the body of knowledge itself. Distributional knowledge of coastal resources, while good in some instances, may be restricted in quantity, quality, area, season or trends. Knowledge of critical periods within the lifetime of the various marine species inhabiting the area, and the critical habitat areas where these occur, seems to be indistinct and would seem to be inadequate for sensitivity mapping in most cases. The following is to be considered as an overview summary of the more obvious data gaps of the various coastal resources. Abstracted from Trans Mountain Pipeline, Ltd. 1980 and supplemented from other sources, including submissions to the Coastal Zone Resource Sub-Committee, 1978:

a) Marine Geology

Gaps are identified as lack of detailed inventory of substrate materials, sedimentation rates, geochemistry, animal- and plant-sediment rates, and submarine slope stability. Petroleum potential has been evaluated but not tested.

b) Physical Oceanography

While general large-scale features of physical oceanography - tides, currents, climate - are well documented, detailed understanding is poor. An economic bias exists as more information is available regarding oceanographic aspects of the movement and ranges of commercial fish species and of inlets connected to industry and major salmon spawning streams. Few northern inlets and embayments have been studied in detail, and little seasonal circulation information exists. The west coast of the Queen Charlotte Islands is especially poorly known, with no long-term measurements and only a very general understanding of tidal, wind-driven and mean current movements, and limited knowledge of localized wind variations and extremes. Also, no significant winter oceanographic studies have been done.

A most important deficiency here is the lack of accurate weather forecasts for coastal and offshore waters. An inability to predict winds could render general oceanographic knowledge almost useless in the event of an oil spill.

c) Chemical Oceanography

Generally poorly defined or understood. Except for Douglas Channel, available data on hydrocarbons is inadequate and levels are not well known. Data are considered most essential for protected intertidal zones and nearshore zones with economic or ecological significance. The greatest biological impact of petroleum production is considered to be in surface waters of highly productive areas; here is a great need for baseline data.

Trace metal levels are also poorly known. The most significant gap appears to be concentrations in surficial sediments and bottom waters in protected near-shore regions.

Nutrient distributions are poorly defined, again except for Douglas Channel.

d) Biological Oceanography

Nutrient data are limited, systematic collection of data is necessary. Detailed information on plankton is lacking and the reliability of available references is limited regarding the north coast (except Douglas Channel). Gaps are in the knowledge of seasonal cycles, species succession, recruitment and vertical migration. The nature, distribution and biochemistry of organisms is poorly understood, as are food chain energy dynamics.

e) Intertidal Habitat

Relatively little of the B.C. coast has been studied - and information is particularly sparse for the north coast and the Queen Charlottes - but major species common to general habitat categories can be identified, i.e. the physical shorezone is relatively well known (at a small scale with resulting lack of detail) and biota can be interpolated. As few long-term intertidal surveys have been done, seasonal and annual changes in species abundance or diversity remain undetermined. And as few studies have connected intertidal species and habitat to marine food webs, the structure and important species within the open coast food web remain relatively hazy. Subtidal information for different types of shallow water habitats is lacking.

f) Marine Plants

Kelp is good; due to its commercial possibilities it has been well inventorized. Eelgrass has been partially inventorized due to its connection with herring spawning. Other marine plants are poorly known with information unevenly distributed.

g) Invertebrates

No attempts have been made to inventorize communities along the coast except for selected commercially important species (clams, oysters, abalones). Even commercially important species are not completely inventorized - information is limited to areas of commercial harvesting or where site-specific surveys have occurred. Even so, the major areas are probably known. Note that physical shorezone mapping has been done and as species common to the different intertidal habitats are known, this gives an indirect indication of invertebrate numbers and distributions. However, this does not consider the effects of population dynamics, and benthic invertebrates remain, at best, sketchily known.

h) Fish

Information varies by species via an economic criteria. The commercial salmon and herring stock distributions and herring spawning grounds are reasonably well documented; groundfish and non-commercial species are not. The spawning habits of ground fish are not well known and spawning areas may not be well defined. Additionally, knowledge of inshore fish and of the predation habits of salmon is limited.

i) Birds

While considerable information exists, gaps are large and specific, detailed data on distributions and seasonal variations may be limited for many areas. The quality and quantity of information varies by area, season and class of marine-associated birds.

Information on migratory birds is incomplete; migration routes are poorly known and inventories have been spotty. Data are particularly deficient for the

Queen Charlottes and northern estuaries. Waterfowl population densities and distributions by coastal area and by time of year cannot be predicted with confidence.

Seabird colonies have been well inventorized but summering and wintering concentrations are not as reliable as breeding colony information.

Shorebird distributional information is poorly known, inventories are lacking, as is knowledge of the relative value of different habitat types for various species.

Raptors vary. Peregrine falcons and, to a lesser extent, eagles, are well inventorized, although some coastal stretches have been missed. Other species lack inventories but are less common. Research is needed regarding specific habitat preferences of different populations at various times of year.

Information on offshore and pelagic birds and on other bird species of the coastal fringe is virtually non-existent; inventories are lacking.

j) Mammals

Research and inventory of coastal fringe mammals and marine mammals has been minimal. Inventories and research regarding the coastal fringe benefits for ungulates, large carnivores and small mammals has been lacking. Marine mammals are better known, especially sea lions, fur seals, killer whales and, possibly, grey whales, but significant gaps remain. While movements, migrations and populations are generally known, detail is lacking, and little is known of winter species, numbers and movements.

SECTION III AGENCIES INVOLVED IN COASTAL RESEARCH

A fair number of agencies are involved in offshore/shorezone research and data compilation. These range from international bodies through federal and provincial departments to universities and private firms.

An attempt has been made to list here all agencies which are, or have been, involved in coastal zone/offshore research. With each is a brief summary of responsibilities, previous work and current research or projects, as applicable. Little emphasis has been placed on coastal zone management activities; for responsibilities in this area see the Coastal Zone Resources Sub-Committee The Management of Coastal Resources in British Columbia 1978.

International

International North Pacific Fisheries Commission, Vancouver

- joint Canada-Japan-U.S. commission on North Pacific commercial fish stocks.
- do not do own research, coordinate research by the three national fisheries agencies. See Annual Reports.

International Pacific Salmon Fisheries Commission, New Westminster

- joint U.S.-Canadian commission
- more concerned with salmon enhancement in freshwater rivers and lakes, particularly Fraser River system
- some research on salmon estuary habitat, some information on abundance and distribution of salmon in the offshore.

International Pacific Halibut Commission, Seattle

- not contacted, imagine they might have abundance, distribution, habitat and spawning area information for halibut in B.C. waters.

Federal

Department of Energy, Mines and Resources

Geological Survey of Canada

- produces maps of surficial geology and substrate materials
- investigates geophysical processes (e.g. plate tectonics) including geo-oceanic processes within Queen Charlotte Sound and Hecate Strait
- evaluates petroleum potential
 - Petroleum Resources Appraisal Secretariat, Calgary
Richard Proctor, director.
- evaluates mineral potential

Resource Management Branch

- prime regulatory agency for mineral resource activities in Canada's offshore and Canada Lands south of 60°
- operates as lead agency and industry liaison
- Mineral Rights Division: responsible for assigning and administering mineral and petroleum rights and exploratory permits
- Resource Geology Division: evaluates geological and geophysical information submitted by offshore operators and assesses mineral resource potential
- Environmental Assessment Division: assesses implication of offshore mineral resource activity. Contact Michael Bell, Director.

