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Mineral Resource Activities in the Canadian Offshore*

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The world-wide increase in the search for petroleum offshore during recent years has been extraordinary. Today there are hundreds of companies exploring the continental shelves of 80 different countries, and some 30 nations are producing or are preparing to produce oil and gas from their offshore regions. More than 12,000 offshore wells have been drilled to date. Already, production is coming from as far as 70 miles out to sea, and significant discoveries have been made recently as far as 170 miles offshore. Production is now coming from areas with water depths ranging to 340 feet, and major discoveries are indicated in water depths exceeding 1,000 feet. Technology is fast evolving methods of completing and producing wells commercially in water depths of this magnitude.

World offshore petroleum production now amounts to more than 15 per cent of the world's total output, and subsea reserves now comprise more than 20 per cent of the world's total reserves. It is anticipated that in only 10 years, 1/3 of the world's total petroleum production will come from the Offshore. It has been estimated that of a total of 10 million square miles of offshore area in the world out to a water depth of 1,000 feet, 6 million square miles have potential for petroleum. Only a small fraction of this vast offshore area has been exploited thus far.

Although interest in the mineral resources off Canada's seacoasts, as elsewhere in the world, has been focussed primarily on the search for petroleum, so this is the main area of concern at the moment. Recent developments indicate that interest is building up in respect to offshore mineral resources other than oil and gas. Certain of these minerals occur in areas underlain by the same types of rocks in which oil and gas deposits are found, and exploration for them may utilize techniques similar to those applied in the search for oil and gas. Interest is also being shown in possible offshore mining prospects where the techniques of exploration are quite different from those utilized in the search for oil and gas, for example, placer-type deposits. This serves to demonstrate the multi-mineral resource potential of Canada's offshore regions.

Canada's submerged continental margin is probably the largest in the world. The continental margin comprises the continental shelf and the continental slope beyond as complementary components. The continental shelf is that submerged portion of a continent that dips gently seaward, on the average less than 1°, to a point where it merges into the continental slope through an increase in gradient to, on the average, about 3½°. The continental slope then continues downward into the ocean depths.

Canada's continental margin comprises a total area of some 1.5 million square miles, which is 40 per cent as large as Canada's entire land area. Of this, 500 thousand square miles lie off the east coast, 400 thousand square miles lie in the Hudson Bay and Hudson Strait regions, 50 thousand square miles lie off the west coast, and some 500 thousand square miles are in the Arctic, in the Beaufort Sea and the Arctic Archipelago region. Mineral resource activities in the Canadian Offshore are still in the exploration stage - we have not yet begun to exploit the great mineral potential of these areas.

Canada Oil and Gas Permits now cover approximately 850 thousand square miles, well over half of Canada's total continental margin. Off Canada's east coast alone, the total acreage now covered by Canada Oil and Gas Permits is about 260 million acres. The Prime Minister's announcements of December 2, 1968, and March 4, 1969, have served as a stimulus to offshore exploration in the regions involved. This is reflected in the marked increase in applications for exploratory permits as well as in the number of new exploration programs that have taken shape since then, specially in the east coast offshore region. In the Arctic, great interest has been sparked by the Prudhoe Bay oil discovery in Alaska, about 200 miles west from the Canadian boundary, and more recently by the significant oil showing encountered near Atkinson Point, about

¹ The Resource Administration Division administers and manages the federal interests in mineral resources offshore from Canada's east and west seacoasts and in the Hudson Bay and Hudson Strait regions, as well as those federally-owned mineral rights in the Provinces that become available for disposition.

In addition, the Division develops and provides policy recommendations and advice in regard to matters related to the Offshore, provides representation and expertise in dealing with inter-departmental, federal-provincial and international offshore matters, and provides for co-ordination between government and industry agencies concerned with utilization of offshore areas.

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100 miles northeast of Inuvik. Extensive Canadian offshore permits have been issued in the Beaufort Sea. Farther to the northeast, offshore permits have been issued covering areas between and adjacent to various of the Arctic Islands, the interest in this region being generated primarily by the current Panarctic Oils exploration program.

