

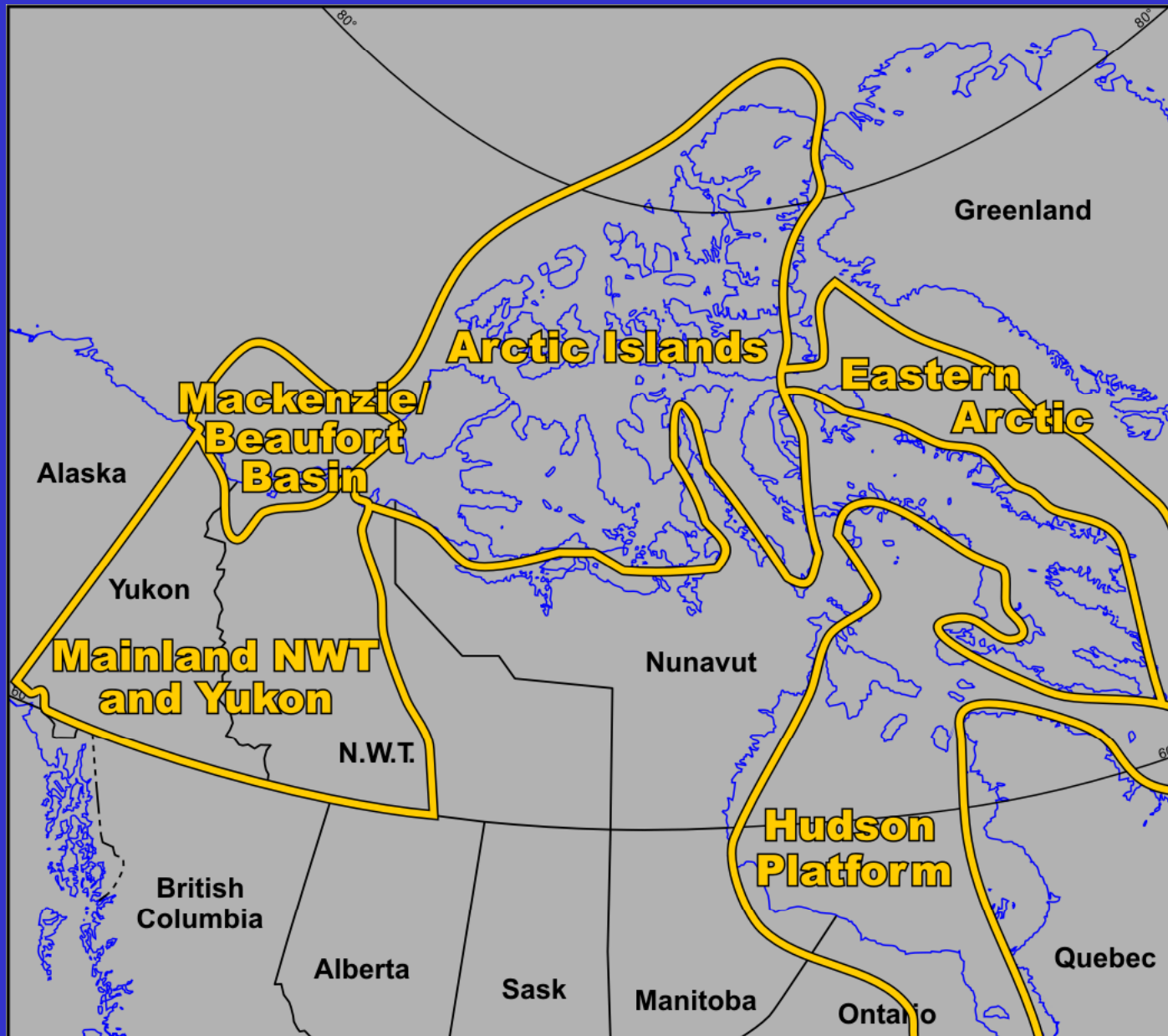
# **PETROLEUM EXPLORATION IN CANADA'S NORTHERN REGIONS**

**History, Current Activity and Future Potential**

**Gerry Reinson, Reinson Consultants Ltd.  
and**

**Ken Drummond, Drummond Consulting**

# CANADA'S NORTHERN REGIONS



# WELLS DRILLED IN CANADA'S NORTH

MAINLAND NWT AND YUKON	1,128
MACKENZIE/BEAUFORT BASIN	263
ARCTIC ISLANDS	174
EASTERN ARCTIC	5
HUDSON PLATFORM	4
<b>TOTAL</b>	<b>1,574</b>

**PRAIRIE PROVINCES AND B.C. > 430,000**

# DISCOVERED RESOURCES

PETROLEUM PROVINCE (REGION)	OIL (MMbbl)*	GAS (Bcf)*
MACKENZIE/BEAUFORT BASIN	1,041	10,136
NORTHWEST TERRITORIES/YUKON	317	1,773
ARCTIC ISLANDS	335	17,383
EASTERN ARCTIC	0	1,810
HUDSON PLATFORM	0	0
TOTAL	1,693	31,102

\* recoverable

# OBJECTIVES

1. To provide an overview of the history, and current and future activity, of petroleum exploration in Canada's northern regions
2. To highlight those sub-regions/basins having favourable potential, and which are viable/accessible for development by junior/intermediate as well as major E&P companies

# **HISTORY OF EXPLORATION**

**1920 - Initial Discovery, Oil at Norman Wells, NWT**

**1940's - World War II: Large-Scale Production at Norman Wells**

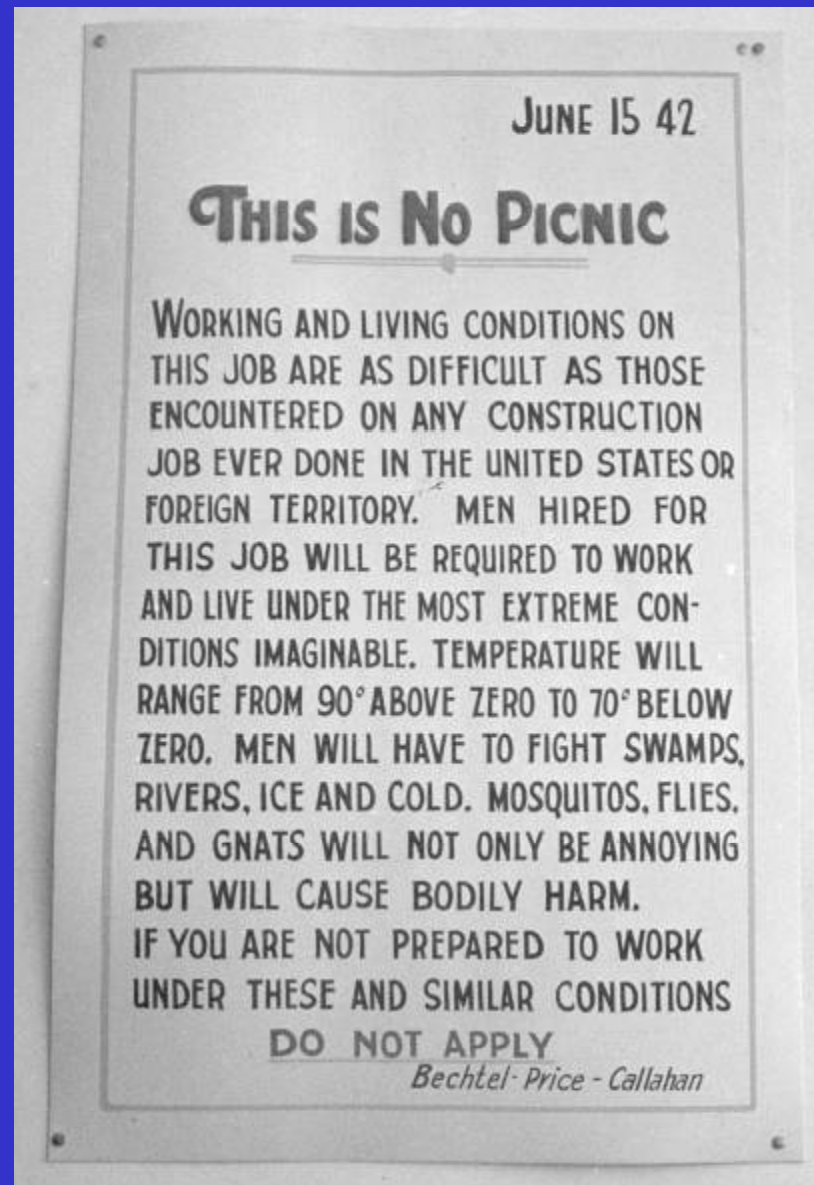
**1947 - Leduc Discovery, Canada Became Self-Reliant**

**1950's-60's - Drilling Extended into NWT and Yukon, Pointed Mountain Gas Discovery**

**1960's - Canada's Sovereignty Over Arctic and Offshore - Federal Government Granted Exploration Permits in High Arctic and Mackenzie/Beaufort – GSC, J.C. Sproule, Prudhoe Bay Discovery, 1968**

**1970's - Surge in Exploration Activity, Many Discoveries in Mackenzie/Beaufort and Arctic Islands**

# CANOL PIPELINE JOB AD



Richard S. Finnie/Library and  
Archives Canada/PA-171534

# **HISTORY OF EXPLORATION**

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# **HISTORY OF EXPLORATION**

**1970's - Arab Oil Embargo, Iranian Revolution - Led to NEP.  
Drilling Intense Until Early 1980's**

**Mid-1980's - High Interest Rates, Low Commodity Prices  
Terminated Northern Exploration. Deregulation of  
Petroleum Industry and NAFTA.**

**Mid-late 1980's - Settlement of Aboriginal Land Claims,  
Renewed Issuance of Exploration Rights**

**1990's - Uptake of Exploration Lands in southern NWT and  
Mackenzie Valley in 1994, and Strong Interest in 1999 in  
Mackenzie/Beaufort Basin**

**Mid-1990's-2007 - Rising Commodity Prices, Diminishing  
North American Supply versus Increasing Demand  
Creates Unprecedented Interest in Canada's North**