Department of the Environment

Atmospheric Environment Service

- maintains network of climatological stations
- issues monthly summaries for many stations
- publishes Canadian Normals and station data
- some research on meteorological conditions and events
- contact Dave Phillips, Chief, Data Acquisition, or Climate Information.

Environmental Conservation Service

Canadian Wildlife Service

- under Canada Wildlife Act, conducts research into wildlife, habitat and internationally regulated marine wildlife within provincial boundaries.
- mainly concerned with marine and migratory waterfowl.
- cooperates with B.C. Fish and Wildlife and B.C. Provincial Museum to perform annual seabird colony census.

- on-going projects of interest to shorezone/offshore environments (1981):
 - Project #5500 Marine Birds in Relation to Offshore Drilling, Pacific Coast. Contact K. Vermeer.
 - Project #5201 Habitat Management and Assessment. Contact N.G. Perret.
 - Project #5230B Special Species and Habitat-North Coast. G. Kaiser.
 - Project #5231C Distribution and Abundance of Pelagic Birds. R. McKelvey.
 - Project #5242 Habitat Assessment-Coastal. D.E.C. Trethewey.
 - Project #5330 Seabird Research. Contact K. Vermeer.

Inland Waters Directorate

- monitors hydrographic discharge of rivers and streams
- can regulate nutrient discharges into fresh water
- primarily concerned with fresh water.

Lands Directorate

- prepares inventories of land use, capability and characteristics, including shorezone baseline studies (e.g. Coastal Resources Folio)
- input to environmental impact reviews and assessments.

Environmental Protection Service

- assesses and controls ocean dumping and pollutant discharge into lakes, rivers and shore zone.
- develops oil spill contingency plans and proposes preventive measures.
- assesses environmental impacts of planned and existing federal undertakings - key role in EARP.
- contact John Millen, Environmental Services Branch.

Department of Fisheries and Oceans

Fisheries and Marine Service

Fisheries Management - Resource Services Branch

- The Canada Fisheries Act enables research into all aspects of fish and fish management, including fin fish and shellfish.
- research has embraced fish, particularly salmon, inventories, salmon spawning and migration routes, and some connected research: sea lion inventories, fur seal research, kelp and marine plant inventories.
- besides The Fisheries Act, legislation includes the Fisheries Research Board Act - enabling research into pollution of waters frequented by fish - and the International Convention Acts - enabling research into protection of fisheries in accordance with Canada's commitments.
- a large number of documents, papers, reports, manuscripts, etc. have been

generated and presented on a regular or irregular basis in various Fisheries Research Board or Marine Service serials. Some of these are relevant to the northern B.C. coastal/offshore zone.

- the Resource Services Branch includes:
 - Habitat Protection Division
 - Estuary and Marine Group
 - Pacific Biological Research Station, Nanaimo
 - extensive records of plankton data from oceanographic surveys from the mid-1950's to the mid-1960's (Pacific Oceanographic Group)
 - zooplankton sampling program started January, 1980
 - shoreline marine vegetation project from 1975
 - research on abalone and sub-tidal communities
 - research on commercial fish stocks: herring, salmon, ground fish.

Institute of Ocean Sciences, Sidney

- under jurisdiction of the Department of Fisheries and Oceans, but other departments have space, e.g. EMR has a large contingent.
- primarily concerned with oceanographic research - physical, chemical and biological, and marine geology - in the Pacific and western Arctic oceans.
- for the B.C. north coast, research includes bathymetry, near-surface and bottom current measurements. STD data gathering, B.C. shore station measurements of seawater temperature and salinity, plankton cruises, petroleum potential evaluations, seismic profiles; co-ordinates ships of opportunity program along with the UBC Institute of Oceanography (now Department of Oceanography).

Provincial

Ministry of Energy, Mines and Petroleum Resources

- administers B.C. jurisdiction over energy and petroleum resources in the shore-zone and inland waters. Note again that B.C. considers Hecate Strait and Queen Charlotte Sound to be inland waters rather than offshore waters that are federally owned.

Ministry of the Environment

Assessment and Planning Division

Assessment Branch

- assesses environmental impacts of proposed projects or activities
- has looked at marine transportation and oil tanker traffic risks: contact Bill Wolferstan
- coordinates some coastal zone management activities; see Appendix C.

- work in progress on Offshore Hydrocarbon Exploration and Development: A Preliminary Environmental Assessment for British Columbia, expected to be ready for general distribution about the middle of March, 1982. This is to be an evaluation of the marine and terrestrial impacts of renewed petroleum exploration and production in the B.C. offshore. No new research was generated; instead, existing biophysical environment information is summarized in the text and mapped at a scale of approximately 1:2,000,000 (i.e. scale-reduced from original maps). Objectives include determining data and information requirements, evaluating adequacy of existing data and identifying data gaps in information required for a comprehensive evaluation of petroleum industry impacts and to identify major environmental concerns related to renewed petroleum exploration and exploitation. Additionally, information on impacts of the petroleum industry on the offshore of other countries has been collected. The Terms of Reference for the Offshore Petroleum P.E.A. are included here in Appendix B, the bibliography is included in Appendix D. Contact Bob Langford for further information.

Terrestrial Sciences Branch

- wildlife: coastal zone fish and wildlife habitat inventory and mapping, waterfowl surveys. Contact Bruce Pendergast.
- terrain: physical shore zone classification manual being prepared. Contact Don Howes.

Environmental Management Division

Fish and Wildlife Branch

- The B.C. Wildlife Act enables research into all aspects of wildlife habitat, biology, etc., including fish stocks. Enables the establishment of wildlife sanctuaries.
- research includes inventories of waterfowl, sea birds, sea lions, and raptors (peregrine falcon and bald eagle); inventories of winter waterfowl on the Queen Charlotte Islands; habitat assessment.
- cooperates with B.C. Provincial Museum and Canadian Wildlife Service in Queen Charlotte Island seabird colony censuses.

Marine Resources Branch

- The B.C. Fisheries Act enables research into all aspects of the fisheries resource and includes control and protection of marine plants and shellfish.
- research includes:
 - continuing series of kelp inventories, reported in Fisheries Development reports, and commercial sea plants other than kelp
 - herring spawning ground inventories and harvest statistics, annually since 1937
 - shellfish inventories, e.g. oysters, clams, geoducks
 - commercial fish species inventories, e.g. ground fish
- note commercial bias.

Ministry of Lands, Parks and Housing

Lands Division

Land Records Section, Surveys and Land Records Branch

- foreshore lease records, reservations, etc.

Ecological Reserves Unit, Land Programs Branch

- preservation of ecological resources for scientific research and education
- not to be confused with parks or other recreational areas.

Parks and Outdoor Recreation Division

- The Park Act provides for the creation of provincial parks, including marine parks, as a recreational resource, and also provides for the establishment of Nature Conservancy Areas. Note also that Anthony Island in the Queen Charlottes is a World Heritage Site.

Provincial Museum

- cooperates with B.C. Fish and Wildlife and Canadian Wildlife Service to inventorize B.C. seabird colonies
- publishes natural history handbooks on various B.C. wildlife species
- maintains exhibits of B.C. biotic areas including the shore zone.