In total, approximately 540 million acres are now held under offshore Canada Oil and Gas Permits, as follows:

East Coast	- 259 million acres
Hudson Bay-Hudson Strait	- 115 million acres
West Coast	- 16 million acres
Arctic	- 150 million acres (approximately)

These permits have been issued in water depths ranging to thousands of metres: to 2,200 metres (about 7,000 feet) in the Gulf of Maine region, to 3,700 metres (about 12,000 feet) in the Scotian Shelf region, to 2,800 metres (about 9,000 feet) in the Grand Banks region, to 2,100 metres (about 6,800 feet) in the Labrador Sea region, to 900 metres (about 3,000 feet) in the Arctic Islands region, and to 2,600 metres (about 8,500 feet) in the Beaufort Sea region. Perhaps the extent of the offshore areas now covered by Canada Oil and Gas Permits may be more readily envisaged by noting that permits issued off the east coast alone now cover an area about twice as large as that of the four Atlantic Provinces combined including Labrador.

Off the east coast, geophysical surveys have been conducted over an area stretching for some 2,000 miles, extending northeasterly from the Gulf of Maine region to the Grand Banks region and thence northerly to Hudson Strait. These surveys have been carried out up to 300 miles offshore, commonly in areas with depths of several hundreds of feet, in places several thousands of feet. Off the west coast, similar surveys have been carried out over a 500-mile stretch extending from off Juan de Fuca Strait northerly to the Dixon Entrance region. In Hudson Bay extensive surveys have been carried out covering a very large area considered favourable for petroleum exploration. Some seismic work has been carried out in the Beaufort Sea off the mainland coast of the Territories.

Exploratory drilling programs have been or are being carried out off the west coast, off the east coast, and in the Hudson Bay and Hudson Strait regions. As early as 1965, extensive core drilling was carried out off the east coast in the Grand Banks and other regions, in water depths ranging to 3,500 feet. The first deep drilling program on Canada's continental shelf was carried out on the Grand Banks in 1966, with one well drilled 100 miles offshore and a second 175 miles offshore. The following year, a deep exploratory well was drilled on Sable Island. More recently, over a two-year period from mid-1967 to mid-1969, an extensive 14-well program was carried out off the west coast.

The first well in Hudson Bay was drilled last summer, about 125 miles offshore. Drilling operations also took place last summer farther to the northeast in the Hudson Strait region, on Akpatok Island in Ungava Bay.

New extensive drilling programs are now underway off the east coast. Shell Canada is drilling their fourth well on the Scotian Shelf, and Hudson's Bay Oil and Gas has just spudded their first well in the Gulf of St. Lawrence. There are plans for additional drilling programs in east coast areas. Two of these future programs will be carried out by semi-submersible drilling units built in Halifax at a cost of about \$13 million each. One of these drilling units was christened on March 21 and will be in operation on the Scotian Shelf in May - the second is expected to be in operation on the Grand Banks for Amoco Canada Petroleum and Imperial Oil near the end of this year. Each of these units will have a drilling capability of 25 thousand feet and the ability to operate in 800 feet of water. On the basis of announced drilling programs, and tentative programs as yet in various stages of planning, it seems a reasonable estimate that some 50 exploratory wells will probably be drilled off the east coast over the next three years.

Drilling developments in the areas off our seacoasts have certainly outstripped the expectations of only a few years ago, with the most remarkable upsurge taking shape in the east coast offshore region. The Canada Oil and Gas Land Regulations require that the position of a well be surveyed in accordance with a plan of legal survey approved by the Surveyor General. These surveying requirements, as they stand at present, were actually formulated for wells drilled onland in the Yukon and Northwest Territories. There is now a real and urgent need to design and put into effect appropriate surveying requirements for Canada's offshore regions, each of which has its own variety of special operating conditions.