# DISCOVERED RESOURCES

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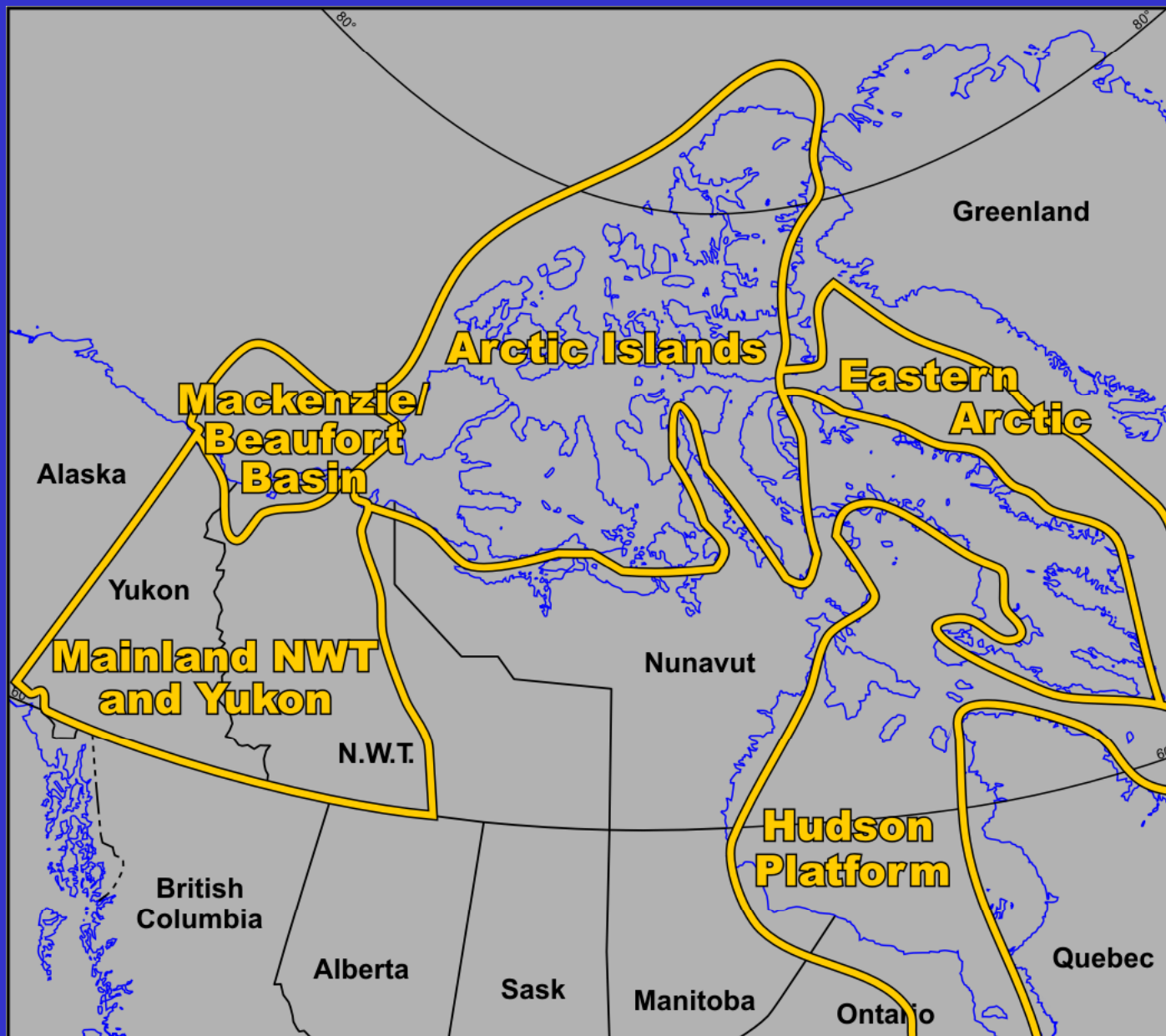
# NORTHERN CANADA PRODUCING GAS FIELDS JUNE 30, 2007

FIELD	EXPLORATION SUB-REGION	DISCOVERY DATE	CUM PROD (Bcf)	DATE PROD CEASED
BEAVER RIVER	LIARD PLATEAU	1969	7.7	1977
POINTED MOUNTAIN	LIARD PLATEAU	1967	315.7	2001
KOTANEELEE	LIARD PLATEAU	1964	225.8	
LIARD K-29	LIARD PLATEAU	1999	140.9	
LIARD P-66	LIARD PLATEAU	1998	2.5	2003
FORT LIARD F-36	LIARD PLATEAU	1987	9.3	
S.E. FORT LIARD N-01	LIARD PLATEAU	1987	8.7	
CAMERON HILLS	GREAT SLAVE PLAIN	1968	19.7	
IKHIL	MACKENZIE DELTA	1986	4.1	
TOTAL			734.4	

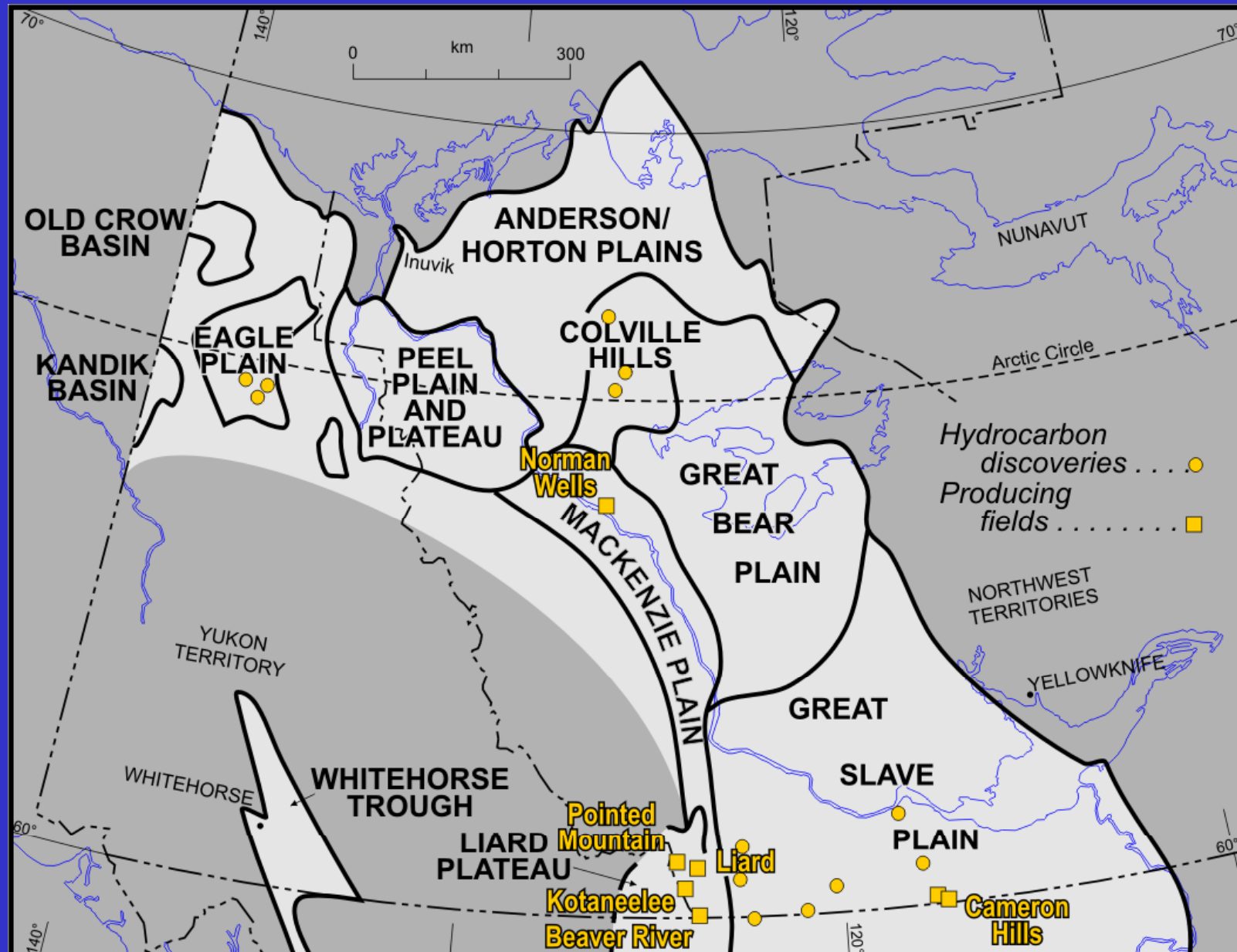
# NORTHERN CANADA PRODUCING OIL FIELDS JUNE 30, 2007

FIELD	EXPLORATION SUB-REGION	DISCOVERY DATE	CUM PROD (MMb)	DATE PROD CEASED
NORMAN WELLS	MACKENZIE PLAIN	1920	242.3	
BENT HORN	ARCTIC FOLD BELT	1974	2.8	1996
AMAILIGAK	BEAUFORT SEA	1983	0.4	1986
CAMERON HILLS	GREAT SLAVE PLAIN	2001	1.4	
TOTAL			246.9	

