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Scientific Review Office
Victoria, British Columbia
March 1996

COMMITTEE OF PROVINCIAL GEOLOGISTS
CHAIRPERSON'S REPORT, 1995

The Committee of Provincial Geologists (CPG) was almost wholly preoccupied in 1995 with the formulation of a geoscience accord between the Geological Survey of Canada (GSC) and the provincial and territorial geological surveys. The wording of the accord was negotiated through the National Geological Surveys Committee (NGSC) which includes all members of the CPG and representatives of the GSC.

Members of the CPG and NGSC met in March at the Prospectors' and Developers Annual Meeting in Toronto and again at the Mines Ministers Conference Saskatoon in September. A special meeting on drafting the accord was also held in Winnipeg in June.

Provincial geologists are faced by increasing demands at the technical level for geoscience information, and at the political level by reduced budgets and sometimes lesser appreciation of the value of geoscience. The traditional activity of geological survey agencies is to provide support for and promote mineral exploration in the context of sustainable economic development. These agencies also provide and maintain systematic coverage of the geoscience database for a wider range of needs. Today there is an increasing demand for geoscience information for environmental and land use management, including involvement in land claim negotiations. There is also a shift toward client-oriented studies, and a heavy involvement in the transition to the new world of digital data handling, packaging and communications.

With the above in mind, the accord aims to improve the effectiveness of government geoscience in Canada by defining a new collaborative relationship between the provincial and territorial geological survey agencies on the one hand, and the GSC on the other. It also stresses the complementary roles and responsibilities of the agencies, and is expected to lead to a better utilization of resources.

The accord is expected to be administered and monitored by the NGSC. The final document was approved in principle by the Intergovernmental Working Group on the Mineral Industry Committee (IGWG), and later by the Privy Council and, under the name "Intergovernmental Geoscience Accord" (IGA), is proposed to be signed at the March 1996 PDAC meeting.

Provincial geologists have also shared information on a number of bilateral agreements with the GSC which are being negotiated currently by most provinces.

Bob Macdonald
Chair, Committee of Provincial Geologists,
December 1995

NOTES

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Compiled by the British Columbia
Ministry of Employment and Investment

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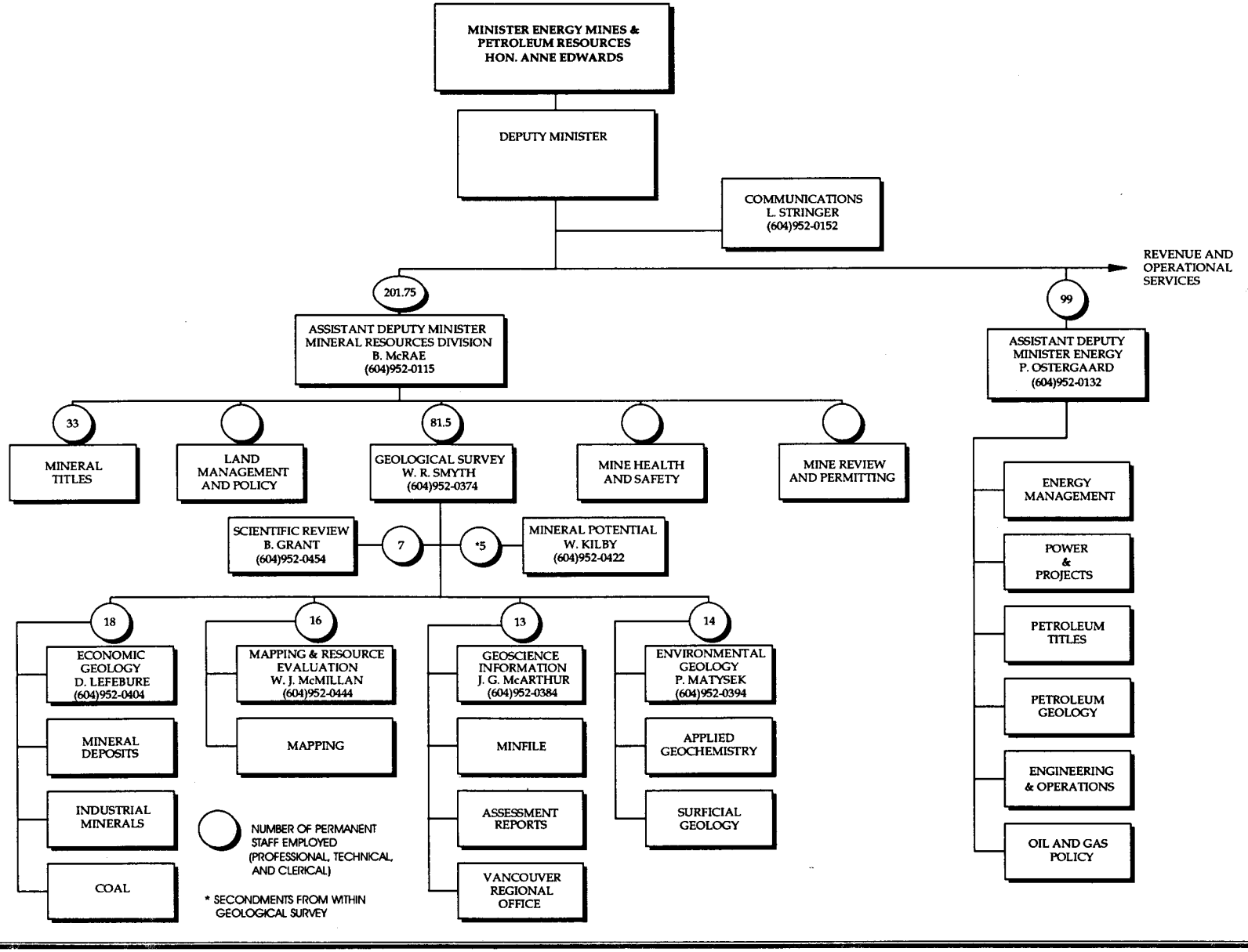
The *Provincial Geologists Journal* is available in each province and territory through the offices of the respective geological surveys listed at the back of this journal.

NOTES

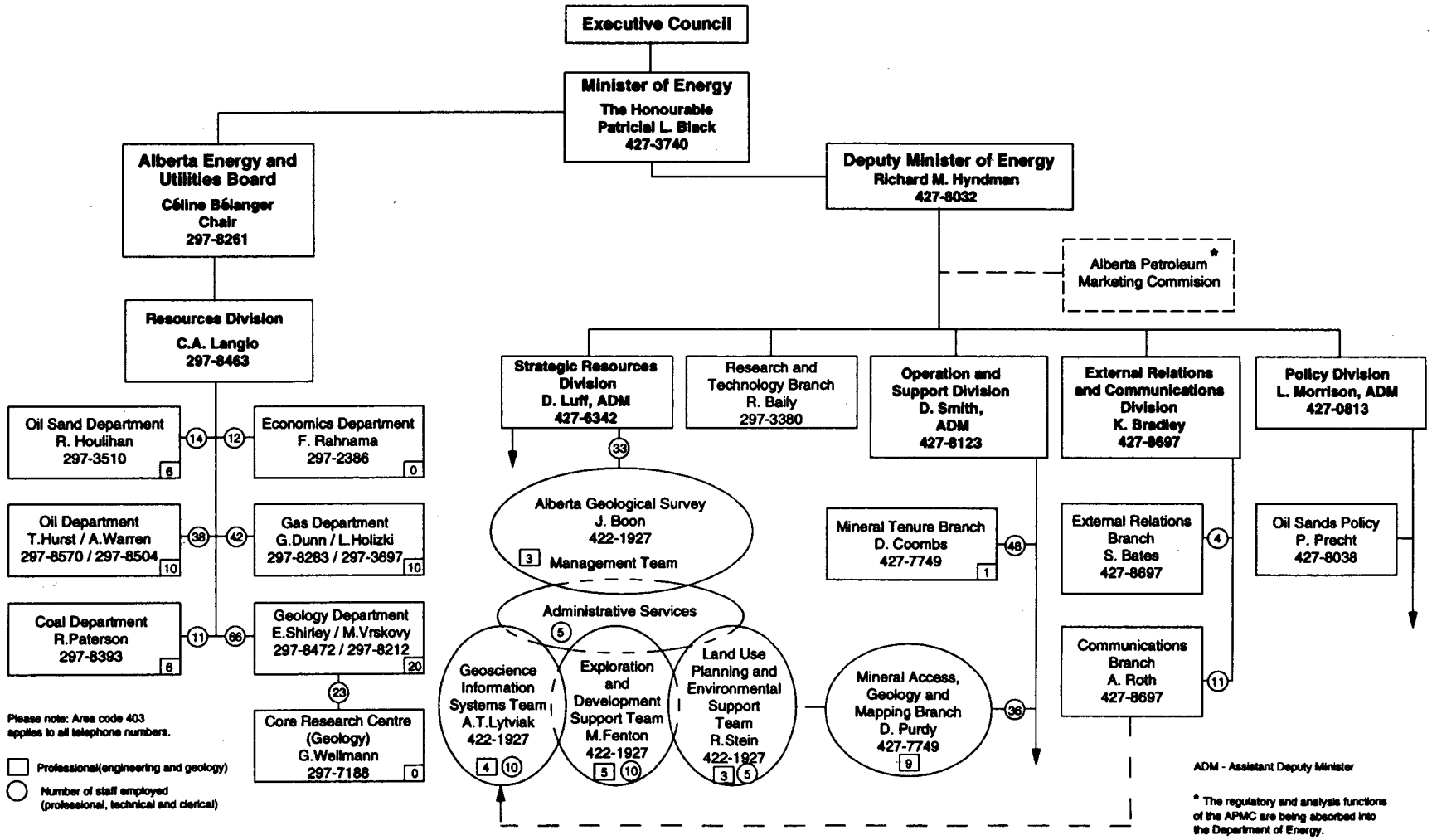
GEOSCIENCE ORGANIZATION CHARTS

Each provincial and territorial government in Canada has developed its own organization structure for conducting geoscientific survey and research work. Some provinces have what is formally called a Geological Survey (*e.g.*, Ontario Geological Survey), but in most jurisdictions the main elements of the geological survey function are embraced in one or more Branches or Divisions of provincial Mines/Energy/Natural Resources Departments (*e.g.*, the British Columbia Ministry of Energy, Mines and Petroleum Resources has a Mineral Resources Division, with the bulk of geological survey and research work conducted in the Geological Survey Branch.) The following organization charts are set out in standard format to help alleviate confusion amongst potential users of provincial geoscience services. The charts contain reference to the lines of reporting of the various units in each hierarchy, the manpower associated with each separate jurisdiction, and the names and telephone numbers of key individuals in each system.