As can be readily envisaged, the types of exploration permits or exploitation leases designed with regard to minerals other than oil and gas will vary greatly as to areal extent and other terms and conditions from those issued for oil and gas, and there will be a wide range of such terms and conditions with respect to different designated minerals. Eventually, the situation will develop in our offshore regions where a variety of terminable grants issued in respect of oil and gas and other various designated minerals will overlap, coincide, or become

completely enclosed by one another. There will be, therefore, this additional level of complexity associated with the multi-mineral resource development of our offshore regions.

An effective offshore surveying system is needed in order for Industry and Government to be able to fulfill their respective obligations. Both Industry and Government are concerned with the basic need to identify the specific areas for which various types of mineral rights have been granted. A permittee or lessee is then in a position to effectively explore, develop and exploit his resource rights, and the resource management groups of the Canadian Government are then in a position to fulfill their legal and technical responsibilities. In the case of oil and gas rights, it is vital for example that an operator be able to relocate a well for the purpose of undertaking remedial measures should an abandonment or suspension program prove to be inadequate, and where commercial production is attained, it is important to ensure that a well is located so as not to improperly drain that portion of the reservoir outside its assigned area of influence.

Offshore mineral resource activities have raised a number of international problems for Canada. Firstly, there are bilateral international problems involving Canada's offshore boundaries with other nations. It is the accelerating interest in offshore minerals in recent years, specifically the issuance of offshore oil and gas permits, that has given rise to the necessity for defining Canada's offshore boundaries vis-a-vis adjacent and opposite foreign nations.

Off the east coast, France has claimed jurisdiction over the resources of a relatively large area of the continental shelf south of Newfoundland because of her ownership of the St. Pierre-Miquelon Islands. Canada has rejected France's claim as excessive, and we have been negotiating with France for some time in regard to the delimitation of our respective areas of continental-shelf jurisdiction. Offshore boundaries must also be established between Canada and the United States, and in this case there are four different offshore regions involved - the Gulf of Maine region off the east coast, the Strait of Juan de Fuca and Dixon Entrance regions off the west coast, and the Beaufort Sea region off the Arctic coast. Each of these regions has its own special problems, both technical and legal. Negotiations with the United States on these matters are as yet in the preliminary stage. Most recently, the issuance of exploratory permits in the Davis Strait region has given rise to an interchange of discussions with Denmark as regards respective areas of continental-shelf jurisdiction in the region between Canada and Greenland.

In response to the demands of Industry for oil and gas permits upon which to carry out exploration programs, the Canadian Government has issued permits in all the foregoing areas. It is unlikely that firm agreements on these boundaries will be reached overnight. We are involved here not just with the necessity of separating out different areas covering various types of mineral rights granted under Canadian regulations to competitive parties, we are involved in an even more serious matter, differentiating between the offshore areas within which two separate sovereign nations may exercise mutually exclusive rights for the purpose of exploring and exploiting seabed resources, including of course the drilling of wells. The day will come when these negotiations have been consummated, when appropriate treaties have been signed and sealed, and then those responsible for doing so will have to determine these boundaries in detail and demarcate them in some fashion.

Apart from bilateral international problems, there is the additional, broad, international problem of the seaward extent of Canada's national limits of jurisdiction over the natural resources of the seabed and subsoil. Here again, this is a problem that has reached its present prominence due primarily to the greatly increased interest in the potential of offshore mineral resources, with the interest expressed in this case by the world community as a whole. This is a fundamental question, directly affecting not only Canada but every other coastal nation as well.

It is now generally recognized by nations that there exists an area of the ocean floor which lies beyond the limits of national jurisdiction, and further, that the seabed resources within this area should be exploited for the benefit of mankind. In the past two years in particular, the problem of how far seaward the limits of national jurisdiction over seabed resources should extend has been the subject of extensive study and debate. Canada has become deeply engaged in this problem, especially through participation in the United Nations Committee on the Seabed. In this connection, it is important for Canada to be able to demonstrate to the world at large that we have not only the right and the desire to administer the seabed resources off our coasts, but also the technical, financial and human resources to do the job effectively.