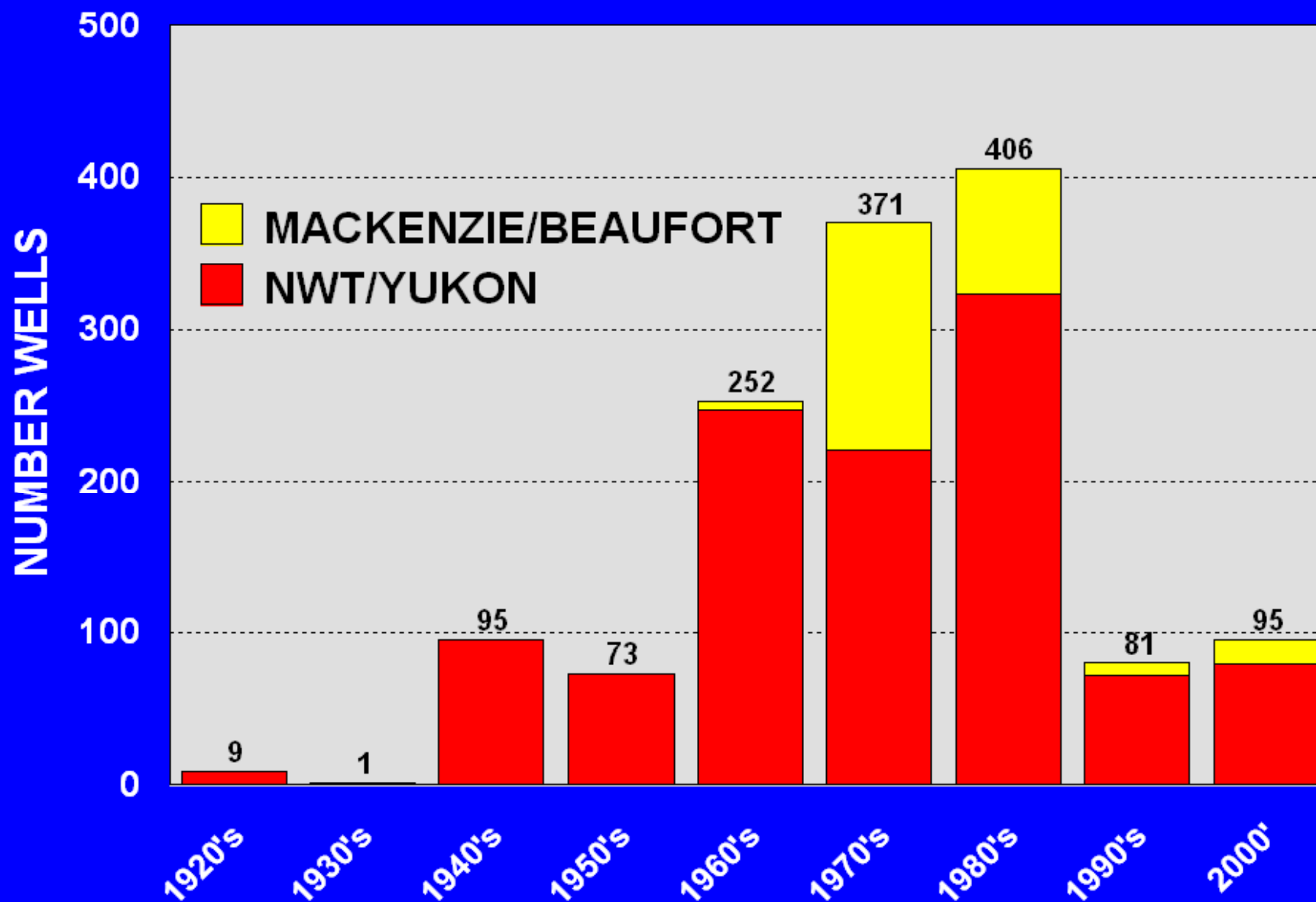
# CANADA'S NORTHERN REGIONS



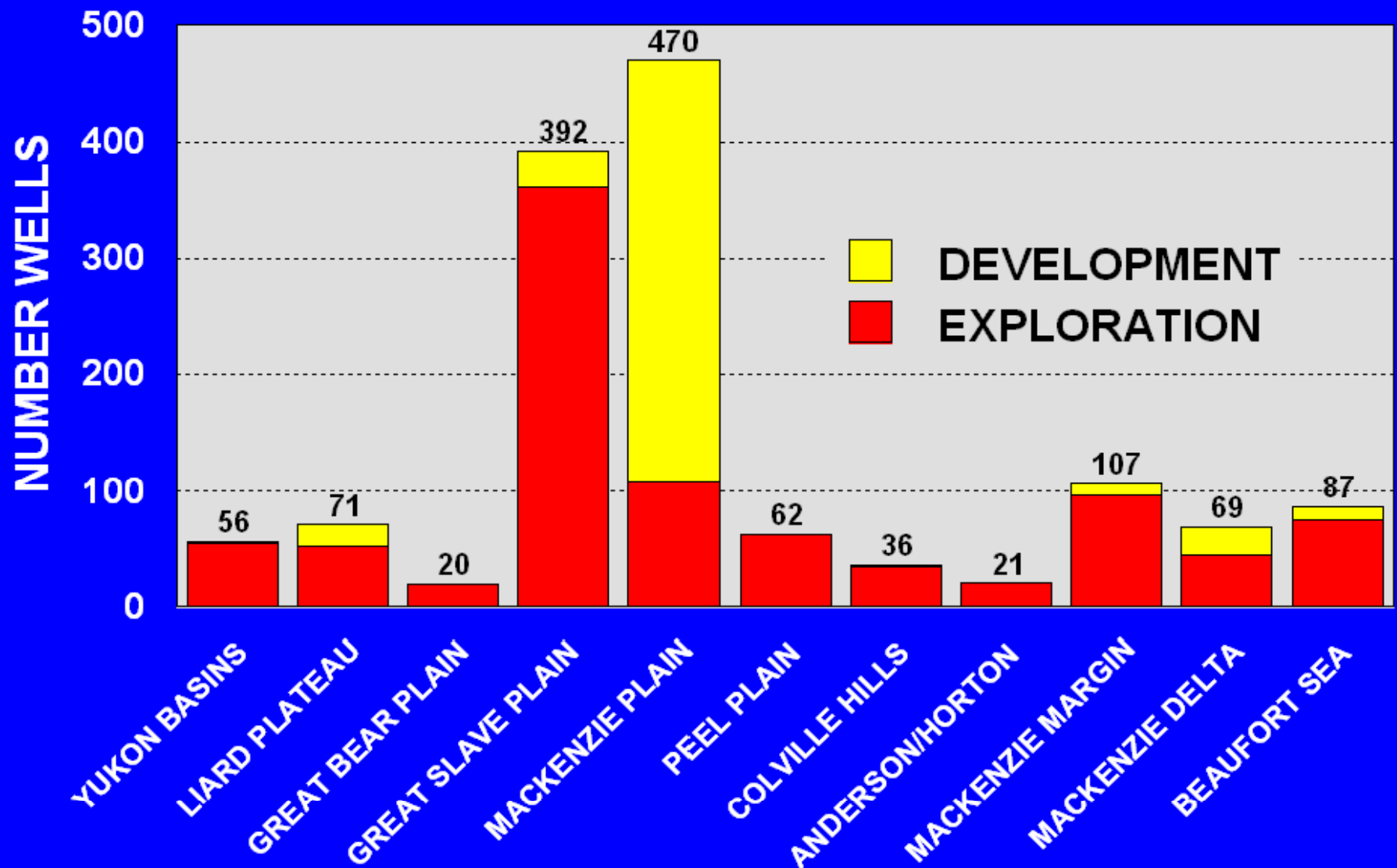
# NORTHWEST TERRITORIES AND YUKON



# WELLS DRILLED BY DECADE



# WELLS DRILLED BY SUBREGION (BASIN) NWT/YUKON AND MACKENZIE/BEAUFORT





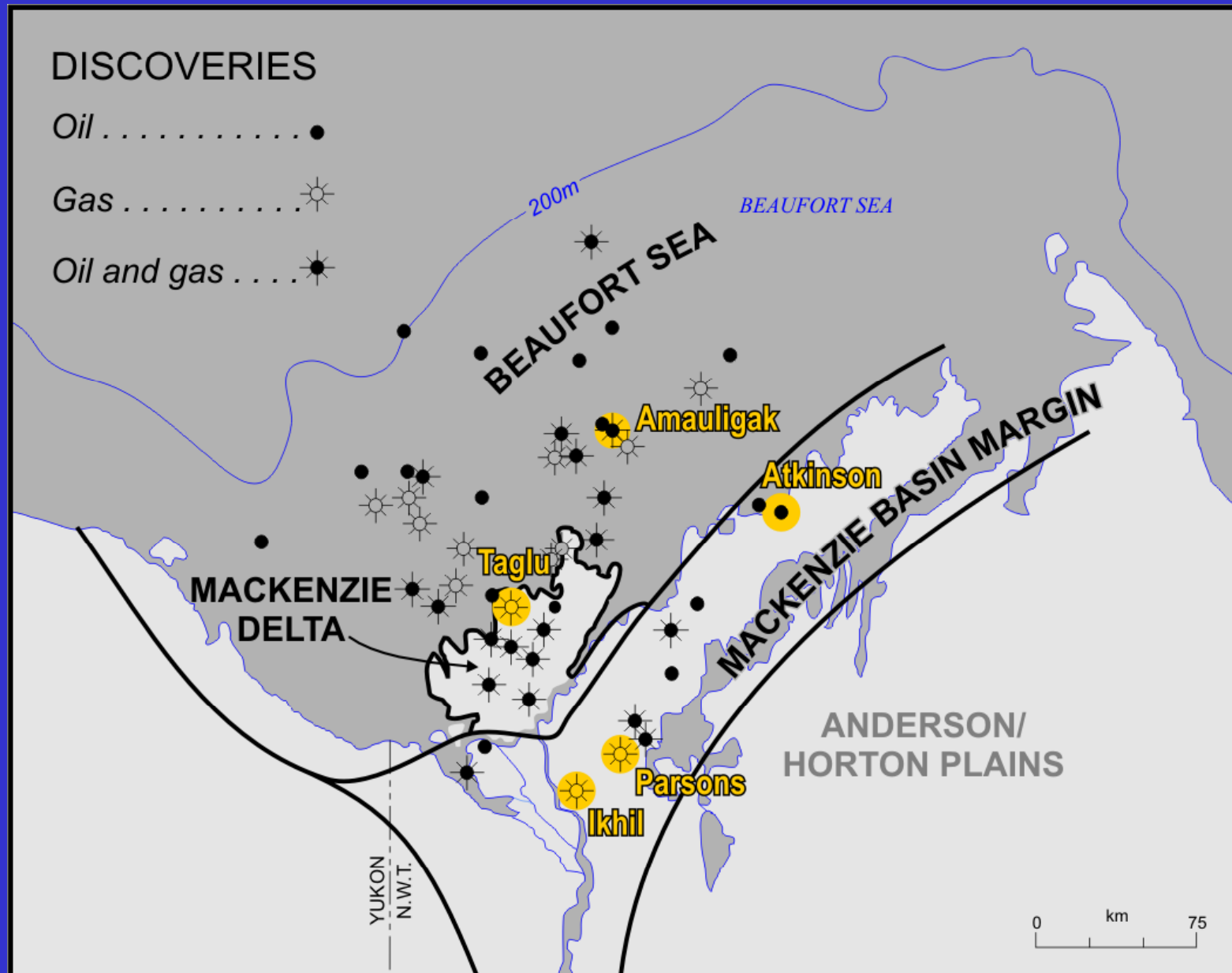
# ULTIMATE RECOVERABLE PETROLEUM RESOURCES NWT/YUKON