Universities

Information is generated at the three B.C. universities due to:

- faculty and post-graduate research
- undergraduate and graduate level research (degree theses)
- special institutes or departments
- Bamfield Marine Station, jointly operated by the University of British Columbia, University of Victoria, Simon Fraser University, the University of Alberta and the University of Calgary. Research into both oceanography and marine biology.

University of British Columbia

U.B.C. has the most diverse teaching and research facilities of the three B.C. universities, and not surprisingly is most involved in the B.C. offshore/shorezone. Interaction and cooperation between departments and inter-disciplinarian research, is encouraged.

- Department of Botany: research on plants of the B.C. coast, including marine plants.
- Department of Geological Sciences: some research on marine and shoreline geology, have done some sedimentological studies of straits and inlets and some work on offshore petroleum potential evaluation.

- Department of Oceanography (formerly the Institute of Oceanography):
applies basic sciences to the study of oceans.
 - Ship-of-Opportunity program reports on plankton and zooplankton species composition and abundance
 - summer ship cruises sampling oceanographic data
 - research on biochemical responses to pollution, nutrient uptake kinetics, etc.
- Institute of Animal Resource Ecology: identify principles of theoretical and applied ecology and population genetics, relate these to specific ecological systems, marine communities included. Research includes:
 - biological oceanography
 - marine food chains
 - plankton and their environment
 - intertidal ecology
- Westwater Research Centre
 - conducts interdisciplinary research on the management of water and associated resources
 - researches alternatives to provide an improved foundation for decisions about policies and institutional arrangements
 - interest in coastal zone resource management; however, 1976 research proposal to Canada Council not approved
 - currently preparing two publications on Offshore Oil and Gas in Canada: West Coast Events and West Coast Environmental, Social and Economic Impacts
- A Fisheries and Oceans Canada research station is located on campus.

Simon Fraser University

Involved to a lesser extent than U.B.C., but has both oceanography and marine biology at the graduate level within the Faculty of Science.

Master of Resource Management Program includes coastal resources.

Private

Consulting Firms

Consulting firms that have been involved in B.C. shorezone/offshore research and data compilation, or inventories of existing data, under contract to another company understandably may not release information derived during the course of the study - this would have to be obtained from the initiating company - but individuals who worked on the project may now be experts on the status of knowledge of a particular resource. At any rate, some firms recently active in B.C. coastal zone research are noted here.

ESL - Environmental Services Ltd., Vancouver

- physical oceanography and climate

LGL Ltd., Sidney

- marine resources and impact assessment

Seakem Oceanography Ltd., Vancouver

- physical and chemical oceanography

These three firms prepared the oceanographic, biological resources, and map folio volumes for Trans Mountain Pipeline Ltd.'s Low Point proposal.

Seaconsult Marine Research, Ltd., Calgary

- prepared the Initial Environmental Evaluation (IEE) for renewed offshore petroleum exploration for Chevron Standard Ltd. and Petro Can - the major permit holders. The I.E.E. is apparently completed and in Ottawa, but no distribution plans exist as yet. V.V. Spence, Environmental Conservation Service, Ottawa, can be contacted regarding distribution of a copy of the I.E.E. to this office.

Public Interest

Greenpeace

Is compiling information relating to offshore petroleum exploration and offshore resources.

APPENDIX A DRILLING HISTORY AND PETROLEUM POTENTIAL

Limited petroleum exploration has been conducted off the B.C. coast. Some two dozen wells have been drilled, the first in 1913-1915, but most since 1958. In the 1967-1969 period, Shell Canada drilled fourteen exploratory wells (list and map #1) but all were dry and all have been plugged and abandoned. In 1971 the federal moratorium on oil and gas exploration came into effect.

A 1978 Geological Survey of Canada report on petroleum potential of the offshore - only recently released to the public (Haimila and Procter 1982) - estimates maximum gas reserves could reach 94 trillion cubic feet and oil reserves could be almost five billion barrels. The five billion figure is an absolute maximum; more reasonable expectations are of 500 million barrels of oil. Additionally, the GSC reports the area as probably gas rich. More recent studies have indicated these figures may be pessimistic and oil potential is probably much greater than originally estimated. Petro Can geologists, especially, are optimistic regarding oil in Dixon Entrance.

The major permit holders of Federal Oil and Gas Exploratory Rights to the B.C. offshore are Chevron Standard Ltd. - through a farm-in agreement with Shell - and Petro Can. Chevron's permits cover most of Hecate Strait and Queen Charlotte Sound, with some coverage of the offshore west of Vancouver Island. Petro Can has been issued permits for most of Dixon Entrance as well as isolated, previously unissued permits in the rest of the area (map #2).

The most likely areas for drilling activity if the moratorium were to be lifted now are the Queen Charlotte Basin south and east of Moresby Island by Chevron, and the eastern Dixon Entrance area, north and east of Rose Spit, by Petro Can. The Winola Basin west of Cape Scott also looks promising.

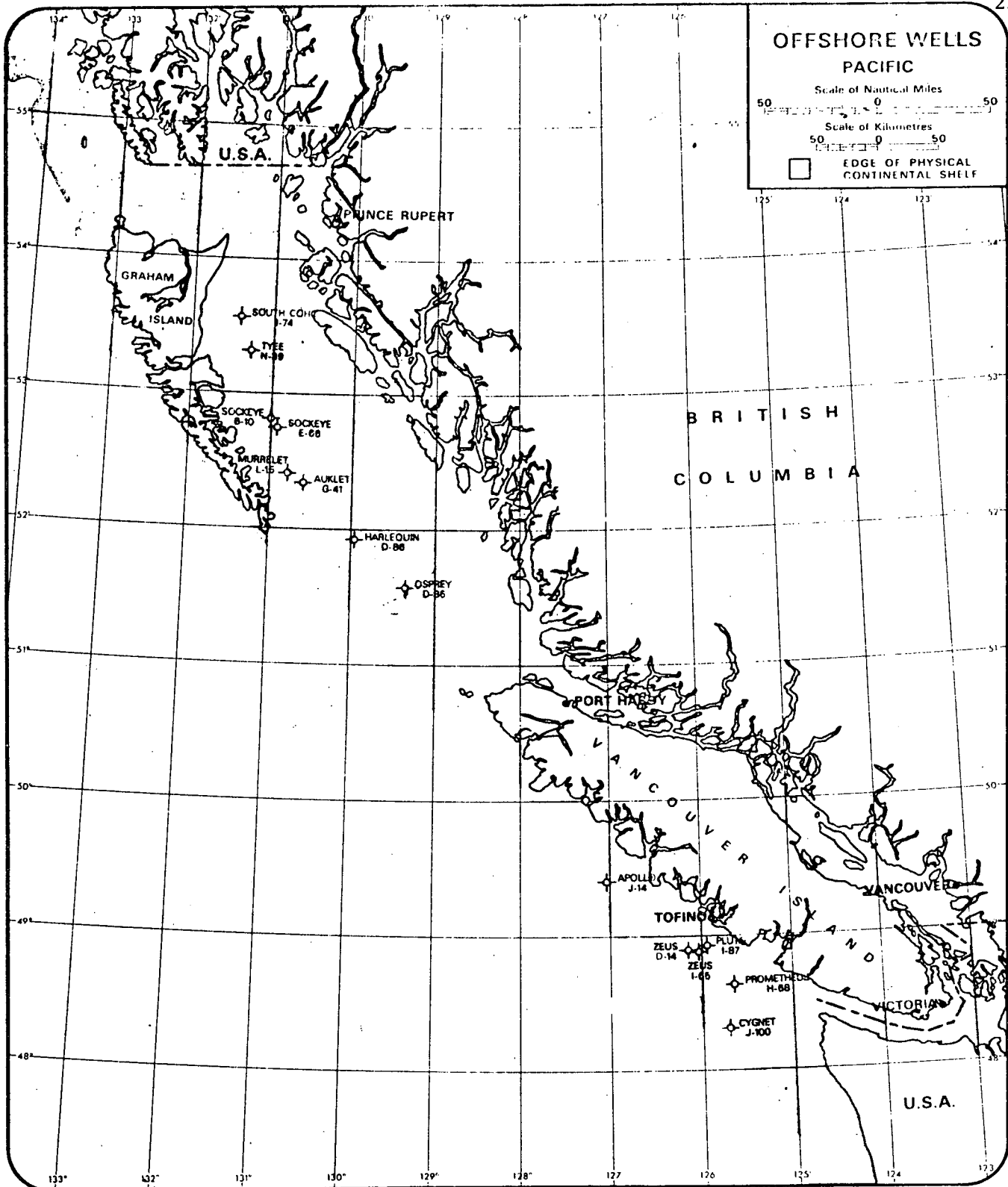
For further information, contact:

