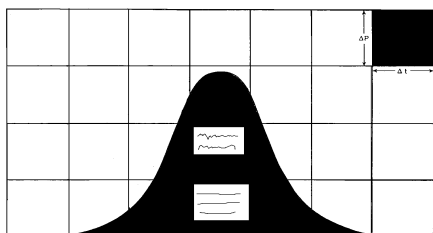


HUBBERT CENTER NEWSLETTER # 2002/4



M. KING HUBBERT CENTER FOR PETROLEUM SUPPLY STUDIES

M. KING HUBBERT CENTER
Petroleum Engineering Department
COLORADO SCHOOL OF MINES
GOLDEN CO 80401-1887

PETROLEUM POSITIONS OF UNITED STATES (US/48 & ALASKA), CANADA, MEXICO NORTH AMERICA REGION

L. F. Ivanhoe

NORTH AMERICA

These Western Hemisphere nations have a total population of 392 million with an increase of 43 million during the last decade. Population, infrastructure, social problems, and economics vary greatly between different parts of arctic Alaska, sub-arctic Canada, industrialized lower US/48 states, and developing Mexico. All of the countries are oily, with 8.0% of the world's claimed oil reserves (COR).

Alaska's adverse climate, lack of people and infrastructure, oil laws, operating problems, etc. are so different from those of the lower US/48, that Alaska is treated as a separate (LDC) region/country by the CSM/Hubbert Center.

Table 1: World Petroleum Supply and Disposition

This table is from the U.S. Department of Energy report: International Energy Annual—DOE/EIA-0219(99), Feb. 2001. This compilation combines data from several sources to present the oil Production/Consumption/Imports/Exports of each nation. The table is always a couple of years late due to the complexity of assembling the various data into one table. It allows direct comparison between the several factors for each of the nations of the table or other HC newsletters on petroleum positions.

Table 1 World Petroleum Supply and Disposition, 1999
(Thousand Barrels per Day)

The underlined/graphed nations are the most important oil producers in the region.
See Table #1 for other nations' recent oil production/consumption.

Region/Country	Primary Supply			Disposition			Bunkers	
	Oil Production ¹	Crude Oil Imports	Total Imports of Refined Petroleum Products	Crude Oil Exports	Total Exports of Refined Petroleum Products	EIA Annual 2000 - Feb. 01 Apparent Consumption (Including Bunkers) ²	Residual Fuel Oil	Distillate Fuel Oil and Other Products
<u>Canada</u>	2,620	836	178	1,059	754	2,029	18	4
<u>Mexico</u>	3,373	0	364	1,580	149	2,000	2	22
<u>United States</u>	8,993	8,731	2,122	118	822	19,519	213	393
Other	0	0	8	0	(s)	8	0	(s)
Total	14,986	9,567	2,671	2,757	1,725	23,556	233	419

¹ Oil production includes crude oil, natural gas plant liquids, other liquids, and refinery processing gains.

² Apparent consumption includes internal consumption, refinery fuel and loss, and bunkering. Also included, where available, are liquefied petroleum gases sold directly from

natural gas processing plants for fuel or chemical uses.

(s)=Value less than 500 barrels per day.

Note: Sum of components may not equal total due to independent rounding.

Energy Information Administration/International Energy Annual 2000: DOE/EIA-0219(00), Feb. 2002

Note: This is one of a series of 7 CSM/HC concise "petroleum position" summaries of the most significant oil producing countries in each of the U.S. DOE/EIA-0219 "regions". Please save for future reference/comparisons of graphs.

HC#2002/4-1-1
OCTOBER, 2002

Colorado School of Mines (CSM) / Hubbert Center (HC)

Country Oil Summary

GEOGRAPHY, HISTORY, POLITICS

Country: UNITED STATES OF AMERICA (USA) Region: North America Figure No. 1A (Special 10K scale)
 Population: (2000) 285 millions Main Language/Religion English/Christian
 Independence: (1783) from British King Current political status: Republic
 Major Social Turmoil: (1861-65) Civil War (U.S. vs Confederate States-US won)

The U.S. (US/48 = conterminous 48 states without Alaska or Hawaii) is a huge country and dominates the North American economies. It is bounded on the north by Canada; on the east by the Atlantic Ocean; on the south by the Gulf of Mexico and Mexico; and on the west by the Pacific Ocean. It was first populated along the east coast by the English in the early 1600s. After the War of Independence (1775-1783) settlers gradually crossed the Appalachian Mountains into the Mississippi River flatlands. In 1803 the drainage area west of the Mississippi was purchased from France, and Florida (1819) from Spain. The entire strip from Texas west to California was liberated from Mexico after the US/Mexican war (1848), and the Oregon Territory was divided with Britain (1846). During its attempt to entice settlers to the virgin lands west of the Appalachians, the U.S. government offered each "homesteader" 160 acres of land, INCLUDING THE MINERAL RIGHTS on all farm lands. This "Homesteaders' Mineral Rights" law is unique to the U.S./48 and is the principal reason why the oil business developed in the U.S., where the "ROYALTY" was paid to the landowner instead of to the "Crown" wherever the government owns all mineral rights.