## OIL (MMbbl)

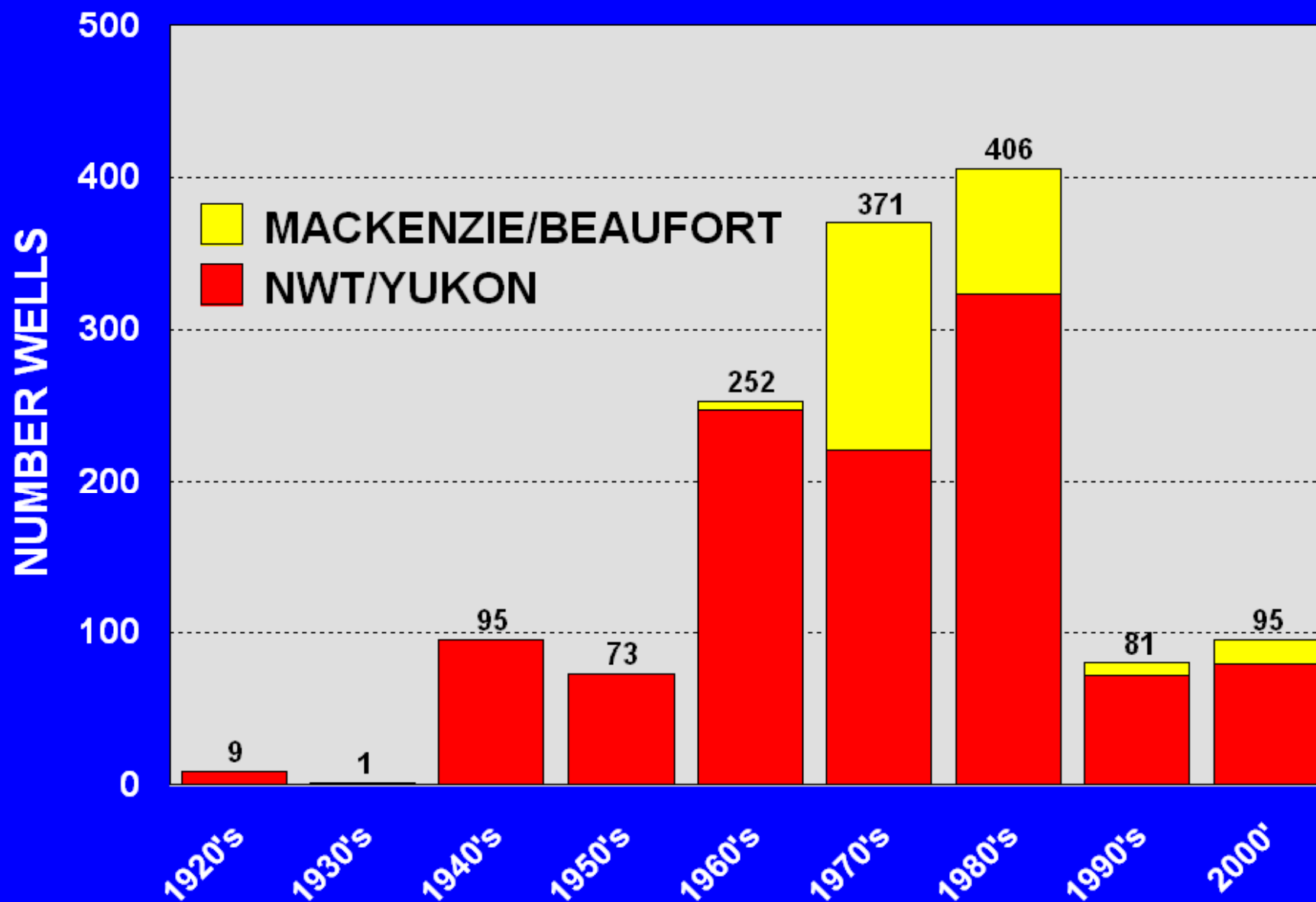
## GAS (Bcf)

SUB-REGION	discov	undiscov	ultimate	discov	undiscov	ultimate
GREAT SLAVE PLAIN	3.8	58.2	62.0	102	3,322	3,424
PEEL PLAIN/PLATEAU	-	35.3	35.3	-	3,150	3,150
YUKON BASINS	11.7	50.6	62.3	84	3,342	3,426
MACKENZIE PLAIN	301.6	107.0	408.6	-	1,650	1,650
COLVILLE HILLS	-	28.0	28.0	692	4,514	5,206
ANDERSON/HORTON	-	15.0	15.0	-	633	633
LIARD PLATEAU	-	-	-	895	4,644	5,539
<b>TOTAL</b>	<b>317.1</b>	<b>294.1</b>	<b>611.2</b>	<b>1,773</b>	<b>21,255</b>	<b>23,028</b>

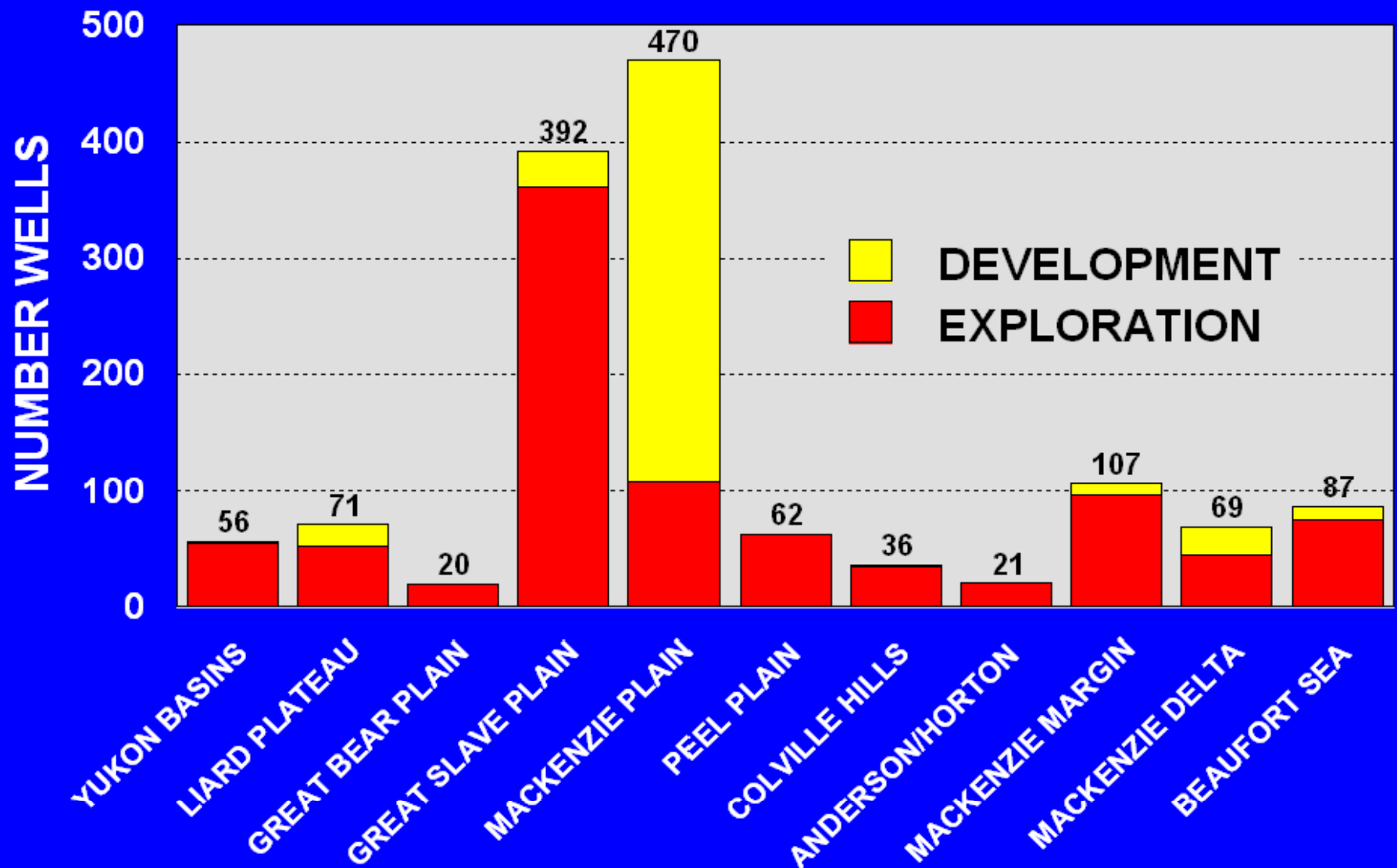
# MACKENZIE/BEAUFORT BASIN



# WELLS DRILLED BY DECADE



# WELLS DRILLED BY SUBREGION (BASIN) NWT/YUKON AND MACKENZIE/BEAUFORT



# ULTIMATE RECOVERABLE PETROLEUM RESOURCES MACKENZIE/BEAUFORT BASIN

SUB-REGION	OIL (MMbbl)			GAS (Bcf)		
	discov	undiscov	ultimate	discov	undiscov	ultimate
MACKENZIE BASIN MARGIN	69.4	492.4	561.8	1604	4375	5979
MACKENZIE DELTA	103.6	532.6	636.2	3579	8114	11693
BEAUFORT SEA	867.7	4339.1	5206.8	4953	40369	45322
<b>TOTAL</b>	<b>1040.7</b>	<b>5364.1</b>	<b>6404.8</b>	<b>10136</b>	<b>52858</b>	<b>62994</b>