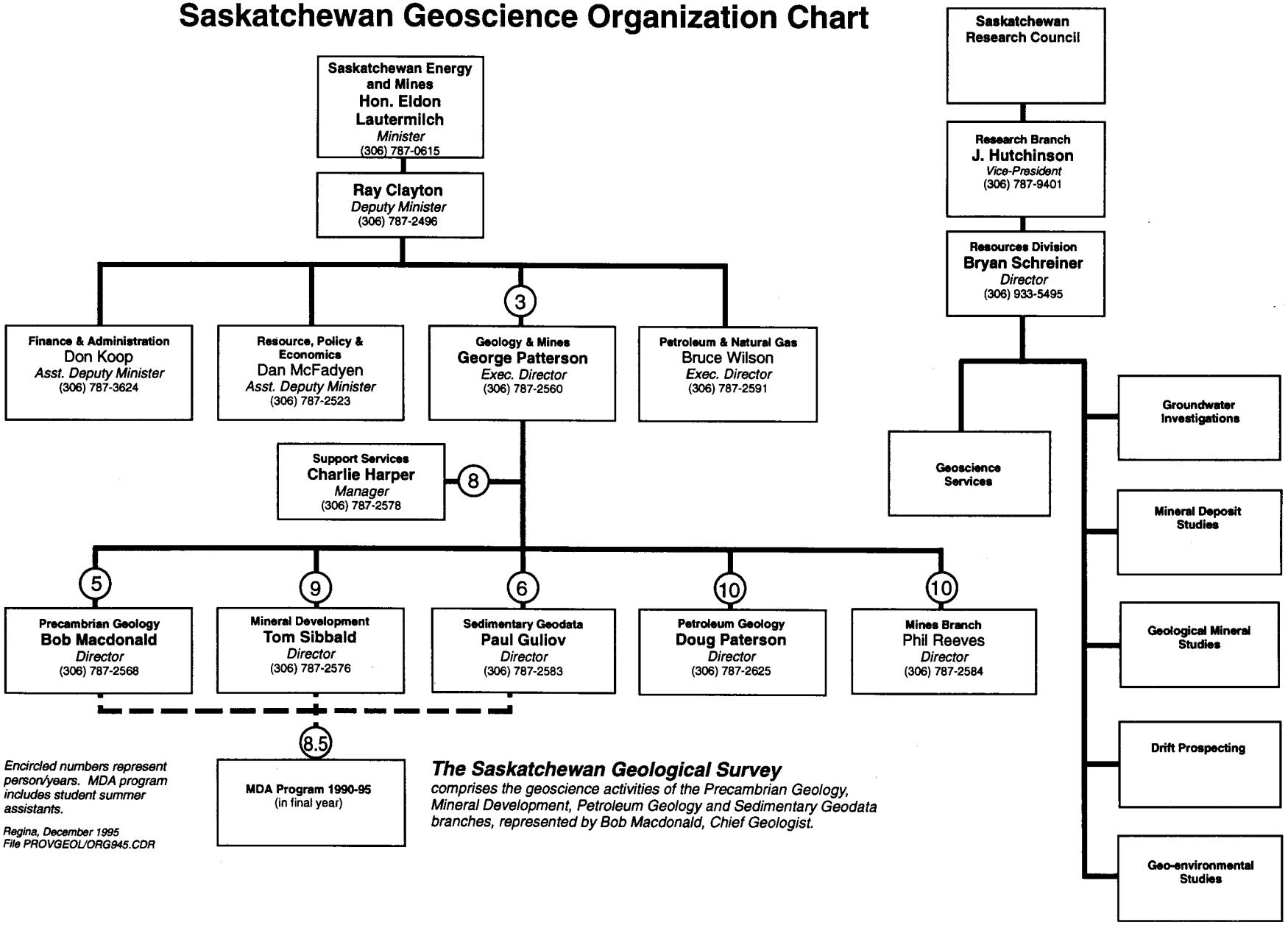
BRITISH COLUMBIA GEOSCIENCE ORGANIZATION CHART, 1995



Alberta Geoscience Organization Chart (1995)



Saskatchewan Geoscience Organization Chart

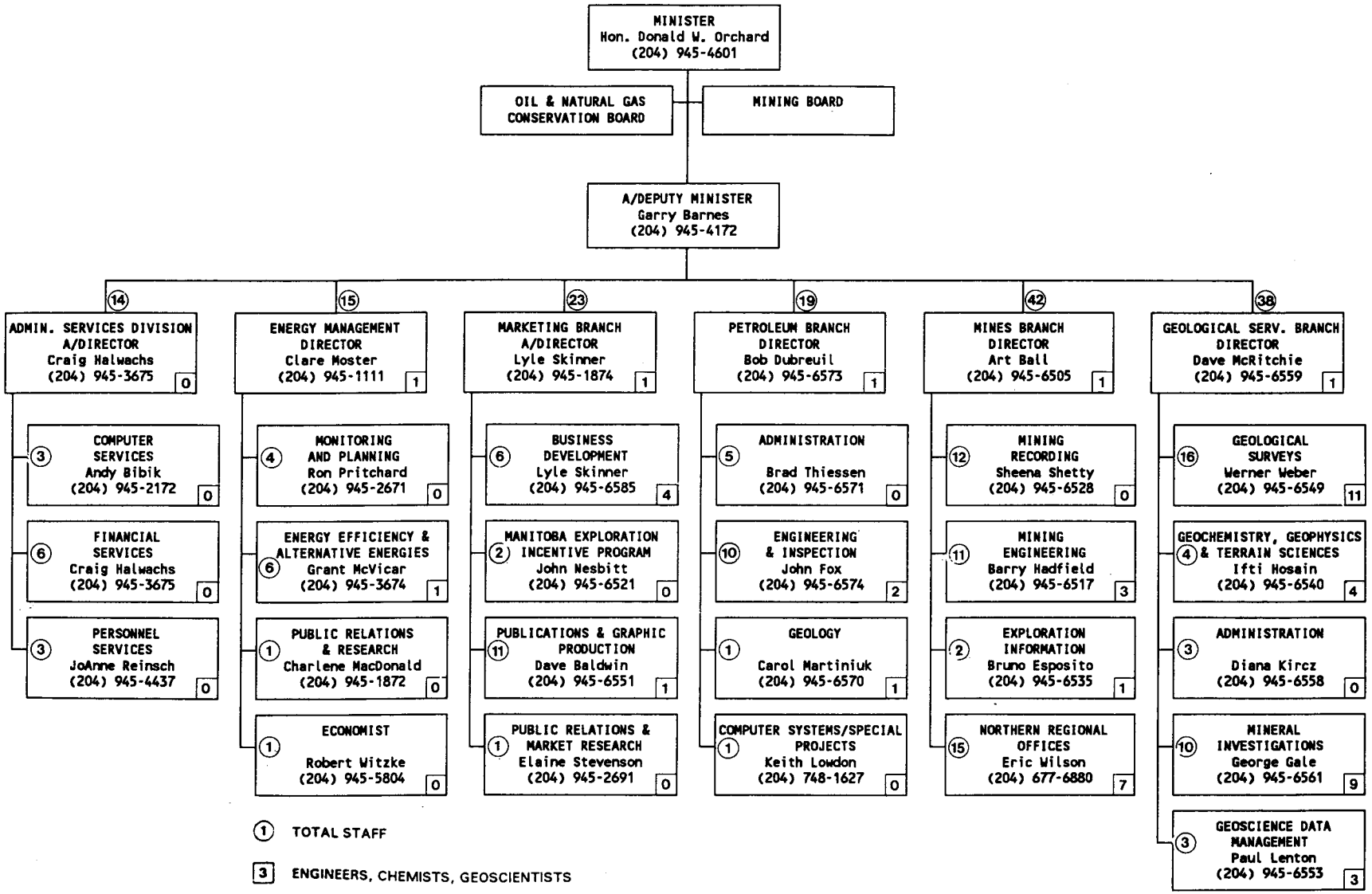


Encircled numbers represent person/years. MDA program includes student summer assistants.

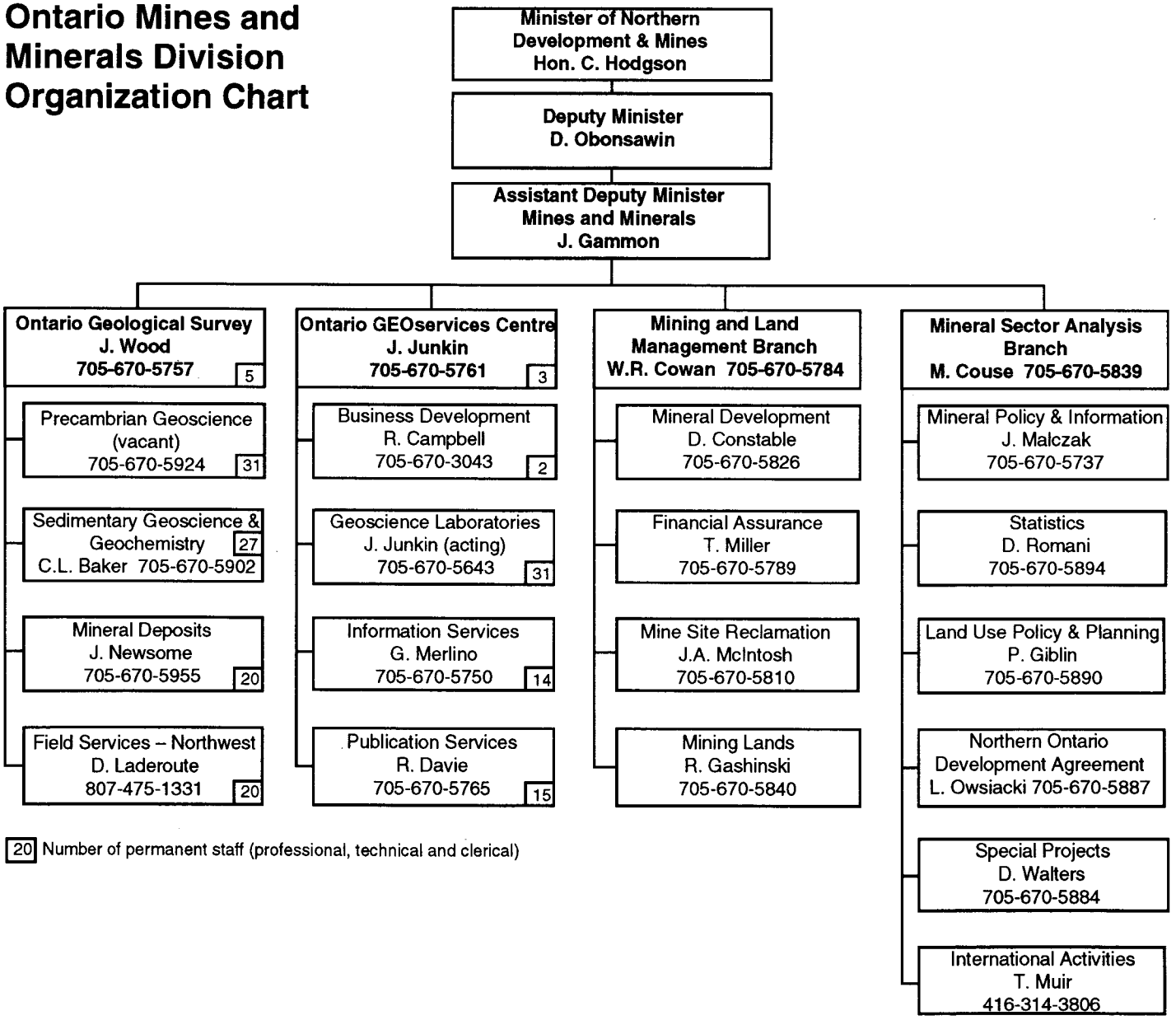
Regina, December 1995
File PROVGEOL/ORG945.CDR

The Saskatchewan Geological Survey
comprises the geoscience activities of the Precambrian Geology, Mineral Development, Petroleum Geology and Sedimentary Geodata branches, represented by Bob Macdonald, Chief Geologist.