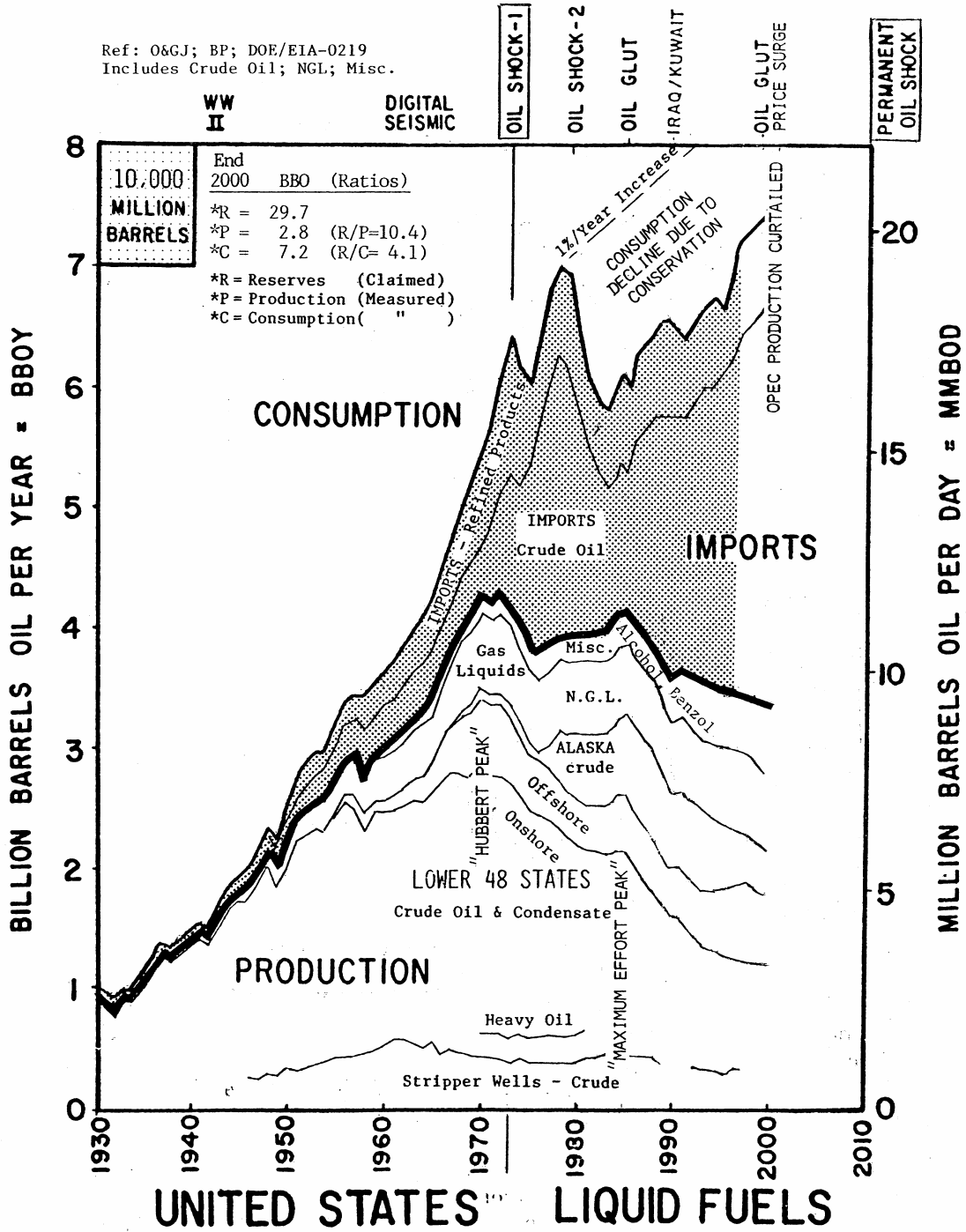
PETROLEUM: UNITED STATES is "gassy" & "oily": (with 2.9 % of world's COR.)