## **THREE DELTA AREAS – STATISTICS**

### **( June 30, 2007 )**

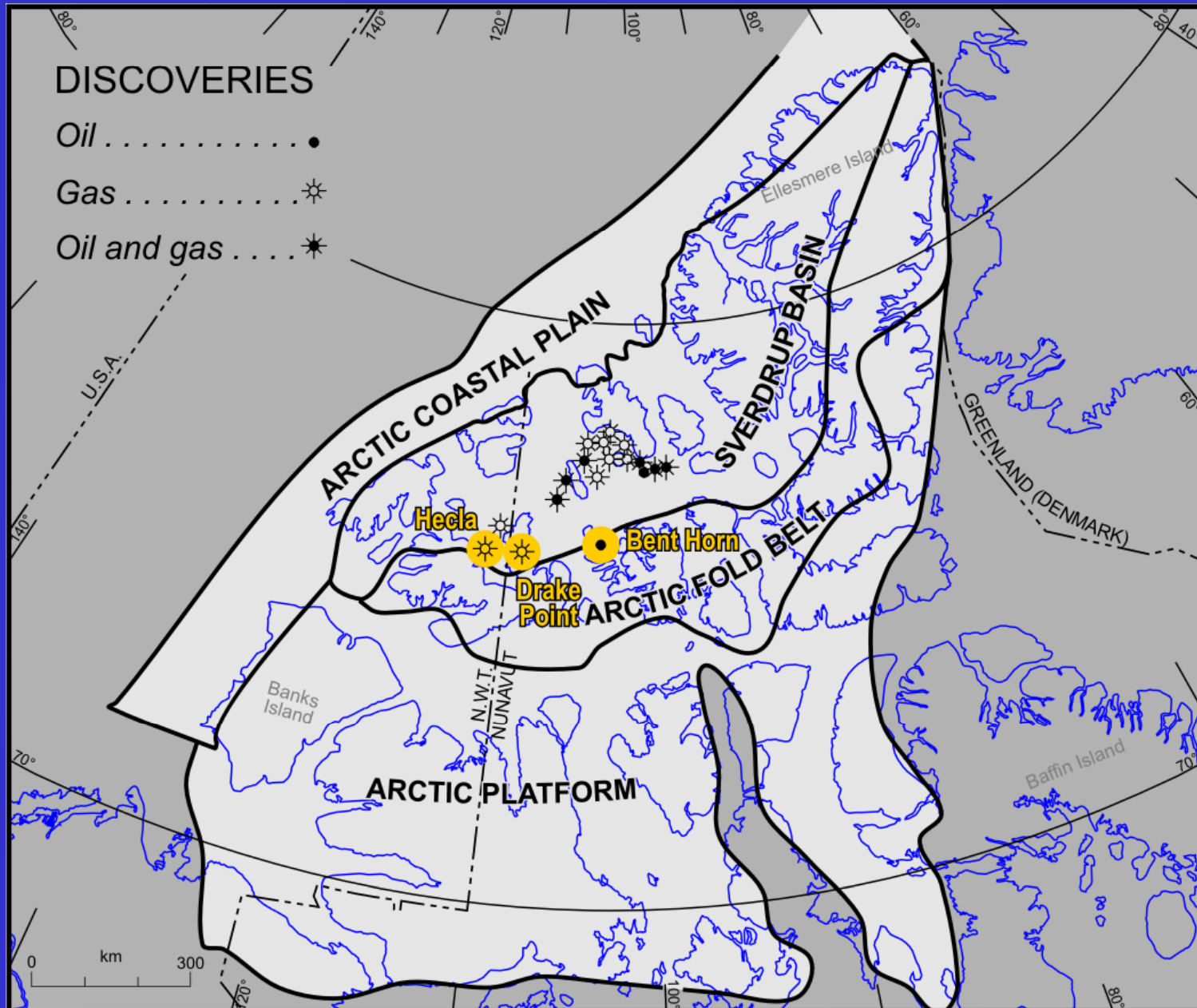
	NUMBER OF WELLS	NUMBER OF FIELDS	AVERAGE FIELD SIZE (BCF)	CUMULATIVE PRODUCTION (BCF)
BEAUFORT/ MACKENZIE BASIN	263	40	253	4.1
SCOTIAN BASIN	169	21	324	1,186
LOUISIANA GULF COAST BASIN	~108,000	6,400	47	283,142

## **RECOVERABLE GAS RESOURCES (TCF)**

**( June 30, 2007 )**

	<u>CUM PROD</u>	<u>REM RSV</u>	<u>DISCOV RES'RCE</u>	<u>UNDISC RES'RCE</u>	<u>ULT RES'RCE</u>
BEAUMACK	0.0	0.0	10.1	52.9	63.0
SCOTIAN	1.2	1.8	3.8	11.4	18.2
LOUISIANA	283.1	18.0	0.0	56.9	358.0
TOTAL	285.3	19.8	13.9	121.2	439.2