- Chris Yorath, Institute of Ocean Sciences, Sidney, B.C.
- Petroleum Resources Appraisal Secretariat, Calgary, Alta.

WEST COAST REGION:

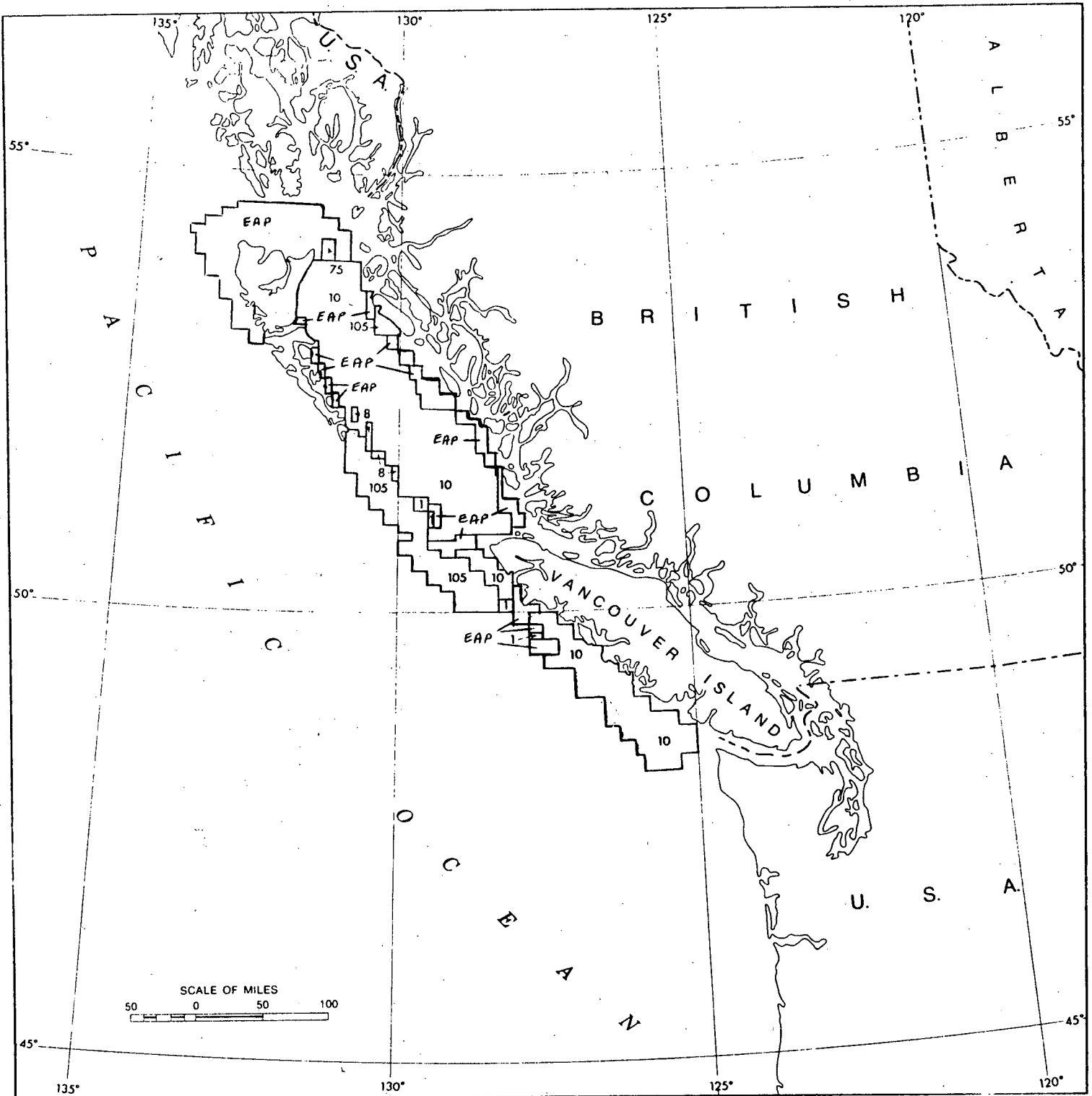
ALL WELL HISTORY REPORTS HAVE BEEN RELEASED
 * INDICATES VELOCITY SURVEY AVAILABLE