First oil/gas discovery: Onshore (1859) Offshore: (1896) California
 National oil company formed: (-); Name: - Oil Nationalized (-)
 Joined OPEC: (-) OAPEC: (-)
 Oil Production: (2000) 7,742 MBD Oil Consumption: (2000) 19,697 MBD
 Exports: () MBD Imports: (2000) 11,955 MBD
 COReserves (2001) 30.4 BBO; CGR: 167 Tcf. Oil:R/P= 10.7 yrs;R/C= 5 yrs
 Hubbert production peak: (1970) Maximum effort peak: (1985) EUR: BBO
 Non-conventional oil prod.() MBD; "Other" oil prod. () MBD

The unique "Landowner mineral rights" is the reason why the U.S./48 is the most thoroughly drilled nation in the world, with 3X the number of oil fields (1989=31,385) as in all the rest of the world combined (1989=9,779). Until WW II, the U.S. was the world's main oil producer, and was the globe's "swing producer" until 1971 when Texas production topped out. The U.S./48 today imports 55% of its liquid fuel (=oil & products), making the U.S. the world's largest oil consumer (=25% of total global demand). Foreigners blame the U.S. for using more than its share of the world's oil resources. The U.S./48 and Alaska is again the world's #2 oil producer (after Saudi Arabia) now that the USSR's production dropped off after 1989.

References: (1) BP Statistical Review (annual); (2) DOE/EIA-0219 (annual); (3) CSM Hubbert Center Newsletter: HCN# <u>98/1-1, Jan 1998, Petroleum Positions of United States</u> (4) BP (US) 2000 Ref (1): Oil Production = crude oil + oil sands + natural gas liquids. () = year; MBD = 1,000 Barrels/Day; Reserves = (end year)from BP/O&GJ; OPEC = Organization of Petroleum Exporting Countries; OAPEC = O-Arab-PEC. BBO = Billion Barrels Oil; Tcf = Trillion cubic feet gas; COR = Claimed Oil Reserves; CGR = Claimed Gas Reserves; EUR = Estimated Ultimate Recovery-BBO. e = estimated.	Ivanhoe Date: <u>8/02</u> Rev: _____ _____ _____ _____
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Ref: O&GJ; BP; DOE/EIA-0219
Includes Crude Oil; NGL; Misc.



IVANHOE **FIGURE I-A**

NOTE: VERTICAL SCALE OF THIS (10,000) GRAPH IS 5 TIMES THAT OF USUAL (2000) CSM/HC GRAPHS.

Colorado School of Mines (CSM) / Hubbert Center (HC)

Country Oil Summary

GEOGRAPHY, HISTORY, POLITICS

Country: ** ALASKA (USA) Region: North America Figure No. 1B (scale=2K)
 Population: (1995) 0.6 millions Main Language/Religion English/Christian
 Independence: (1959) from U.S. Territory Current political status: US # 49 State
 Major Social Turmoil: () _____

**Alaska's operating problems (remoteness, lack of infrastructure & people); most lands owned by the Federal/State/Native governments result in the mineral rights/royalties being held-by/paid-to the "state" (in contrast to the lower US/48 legal system) is more similar to operating problems in a foreign "less developed country" (LDC) than the US/48. Alaska is accordingly treated by CSM/HC as a distinct region-separate from the lower US/48.

Alaska is a huge peninsula at the NW corner of North America, between the frozen Arctic Ocean on the North; NW Canada on the east; cold Gulf of Alaska on the south; and frigid Bering Sea on the west. Alaska is roughly the size of Iran or the States of California + Oregon + Washington + Idaho + Nevada + Utah combined. Alaska's population of 0.6 million is less than that of any OPEC nation – most of Alaska being frigid and virtually unpopulated when compared with the lower US/48 states with 280 million people. Alaska was bought from Russia in 1867 for \$7.2 million. The Yukon (Canada) gold rush in 1897 brought miners. Only three towns (Anchorage, Fairbanks, Juneau) now have more than 10,000 residents.