# ARCTIC ISLANDS

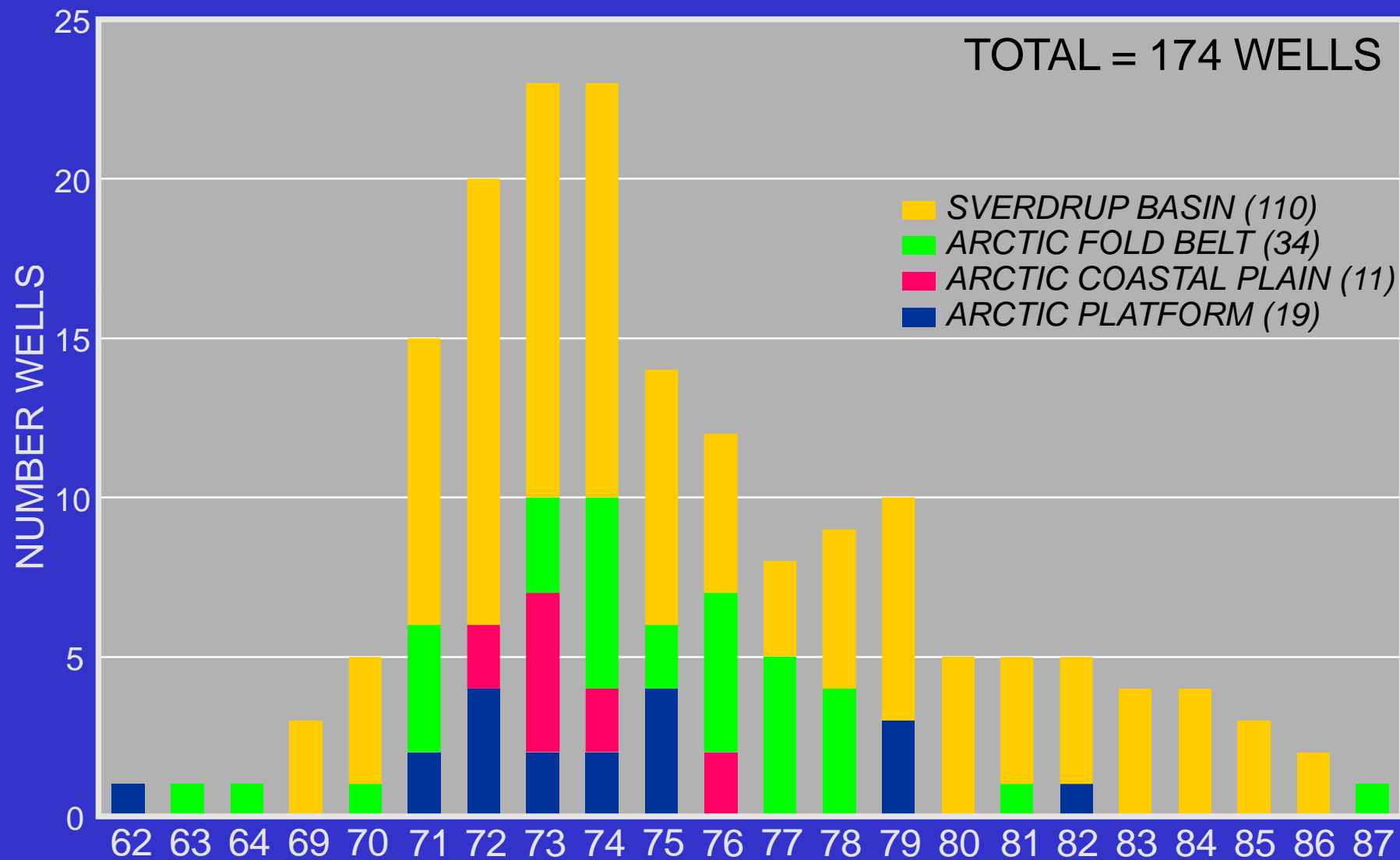




# WELLS DRILLED BY SUB-REGION

## ARCTIC ISLANDS

TOTAL = 174 WELLS

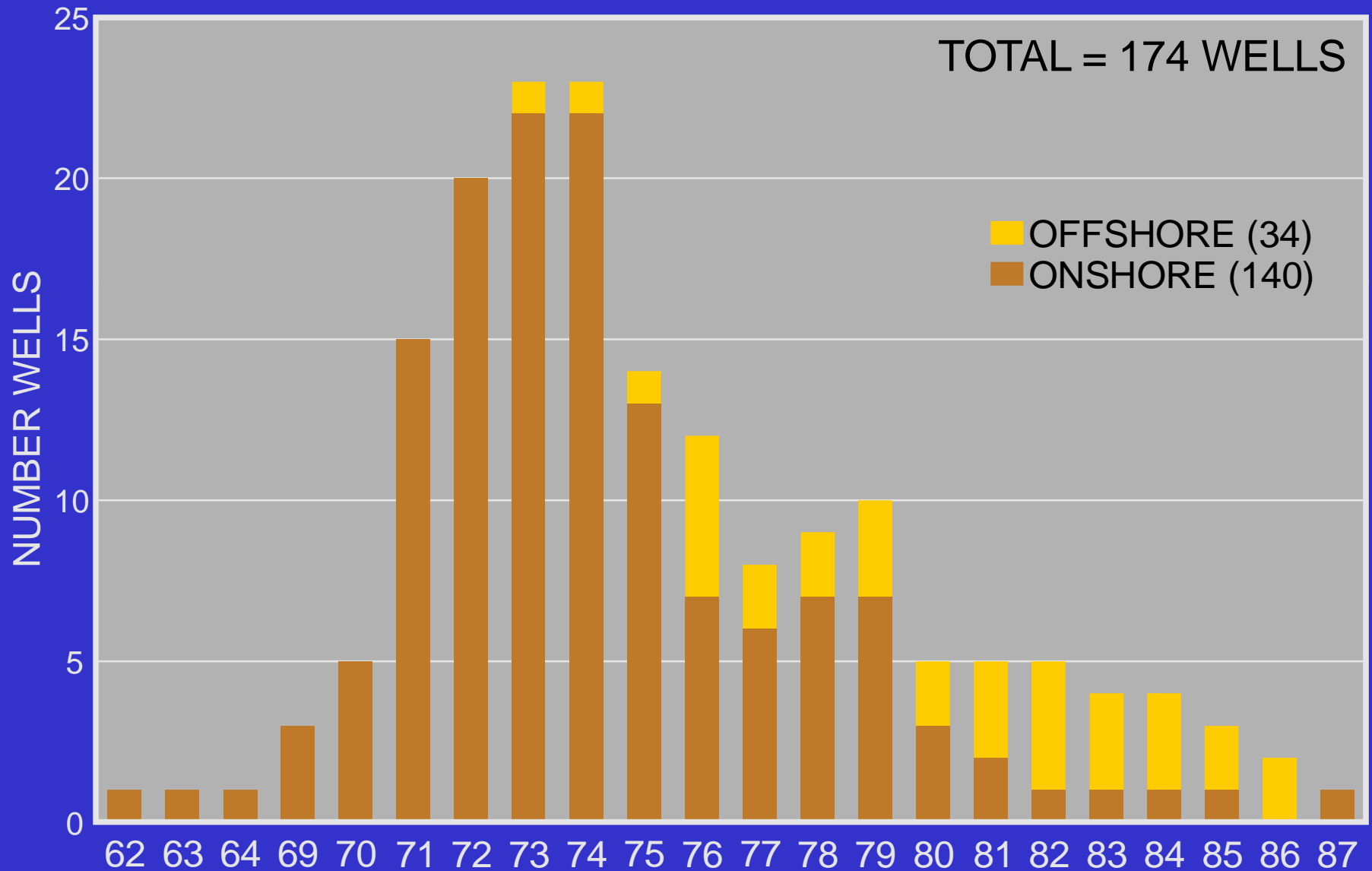


# WELLS DRILLED BY DECADE

## ARCTIC ISLANDS

TOTAL = 174 WELLS

OFFSHORE (34)  
ONSHORE (140)



# ULTIMATE RECOVERABLE PETROLEUM RESOURCES

## ARCTIC ISLANDS PETROLEUM PROVINCE

### OIL (MMbbl)

### GAS (Bcf)

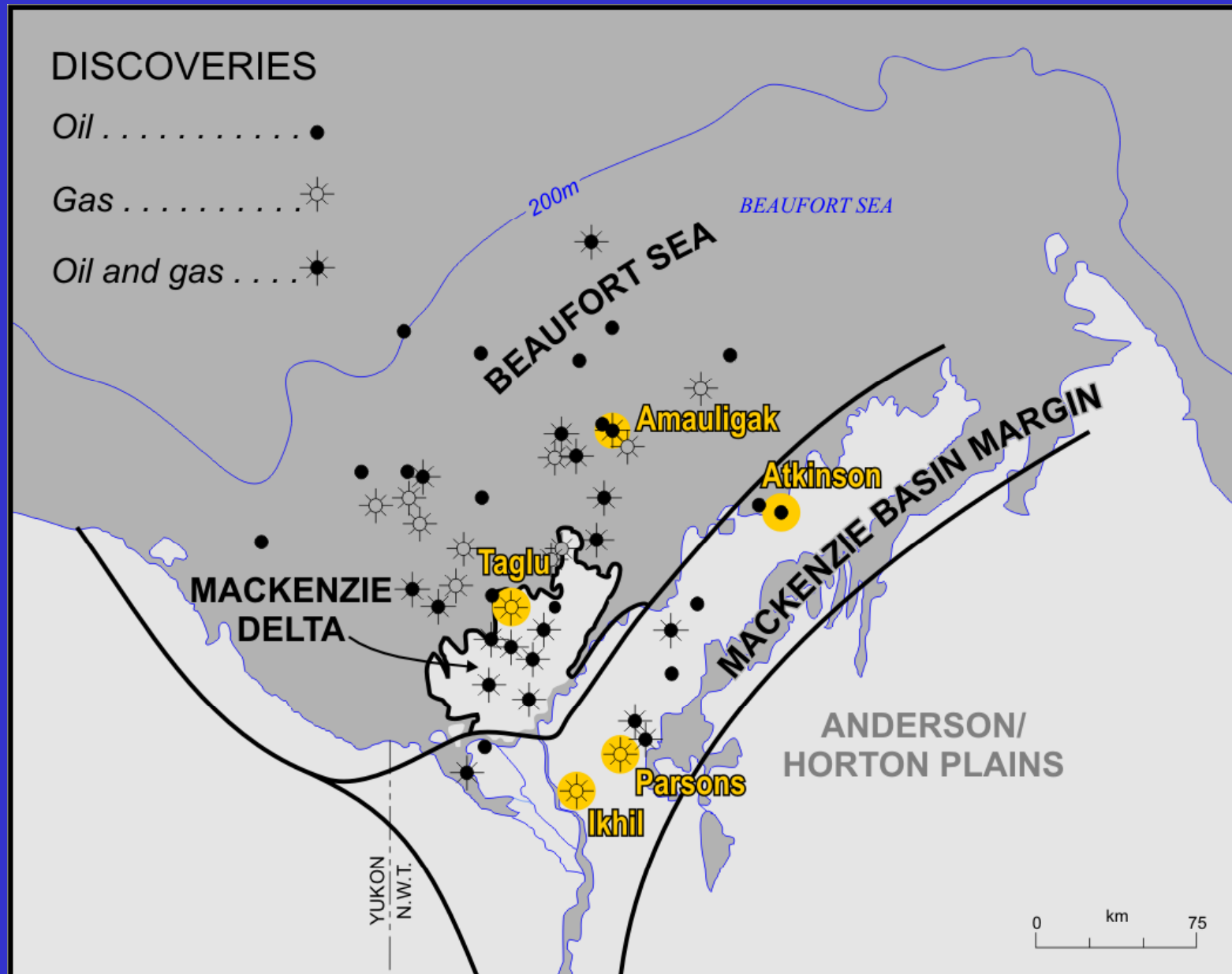
REGION	discov	undiscov	ultimate	discov	undiscov	ultimate
SVERDRUP BASIN	332.1	1189.2	1521.3	17 383	68 909	86 292
ARCTIC FOLD BELT	2.8	564.5	567.3	-	7797	7797
ARCTIC PLATFORM	-	1163.0	1163.0	-	8969	8969
ARCTIC COASTAL PLAIN	-	566.1	566.1	-	14 902	14 902
<b>TOTAL</b>	<b>334.9</b>	<b>3482.8</b>	<b>3817.7</b>	<b>17 383</b>	<b>100 577</b>	<b>117 960</b>

# **CURRENT ACTIVITY**

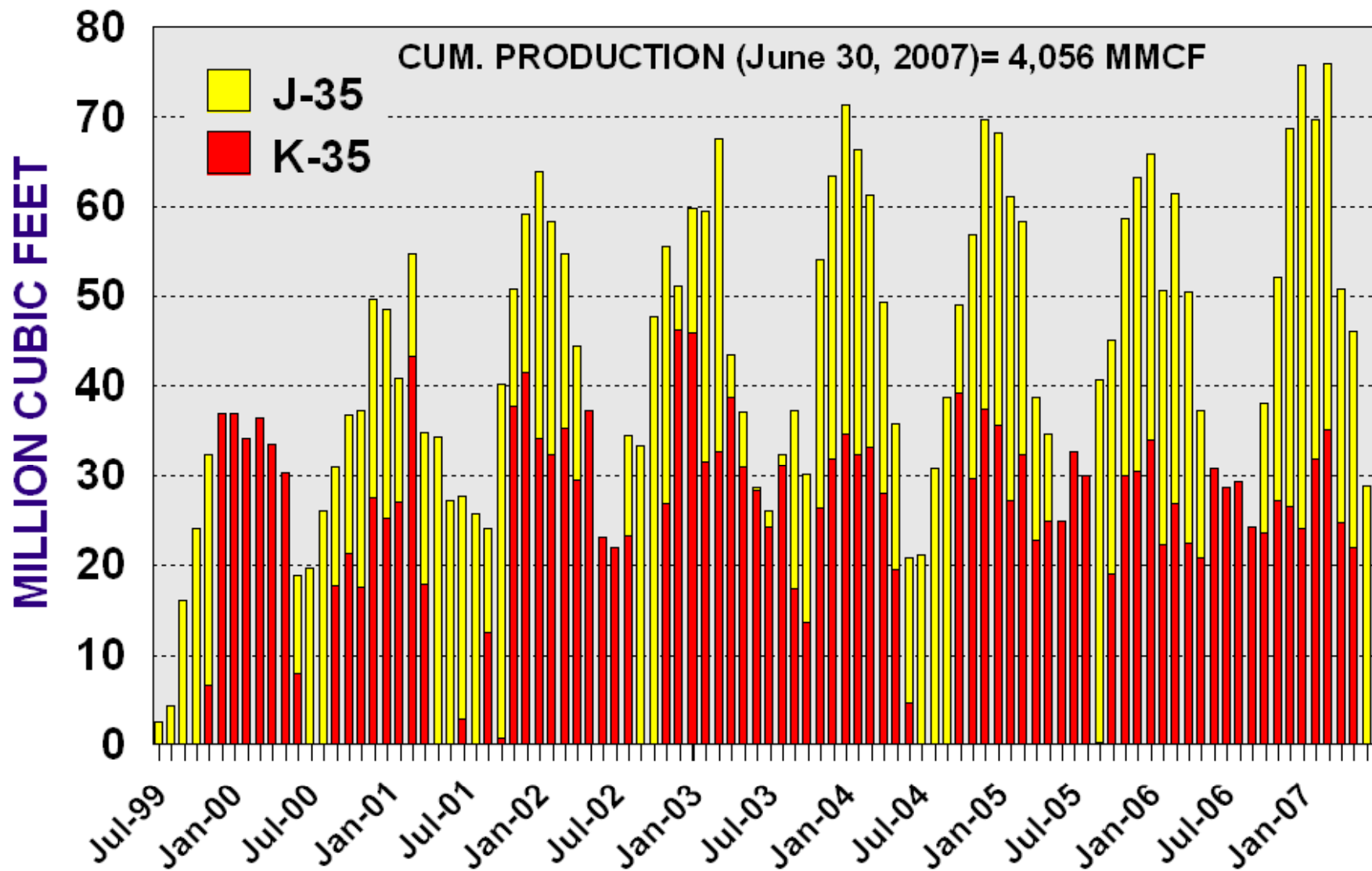
## **MACKENZIE/BEAUFORT BASIN**

- **Mackenzie Gas Project (Producer's Group) – Imperial, Conoco-Phillips, Shell, Exxon Mobil, APG**
- **Mackenzie Valley Pipeline – Environmental and Regulatory Review Stage, Public Hearings Underway**
- **Mackenzie Delta 4 Wells 2004/2005, 2 Wells 2006/2007**
- **Umiak (2004) – Largest Discovery Since 1970's**
- **Devon Drilled Beaufort Sea Well, 2005/2006 Winter**
- **MGM - 3 Wells to be Drilled in 2007/2008 Winter in the Mackenzie Delta**
- **Ikhil Production**