Well Name	Area	Latitude Longitude	Drilling Unit	Spud Date Rig Released	RT Elev'n Water Depth	Depth (RT) Well Status
Shell Anglo Prometheus H-68	West of Van- couver Island	48° 37' 19.57" 125° 39' 06.54"	Sedco 135-F	67-06-11 67-08-09	34.4 m 55.2	2 335.4 m P & A
Shell Anglo Pluto I-87	West of Van- couver Island	48° 56' 36.73" 125° 57' 01.30"	Sedco 135-F	67-08-11 67-10-12	32.9 60	3 726.2 P & A
Shell Anglo Zeus I-65	West of Van- couver Island	48° 54' 34.25" 126° 09' 09.93"	Sedco 135-F	67-11-07 68-02-05	34.4 98.5	3 042.2 P & A
Shell Anglo Zeus D-14	West of Van- couver Island	48° 53' 01.0" 126° 02' 59.8"	Sedco 135-F	68-02-24 68-03-31	34.1 79.9	2 433.5 P & A
Shell Anglo Tyee N-39	Hecate Strait	53° 18' 54.51" 131° 20' 21.42"	Sedco 135-F	68-04-07 68-05-19	29.3 27.4	3 459.5 P & A
Shell Anglo Sockeye B-10	Hecate Strait	52° 49' 08.53" 131° 00' 44.19"	Sedco 135-F	68-05-21 68-07-22	35.4 31.1	4 771.9 P & A
Shell Anglo Sockeye E-66	Hecate Strait	52° 45' 24.62" 130° 55' 19.44"	Sedco 135-F	68-07-23 68-08-12	34.7 55.8	2 786.5 P & A
Shell Anglo Auklet G-41	Hecate Strait	52° 20' 16.12" 130° 36' 32.77"	Sedco 135-F	68-08-16 68-08-29	34.7 169.5	2 370.4 P & A
Shell Anglo Osprey D-36	Queen Charlotte Sound	51° 35' 06.20" 129° 20' 47.65"	Sedco 135-F	68-09-01 68-09-17	34.1 58.5	2 530.4 P & A
Shell Anglo Harlequin D-86	Queen Charlotte Sound	51° 55' 03.58" 129° 58' 12.35"	Sedco 135-F	68-09-22 68-11-01	34.1 139.9	3 240.9 P & A
Shell Anglo Apollo J-14	West of Van- couver Island	49° 23' 34.60" 127° 02' 04.58"	Sedco 135-F	68-11-23 69-01-23	34.1 141.4	3 094.3 P & A
Shell Anglo Cygnet J-100	West of Van- couver Island	48° 19' 42.3" 125° 43' 03.0"	Sedco 135-F	69-01-26 69-02-20	34.1 147.8	2 459.7 P & A
Shell Anglo South Coho I-74	Hecate Strait	53° 33' 32.6" 131° 25' 48.9"	Sedco 135-F	69-03-12 69-04-05	35.4 21.3	2 780.1 P & A
Shell Anglo Murrelet L-15	Hecate Strait	52° 24' 41.3" 130° 47' 38.0"	Sedco 135-F	69-04-13 69-05-05	33.8 110.9	2 919.4 P & A



1979 04 01

PUBLISHED BY RESOURCE MANAGEMENT BRANCH
DEPARTMENT OF ENERGY, MINES AND RESOURCES



DEPARTMENT OF ENERGY,
MINES AND RESOURCES

FEDERAL OIL AND GAS LEASES, EXPLORATORY PERMITS AND EXPLORATORY AGREEMENTS

RESOURCE MANAGEMENT BRANCH

PACIFIC
JANUARY 1ST 1981

Key

Permittee

- | | |
|-----|---------------------------------------|
| 1 | Lochiel Exploration Ltd. |
| 8 | Ranger Oil Ltd. |
| 10 | Shell Resources/Chevron Standard Ltd. |
| 75 | Union Oil Canada Ltd. |
| 105 | D.F. Smith |
| EAP | Exploration Agreement PetroCan |

See also: Map #100 Pacific Canada Oil and Gas Lands Administration. 1982.

APPENDIX B MISCELLANEOUS OFFSHORE RELATED DOCUMENTS

Appended here are photocopies of:

- 1) Pacific Region Screening and Coordinating Committee (SCC) Project Status Record of Oil and Gas Drilling off the Canadian West Coast to the end of 1981.
- 2) Draft Guidelines for an Initial Environmental Evaluation of Oil and Gas Exploratory Drilling off the Canadian West Coast. Resource Management Branch, Department of Energy, Mines and Resources. May 1978.
- 3) Proposed I.E.E. Outline distributed to S.C.C. Westcoast Offshore Oil Task Force members, June, 1980.
- 4) Offshore Petroleum Exploration and Development: Preliminary Environmental Assessment - Terms of Reference. Assessment Branch, Assessment and Planning Division, B.C. Ministry of the Environment, 1981.

PROJECT STATUS RECORD

P.S.R. No. P-132

25

File No. _____

PROJECT NAME:

Oil and Gas Exploratory Drilling off the Canadian West Coast

PROponent:

Department of Energy, Mines & Resources

DATE REGISTERED: May 18, 1978

LOCATION:

West of Vancouver Island, Queen Charlotte Sound, Hecate Strait and Dixon Entrance

RESPONSIBLE FEDERAL AGENCY:

Dept. of Energy, Mines & Resources (EMR)

STATUS OF PLANS:

DESCRIPTION:

SCC ACTION:

Date to the SCC: June 1, 1978

Category: B

Lead Agency: EPS

Co-Ordinator: John Millen

Supporting Agencies: (DFO)

(CWS) L. Retfalvi (AES) D. Faulkner

(OAS) Larry Giovando (LD) M. Romaine

(EPS) Lee Harding

DATE

REMARKS

Exploratory drilling for oil and gas off the Pacific Coast, has been under a moratorium since 1970. Prior to that Shell Canada drilled 14 wells between 1967-1969 without success, although hydrocarbon generating formations were encountered. Currently, some 15 million acres are held under permit. Most of this acreage is held by Shell. Other permit holders are Smith Douglas Fletcher, Loehel Exploration, and Ranger Oil.

DFE/EMR Ministers correspondence commenced August 1976 to lift the moratorium.

May /78

"Draft Guidelines for an Initial Environmental Evaluation of Oil and Gas Exploratory Drilling Off the West Coast" issued by the Resource Management and Conservation Branch of the Department of Energy, Mines and Resources. Guidelines distributed to Pacific Region SCC for initial DFE comments.

June /78

RSCC comments of IEE Guidelines sent to D.G. Crosby, Energy, Mines and Resources .

July /78

IEE Guidelines, with work sharing proposal (EMR/Industry) sent by EMR to Chevron and Petrocan who are permit holders.

Oct. /78

West Coast Offshore Environment Map series (9 maps) published and distribution commenced.

Nov. /78

Chevron has not indicated so far that it is proceeding with IEE work. East Coast discoveries are demanding their attention and resources.

PSR no. & Name: Oil and Gas Exploratory Drilling off the Canadian West Coast.
 Page no.: 2

P-132

DATE	REMARKS
June 12, 1979	Pacific Regional Directors Meeting with M. Bell, EMR, representatives of Chevron and Seaconsult discussed preparation of IEE.
Sep. 21, 1979	Joint announcement by Premier Bennett and Prime Minister Clark that the Federal Govt. would turn over "jurisdiction of offshore lands" to the Province.
Sep. 27, 1979	Meeting in Victoria of EMR Officials with Provincial Agencies. Also attended by D.S. Lacate, Director, Lands. Recommended formation of a Federal Provincial policy level steering committee with representation Federal EM & R, DOE, Provincial E.M. and PR, Environment, to interface with permittees over environmental assessment.
Feb. 18/19, 80	Pacific Region Workshop on Offshore Oil & Gas Drilling and Production. Attended by representatives of all agencies of DOE regionally and N. Tywoniuk, W. Bryant EPS NW Region; R. Percy EPS Atlantic Region; G. Prach, T. Berry CWS NW Region; R. Baker EPS Ottawa.
Mar. 5/6, 1980	Departmental Workshop on Offshore Oil & Gas Drilling and production, Ottawa. Pacific Region representatives: J. Millen, J. Wiebe, M. Romaine.
June 1980	PROJECT IS NOW INACTIVE
Jan. 3, 1981	Chevron is preparing an IEE expected to be ready for release in April 1981
May 5, 1981	Task Force Meeting with Bob Weir, Dave Marshall and John Wiebe to review new interest in B.C. offshore drilling
June 2, 1981	B.C. Provincial Government Energy Minister, Bob McClelland announced "claims to offshore petroleum rights beyond B.C.'s inland marine waters". He also announced a B.C. Utilities Commission Inquiry for public examination of environmental and social issues. The first phase to be completed by spring 1982 would precede exploration. A second phase would be required before production could begin.
Sep. 24, 1981	Ministers of Energy for Canada and for British Columbia (Lalonde and McClelland) jointly announced that they agreed to hold discussions on offshore jurisdiction and to make every effort to resolve differences early in 1982.
Nov. 18, 1981	Letter Seaborn/Marr assuring Province of DOE commitment to cooperation on a comprehensive environmental review of hydrocarbon exploration and production.
Dec. 1981	Bill C48 completed second reading.
Dec. 1981	The Chevron IEE is reported to be in the hands of EMR, Ottawa. No plans for an interdepartmental review have been released.