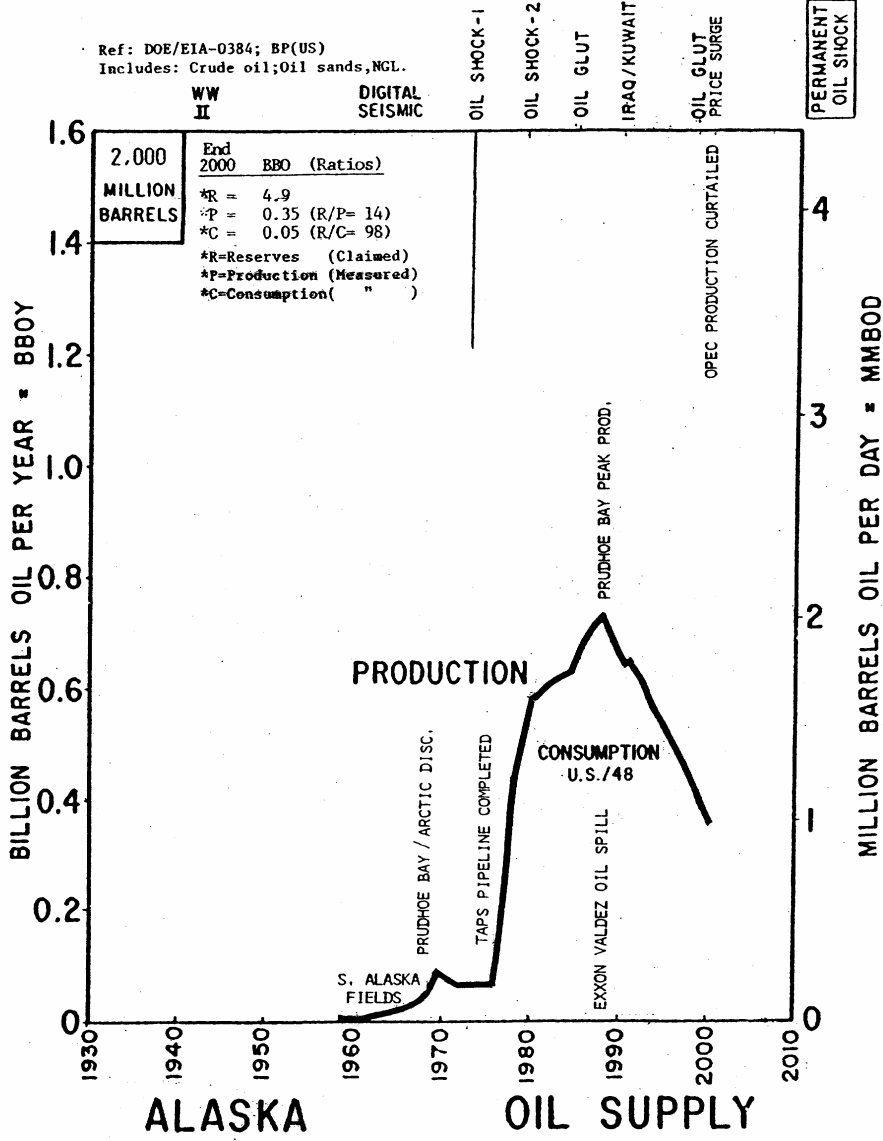
PETROLEUM: ** ALASKA is very "oily":(with 0.5 % of world's COR.)

First oil/gas discovery: Onshore (1905) Offshore: (1962)
 National oil company formed: (-) Name: _____ Oil Nationalized ()
 Joined OPEC: (-) OAPEC: (-)
 Oil Production: (2000) 970 MBD/BP(US) Oil Consumption:(2000) 129 MBD/BP (US)
 Exports:(2000) 841 MBD Imports:() _____ MBD
 COReserves(2000) 4.9 BBO; CGR: 9.7 Tcf. Oil:R/P= 14 yrs;R/C= 104 yrs
 Hubbert production peak: (1988) Maximum effort peak: (-) EUR: _____ BBO
 Non-conventional oil prod.() _____ MBD; "Other" oil prod. () _____ MBD

Oil seeps along the Gulf of Alaska seashore were tested by early prospectors. During WW II the US Navy explored the US Naval Petroleum Reserve (NPR-A) along the Arctic Ocean coast-discovering the Umiat oilfield and the Point Barrow gas field. In 1957, Richfield Oil Co. discovered the Swanson River field on the S. Alaska Cook Inlet, which led to several discoveries in the Cook Inlet area. In 1968 Richfield and BP discovered the supergiant (EUR=12BBO) Prudhoe Bay field on the Arctic North Slope, east of the NPR-A. Huge structures in the Gulf of Alaska were drilled during the 1970s but were barren of oil. The USGS supervised U.S. government exploration (est. \$500 billion) of the NPR-A, during the 1970s but found no oil. The Trans-Alaska Pipeline (TAPS) was completed in 1978 to deliver Prudhoe Bay oil from North to South Alaska ice-free port of Valdez. Prudhoe Bay production peaked 10 years later in 1988, when it produced 25% of the U.S. total production. Alaska's Arctic Slope is the last remaining major undrilled onshore prospective region of Alaska & US/48.