DEPARTMENT OF ENERGY AND MINES (MANITOBA)

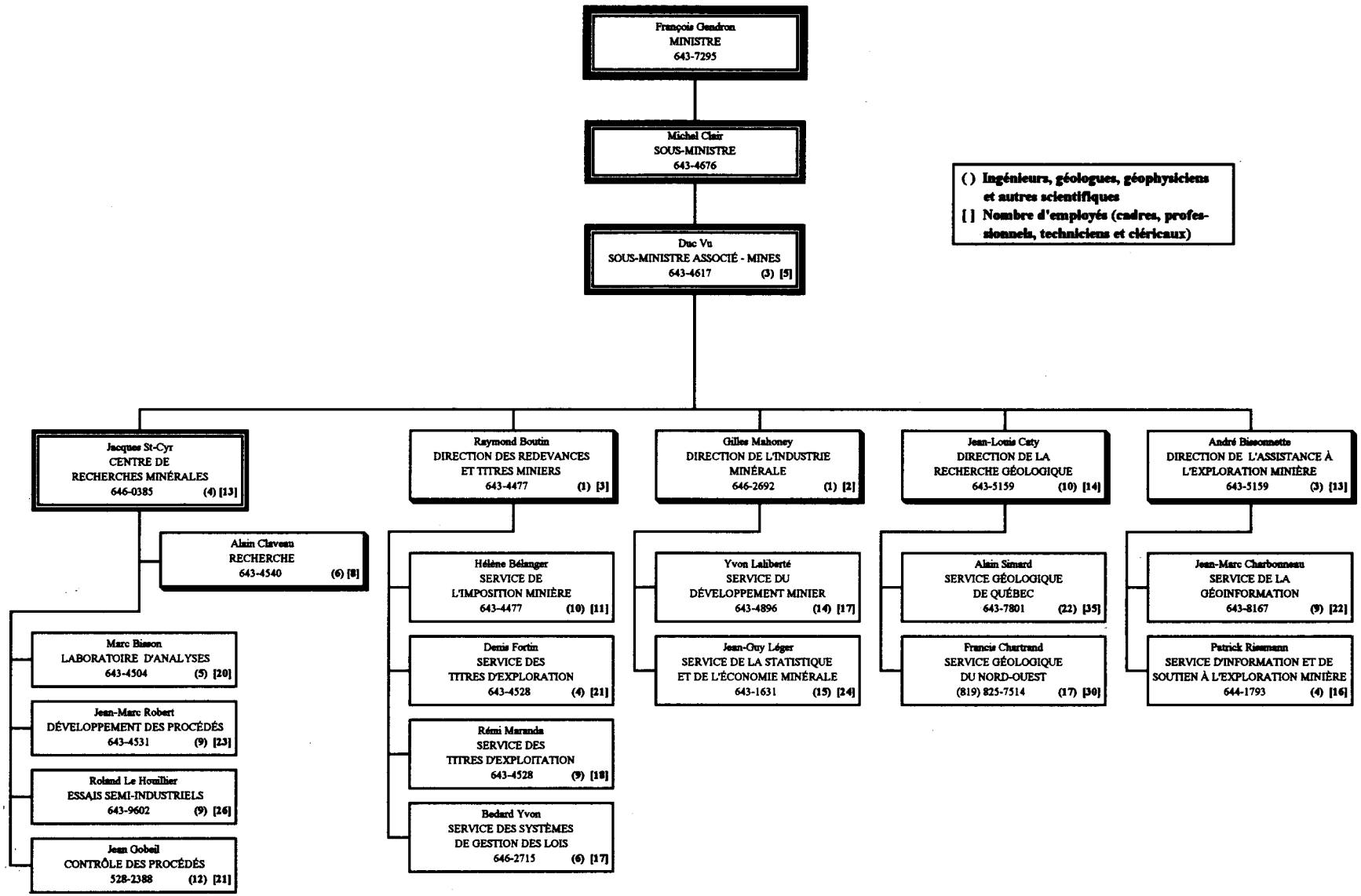


Ontario Mines and Minerals Division Organization Chart



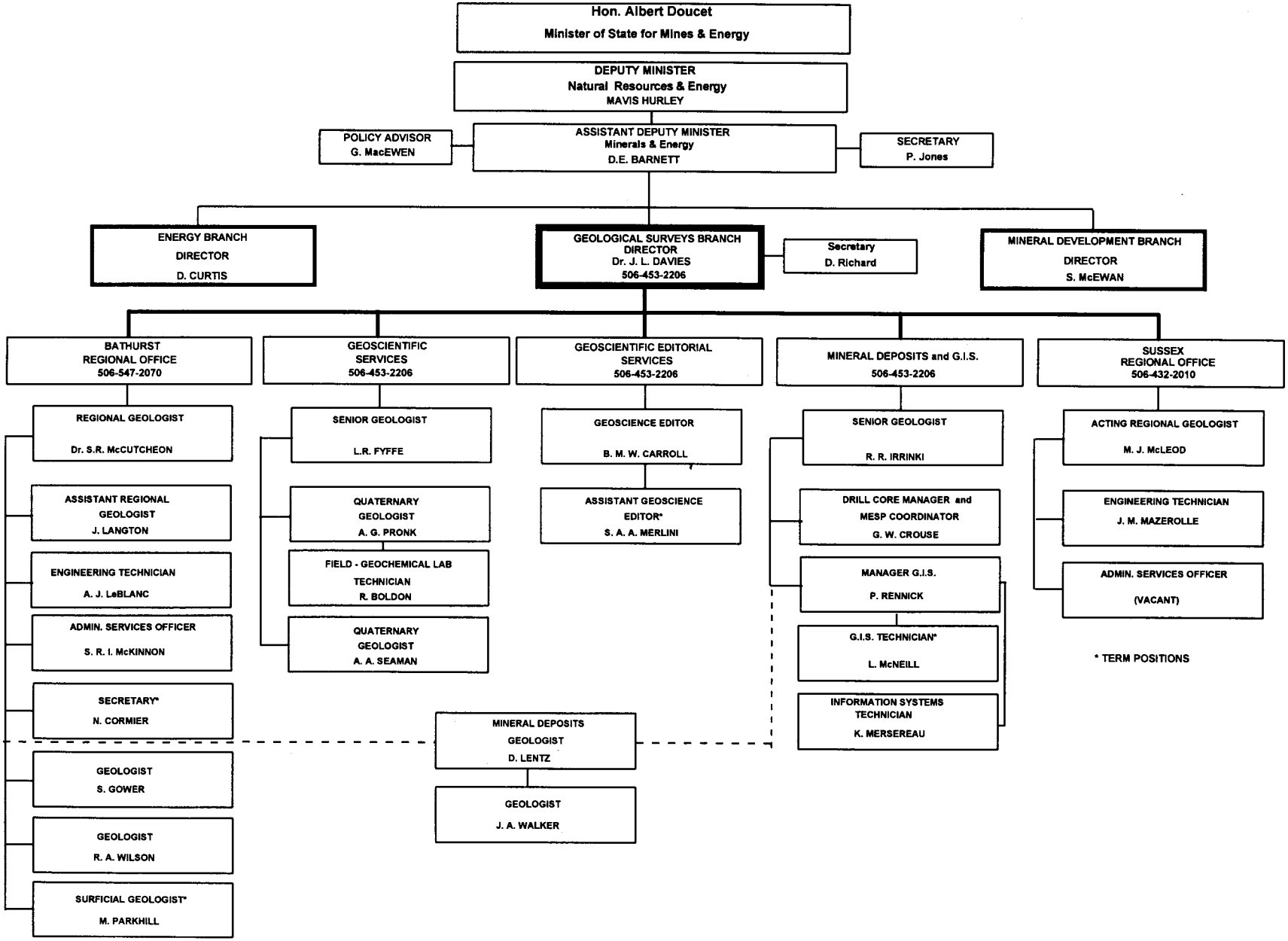
20 Number of permanent staff (professional, technical and clerical)

MINISTÈRE DES RESSOURCES NATURELLES - SECTEUR DES MINES

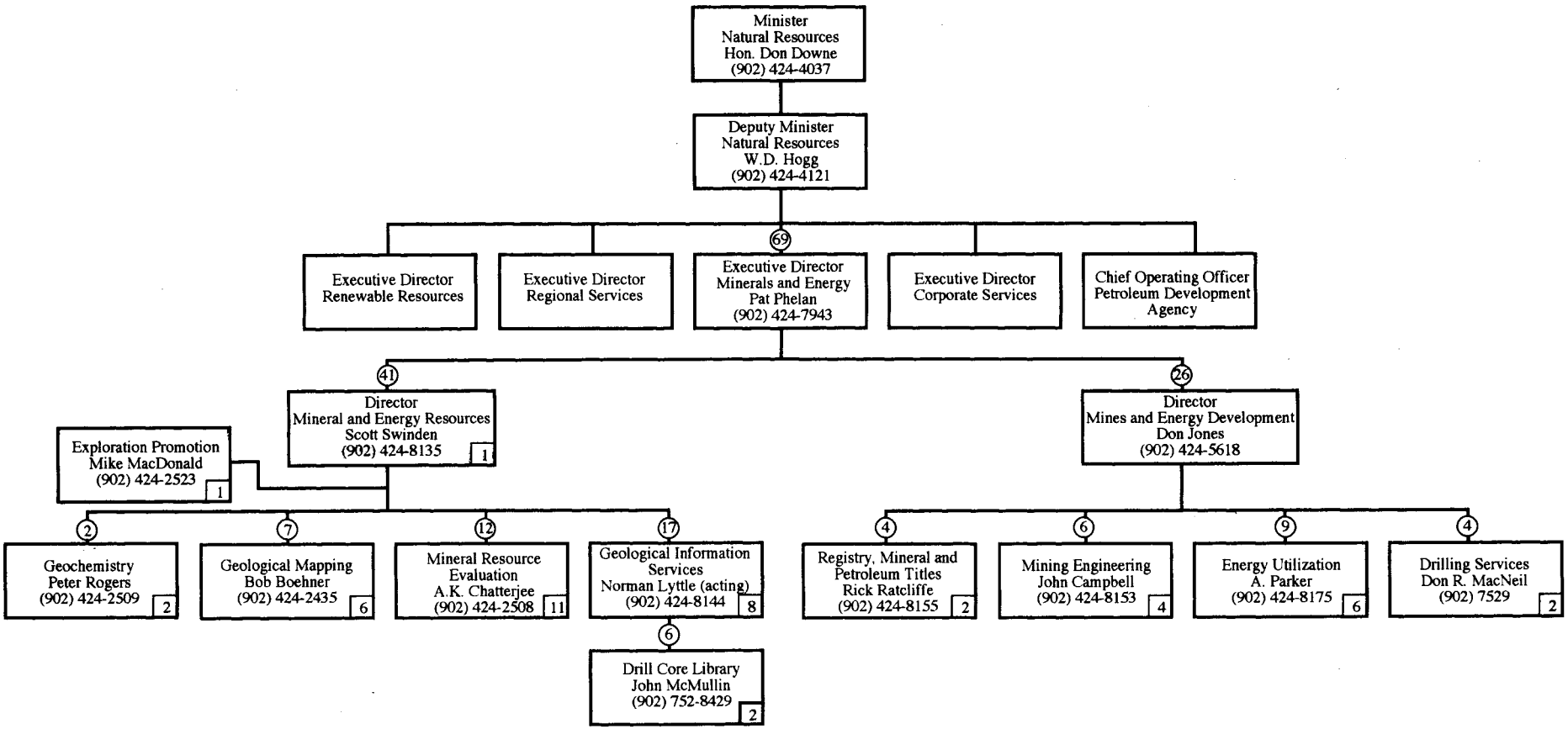


Le 28 novembre 1995 (selon les postes autorisés au 1 avril 1995)