PSR NO. & NAME Oil and Gas Exploratory Drilling
off the Canadian West Coast

P-132

PAGE NO. 3

DATE	REMARKS
Dec. 11, 1981	<p>J. Millen, R. Baker (EPS Ottawa) and J. Wiebe attended a B.C. Provincial briefing on progress of the Provincial Offshore Hydrocarbon Preliminary Environmental Assessment.</p> <p>Discussions were also held on the possibility of a major West Coast Workshop on Environmental Planning for Hydrocarbon Projects. Tentative date suggested was Spring 1983.</p> <p>A proposed B.C. Government Seminar on Industrial Benefits of Offshore Development to be held in the Fall of 1982, was noted.</p>

DRAFT GUIDELINES
FOR AN
INITIAL ENVIRONMENTAL EVALUATION
OF
OIL AND GAS EXPLORATORY DRILLING
OFF THE CANADIAN WEST COAST

Resource Management and Conservation Branch
Department of Energy, Mines and Resources

OTTAWA
May 1978

D R A F T1. OBJECTIVE OF INITIAL ENVIRONMENTAL EVALUATION

- a) Provide rationale for Initial Environmental Evaluation to determine the nature and extent of any significant environmental effects;
- b) review public perceptions of environmental matters including the moratorium on drilling; attitudes regarding commercial fishing; recreational use of coastal waters; and recent oil port and tanker proposals;
- c) distinguish between exploration and production by comparing engineering concepts, longevity, site specific-ness, associated risks, etc. of each stage and provide a rationale for a comprehensive site specific environmental assessment prior to production.

2. SUMMARY

The purpose of the summary is to highlight the environmental concerns and possible effects of the proposed activity. It is to be written in a style easily comprehended by the public so that it may be extracted for media or other purposes.

Summary to include:

- a) the probable nature, magnitude and duration of an offshore exploratory drilling program; the major offshore and onshore resources, facilities, logistics and costs likely to be involved;
- b) the legal regime under which the program would be carried out;
- c) any effects upon the biological or physical environment;
- d) consequences of an oil spill, with a probability analysis of the likelihood and extent of spill damage that might be associated with the recommencement of exploratory drilling and with possible production off the west coast;

- e) the social, industrial, economic and other regional or local implications of the program with a brief assessment of their potential significance;
- f) a résumé of the collision prevention measures and other navigational safety aspects of drilling and shipping;
- g) alternate or mitigating measures that could be implemented into the program to eliminate or reduce to a minimum any significant environmental, social or navigational risks identified in the IEE;
- h) the nature, extent and duration of any short-term and residual effects, both on land and offshore, that may justify significant environmental concerns in the carrying out of the program.

3. THE PROJECT SETTING

Historical overview of mineral resource developments off the Canadian West Coast, including information on:

- a) the status of oil and gas exploratory permits since June 1960, Crown reserve acreage; the withdrawal of permits from sensitive areas in Strait of Georgia and Strait of Juan de Fuca;
- b) the geophysical, geological and drilling activities to date by industry;
- c) the geophysical, geological and geodetic survey work by government;
- d) exploration results so far;
- e) proposal to recommence oil or gas exploration and its relationship to possible production in the future;
- f) Federal/Provincial relations with respect to offshore mineral rights;

- g) oil spill risks including a mathematical description of the probable occurrence of a serious, moderate or light oil spill and showing the relationship between oil spills, imported oil tanker traffic and local offshore production.

4. THE NEED FOR THE PROGRAM

Report on the:

- a) Canadian energy supply and demand picture;
- b) government's "need-to-know" for energy policy, and policies related to the development of Canadian mineral resources;
- c) estimated oil and gas potential off the West Coast;
- d) primary purpose of the exploratory program in relation to national and provincial energy needs and the anticipated timing;
- e) alternate means of meeting the need for energy supplies (foreign sources, tankers, etc.) using cost/benefit analysis and comparisons of relative environmental risks.

5. THE DRILLING PROGRAM

1. Maps and drawings:

- a) identifying the marine areas where exploratory drilling may take place (west of Vancouver Island, Queen Charlotte Sound and Hecate Strait);
- b) identifying areas closed to offshore oil and gas developments in 1962 (Strait of Georgia, Juan de Fuca Strait and Queen Charlotte Strait, etc.);
- c) identifying geography, geology, bathymetry, permit acreage and permittees, existing wells, coastal features, roads, harbours and facilities, marine traffic lanes, and related information.

2. Operations:

- a) general description of an exploratory drilling program including rig, work boats, helicopters, personnel, shore facilities, consumables, monitoring and surveillance programs;
- b) outline of operational safety and pollution prevention measures (BOPs, casing, mud, kicks, drills, explosions, collisions, test fluids);
- c) statement of the collision prevention regulations and other navigational safety provisions applying to offshore rigs and to shipping;
- d) description of waste disposal methods, including type of wastes, volumes, concentrations, and any known environmental effects and ultimate fate;
- e) identification of equipment, plant, supplies, etc. likely to be removed or, conversely, to remain upon termination of the exploratory drilling program; seafloor obstacle clearance and other site restoration;
- f) suggestion of secondary projects and associated facilities that might be required during the exploratory program.

3. Oil Spill Contingency Planning:

- a) oil spill prediction studies showing the physical trajectories and chemical degradation of (hypothetical) oil spills;
- b) outline contingency plans for the arrest and clean-up of an oil spill or other marine emergency by the operating company, industry associations and contractors, regional and provincial authorities, and the federal government (under the National Marine Emergency Plan and the Joint Canada-U.S. Marine Pollution Contingency Plan);

- c) identify stand-by drilling and emergency equipment available in the area in the event of a major oil spill

4. Legislative Regime:

- a) report on the adequacy of EMR's statutory authority over offshore mineral resource developments and the regulatory control under which any exploratory or development drilling program (or oil and gas production and transportation) would be carried out; including the requirements of the operator under the Oil and Gas Production and Conservation Act and the draft Canada Oil and Gas Drilling Regulations thereunder, including the approval process for the commencement/termination of operations, testing, plugging, etc.; the environmental and related provisions under the proposed Canada Oil and Gas Act; surveillance, enforcement and reporting procedures; and penalty clauses;
- b) describe the notification procedure, input and role of other agencies with practical offshore concerns.

5. Insurance, Bonding, Liability and Compensation:

Outline the requirements with respect to performance bonding, liability and compensation to account for damages in the event of an oil spill or other mishap.