References: (1) BP Statistical Review (annual); (2) DOE/EIA-0219 (annual); (3) CSM Hubbert Center Newsletter: HCN# _____ (4) BP (US) 2000	Ivanhoe Date: <u>8/02</u> Rev: _____
Ref (1): Oil Production = crude oil + oil sands + natural gas liquids. BP = British Petroleum; O&GJ = Oil & Gas Journal; () = year; MBD = 1,000 Barrels/Day; Reserves = (end year)from BP/O&GJ; OPEC = Organization of Petroleum Exporting Countries; OAPEC = O-Arab-PEC. BBO = Billion Barrels Oil; Tcf = Trillion cubic feet gas; COR = Claimed Oil Reserves; CGR = Claimed Gas Reserves; EUR = Estimated Ultimate Recovery-BBO. e = estimated. R/P = COR/Production; R/C=COR/Consumption	_____

Ref: DOE/EIA-0384; BP(US)
Includes: Crude oil; Oil sands, NGL.



IVANHOE FIGURE I-B

Colorado School of Mines (CSM) / Hubbert Center (HC)

Country Oil Summary

GEOGRAPHY, HISTORY, POLITICS

Country: CANADA Region: North America Figure No. 2A & 2B (scale=2K)
 Population: (1995) 30 millions Main Language/Religion English & French / Christian

Independence: (1867) from Britain Current political status: Confederation
 Major Social Turmoil: (1914, 1939) WW I and WW II w/Britain against Germany (= major casualties)

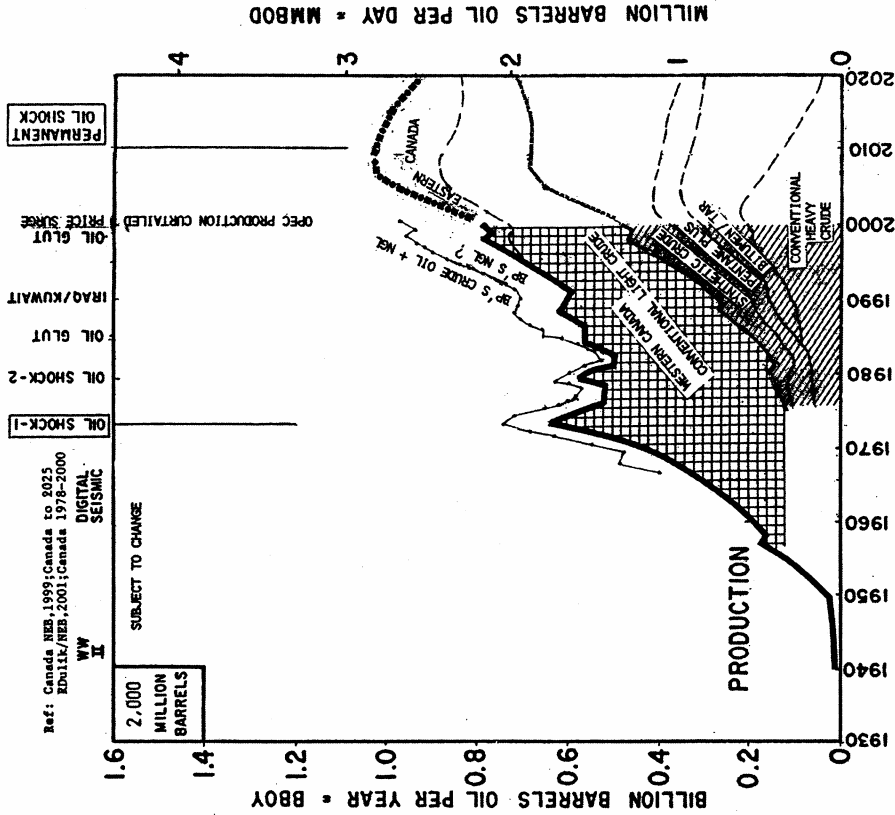
Canada is a vast country, the second largest in the world after the USSR. It is bounded on the south by the U.S.; on the west by the Pacific Ocean and Alaska; on the north by the frozen Arctic Ocean; and on the east by the North Atlantic Ocean. The population is virtually all within 200 miles of the U.S. border north to the limits of farming. Much of Canada is covered by the non-petroliferous basement rocks of the “Canadian Shield”, where mining is the main economic business. The native Inuit/Eskimos are sustained by the welfare system and try to maintain their old life-style in the Arctic. Canada was originally explored after 1670 by fur traders working for the Hudson Bay Co. from its various trading posts, and by French settlers along the St. Lawrence River. The French were defeated by the British in 1760, but the French language and customs have held on to remain a problem to the present-day Canadians – Quebec province constantly threatens to leave the Confederation. Canada is one of the four largest oil exporters to the U.S., which include: Venezuela, Canada, Mexico, and Saudi Arabia.

PETROLEUM: CANADA is “gassy” & “oily”: (with 0.6 % of world’s COR.)