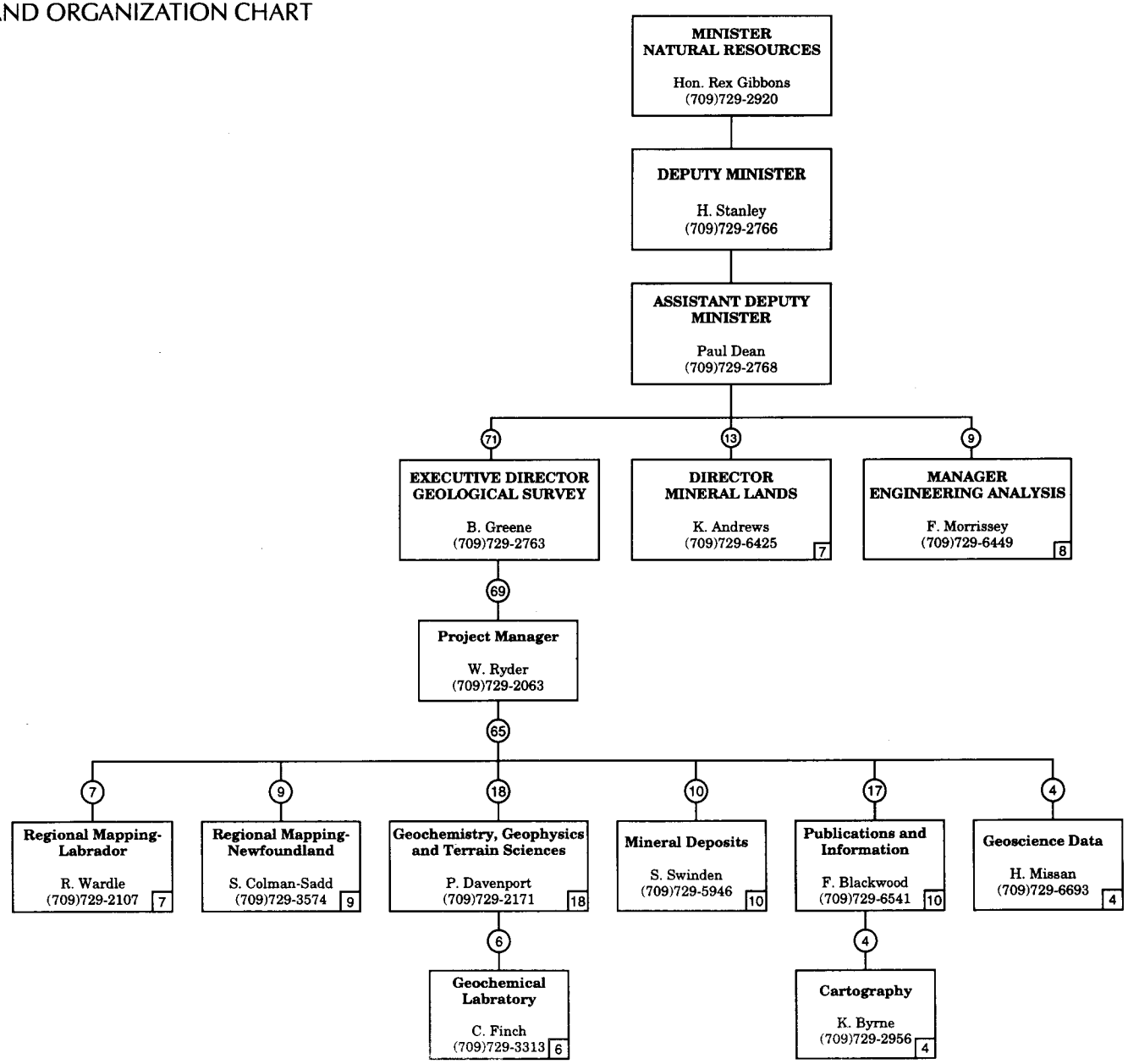
New Brunswick Department of Natural Resources & Energy
Minerals and Energy Division



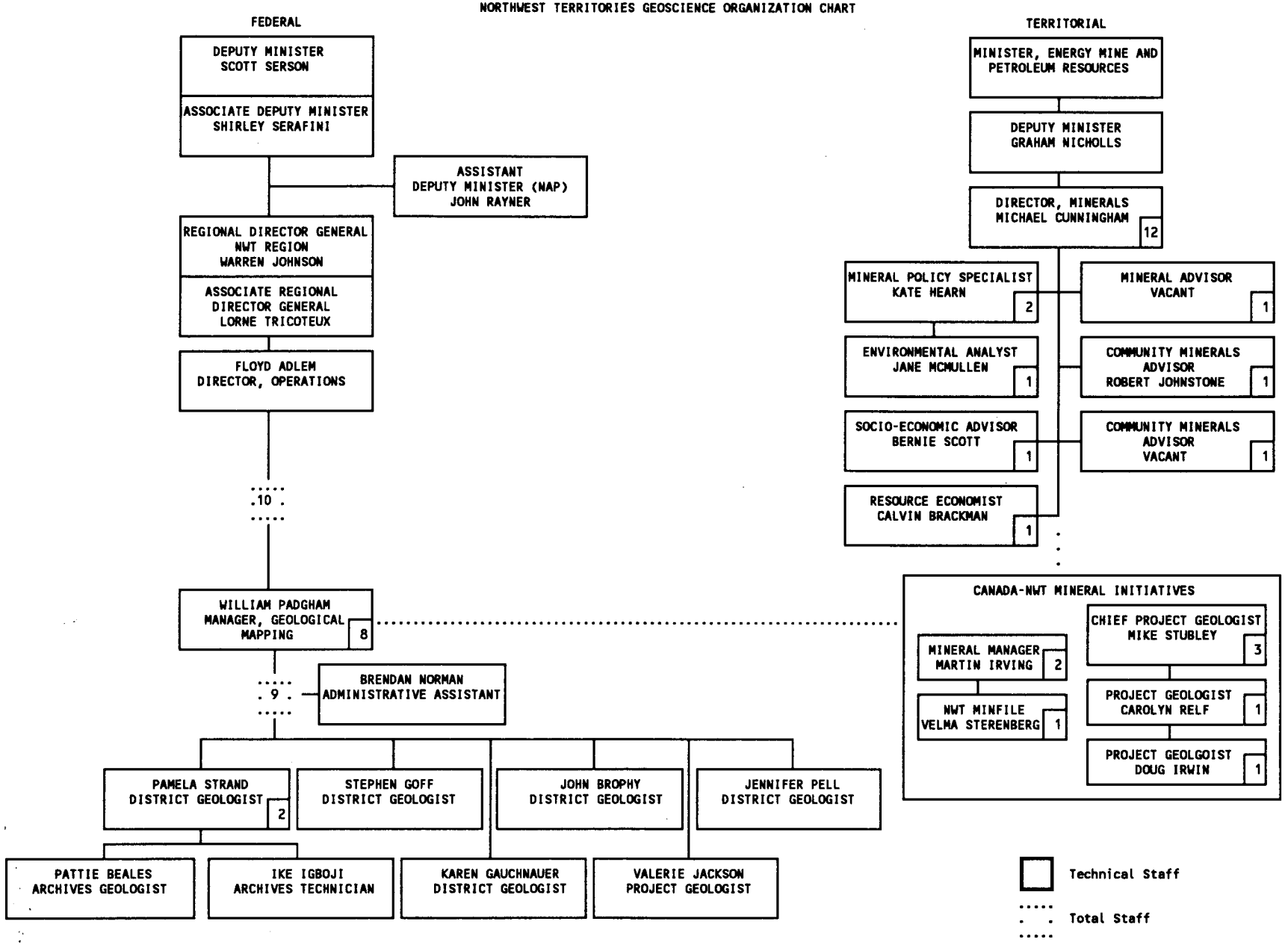
NOVA SCOTIA GEOSCIENCE ORGANIZATION CHART