Under the provisions of the 1958 Geneva Convention on the Continental Shelf, a coastal nation has exclusive sovereign rights for the purpose of exploring and exploiting the natural resources of the seabed and subsoil seaward from the outer limit of its territorial sea to where the depth of water reaches 200 metres, or beyond that point to where the depth of water permits exploitation. The crucial question is: at what point should this seaward extension of exclusive exploration and exploitation rights stop? Here we become involved in the fundamental issue of differentiating between the mineral resource rights of Canada vis-a-vis the world community of nations as a whole. When this basic and intricate international problem has become resolved, it will then be necessary, as in the case of other offshore boundaries, for the limits of national

jurisdiction to be determined in detail and demarcated in some fashion.

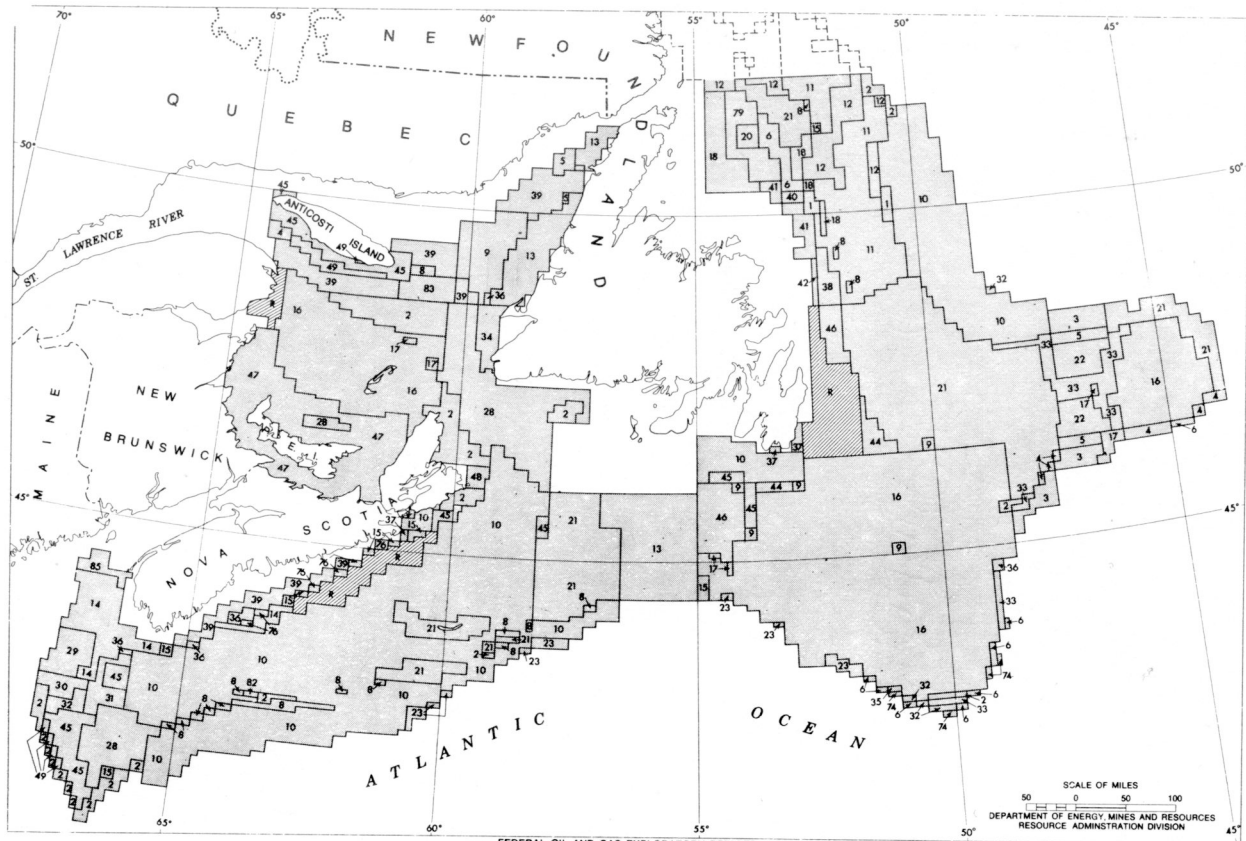
In summary, an effective surveying system in the Offshore is necessary from the standpoint of both Government and Industry. Obviously, there are many legal and technical reasons why both Industry and Government are concerned with the basic need to identify the specific areas for which mineral rights are granted and the specific locations of mineral resource activities. Furthermore, when Canada's offshore boundaries with adjacent and opposite nations are determined, they will have to be demarcated in detail, and eventually the limits of Canada's jurisdiction over seabed resources vis-a-vis that of the world community will have to be similarly demarcated.