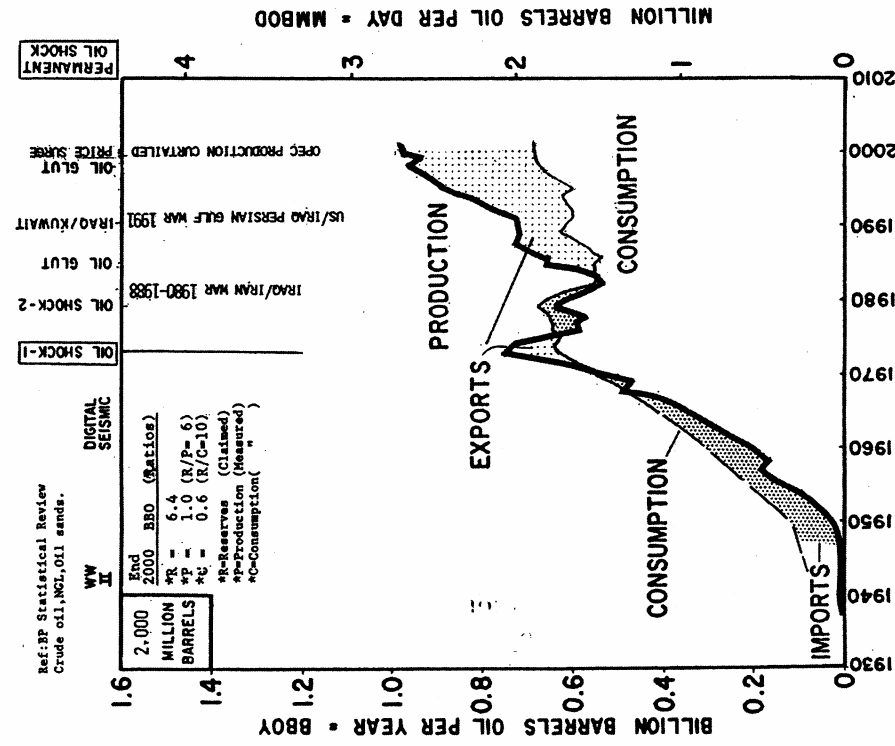
First oil/gas discovery: Onshore (1858) Offshore: (1979)
 National oil company formed: (-); Name: Petrocanada Oil Nationalized (-)
 Joined OPEC: (-) OAPEC: (-)
 Oil Production: (2001) 2,763 MBD Oil Consumption: (2001) 1,941 MBD
 Exports: (2000) ** 1,576 to U.S. MBD Imports: (1998) * Venezuela 783 + 185 prod. MBD
 COReserves (2000) 6.6 BBO; CGR: 59.7 Tcf. Oil:R/P= 8.8 yrs; R/C= 9.3 yrs
 Hubbert production peak: (1973) Maximum effort peak: () EUR: BBO
 Non-conventional oil prod. (1999) Tar/Syncrude = 324 MBD; “Other” oil prod. () MBD

Virtually all Canadian oil comes from: (A) Alberta oil province which runs from the U.S. border to the Arctic Ocean; (B) Arctic Islands; (C) Great Lakes; (D) Atlantic offshore. The lack of long pipelines limits exploration and production of remote regions. The first major oil discovery in Canada was the Leduc reef field in 1947 near Edmonton, Alberta. The Alberta Basin north of Montana border has now been extensively explored and is a mature oil province. The Arctic Islands did not live up to the initial hopes to find Big Oil there. The “Giant” Hibernia oil field was found in 1979 in the Atlantic off SE Newfoundland, and went on production in 1999. Alberta also has extensive “Tar Sands” (Athabasca; Cold Lake; Fort McMurray, etc.) that are now being mined and refined into usable oil liquids and road asphalt. (Fig. 2B) Huge investments are required for Tar Sand operations=\$1 billion/100,000 B/D. Tar sands production has increased rapidly since 1982. Alberta exports lots of natural gas to the U.S. *Imports of Venezuelan heavy crude oil may be omitted in some production statistics. Venezuelan oil is imported for East Canada refineries while light oil from Western Canada is exported to Western U.S.

References: (1) BP Statistical Review (annual); (2) *DOE/EIA-0219 (annual); (3) CSM Hubbert Center Newsletter: HC HCN# <u>98/1-1, Jan 1998, Petroleum Positions Canada & Mexico, HCN# 2002/2, Apr. 2002</u> (4) Canada’s future oil production; Projected 2000-2020; HCN# 2002-2 (5) BP Statistical Review of US (2000)**	Ivanhoe Date: <u>8/02</u> Rev: <u> </u>
Ref (1): Oil Production = crude oil + oil sands + natural gas liquids. BP = British Petroleum; O&GJ = Oil & Gas Journal; () = year; MBD = 1,000 Barrels/Day; Reserves = (end year)from BP/O&GJ; OPEC = Organization of Petroleum Exporting Countries; OAPEC = O-Arab-PEC. BBO = Billion Barrels Oil; Tcf = Trillion cubic feet gas; COR = Claimed Oil Reserves; EUR = Estimated Ultimate Recovery-BBO. e = estimated.	