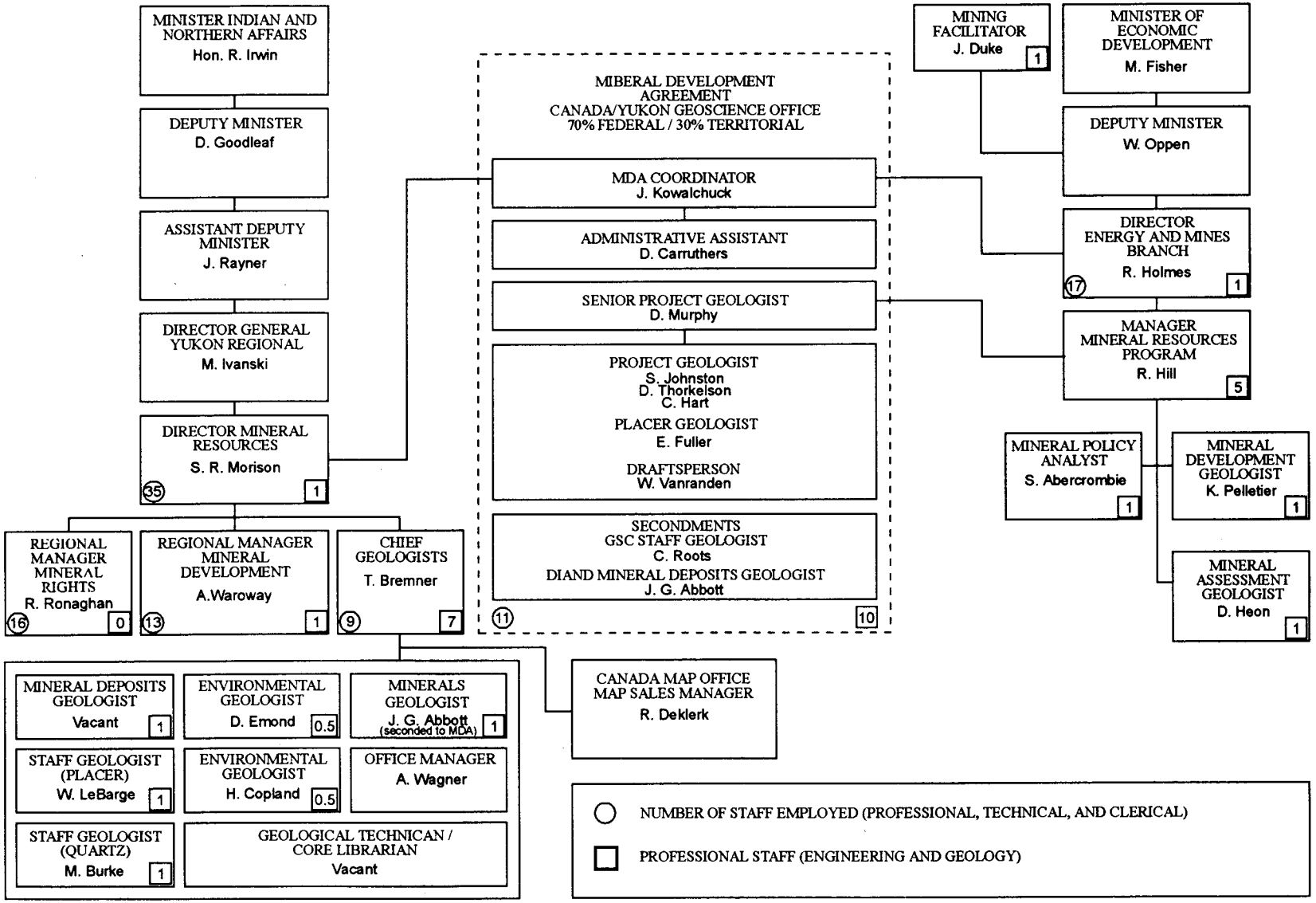
NEWFOUNDLAND ORGANIZATION CHART



NORTHWEST TERRITORIES GEOSCIENCE ORGANIZATION CHART



YUKON GEOSCIENCE ORGANIZATION CHART



PROVINCIAL GEOLOGICAL SURVEY
EXPENDITURES 1994-1995

PROVINCIAL GEOLOGICAL SURVEY EXPENDITURES
1994-1995

PROVINCE/ TERRITORY	EXPENDITURES $x10^6$	% OF TOTAL	TOTAL 1994 VALUE OF PROVINCIAL MINERAL PRODUCTION‡ $ X 10^3	SURVEY EXP. AS % OF TOTAL VALUE OF PROVINCIAL MINERAL PRODUCTION	AREA PROV/TERR KM^2 X 10^3	SURVEY $ KM^2	POP 1991 X 10^3	SURVEY $ SPENT/ CAPITA
NEWFOUNDLAND	3.9	6.1%	$837,449	0.47	405	9.6	568	6.9
NOVA SCOTIA	3.4	5.3%	$408,549	0.82	55	60.9	900	3.7
PRINCE EDWARD ISLAND	—	—	$1,190	-	6	-	130	-
NEW BRUNSWICK	3.4	5.3%	$862,044	0.39	73	46.6	724	4.7
QUEBEC	17.0	26.4%	$2,956,265	0.56	1,541	11.0	6,896	2.5
ONTARIO	14.5	22.5%	$4,834,560	0.30	1,069	13.6	10,085	1.4
MANITOBA	4.3	6.7%	$736,895	0.58	650	6.6	1,092	3.9
SASKATCHEWAN	2.3	3.6%	$1,843,466	0.12	652	3.5	989	2.3
ALBERTA	3.9	6.1%	$21,084,996	0.018	661	5.9	2,546	1.5
BRITISH COLUMBIA	6.5	10.1%	$2,632,482	0.25	948	6.9	3,282	2.0
YUKON	3.3	5.1%	$63,610	5.20	483	6.8	28	117.8
NORTHWEST TERRITORIES	1.9	3.0%	$496,407	0.38	3,380	0.6	58	32.8

‡. Source: Energy, Mines and Resources Canada; Statistics Canada

Note:
- Comparisons between jurisdictions are difficult due to the variety of program/budget components and methods of reporting data.
- Expenditures column includes a total of A-base funds and MDA funds available to the geological surveys.
- Provinces include metals, non-metals, structural materials and coal.
- Alberta figures also includes natural gas, natural gas by-products and crude oil.

PROVINCE: BRITISH COLUMBIA 1994-1995
Geological Survey Branch

Category	No. of Projects	Salaries	Operations	Employees Permanent	Employees Casual	Total $$	Funding
Mineral Activities:							
Bedrock Geology Surveys	Tatogga 50%	11,700.00	18,300.00		0.23	30,000.00	MDA
	NVI (Nixon)	85,300.00	78,700.00		1.77	164,000.00	MDA
	Tatlayoko	63,819.00	66,181.00		1.38	130,000.00	MDA
	Gataga	29,754.00	90,246.00		0.73	120,000.00	MDA
	Tulsequah	73,600.00	91,400.00		1.36	165,000.00	MDA
	IP - Bedrock	24,264.00	67,736.00		0.5	92,000.00	MDA
	Map Section	953,695.00	106,904.00	16		1 060,599.00	A-BASE
		1 242,132.00	**519,467.00**	**16**	**5.97**	**1 761,599.00**	
Geochemical Surveys	NVI - S Sibbick	33,500.00	16,500.00		0.5	50,000.00	A-BASE
	Gataga - North	—	60,000.00			60,000.00	MDA
	RGS Archive	—	20,000.00			20,000.00	A-BASE
	IP - Geochem.	14,713.00	38,287.00		0.25	53,000.00	MDA
	Env Geol Sect.	512,617.00	74,687.00	6		587,304.00	A-BASE
		560,830.00	**209,474.00**	**6**	**0.75**	**770,304.00**	
Surface Geology Surveys	NVI - P Bobrowsky	44,900.00	25,100.00		0.75	70,000.00	A-BASE
	IP - Surficial	57,454.00	52,546.00		1.3	110,000.00	MDA
	Aggregate	33,400.00	16,600.00		0.5	50,000.00	A-BASE
	Env Geol Sect.	135,058.00	37,343.00	3.5		172,401.00	A-BASE
		270,812.00	**131,589.00**	**3.5**	**2.55**	**402,401.00**	
Geophysical Surveys			600,000.00			**600,000.00**	EXPLORE
Mineral Investigations (Field)	IP - Minerals	—	10,000.00			10,000.00	MDA
	Vancouver Office	169,541.00	33,541.00	3		203,082.00	A-BASE
		169,541.00	**43,541.00**	**3**	**0**	**213,082.00**	
Mineral Deposit	Tatogga 50%	11,700.00	18,300.00		0.23	30,000.00	MDA
Analysis/Inventory	IM Skarns	14,000.00	22,000.00		0.25	36,000.00	MDA
	Econ Geol Sect 50%	432,545.00	61,790.00	7.5		494,335.00	A-BASE
	Goldstream	76,610.00	91,390.00		1.59	168,000.00	A-BASE
	Creston	71,760.00	78,240.00		1.65	150,000.00	A-BASE
	NVI - Andre	27,112.00	10,190.00		0.25	37,302.00	A-BASE
	Minfile Section	270,144.00	40,989.00	4.5	0.25	311,133.00	A-BASE
		903,871.00	**322,899.00**	**12**	**4.22**	**1 226,770.00**	
Industrial Minerals	Andalusite	27,120.00	17,880.00	0.5		45,000.00	ABASE
	Quesnel	27,900.00	12,100.00	0.5		40,000.00	A-BASE
	Promo Initiative	—	42,500.00			42,500.00	A-BASE
	Econ Geol Sect. 35%	302,781.00	43,253.00	5		346,034.00	A-BASE
		357,801.00	**115,733.00**	**6**		**473,534.00**	
Energy Activities:							
Coal/Peat	Coal	—	10,000.00			10,000.00	A-BASE
	Econ Geol Sec 15%	129,763.00	18,537.00	2.5		148,300.00	A-BASE
		129,763.00	**28,537.00**	**2.5**		**158,300.00**	
Other Activities:		—	—	—		—	
Laboratories		**44,187.00**	**50,000.00**	**1**		**94,187.00**	A-BASE
Chief's Office/Admin.		**349,861.00**	**249,649.00**	**5**		**599,510.00**	A-BASE
Misc Details							
Publications		**317,907.00**	**128,385.00**	**6.64**		**446,292.00**	A-BASE
Prospector's Assistance		**65,810.00**	**434,190.00**	**0.5**	**0.25**	**500,000.00**	PAP
Research Grants		—	**121,300.00**			**121,300.00**	A-BASE
Mineral Potential Assess.		**183,011.00**	**154,489.00**	**3**		**337,500.00**	CRII
Explore Grants/Admin.		**143,309.00**	**2 756,691.00**	**0.5**	**1.26**	**2 900,000.00**	EXPLORE
Assessment Report Sect.		**82,625.00**	**187,162.00**	**4.5**		**269,787.00**	A-Base
			Total FTE's	***70.14***	***15.7***	***$1,000,000***	***Total MDA***
						$5,537,066	***Total A-Base***
						$337,500	***Total CRII***
						$4,000,000	***Total Explore/PAP***

PROVINCE: ALBERTA 1994-1995

Category	Survey Research Agency	Funding	Projects	PY Perm.	PY Casual	SALARIES Permanent	SALARIES Casual	Operating Expenditures	Total $$
Mineral Activities									
Geochemical Surveys	ARC	ADoE	1	1.04	0.13	$67,388.00	$3,185.00	$60,945.00	$131,518.00
Subsurface Geology Surveys	ARC	ADoE	2	0.38	1.13	$18,460.00	$19,925.00	$16,321.00	$54,706.00
Minerals Investigations (Field)	ARC	1	7	2.76		$171,993.00	—	$122,797.00	$294,790.00
Mineral Deposit Analysis/Inventory	ARC	2	4	2.79		$169,287.00	—	$42,357.00	$211,644.00
Industrial Minerals	ARC	ADoE	7	3.21	0.23	$201,901.00	$5,590.00	$158,416.00	$365,907.00
Core Repositories	ARC	ADoE	1	0.68		$36,097.00	—	$4,898.00	$40,995.00
Energy Activities									
Coal/Peat	ARC	—	1	0.02		$,857.00	—	$,228.00	$1,085.00
Oil & Gas	ARC	3	6	2.72		$164,268.00	—	$128,567.00	$292,835.00
Subsurface Analysis	ARC	ADoE	2	0.78		$45,126.00	—	$67,405.00	$112,531.00
Other Activities									
Environment/Land Use	ARC	ADoE	6	1.43		$76,107.00	—	$200,471.00	$276,578.00
Hydrogeology	ARC	4	4	1.21		$75,798.00	—	$48,806.00	$124,604.00
Laboratories	ARC	Various	2	0.40		$22,840.00	—	$3,110.00	$25,950.00
Misc. Activities	ARC	5	9	2.92		$159,284.00	—	$107,487.00	$266,771.00
Chief's Office /Admin.	ARC	6	11	9.26		$611,648.00	—	$193,582.00	$805,230.00
Misc Details									
Library	ARC	—	1	—		—		$114,651.00	$114,651.00
Publications	ARC	Various	3	0.03		$1,391.00	—	$94,424.00	$95,815.00
Information/Assessment Files	ARC	—	1	0.01		$,123.00	—	$,294.00	$,417.00
Other	ARC	ADoE	17	4.82		$296,690.00	—	$414,095.00	$710,785.00
Research Grants	ARC	—	1	0.04		$1,508.00	—	$7,747.00	$9,255.00
Totals			**86**	**35**	**1.49**	**$2,120,766.00**	**$28,700.00**	**$1,786,601.00**	**$3,936,067.00**

1. *ADoE/Cameco/Tintina Mines/Lac North America/Troymin Resources*
2. *ADoE/Natural Resources Canada*
3. *ADoE/Alberta Energy Company/Imperial Oil Company/Alberta Oil Sands Technology and Research Authority*
4. *Sherritt/Komex/Environment Canada*
5. *ADoE/Accumap Enerdata/Canadian Society of Petroleum Geologists/Trans Alta Utilities*
6. *Alberta Economic Development and Tourism/City of Edmonton*