# MACKENZIE/BEAUFORT BASIN



# IKHIL GAS FIELD PRODUCTION



# **CURRENT ACTIVITY**

## **MAINLAND NWT AND YUKON**

- **3 Wells Drilled in 2005/2006 Winter, 5 in 2006/2007**
- **Cameron Hills and Liard Plateau - "Tied-in", Producing**
- **Husky et al - 2 Wells Planned for 2007/2008 Winter in the Summit Creek Area**
- **Petrocanada - One Well Planned for 2007/2008 Winter on EL 433 in the Blackwater Lake Area**
- **Colville Hills, Summit Creek, Eagle Plain**

# CUMULATIVE PRODUCTION

June 30, 2007

## CAMERON HILLS

- Gas = 19.7 Bcf
- Oil = 2.8 MMbbl

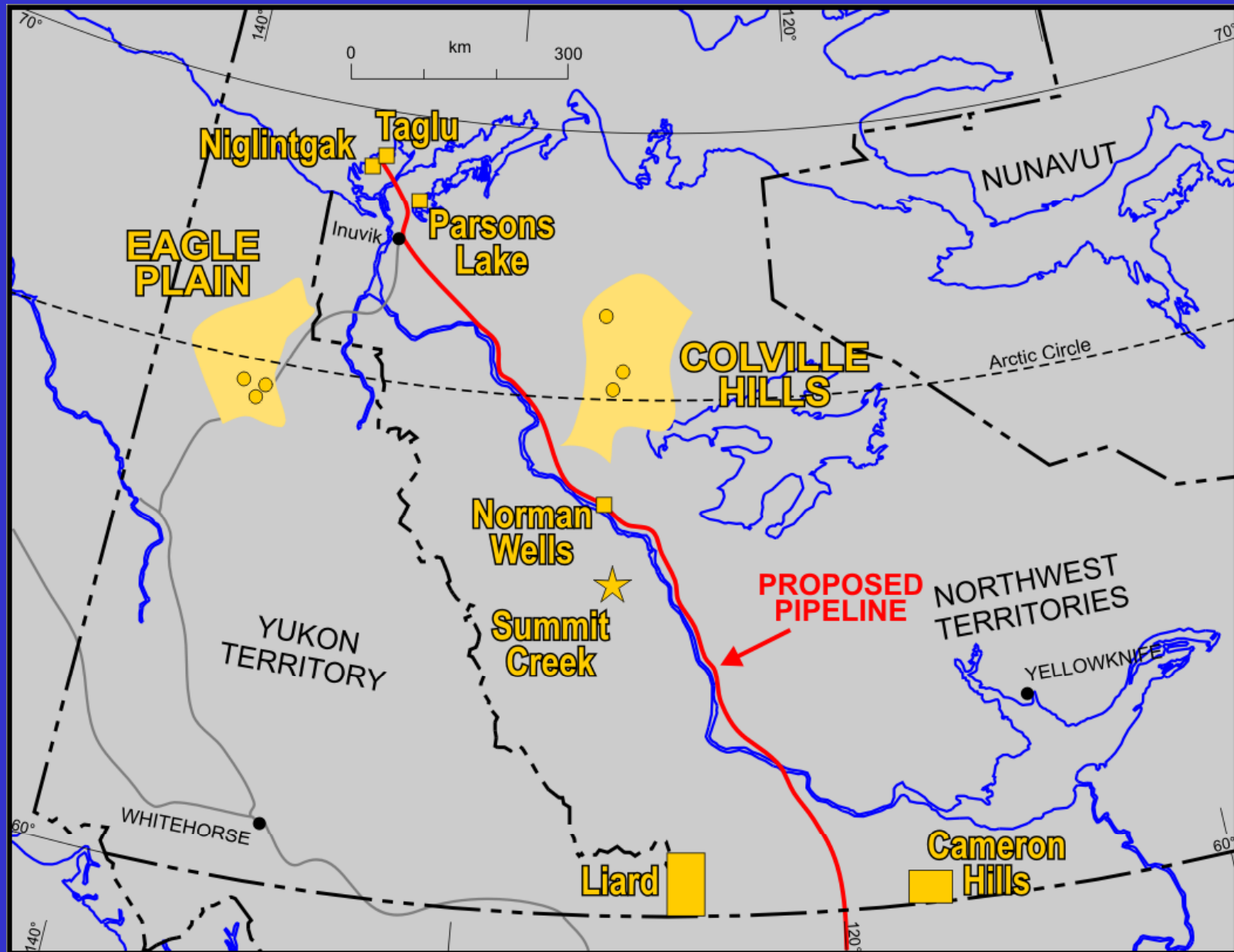
## LIARD PLATEAU

- Gas = 710 Bcf
  - \* Devon Kotaneelee L-38 - producing 9 MMcf/d

Cumulative production = 10.9 Bcf since May, 2005



# PROPOSED MACKENZIE GAS PIPELINE



# **COLVILLE HILLS**

**2003 – 2005**

- **12 Wells Drilled (Paramount, Apache, CNRL),  
Some Results Not Yet Public**

**1974 – 1986**

- **Discovered Gas Resource 692 Bcf in Four  
Fields (Tweed Lake, Tedji, Bele, Nogha).  
Basal Cambrian Sandstone Reservoir**

**2004 – 2005**

- **Lac Maunoir C-34 tested 43° oil at 235 b/d**

**ESTIMATED UNDISCOVERED GAS – 4.5 Tcf**

# **EAGLE PLAIN**

**2005**

- **One Well Drilled (Devon Eagle Plains K-58)**

**1960 – 1965**

- **Discovered Gas and Oil – 84 Bcf and 12 MMbbl  
in Three fields (Chance, Birch, Blackie).  
Mississippian, Permian and Lower Cretaceous  
Clastic Reservoirs**

**ESTIMATED UNDISCOVERED GAS – 4.5 Tcf  
OIL – 28 MMbbl**

# **SUMMIT CREEK DISCOVERY**

## **NORTHROCK et al SUMMIT CREEK B-44**

- Spudded Winter 2004, Tested January – March 2005

## **RESULTS**

- 180m Hydrocarbon-Bearing Column in Devonian Folded Carbonates
- Two Intervals Tested, Combined Rate of:
  - 20 MMcf/day of Gas
  - 6000 bbl/day of Light Oil and Condensate

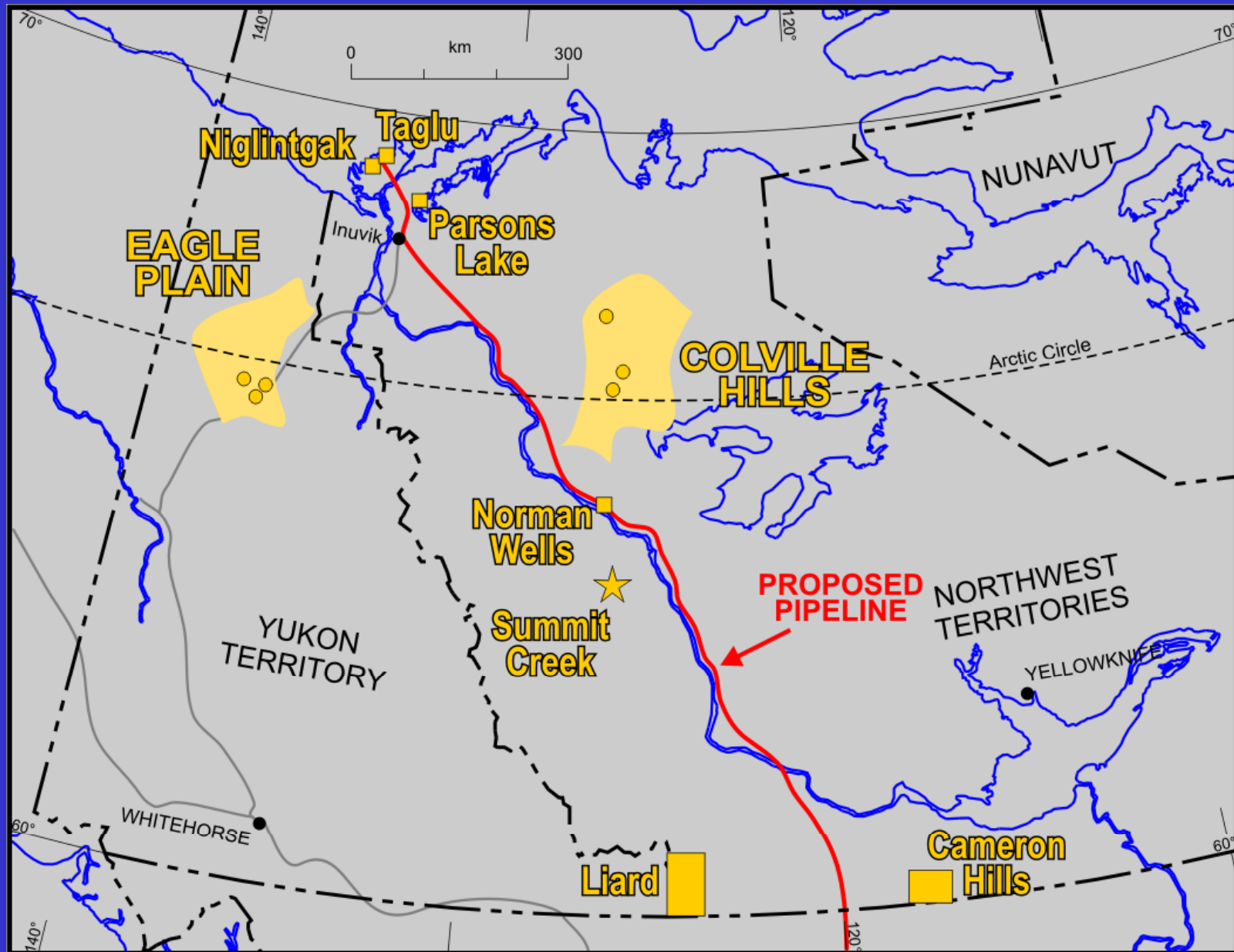
**FIRST DISCOVERY IN MACKENZIE VALLEY SINCE 1920  
DISCOVERY 40 MILES FROM NORMAN WELLS PIPELINE  
TWO WELLS IN JANUARY 2006**