The submerged lands of our continental margin represent vast new areas of great resource potential for Canada, and it is clearly in the national interest to facilitate the rapid development of these resources. We must at the same time bear in mind the vital necessity of protecting our vulnerable offshore environment. Offshore resource management objectives must include supervising and controlling mineral resource activities so as to protect the ecosystem of our seas and oceans. We must ensure the conservation of the living resources of the sea, the protection of the recreational and other uses of the water itself, and the preservation of the environment for the owners and users of the shoreline.

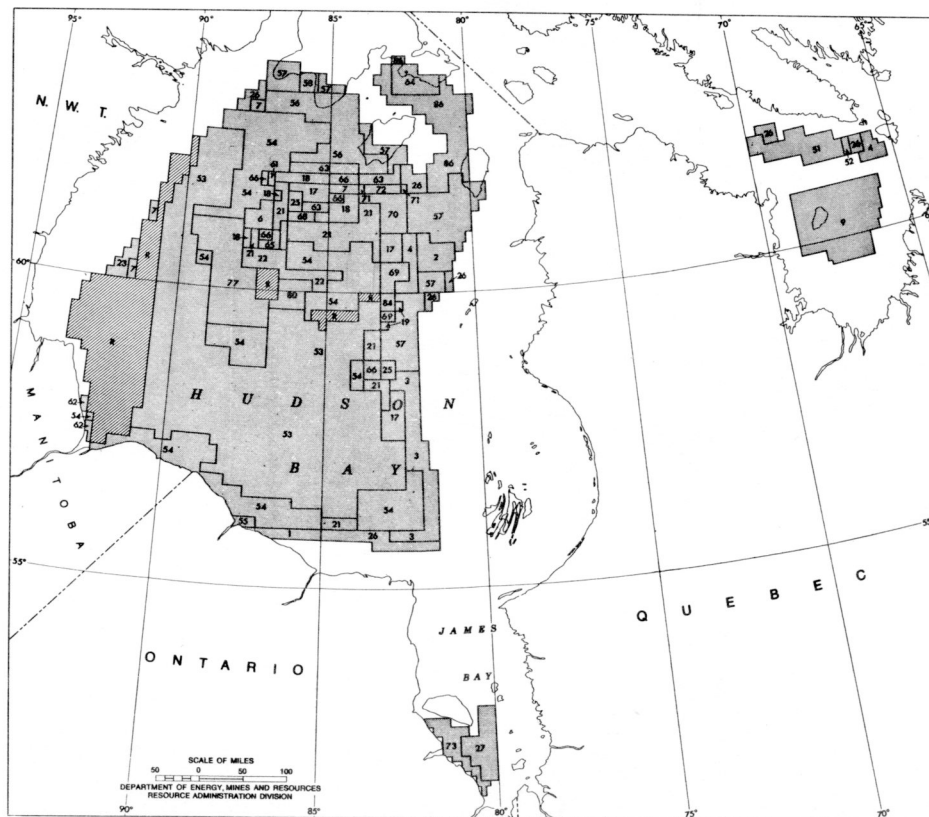
■ INDEX TO FEDERAL OIL AND GAS PERMIT MAPS AND ACREAGE ■