ARC - Alberta Research Council

ADoE - Alberta Department of Energy

PROVINCE: SASKATCHEWAN 1994-1995

	No. of projects	Positions		Salaries		Operational $		Totals $
		Permanent	Casual	Permanent	Casual	A-Base	MDA	
MINERAL ACTIVITIES								
Bedrock geology surveys	5	4.0	4.6	$243,861.80	$169,850.20	$19,119.78	$55,797.00	$488,628.78
Geochemical surveys	1	0.3	0.6	$9,513.42	$20,371.75	$1,386.18	$,0.00	$31,271.35
Surficial geology surveys	—	—	—	—	—	—	—	—
Geophysical surveys	2	0.3	0.9	$9,513.42	$27,779.75	$1,937.32	$6,545.00	$45,775.48
Mineral investigations (field)*	1	—	0.3	$,0.00	$9,717.00	$,501.45	$66,763.00	$76,981.45
Mineral deposit analysis/inventory	2	0.8	0.0	$42,055.78	—	$3,004.05	—	$45,059.83
Industrial mineral studies	2	1.0	0.5	$38,053.67	$26,201.50	$2,505.15	$67,317.00	$134,077.32
District geologists	n/a	2.3	—	$126,167.30	$,0.00	$9,012.15	—	$45,059.83
Core repositories	1	—	0.6	$,0.00	$16,373.38	$2,323.13	$8,677.00	$27,373.51
ENERGY ACTIVITIES								
Coal/peat	—	—	—	—	—	—	—	$,0.00
Oil and gas	—	—	—	—	—	—	—	$,0.00
Core repositories	n/a	2.0	—	$82,807.11	—	$7,715.00	—	$90,522.11
Subsurface analysis	n/a	3.5	—	$144,912.40	—	$13,501.25	—	$158,413.65
OTHER ACTIVITIES								
Environmental/land use studies	—	—	—	—	—	—	—	$,0.00
hydrogeology	—	—	—	—	—	—	—	$,0.00
laboratories	n/a	—	1.0	—	$21,519.67	$3,857.50	—	$25,377.17
Misc. (service/support)	n/a	—	0.5	—	$18,037.12	$,797.41	$26,633.00	$45,467.53
Chief's office/administration	n/a	4.8	0.3	$243,668.10	$12,365.33	$116,410.80	$,0.00	$372,444.23
MISCELLANEOUS								
Library	n/a	0.3	0.0	$14,018.59	—	$1,001.35	$,0.00	$15,019.94
Publications	n/a	3.8	1.0	$174,048.20	$48,018.00	$42,090.94	$2,421.00	$266,578.14
Prospector assistance	1	0.3	—	$14,018.59	—	$1,001.35	$,800.00	$15,819.94
Information/assessment files	3	3.8	4.5	$151,711.60	$95,848.17	$16,470.57	—	$264,030.34
Research grants	0	—	—	—	—	$,0.00	—	$,0.00
Other - GIS/computerization	5	0.5	0.8	$32,384.80	$31,807.17	$2,020.99	$29,096.00	$95,308.96
TOTALS	**23**	**27.3**	**15.6**	**$1,326,734.77**	**$497,889.04**	**$244,656.38**	**$264,049.00**	**$2,333,329.19**

• Includes $25,000 university research contract

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PROVINCE: MANITOBA 1994-1995

Category	Survey Research Agency	Funding Agency	No.of Projects/ Facilities	Positions (SMY) Permanent	Positions (SMY) Casual/Term	SALARIES Permanent	SALARIES Casual	Operating Expenditures	Total
MINERAL ACTIVITIES									
Bedrock Geology Surveys	MGS	MAN	18	10:26	1:03	$,571.60	$,19.30	$,103.60	694.50
Geochemical Surveys	MGS	MAN	-	-	-	-	-	-	-
Surficial Geology Surveys	MGS	MAN	2	2:00	:39	$,115.70	$,13.20	$,29.20	$,158.10
Geophysical Surveys	MGS	MAN	2	2:00	-	$,111.70	-	$,0.60	$,112.30
Mineral Investigations (Field)	MGS	MAN	11	6:26	2:27	$,348.90	$,51.90	$,170.40	$,571.20
Mineral Deposit Analysis/Inventory	MGS	MAN	-	-	-	-	-	-	-
Industrial Minerals	MGS	MAN	4	1:26	:13	$,80.40	$,3.10	$,53.80	$,137.30
District Geologists	MGS	MAN	1	-	-	-	-	$,1.70	$,1.70
Core Repositories	MGS	MAN	3	1:00	:13	$,39.50	$,4.50	$,11.40	$,55.40
ENERGY ACTIVITIES									
Coal/Peat	-	-	-	-	-	-	-	-	-
Oil & Gas	-	-	-	-	-	-	-	-	-
Core Repositories	-	-	-	-	-	-	-	-	-
Subsurface Analysis	-	-	-	-	-	-	-	-	-
OTHER ACTIVITIES									
Environment/Land Use	MB	MAN	1	-	-	-	-	$,80.00	$,80.00
Hydrology	MWR	MAN	2	10:00	-	$,466.00	-	$,512.00	$,978.00
Laboratories	MGS	MAN	3	8:00	-	$,333.40	$,3.90	$,221.40	$,558.70
Miscellaneous Activities	MGS	MAN	5	2:00	-	$,104.70	$,2.90	$,360.60	$,468.20
Chiefs Office/Admin.	MGS	MAN	7	7:26	-	$,348.20	-	$,114.10	$,462.30
MISCELLANEOUS DETAILS									
Library	-	-	-	-	-	-	-	-	-
Publications	-	-	-	-	-	-	-	-	-
Prospectors Assistance Information/Assessment	-	-	-	-	-	-	-	-	-
Files	-	-	-	-	-	-	-	-	-
Research Grants	-	-	-	-	-	-	-	-	-
Other	MGS	MAN	3	-	-	-	-	$,26.30	$,26.30
TOTALS	-	-	-	**51.0**	**5.20**	**$2,520,100.00**	**$,98,800.00**	**$1,685,100.00**	**$4,304,000.00**

MGS - MANITOBA GEOLOGICAL SERVICES
MWR - MANITOBA WATER RESOURCES
MB - MINES BRANCH

PROVINCE: ONTARIO 1994-1995

Programs	Funding Agency	No. of Projects or Facilities	Salaries Permanent (person/yrs)	Salaries Contract (person/yrs)	Salaries $	Operating Expenditures $	Totals $
Mineral Activities							
Bedrock Geology Surveys	MNDM	16	16.0	6.5	$1,118.80	$,848.70	$1,967.50
Geochemical Surveys	MNDM	4	4.0	1.0	$,252.50	$,246.00	$,498.50
Surficial Geology Surveys	MNDM	6	6.0	1.5	$,402.00	$,304.90	$,706.90
Mineral Investigations (field)	MNDM	7	12.0	3.5	$,847.50	$,588.40	$1,435.90
Mineral Deposit Analysis and/or Inventory	MNDM	2	1.0		$,51.50	$,28.00	$,79.50
Industrial Minerals	MNDM	4	4.0	1.0	$,242.20	$,61.40	$,303.60
District Geologists	MNDM	13	46.0	2.0	$2,518.80	$,956.90	$3,475.70
Core Repositories	MNDM	6	1.0		$,50.00	$,42.00	$,92.00
Other Activities							
Environment/Land Use	MNDM	3	3.0		$,180.00	$,25.00	$,205.00
Laboratories	MNDM		31.0		$1,084.30	$,885.00	$1,969.30
Chief Geologists Office Administration - OGS	MNDM		5.0		$,243.90	$,330.00	$,573.90
Director's Office/Administration - OGC	MNDM		5.0		$,239.00	$,154.70	$,393.70
Miscellaneous Details							
Library	MNDM		5.0		$,191.80	$,118.40	$,310.20
Publications	MNDM		15.0		$,515.40	$,456.20	$,971.60
Information/Assessment Files	MNDM		14.0		$,705.70	$,589.90	$1,295.60
Research Grants	MNDM	1				$,194.70	$,194.70
Totals			**168.0**	**15.5**	**$,8,643.40**	**$,5,830.20**	**$,14,473.60**
Prospector's Assistance *	MNDM/OPAP					$,2,000.00	$,2,000.00
NODA	CAN/ONT	14		24.0	$,,865.00	$,1,797.90	$,2,662.90

** Program administered by Mining and Land Management Branch*
MNDM - Ministry of Northern Development and Mines
NODA - Northern Ontario Mineral Development Agreement
OPAP - Ontario Prospector's Assistance Program
OGS - Ontario Geological Survey
OGC - Ontario GEOServices Centre

PROVINCE: QUEBEC 1994-1995

	Funding $
Mineral activities:	
* Bedrock geology surveys	$4,086,000.00
* Geochemical surveys	$,277,000.00
* Mineral investigations (field)	$,86,000.00
* Mineral deposit analysis	$,1,043.00
* Industrial minerals	$,586,000.00
* District geologists	$1,011,100.00
Other activities:	
* Chief geologist's Office/Administration	$1,969,000.00
Miscelleaneous Details:	
* Publications	$1,046,700.00
* Prospectors Assistance	$4,800,000.00
* Information/ Assessment files	$,618,000.00
* Other (GIS-Sigeom)	$2,563,000.00
TOTAL :	**$17,043,843.00**

PROVINCE: NEW BRUNSWICK 1994-1995

	No. of Projects	Staff			Salaries	Operating	Total
		Perm.	Casual	Contract			
Geological Surveys Branch							
Bedrock Geology	5	4	1.4		$297,200.00	$153,300.00	$450,500.00
Surficial Geology & Till Geochemistry	2	3			$135,400.00	$49,200.00	$184,600.00
Mineral Deposits	3	3	1		$166,000.00	$89,700.00	$255,700.00
Geophysics	1	-	-		-	$,900.00	$,900.00
Regional Geologists	2	6			$264,500.00	$106,800.00	$371,300.00
Drill Core	3	1			$50,300.00	$9,000.00	$59,300.00
Editorial	1	1			$45,800.00	$5,900.00	$51,700.00
Prospectors Assistance	1	-	-	-		$50,000.00	$50,000.00
Director's Office	1	2			$92,000.00	$7,800.00	$99,800.00
GIS and Digital Technology	1	2			$67,000.00	$50,520.00	$117,520.00
Research Grants	1	-	-	-		$5,000.00	$5,000.00
Canada/NB Mineral Agreement*	3	-		3	$115,000.00	$11,877.00	$126,877.00
Canada/NB Diversification Agreement!	2	-	-		-	$1055,000.00	$1055,000.00
Mineral Development Branch							
Industrial Minerals	4	4			$229,871.00	$38,729.00	$268,540.00
Publications, Education	3	5			$181,340.00	$38,560.00	$219,900.00
Energy Branch							
Oil, Gas, Oil Shale	1	1			$109,051.00	$8,749.00	$117,800.00
Coal							
Totals	**34**	**32**	**2.4**	**3**	**$1,753,462.00**	**$1,681,035.00**	**$3,434,497.00**

** includes surficial geology, GIS, and editorial projects*

! comprises $595,000 for AEM survey, $400,000 for Junior Co. Assistance, and $60,000 for technology development

PROVINCE: NOVA SCOTIA 1994-1995

Category	*Survey Research Agency*	*Funding Agency*	*No. of Projects (or facilities)*	*Employees*		*Operating Expenditures*	*Budget Allocation*
				Permanent	*Casual*		
Mineral Activities:							
Bedrock Geology Surveys	MERD	NSDNR/CNSCAMD	6	5.50	0.75	75,800.00	334,800.00
Geochemical Surveys	MERD	NSDNR/CNSCAMD	4	2.00	0.75	82,000.00	202,000.00
Surficial Surveys	MERD	NSDNR/CNSCAMD	3	2.00	0.75	60,000.00	168,000.00
Geophysical Surveys	MERD	CNSCAMD	1	0.30	—	47,900.00	47,900.00
Mineral Investigations (Field)	MERD	NSDNR/CNSCAMD	11	4.00	0.75	147,600.00	404,600.00
Mineral Deposit Analysis/Inventory	MERD	NSDNR/CNSCAMD	5	3.00	0.75	110,000.00	262,000.00
Industrial Minerals	MERD	NSDNR/CNSCAMD	8	2.00	—	96,400.00	147,400.00
District Geologists	RSD	NSDNR	3	1.50	—	—	76,000.00
Core Repositories	MERD	NSDNR/CNSCAMD	1	6.00	0.50	73,500.00	341,500.00
Energy Activities:							
Coal/Peat	MERD	NSDNR	5	3.50	—	76,000.00	267,000.00
Other Activities:							
Environmental/Land Use	MERD	NSDNR	2	2.00	—	10,000.00	116,000.00
Misc. Activities	MERD	NSDNR	—	6.00	3.00	179,900.00	501,900.00
Chief Geol's Office/Admin.	MERD	NSDNR	—	**3.00**	—	**20,000.00**	**135,000.00**
Misc Details							
Publications	MERD	NSDNR/CNSCAMD	—	**2.00**	**1.00**	**65,000.00**	**174,000.00**
Prospector's Assistance		CNSCAMD	**2**	—	—	**28,000.00**	**28,000.00**
Information/Assessment Files	MERD	NSDNR/CNSCAMD	**2**	**2.00**	—	**43,000.00**	**144,000.00**
TOTALS:				***44.80***	***8.25***	***$1,115,100.00***	***$3,350,100.00***