6. THE NATURAL ENVIRONMENT

A general description of the present-day environment and patterns of resource use, illustrated with a resource inventory map of the major environmental components of the area; a description of the physical environment and its effects upon the seaworthiness of an offshore drilling vessel, operational safety and response to accidents; plus a

description of the biological environment that may be affected by the implementation of the program; and an identification of any relevant information gaps (the difference between what we know and what we need to know).

1. Physical Oceanography:

- sea and swell
- currents
- tides and tidal currents
- water circulation
- ice?
- temperature and salinity
- unusual features in specific coastal areas

2. Meteorology:

- winds
- air temperatures
- barometric pressures
- precipitation
- visibility, cloud cover and humidity
- storms

3. Geological Environment:

- regional geology
- coastal geomorphology and longshore drift
- marine geology
- bathymetry
- surficial sediments
- shallow structures

4. Geological Hazards:

- seismicity
- tsunamis
- faulting
- slumping
- geopressures

5. Biological Environment (Offshore and Littoral):

- phytoplankton
- zooplankton, ichthyoplankton
- zoobenthos
- pelagic fish and commercial species, seasonal distribution and nursery areas
- marine mammals
- pelagic seabirds
- seaweeds
- shell fish (lobster, crab, etc.)
- estuaries

7. THE HUMAN ENVIRONMENT AND RESOURCE USE

Outline the existing community facilities and the economic, social and cultural conditions of any regions which may be affected by the offshore drilling program in order to assess the nature and extent of any detrimental or beneficial influences of the program upon life in coastal communities. This should be compared with the expected natural evolution of these communities in the absence of offshore drilling. A review of the socio-economic impacts of the drilling program carried out by Shell Canada Ltd. in 1967-69 and the building of the Sedco 135F in Victoria should also be prepared for comparative purposes.

8. EVALUATION OF ENVIRONMENTAL IMPACTS AND MITIGATING MEASURES

This part to provide an overall evaluation of the potential environmental, social, and operational and economic impacts already described and is to assess proposed amelioration and mitigating measures; the manageability of the risks that have been identified as being associated with the program and residual effects. Recommendations and special requirements additional to those imposed under the present legislative regime that may contribute to the safe and innocuous conduct

of the program. Any major impacts upon the environment from any aspect of the program is to be separately identified and assessed as to their nature, extent and duration at the local, regional, national and international levels and in the context of coastal zone activities. Any significant knowledge gaps are also to be clearly identified.

9. REFERENCES

Bibliography

References, sources of information

Other

MEMORANDUM

NOTE DE SERVICE

Task Force Members - Westcoast Offshore Oil


J. Millen
RSCC Task Force Chairman

SECURITY CLASSIFICATION - DE SECURITE
OUR FILE - N° REFERENCE 4376-3
YOUR FILE - V° REFERENCE
DATE June 23, 1980

SUBJECT / OBJET: Proposed IEE Outline

Enclosed are copies of two proposed outlines for an IEE for which some data collection has already been undertaken by the major permit holder (Chevron).

As you can see I have been requested to provide comments by July 4th. I will undertake to roll up and transmit comments received by me up to noon on Thursday, July 3rd.


J.M. Millen

JUN 24 1980

Distribution: Mr. J. Payne, Chief, Land Use Unit
Habitat Protection Division, Resource Services Branch
Fisheries and Oceans Canada
1090 West Pender Street, Vancouver, B.C. V6E 2P1

Mr. L. Retfalvi, Head, Habitat Assessment & Management
Canadian Wildlife Service
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Mr. D. Faulkner, Forest Meteorologist
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Dr. L. Giovando
West Vancouver Laboratory
Fisheries and Oceans Canada
4160 Marine Drive, West Vancouver, B.C. V7V 1N6

→ Mr. M.J. Romaine, Assistant Regional Director
Lands Directorate
#904 - 1001 West Pender Street, Vancouver, B.C. V6E 2M9

Introduction

General purpose of IEE (quote FEARO); rationale and objectives of this study, its limitations (area, exploration), etc.

Organization of IEE study; table of contents.

Executive Summary and/or overview.

The Environment

Geological environment, hazards.

Physical environment.

Biological environment.

Shorelines.

Offshore Exploration

- Introduction to region.
- History of petroleum exploration off west coast.
- Environmental concerns for tankers, drilling.
- International experience: geophysics, drilling.
- Need for renewed exploration, alternatives.
- Petroleum potential off the west coast.
- Legislative regime: acts, regs, procedures (e.g. DPA & ADW under Drilling Regs, also Sec. 79).
- Proposed exploration operations, schedule (geophysical, drilling).
- Contingency plans, emergency response organizations, real-time environmental information.
- Oil spill trajectories, weathering.
- Standby equipment, resources.
- Liability and compensation.
- Rig and vessel discharges.
- Public information.

Environmental Effects

Potential adverse, beneficial effects.

Information gaps.

Recommendations and conclusions.

Selected Annotated Bibliography

Separate volume (?)

Appendices

- List researchers, scientists and affiliation.
- Other.

Proposed Draft Outline for:

April 10, 1980

INITIAL ENVIRONMENTAL EVALUATION
for
RENEWED PETROLEUM EXPLORATION
in
QUEEN CHARLOTTE SOUND AND HECATE STRAIT

DECLARATION

EXECUTIVE SUMMARY

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1.4	Need for Renewed Exploration
1.5	Proposal by Chevron Standard Limited
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1.7	Biological Environment
1.8	Socio-Economic Factors
1.9	Proposed Operations
1.10	Potential Impact on Environment
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1.12	Potential Impact on Industrial Fabric

- 2 PROPOSED PETROLEUM AND NATURAL GAS EXPLORATION
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- 2.2. Previous Operations
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 Methods, time and duration, personnel
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Major Influences:

Oceans and Rivers--contribution to nutrient levels
 General Physiography, protected areas

Biological Productivity

Resource Utilization

Commercial and recreational fishing

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Significant Biological Groups

(Discussion of Groups will include:

Species, abundance, and distribution

Life cycles, habitats, seasonality and migration

Significance in food web, and Resource utilization)

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Conflict with fishing activity

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Means of transport

Waste Disposal: Nature of chemicals, toxicity

Quantities

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Fuel and Chemical: Nature of chemicals, toxicity

Quantities

Storing and transporting

Supply Operations:

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Existing traffic

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Precautions

*Logging transport
ferry, 2019/1
supplies*

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Blowouts

Description, causes

Geological aspects

Mechanical aspects; oil or gas

Emergency equipment and procedure

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Possible Scenario

Trajectory and area

Environmental damage

Economic losses

Indigenous, physical, social

6.4

Contingency Planning

Reference to Separate Report

6.5

Summation of International Experience

Geophysical

Exploratory Drilling

7

RECOMMENDATIONS

TERMS OF REFERENCE

Purpose:

To summarize concerns and issues regarding the environmental impacts associated with all phases of offshore petroleum exploration and development. The assessment will be used as a basis for a Ministry of Environment submission to hearings or reviews which will take place before the resumption of offshore petroleum exploration in British Columbia.

Objectives:

1. a) To determine data and information requirements for the definition and assessment of environmental impacts resulting from offshore petroleum exploration and development.
- b) To evaluate the adequacy of existing information regarding the above impacts.
- c) To identify data gaps and, where possible, to recommend studies required to enable comprehensive evaluation and mitigation of impacts.
2. To identify major environmental concerns and, where possible, to make recommendations regarding avoidance and mitigation of identified impacts.
3. To summarize the existing legislative and regulatory mechanisms for regulation of petroleum development activities and impacts by the Ministry of Environment, and to identify

needs in this area. (This review is presently being carried out by Westwater).