KEY NO.	PERMITTEE	GULF OF ST. LAWRENCE AND ATLANTIC	LABRADOR SEA	HUDSON BAY AND HUDSON STRAIT	PACIFIC OCEAN	TOTALS
1	CITIZENS PIPELINE	368,305	131,849	484,104	327,312	1,311,570
2	SIEBENS OIL & GAS	6,526,697	2,115,138	1,130,567		9,772,402
3	R.G. BELFOI	2,184,669		3,048,361		5,233,030
4	SYRACUSE OILS	897,488		1,184,738		2,082,226
5	TRUDEL MINERALS	1,099,747	394,298			1,494,045
6	{ WESTERN DECALTA 45% PETROL OIL & GAS 5% PETROREP CANADA 25% COREXCAL INC. 25% }	886,065	284,591	616,608		1,787,264
7	BOSWELL MINERALS			609,372		609,372
8	RANGER OIL	1,364,119	249,179		239,268	1,852,566
9	CANADIAN HOMESTEAD	2,894,327		5,546,634		8,440,961
10	SHELL CANADA	47,368,998			12,283,818	59,652,816
11	TRIAD-B.P. EXPLOR'N	7,719,668	4,929,359			12,649,027
12	TENNECO OIL	2,842,479	28,979,564			31,822,043
13	GULF OIL	8,511,088			675,000	9,186,088
14	TRANSALTA OIL & GAS	3,178,555				3,178,555
15	SHENANDOAH OIL	591,489	732,758			1,324,247
16	AMOCO CANADA PET.	9,827,967			348,616	10,176,583
17	CAN. TRUST COMPANY	614,943		2,055,194		2,670,137
18	CAN. INDUSTRIAL G. & O.	2,621,016	422,862	1,404,688		4,448,566
19	WESTERN LAND SERVICE		149,109	129,624		278,733
20	TROY OILS	320,494	577,965			898,459
21	MOBIL OIL	28,532,207	196,054	4,051,896		32,780,157
22	DOMO PETROLEUM	2,081,689		1,456,126		3,537,815
23	JOE PHILLIPS LTD.	1,017,799		507,944		1,525,743
24	SUCCESS OIL LIMITED		305,397			305,397
25	WAINOCO OIL & CHEM.		755,646	510,668		1,266,314
26	SULPETRO OF CANADA			2,903,823		2,903,823
27	WESTERN MINERALS			1,561,346	592,287	2,153,633
28	TEXACO EXPLORATION	9,237,668				9,237,668
29	CAN. PERMANENT TRUST	1,165,941				1,165,941
30	MONTREAL TRUST CO.	563,830				563,830
31	CENTRAL-DEL RIO OILS	798,099				798,099
32	CANADIAN SUPERIOR OIL	653,687				653,687
33	VOYAGER PETROLEUMS	2,664,469				2,664,469
34	J.M. COYNE	725,032				725,032
35	JEFFERSON LAKE PETCHEM.	46,542				46,542
36	R.F. GOSS	409,508				409,508
37	A.S. McLEAN	215,830				215,830
38	ANCO EXPLORATION	670,017				670,017