MERD Mineral & Energy Resources Division
RSD Regional Services Division
NSDNR Nova Scotia Dept. of Natural Resources
CNSCAMD Canada-Nova Scotia Cooperation Agreement on Mineral Development

PROVINCE: NEWFOUNDLAND 1994-1995

PROGRAMS	SURVEY RESEARCH AGENCY	FUNDING AGENCY	NO. OF PROJECTS/ FACILITIES	PERMANENT1 SMY	CASUAL SMY	SALARIES PERMANENT $	SALARIES CONTRACT1 $	CASUAL $	OPERATING EXPENDITURES $
MINERAL ACTIVITIES									
Bedrock geology surveys	NDM	NDM	15	15	2	549,808	158,516	7,413	153,104
Geochemical surveys	NDM	NDM/DEMR	6	9	-	109,147	200,471	-	38,957
Surficial geology surveys	NDM	NDM/DEMR	5	3	2	97,812	38,784	14,343	52,825
Geophysical surveys	NDM	NDM	2	1	-	-	47,520	-	8,879
Mineral investigations (field)	NDM	NDM	6	5	-	221,213	47,520	-	73,206
Mineral deposit analysis and/or inventory	NDM	NDM	3	5	-	47,520	114,794	-	2,325
Industrial minerals	NDM	NDM	2	2	-	47,520	47,644	-	18,671
District geologists	-	-	-	-	-	-	-	-	-
Core repositories	NDM	NDM	1	2	1	57,499	37,172	5,608	42,760
ENERGY ACTIVITIES									
Coal/Peat	-	-	-	-	-	-	-	-	-
Oil & Gas	-	-	-	-	-	-	-	-	-
Core Repositories	-	-	-	-	-	-	-	-	-
Subsurface Analysis	-	-	-	-	-	-	-	-	-
OTHER ACTIVITIES									
Environment/Land Use	-	-	-	-	-	-	-	-	-
Hydrology	-	-	-	-	-	-	-	-	-
Laboratories	NDM	NDM	1	6	-	180,077	-	-	61,333
Miscellaneous Activities	-	-	-	-	-	-	-	-	-
Chief Geologist's Office/Admin.	NDM	NDM	2	8	-	229,918	23,715	-	53,151
MISCELLANEOUS DETAILS									
Library	NDM	NDM	1	4	-	68,013	59,004	-	23,664
Publications	NDM	NDM	3	10	1	269,196	103,701	9,665	88,052
Prospectors Assistance	-	-	-	-	-	-	-	-	-
Information/Assessment files	NDM	NDM	3	6	1	$ 268,862.00	-	$ 5,242.00	$ 210,316.00
Research Grants	-	-	-	-	-	-	-	-	-
Other	-	-	-	-	-	-	-	-	-
TOTALS	**-**	**-**	**50**	**76**	**7**	**$ 2146,585.00**	**$ 878,841.00**	**$ 42,271.00**	**$ 827,243.00**

GRAND TOTAL 3,894,940

1 includes long term temporary staff

NDME - Newfoundland Department of Mines

DEMR - Department of Energy, Mines and Resources, Canada

PROVINCE: NORTHWEST TERRITORIES 1994-1995

	PROJECTS/ FACILITIES	PERSON YEARS	SALARY DOLLARS	OPERATING EXPENDITURES
DIAND PROGRAMS				
ADMINISTRATION	1	2	$103,000.00	$170,000.00
CORE REPOSITORIES	1	0.1	$5,000.00	$5,000.00
BEDROCK MAPPING (1:50,000)	4	3	$,155.00	$262,000.00
LIBRARY/ARCHIVES	1	1.2	$52,500.00	$19,600.00
MINERAL DEPOSIT INVENTORY & ANALYSIS	5	4	$206,000.00	$142,000.00
COMPUTERIZED MINERAL SHOWINGS DATABASE	1	0.2	$10,000.00	$5,000.00
PUBLICATIONS	N/A	0.2	$10,000.00	$5,000.00
PROSPECTOR ASSISTANCE		0.3	$15,000.00	$3,000.00
TOTAL DIAND	**13**	**11**	**$401,655.00**	**$611,600.00**
MIO PROGRAMS				
ADMINISTRATION	1	1	$33,000.00	$82,000.00
BEDROCK MAPPING (1:50,000)	5	8.3	$425,000.00	$400,000.00
COMPUTERIZED MINERAL SHOWINGS DATABASE	1	1	$65,000.00	$65,000.00
PROSPECTORS ASSISTANCE	1			$70,000.00
INFORMATION/EDUCATION	1			$40,000.00
TOTAL MIO	**9**	**10.3**	**$523,010.30**	**$657,000.00**
GSC	13			$637,000.00
GRAND TOTAL GEOSCIENCE EXPENDITURES	**35**	**21.3**	**$924,665.30**	**$1,905,600.00**

PROVINCE: YUKON 1994-1995

	Agency	Funding	Projects	Perm	Casual	Expenditure
Mineral Activities						
Bedrock Geological Surveys	MDA	MDA	4	4	2.8	$660,700.00
	INA	INA/MDA	1	0.8		$72,713.00
	GSC	GSC/MDA	1	1		$79,000.00
Geochemical Surveys	GSC	MDA	1			$10,000.00
Surficial Geology	MDA	MDA	2	1	0.6	$223,800.00
Geophysical	GSC/MDA	MDA	1			$303,500.00
Mineral deposit inventory	INA	INA	1	1		$83,810.00
District geologists	INA	INA	2	2		$133,653.00
Core repositories	INA	INA	1		0.25	$15,550.00
Energy Activities						
Oil & Gas	NEB	YTG	2			$60,000.00
Other Activities						
Environment/Land Use	INA	INA	2	1	0.25	$122,830.00
Chief Geologist's Office/Admin	MDA	MDA	1	3		$307,000.00
	YTG	YTG	1	1		$87,300.00
	INA	INA	1	1.3		$163,268.00
Misc Details						
Library	INA	INA	1			$12,000.00
Publications	INA	INA	2	1		$58,182.00
	MDA	MDA	1			$8,500.00
Prospectors Assistance	YTG	YTG	1	1		$725,800.00
Assessment Files	INA	INA	1	1		$10,000.00
Research Grants	INA	INA	1			$17,303.00
Research Grants	MDA	MDA	1			$38,000.00
Other: Economic Analysis	YTG	YTG	1	1		$72,400.00
Subtotal INA			**8**	**7.1**	**0.75**	**$675,009.00**
Subtotal MDA			**12**	**9**	**3.4**	**$1,644,800.00**
Subtotal YTG			**5**	**3**	**0**	**$945,500.00**
Total			**30**	**20.1**	**3.9**	**$3,265,309.00**

NOTES

GEOLOGICAL PROGRAM HIGHLIGHTS

NOTES

BRITISH COLUMBIA

GEOLOGICAL SURVEY BRANCH

INTRODUCTION

1995 was a special year in the history of the Geological Survey Branch (GSB). It marked the 100th anniversary of the British Columbia Bureau of Mines, the predecessor of the present Mineral Resources Division. The Bureau brought together into one Department all government offices that deal wholly with mining, including the newly created Provincial Mineralogist. The Provincial Mineralogist, later known as the Chief Geologist, was charged with collecting and publishing information on the geology and various mining projects in the Province, and for promoting development of the mining industry. These are the origins of the Geological Survey Branch.

To mark the occasion a commemorative poster was presented by the Minister of Energy Mines and Petroleum Resources to the Branch. Work on preparation of a new geological compilation of the Province is well advanced. Branch publications produced in 1995 bear the 100th anniversary logo.

1995 was another very active year of geological surveying. The base budget was $5.8 million, an increase of 4.7% from the previous year. This budget was supplemented by an additional $1.07 million, made up of $720,000 from the last year of the Canada- British Columbia Mineral Development Agreement, and $354,000 from the Corporate Resource Inventory Initiative to the on going Mineral Potential Initiative. The Mineral Potential Project will be completed in 1996 when mineral resource assessments will have been made for the entire province at 1:250 000 scale. Assessments and the associated geological compilations are posted on the Ministry's World Wide Web site.

Explore BC, the Government's exploration incentive grant program for mineral exploration, continued in 1995-96 with funding of $3.5 million . The Prospectors Assistance program also continued with $500,000 funding. Both programs were managed by the GSB.

Exploration expenditures in British Columbia in 1995 are estimated at $88 million; a similar level to the previous year. Significantly, the forecast value of solid mineral production in 1995 is $3.48 billion, a 38% increase over 1994. This is due largely to increased prices for copper, molybdenum oxide and silver. Two new mines opened in 1995. The Eskay Creek high grade silver-gold mine began direct shipping ore by rail and ocean freight in January 1995. The QR gold mine began production in June 1995.

PROGRAM HIGHLIGHTS

ECONOMIC DEVELOPMENT PROGRAM

The Branch's economic development surveys continued to be focused on regions where existing mines are forecast to close over the next few years (Port Hardy, East Chutneys and Northern Selkirk's) and on underexplored frontier areas with development potential (Gataga, Cry Lake map sheet, Tatogga, and Interior Plateau).

Three new projects were initiated in 1995. A 5-year multidisciplinary geoscientific program under the auspices of the GSC's NATMAP program got underway in the Nechacko Plateau area of central BC. The project is co-ordinated and funded by both the GSC and the GSB. The second project, also a joint venture with the GSC, was a $600,000 multiparameter airborne geophysical survey over three target areas in the vicinity of the Sullivan Mine in the East Kootenays. Two of the target areas were flown in 1995 and the remaining area will be surveyed in 1996. The project was funded by BC with the GSC providing contract supervision and setting technical standards. The third project was a regional geochemical survey of the Cry Lake map sheet in northern BC. This data will be released in the summer of 1996 and is expected to generate exploration staking.

The North Vancouver Island Integrated Base Metal and Precious Metal initiative was completed in 1995 with detailed mapping of the prospective Bonanza Group volcanics in the southern part of the area. Data from all components of the program will be incorporated into an integrated report to be completed in 1996.

The Interior Plateau multidisciplinary project was also completed in 1995. Mapping, geochemical and mineral deposit studies will be incorporated into a final report that will be released in 1996.

Other ongoing projects targeted sedex (Gataga, Creston), VMS (Goldstream) porphyry copper-gold

(Tatogga), mesothermal gold (Cambria), and precious metal (transitional deposits) potential around the province.

The Industrial Minerals Promotion Project continued in 1995 with newsletters, trade shows and targeted field studies. Field work focused on refractory minerals of the andalusite family, gemstones and ornamental stone, and industrial mineral bearing skarns.

The Aggregate Inventory program continued and in 1995 and developed aggregate potential maps of the Prince George area. This work is being done in conjunction with the Province's new Growth Management Planning.

Coal exploration increased in the Province for the first time in recent years. Our work focused on monitoring work on active coal mines and properties and undertaking research studies on phosphorous and sulphur in BC coals.

RESOURCE MANAGEMENT PROGRAM

The last region to be assessed under the mineral potential initiative, the important Northwest Region was tackled in 1995. Compilation of the geology and exploration data sets, such as MINFILE, was completed in 1995 and an expert workshop to estimate the undiscovered potential will be held in March 1996.