IVANHOE FIGURE 2-A



IVANHOE FIGURE 2-B

Colorado School of Mines (CSM) / Hubbert Center (HC)

Country Oil Summary

GEOGRAPHY, HISTORY, POLITICS

Country: MEXICO Region: North America Figure No. 3 (Scale-2K)
 Population: (1998) 100 millions Main Language/Religion Spanish/Catholic Christian
 Independence: (1821) from Spain Current political status: Republic
 Major Social Turmoil: (1846) US/Mexican War (Mexico lost a strip to US from Texas to California)

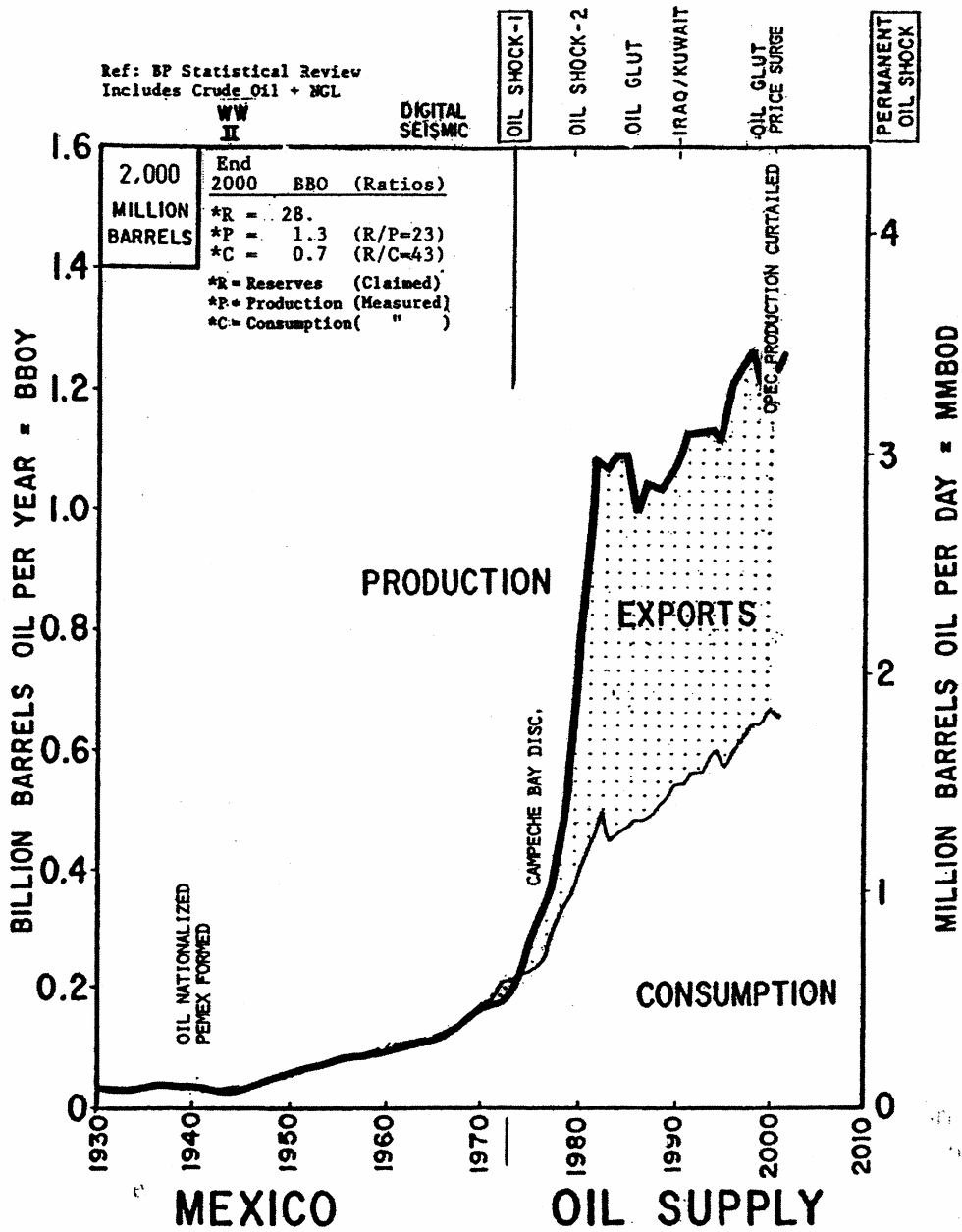
Mexico is a large country, slightly smaller than Alaska + Texas. It is dry and mountainous, bounded on the east by the Gulf of Mexico, on the south by Guatemala and Belize, on the west by the Pacific Ocean. The Spaniard Cortez (with 400 men) conquered the native Aztec kingdom in 1519 Mexican silver mines were important to the trans-Pacific galleon trade from Acapulco to Manila ships during the colonial period 1565-1821. Mexico is the largest Spanish-speaking country in the world. It is still a developing nation, with great differences in wealth between regions and classes. Population growth (16 million in 10 years) is a major problem. The Mexican government encourages migration of the excess poor and uneducated laborers to the U.S. factories along the border or illegally to the U.S. in search of work. Mexicans are generally hard workers and very loyal to their large families.