4. To develop a map and photo folio to present pictorially the environmental resources and potential petroleum development impacts in the potential development areas.

Study Area:

(as outlined on attached map)

Approach:

Existing literature and files will be reviewed. Contact will be made with key technical experts in appropriate provincial and federal government agencies. The report will address impacts during each of the three main development phases:

- a) Seismic exploration
- b) Exploratory drilling
- c) Production

The assessment of environmental concerns will be presented under the following descriptive headings:

- 1) Physical Environment - Offshore
- 2) Biological Environment - Offshore
- 3) Onshore Environmental Implications
- 4) Risk and Safety Analysis - Offshore

The report will identify what is and is not known regarding environmental impacts of offshore petroleum exploration and

production and will identify key investigations which should be undertaken in future assessments. Preliminary recommendations will also be included.

Study Team:

R. Langford - Project Manager and Team Coordinator,
(Contact 387-1928)

Bill Wolferstan, Jim Slater - Physical Environment
Risk and Safety Analysis

Don Tillapaugh, Ken Turner - Biological Environment

Susan Abs, Ken Baillie - Onshore Impacts

APPENDIX C CO-OPERATIVE AND CO-ORDINATING BODIES WITH AN INTEREST IN THE
B.C. OFFSHORE/SHOREZONE

Sea Use Council Advisory Board

An international cooperative advisory board for the scientific and economic development of coastal and ocean resources in the northeast Pacific Ocean area. Information is exchanged regarding offshore oil development and industrial port siting.

- B.C. Ministry of the Environment member: Jon Sector, Assessment and Planning Division.

International North Pacific Fisheries Commission (INPFC)

A Canada-Japan-United States joint commission under the provisions of the North Pacific Fisheries Convention. Plans and co-ordinates research carried out by the three national fisheries research agencies. Encourages collection, exchange and analysis of data directed towards maintaining North Pacific fisheries resources at a level of maximum sustained productivity. Permanent secretariat is located at The University of British Columbia.

International Pacific Salmon Fisheries Commission (IPSFC)

A joint Canada-United States crown corporation to co-ordinate efforts to enhance salmon stocks of the Fraser River system.

Canadian Council of Resource and Environment Ministers (CCREM)

Made up of federal and provincial ministers of resource and environment ministries/departments who meet irregularly to decide resource and environment use policies, resolve conflicts, and hold discussions as necessary. Can initiate working groups/seminars/symposiums on issues related to resource and environment use; these have included shorezone management and offshore resources symposiums.

Associate Committee for Research on Shoreline Erosion and Sedimentation (ACROSES)

Associated to the National Research Council (NRC). Promotes research into nearshore coastal sediment movement and mechanisms of sediment transport, including marine shorezones; identifies needs and priorities for nearshore zone research; promotes communication regarding nearshore research.

Offshore Environmental Studies Forum

To co-ordinate federal, provincial and industry offshore management and research; see copy of memorandum following.

- Environment Canada member: John Wiebe, Regional Director General's office.
- Coordinator, Bob Langford, Assessment Branch, B.C. Ministry of the Environment.

Environmental Land Use Committee (ELUC)

Environmental Land Use Committee Secretariat (ELUCS)
(disbanded September 1981)

A committee composed of representatives of various provincial resource and environment ministries chaired by the Ministry of the Environment. Has role in determining provincial policy regarding resource use and management; co-ordinates studies and planning procedures; implements impact assessment of major projects.

Shore Programs Coordinating Committee

A provincial committee meeting monthly "to foster co-operation, co-ordination and information exchange among provincial agencies involved in Shore Management and Development". Contact Bruce Morgan or Jon Sector, Assessments Branch, B.C. Ministry of the Environment.



To: Members Offshore Environmental
Studies Forum

Date: January 19, 1982

RE: Notice of Meeting February 26, 1982 10:00 a.m.
Offshore Environmental Studies Forum

Thank you each for your affirmative response to my December 18, 1981 letter re offshore environmental studies forum. The first meeting of this group is scheduled for February 26, 1982 at the Senate and Boardroom, Old Administration Building, University of British Columbia. At this meeting, I would like to briefly review each agencies current technical involvements which relate to offshore hydrocarbon exploration in British Columbia.

I would appreciate it if each member could prepare a brief list or summary of their agencies or universities present and planned activities which relate to offshore hydrocarbon exploration in British Columbia and present this at our first meeting.

The proposed agenda is as follows:

- Morning (1) Introductory remarks - B.C. Ministry of Environment
- (2) Technical involvement-- Each Agency
- Afternoon (3) Inventory and Monitoring -- General discussion
- (4) Objectives of Forum - General discussion

If you have comments or suggestions please contact myself or Jim Slater at 387-1928.

R. W. Langford,
Assessment Branch,
Ministry of Environment.

December 18, 1981

Re: Offshore Petroleum Environmental Studies Program

During preparation of a Preliminary Environmental Assessment of offshore petroleum industry for the Provincial Ministry of Environment, it has become clear to us that there is a great need for some type of forum, whereby the technical aspects of assessment and planning for the offshore petroleum industry can be coordinated. There are a large number of government, industry, and university people involved in data collection and interpretation. This information directly or indirectly relates to the inventory and planning needs of regulatory agencies who have the mandate of avoiding or mitigating environmental impacts related to offshore exploration and development.

It is important for the people responsible for the collection of chemical and biophysical information to be coordinating their efforts so that duplication of effort is not made, and so that critically needed information has been collected and interpreted when decisions, based on this data, need to be made. Frameworks for this type of coordination exist in Alaska and in other areas.

- 2 -

The existing needs for the West Coast are as follows:

1. A need for effective communication between the Federal Government Agencies, the Provincial Government Agencies, the companies intending to carry out exploration, and the Universities. The need here is to bring together regulatory agencies and technical experts from all of the sectors involved.
2. A need to examine the existing biophysical data base and to identify data gaps which require investigations and data gathering. Priorization of these needs is an important aspect of this.
3. A need to establish a balanced and effective environmental studies program for the West Coast which will give regulatory agencies the information they need to evaluate short and long term effects of offshore hydrocarbon exploration and development in British Columbia.

We would like to ask your cooperation in establishing an environmental discussion forum on the West Coast to address these needs. We would envisage the first meeting to be called early in the new year for discussion of terms of reference for the forum.

Yours truly,

Dr. R. Langford,
B.C. Coordinator,
Offshore Petroleum Environmental
Assessment.

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APPENDIX D OTHER BIBLIOGRAPHIES

Included here are the relevant biophysical references from Trans Mountain Pipeline, Ltd. Presentation to the N.E.B., Low Point Proposal Volumes 15 and 16, and the bibliography of the B.C. Ministry of the Environment, Assessments Branch, Offshore Petroleum Preliminary Environmental Assessment.

While many of the more useful references have already been cited in the Printed Materials section of this report, and while many references refer to Vancouver Island and the Georgia Strait region, enough potentially useful and previously unlisted material remains that it may be beneficial to include them here.

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