KEY NO.	PERMITTEE	GULF OF ST. LAWRENCE AND ATLANTIC	LABRADOR SEA	HUDSON BAY AND HUDSON STRAIT	PACIFIC OCEAN	TOTALS
39	MISSION OIL DEVELOP.	6,054,289			294,698	6,348,987
40	INTER-ROCK OIL	163,378				163,378
41	ACROLL OIL & GAS	987,010				987,010
42	PRUDHOE BAY OILS	167,573				167,573
43	BARAMY INVESTMENTS	533,576				533,576
44	ANDEX OIL COMPANY	921,243				921,243
45	CHEVRON STANDARD	3,669,581				3,669,581
46	ELF OIL EXPLORATION	2,859,619				2,859,619
47	HUDSON'S BAY OIL & GAS	8,402,067				8,402,067
48	MURPHY OIL COMPANY	306,675				306,675
49	NEW ASSOCIATED DEV.	634,958				634,958
50	PADDON HUGHES DEV.		574,423			574,423
51	TRANS-CANADA RES.			2,067,004		2,067,004
52	J.E. MITCHELL			122,220		122,220
53	ATLANTIC RICHFIELD			38,804,800		38,804,800
54	AQUITAINE COMPANY			18,601,886		18,601,886
55	HOUSTON OILS			153,328		153,328
56	SUNLITE LAND LTD			3,874,522		3,874,522
57	KESTREL EXPLORATION			7,021,312		7,021,312
58	PEYTO OILS LTD			285,644		285,644
59	HIGH COUNTRY MINERALS		64,333			64,333
60	{BOSWELL MINERALS 50%} {CANADIAN EXPORT G & O 50%}		640,950			640,950
61	YELLOWKNIFE BEAR MINES			277,299		277,299
62	PIPAWA EXPLORATIONS LTD			103,000		103,000
63	TECK CORPORATION			1,021,424		1,021,424
64	SOGEPEP LIMITED			685,944		685,944
65	OPEKAR INVESTMENTS			124,488		124,488
66	WORLDWIDE ENERGY CO.			969,823		969,823
67	J.F. LEMIEUX		110,360			110,360
68	J.C. MILLIKIN			246,384		246,384
69	GEM PETROLEUMS			1,009,404		1,009,404
70	BLUE WATER OIL & GAS			1,165,788		1,165,788
71	WESTERN OIL CONSULT.			121,244		121,244
72	ULSTER PETROLEUMS			303,110		303,110
73	MID EASTERN OIL & GAS			985,528		985,528
74	NORTH AMERICAN ENERGY	186,226				186,226
75	OFFSHORE OIL & GAS				839,155	839,155
76	{BOSWELL MINERALS 25% UNITED CANSO O & G 25%} {CAN EXPORT G & O 50%}	310,217				310,217
77	{TRANSALTA OIL & GAS 35% MOBIL OIL 25%} {CANADA CITIES SERVICE 30%} {HAMILTON BROS. CAN GAS 10%}		4,516,634			4,516,634
78	{AMOCO CANADA PET. 50%} {IMP. OIL ENTERPRISES 50%}	39,537,129				39,537,129
79	{HOUSTON OILS LTD 25% ASAMERA OIL CORP 25%} {OCEANIA OIL LTD 25% LOCHABER OIL CORP 25%}	1,603,867				1,603,867
80	{BOW VALLEY LAND CO. 50%} {HOME OIL COMPANY LTD 50%}			898,431		898,431
81	BALLINDERRY EXPLORATIONS	659,770				659,770
82	BUTTES RESOURCES CANADA	46,791				46,791
83	J.M. HUBER CORPORATION	798,712				798,712
84	{AXEL HEIBERG OIL CO. 98%} {ARTIK LEASEHOLDS INC 2%}			257,334		257,334
85	{J. RAY McDERMOTT CANADA LTD. 50%} {GENERAL CRUDE OIL ALBERTA LTD 50%}	469,543				469,543
86	{TEXAS GULF SULPHUR 40%} {TECK CORPORATION 20%} {CAN. HOMESFEAD OILS 20%} {SOGEPEP LIMITED 20%}			3,920,548		3,920,548
		217,372,189	41,613,835	114,738,792	15,600,154	389,324,970



FEDERAL OIL AND GAS EXPLORATORY PERMITS
GULF OF ST LAWRENCE AND ATLANTIC
JANUARY 1, 1970



FEDERAL OIL AND GAS EXPLORATORY PERMITS
HUDSON BAY AND HUDSON STRAIT
JANUARY 1, 1970