PETROLEUM: MEXICO is quite "oily":(with 2.6 % of world's COR.)

First oil/gas discovery: Onshore (1904) Offshore: (1959)
 National oil company formed: (1938); Name: PEMEX Oil Nationalized (1938)
 Joined OPEC: (-) OAPEC: (-)
 Oil Production: () 3,560 MBD Oil Consumption:(2001) 1,813 MBD
 Exports:(2001) 1,747 MBD Imports:() - MBD
 COReserves(2000) 26.9 BBO; CGR: 29.5 Tcf. Oil:R/P= 22 yrs;R/C= 41 yrs
 Hubbert production peak: () Maximum effort peak: () EUR: BBO
 Non-conventional oil prod.() MBD; "Other" oil prod. () MBD

All of Mexico's oil and gas production is from the Gulf of Mexico's onshore and offshore areas. Mexico imports natural gas from Texas. Mexico is one of the four largest oil exporters to the U.S. (Venezuela, Canada, Saudi Arabia, Mexico). Mexico joined in 1999 with the OPEC nations to reduce their production to raise/stabilize global oil prices. Pemex's budgets are limited by the Mexican government's large social needs.

References: (1) BP Statistical Review (annual); (2) DOE/EIA-0219 (annual); (3) CSM Hubbert Center Newsletter: HC HCN# <u>98/1-2, Jan 1998, Petroleum Positions Canada & Mexico</u>	Ivanhoe Date: <u>8/02</u> Rev: <u> </u>
Ref (1): Oil Production = crude oil + oil sands + natural gas liquids. BP = British Petroleum; O&GJ = Oil & Gas Journal; () = year; MBD = 1,000 Barrels/Day; Reserves = (end year)from BP/O&GJ; OPEC = Organization of Petroleum Exporting Countries; OAPEC = O-Arab-PEC. BBO = Billion Barrels Oil; Tcf = Trillion cubic feet gas; COR = Claimed Oil Reserves; CGR = Claimed Gas Reserves; EUR = Estimated Ultimate Recovery-BBO. e = estimated R/P = COR/Production; R/C = COR/Consumption	



IVANHOE FIGURE 3

- A. Public Perceptions are often not engineeringwise correct; but PUBLIC PERCEPTIONS ARE FACTS TO POLITICIANS.

“LONG TERM” TO POLITICIANS IS UNTIL THE NEXT ELECTION.

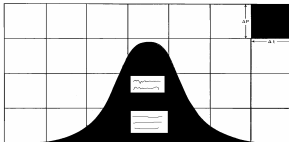
POLITICIANS GET ELECTED ON “GOOD NEWS”. Bad news is a “NO!NO! Politicians listen more willingly to bureaucrats who produce “good news” reports than to “Cassandra” whose warnings are “bad news.”

- B. THE FIRST STEP TO SOLVE ANY PROBLEM IS TO ADMIT THAT A PROBLEM EXISTS. Americans commonly feel that all problems can be solved. But for some problems there are no good solutions. A global oil shortage will be one of the worst problems to confront our civilization – even worse than the two World Wars.

- C. NEITHER CAPITAL NOT LABOR CAN CREATE PETROLEUM. We cannot print oil.

HC#2002/4-2-10

H.C. NEWSLETTER



The M. KING HUBBERT CENTER FOR PETROLEUM SUPPLY STUDIES

located in the Department of Petroleum Engineering
Colorado School of Mines
Golden, Colorado

The Hubbert Center has been established as a non-profit organization for the purpose of assembling and studying data concerning global petroleum supplies and disseminating such information to the public.

The question of WHEN worldwide oil demand will exceed global oil supply is stubbornly ignored. The world's oil problems, timing and ramifications can be debated and realistic plans made only if the question is publicly addressed. A growing number of informed US and European evaluations put this crisis as close as now to 2014. The formation of this center is to encourage a multi-field research approach to this subject.

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