- Pool Delineation and Stewart D-57 Prospect

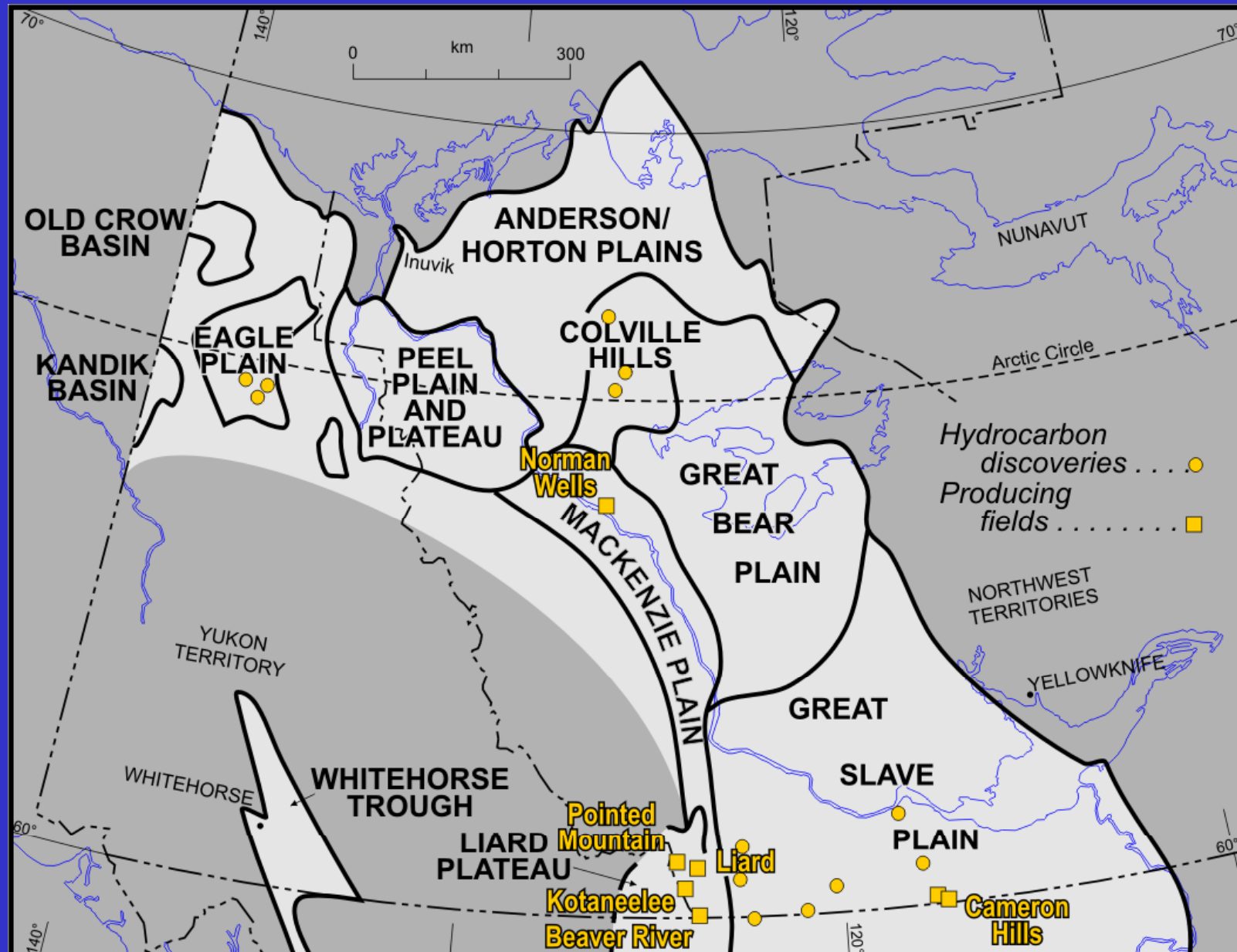
## **STEWART D-57 CRETACEOUS GAS DISCOVERY**

- 5 MMcf/day of Gas

# PROPOSED MACKENZIE GAS PIPELINE



# NORTHWEST TERRITORIES AND YUKON



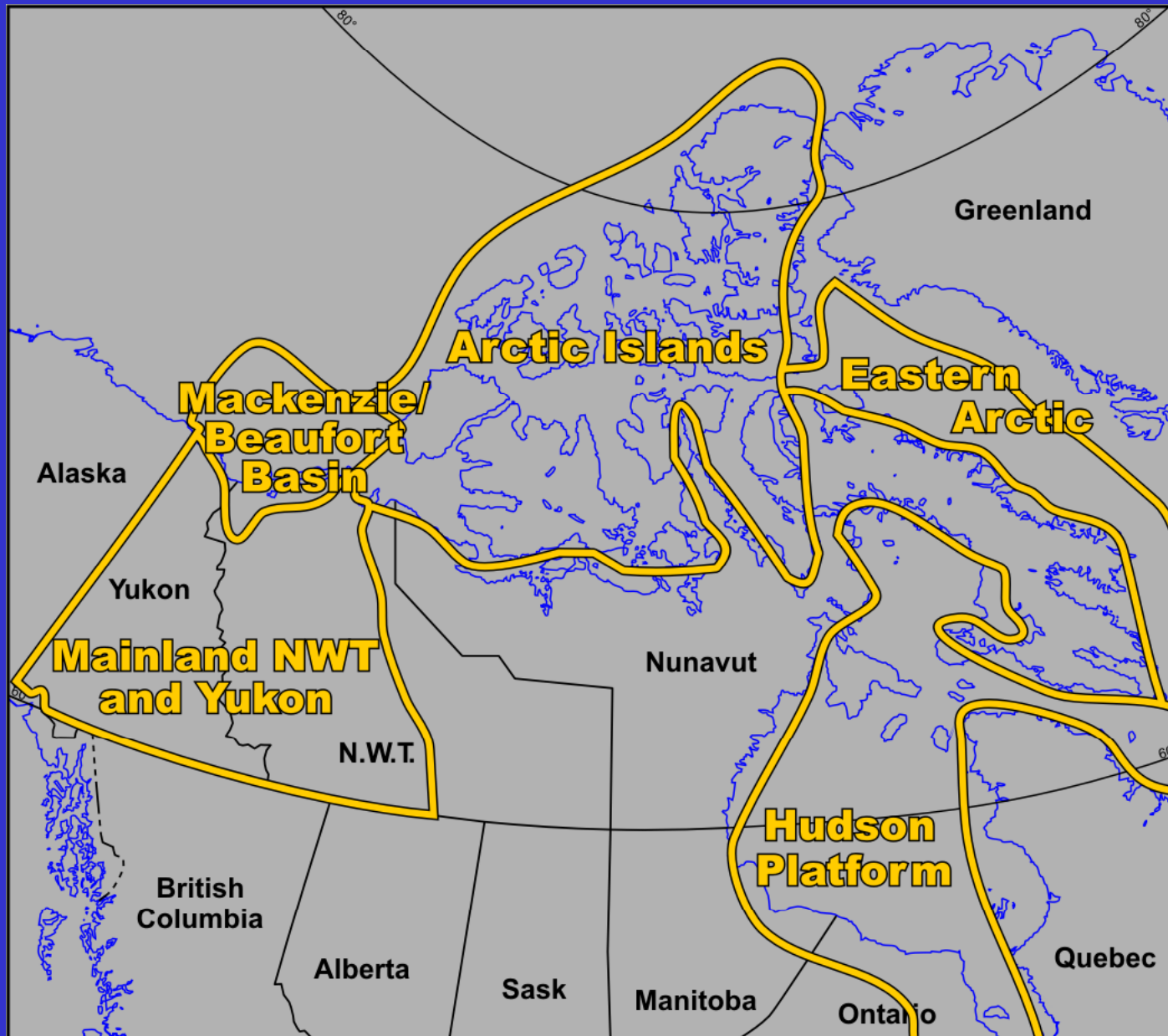
# **SUMMARY**

- 1. Geological plays similar to Western Canada Sedimentary Basin**
- 2. Resource in Mackenzie is a given**
- 3. Significant discoveries in other "basins" in mainland NWT/Yukon**
- 4. Demonstrated there is opportunity for E&P companies of all sizes**
- 5. "Field of Dreams" scenario**

**If Mackenzie Valley Pipeline built "they will come"**

**The time to act is now**

# CANADA'S NORTHERN REGIONS





A close-up photograph of an ostrich's face, showing its large, grey, textured beak and its large, orange-brown eyes with dark pupils. The ostrich has dark, spiky feathers on its head and neck. In the background, there is a grassy field and a body of water under a bright sky. A yellow speech bubble is positioned in the upper right corner of the image.

**So, What Are  
We Waiting  
For?**