Yukon contracted the Ministry to provide management and training for a similar program they are undertaking utilising the BC methodology, which is modelled on methods pioneered by the USGS.

ENVIRONMENTAL PROGRAM

A pilot earthquake hazard map was completed in 1995 for the Chilliwack region. The map and methodology used received favourable reviews from geotechnical engineers, municipal planners and insurance industry representatives. Based on this positive response the Ministry has requested funding from an intergovernmental inventory program to prepare hazard maps on a systematic basis for the Lower Mainland and Victoria regions. A decision is expected in March 1996.

The Branch co-operated with the GSC on a landslide hazard inventory program in south-western BC. Numerous landslides have caused considerable economic loss in this region. The project goals are to document the distribution and styles of landslides, and to design mitigative land use strategies.

In 1995 the Ministry applied for funding from the new Forest Renewal BC Program to act as the Government custodian of terrain and terrain stability mapping that the Forest Industry is now required to conduct and file under the Forest Practices Code. If approved, an Internet-accessible database will be constructed in 1996 to receive the expected large number of reports and data that will be filed with the Ministry of Forests. This new data will complement the Branch's extensive quaternary geological database.

ELECTRONIC PUBLISHING

The Branch is moving quickly towards full electronic publishing and print-on-demand for its geoscience publications. A home page has been created under the Ministry's WWW site: http://www.empr.gov.bc.ca

The Mineral Potential data is available free of charge from this site. Also the 1995 edition of Geological Fieldwork and Current Research was prepared in print-on-demand format.

ALBERTA DEPARTMENT OF ENERGY
ALBERTA GEOLOGICAL SURVEY

The Alberta Geological Survey (AGS) joined the Alberta Department of Energy on March 1, 1995, through a transfer of administration from the Alberta Research Council. The physical move took place on April 1, 1995. During the fiscal year, AGS, in cooperation with Department of Energy management, developed goals for the year 2010. AGS also restructured itself in alignment with the Department's mission and mandate. It is now organized into the following work teams: Geoscience Information Systems, Land Use Planning and Environmental Management Support, Exploration and Development Support, and Administration Services. Close links were established with the Mineral Access, Geology and Mapping Branch in the Operations and Support Division of the Department.

The Alberta Geological Survey celebrated its 75th anniversary on January 6, 1996. Celebrations started in the fall of 1995. The AGS Open House on October 19, 1995 included a special luncheon for invited guests, featuring the "ghost" of AGS founder, Dr. John A. Allan, reminiscing on the past. The Open House was informative and well received by Department of Alberta Energy staff, clients from industry, governments, universities and the general public. As well, AGS offered a Public Lecture Series with the theme "Alberta Under Our Feet,"composed of eight lectures. It covered such topics as: diamonds and gemstones, gold and silver, dinosaurs, various aspects of the Canadian Rockies, the North Saskatchewan River valley, how geologists find oil, and stories about Alberta miners.

The Public Lecture Series was sponsored by industry and government, and drew large audiences.

AGS maintains communications with the geoscience community through its semi-annual newsletter, Rock Chips.

Some of the highlights of 1995 are described in detail in the following sections.

LAND USE PLANNING AND ENVIRONMENTAL MANAGEMENT SUPPORT TEAM

This team conducted a series of land use planning and groundwater related projects during 1995. These projects include the West Castle and Kakwa Compilation Mapping Project, Southern Alberta Compilation Project, Land Use Support Project, Geology of Alberta Map Project, UTF Pleistocene Aquefer Study, development of a Groundwater Information Management and Modeling System, a Three-dimensional Characterization of the Pleistocene Geology at Sherritt Inc., and revision of Alberta Environmental Protection Guidelines for Landfill Investigations. The Team provides ongoing land use planning support to the Mineral Access, Geology and Mapping Branch.

WEST CASTLE AND KAKWA COMPILATION MAPPING PROJECT

The project provides resource compilation maps and reports to stimulate and support industry exploration programs, and assist government agencies in the land use planning.

Each compilation map includes a primary map and a series of thematic maps. The primary map, at a 1:50 000 scale, includes bedrock geology (including major structures); cultural, hydrographic and topographic features; and non-renewable resource data such as metallic and industrial mineral deposits, oil and gas well locations, gas pool outlines, coal outcrops, coal mines and coal drill holes. Thematic maps, at a 1:250 000 scale for various data coverages, include Refined Eastern Slopes Zones, Petroleum and Natural Gas Leases, Oil and Gas Fields, Coal Leases, Coal Development Potential, Metallic Mineral Permit Areas, Integrated Resource Plans, Aggregate Deposits, and a reference map outlining the area coverage of each reference report. By providing an overview of the non-renewable resources and environmental concerns for the designated area/mapsheet, the project contributes towards informed decision making in resource management and land use planning.

The mapping of the West Castle area has been completed and published. Following summer field work, map compilation of the Kakwa region is in progress.

SOUTHERN ALBERTA COMPILATION PROJECT

The objective of this project is to provide resource maps and associated reports to stimulate and support industry exploration programs, and assist government resource management and land use planning, including resources conflict avoidance and environmental stewardship. Another objective is to generate and in-

corporate new information. Map areas include Pincher Creek/Crowsnest Pass and Whaleback regions.

The project complements the Canada National Geoscience Mapping (NATMAP) Program, developed by the Geological Survey of Canada (GSC) of the federal Ministry of Energy, Mines and Resources. NATMAP provides coordination and funding support to related field-based geoscience mapping projects conducted by the GSC, provincial geological surveys, industry and universities.

Field work was carried out around the Pincher Creek, Crowsnest Pass, Waterton and Whaleback regions during the summer. Several samples were collected for analysis. Map compilation for both regions is still in progress. The format of the final map product will be similar to the West Castle and Kakwa Compilation Mapping - a 1:50 000 scale primary map and a series of 1:250 000 scale thematic maps. Three to four maps will be completed by April 1996.

LAND USE SUPPORT PROJECT

The project is designed to assist land use planners at the Mineral Access, Geology and Mapping Branch of the Operations and Support Division in resource management and land use planning using GIS mapping technology. Mapping of the Whaleback region was completed, and aggregate and mineral data were reviewed for the initial two rounds of Special Places 2000 nominations. (The special Places 2000 program is designed to protect environmentally sensitive areas of Alberta.)

GEOLOGY MAP OF ALBERTA

The objective of this project is to produce a revised and updated geological map of Alberta to replace the 1972 version, which is outdated in many aspects and now out of print. This is an on-going project.

PUBLIC LANDS GRAVEL RESOURCE MANAGEMENT MAPS

The Resource Information Branch of Alberta Environmental Protection has successfully integrated surface lease and reservation data for sand and gravel from the Land Status Automated System with sand and gravel deposit data from the AGS database. This resulted in the production of a Public Lands (Alberta Agriculture and Rural Development) district map. The Alberta Forest Service recognized the potential of this product for mineral aggregate resource and land use management. The Bonnyville study area was subsequently expanded to a full 1 :250 000 NTS sheet and other regions were identified to include the needs of both Public Lands and Forestry land use management. Alberta Geological Survey sand and gravel data are being assembled for use by the Resource Information Branch in production of the full NTS sheets (73L, 83O, and 83F).

HYDROGEOLOGY OF THE UNDERGROUND TEST FACILITY (UTF) SITE, FORT MCMURRAY

The Alberta Geological Survey has been involved in the characterization of the hydrogeological setting of the UTF site for a number of years. AGS recently completed a study which addresses the potential of the Steam Assisted Gravity Drainage (SAGD) process to impact groundwater quality near the UTF site. The AGS is currently conducting a project to characterize a buried Pleistocene aquifer which supplies the UTF operation with water for steam injection. Based on the interpretation of existing information, supplemented with field work, AGS has been able to map the underground distribution of segments of this valuable aquifer, and to characterize the properties of the geological materials which comprise the aquifer and overlying aquitard. Winter drilling investigations are being planned for 1996 to install observation wells and to characterize the hydraulic properties of the aquifer. In addition to providing the UTF with much needed information on local groundwater resources, this study will provide baseline information on aquifer behaviour and groundwater quality which can be used to characterize other potential water sources from buried Pleistocene aquifers elsewhere in the Athabasca oil sands region.

THREE-DIMENSIONAL CHARACTERIZATION OF THE SURFICIAL GEOLOGY, SHERRITT, FORT SASKATCHEWAN

The Alberta Geological Survey was contracted by Sherritt Inc. to conduct a three-dimensional characterization of the surficial geology at the company's Fort Saskatchewan site, as the basis for future hydrogeological investigations. Sherritt approached the AGS because of its specific combination of Quaternary stratigraphy and hydrogeology expertise in the region, which was not available in the private sector. The study incorporated information collected over more than 20 years of operations at the Sherritt site. More than 700 boreholes were interpreted within a stratigraphic framework previously devised by the AGS. The results of the study are presented in a series of structure contour maps, isopach maps, and stratigraphic cross-sections showing the distribution and thickness of various aquitard and aquifer units at the

site. This information is currently being used to develop a hydrogeological model of the site, in support of environmental monitoring of the various industrial activities.

GROUNDWATER INFORMATION MANAGEMENT AND MODELLING SYSTEM (GIMMS)

Petroleum development in Alberta is hampered by two types of groundwater issues that can stall development or increase production costs: water supply and possible groundwater contamination. It is anticipated that growing demand for groundwater for enhanced petroleum recovery will lead to increased conflicts between various users. As a result, the petroleum industry, the Alberta Energy and Utilities Board and other regulatory agencies in Alberta have indicated an increasing need for a readily accessible, automated framework of interpreted groundwater information linked to various modelling tools to manage those issues in an acceptable manner.

The GIMMS was initiated to develop the necessary technology for an automated groundwater information management and modelling system for areas of high water demand such as Cold Lake, Pembina, Peace River, and other petroleum producing areas of Alberta. The system will incorporate a relational database structure, an electronic database currently being developed by Alberta Environmental Protection, and Quaternary and pre-Quaternary stratigraphy to provide the basic framework for various groundwater modelling and management strategies.

For this year, a prototype system is being set up in the Cold Lake region. It is proposed that GIMMS be deployed in other areas of the province where major water sources are needed to support the petroleum industry.

REVISION OF ALBERTA GUIDELINES FOR LANDFILL INVESTIGATIONS

The Alberta Geological Survey has made significant contributions to the investigation of proposed landfill sites in the Edmonton municipal region over the past five years by incorporating new and innovative techniques and procedures for characterizing such sites. In 1995, Alberta Environmental Protection contracted the AGS, Alberta Research Council, and SENTAR Consultants to update and revise current guidelines which would include new protocols and procedures to better characterize the hydrogeologic settings of proposed landfill sites. The revised guidelines will provide both the regulatory agencies and consulting industry with a clearer understanding of the type of information needed in selecting suitable sites for Alberta.

EXPLORATION AND DEVELOPMENT SUPPORT TEAM

The 1995-1996 projects undertaken by the Exploration and Development Support Team include the Financial Credit and Technical Evaluation of Mineral Permit Assessment Reports, Mineral Exploration Permit Assessment Report Cataloguing and Compilation, Mineral Exploration Core and Rock Sample Selection Storage and Public Access, Mineral Resources Mapping of Main Mountain Corridors, Shaftesbury Mapping, Drilling and Building Stone, Oil Sands or Heavy Oil Deposits Resources Characterization, Gold and Other Mineral Potential in Athabasca Oil Sands and Adjacent Regions, and Industry and Public Enquiry Response.

In addition, the following projects were funded by the Canada-Alberta Partnership on Minerals: the Reconnaissance Mineral and Geochemical Survey with Emphasis on Northern Alberta, Mapping and Resouce Exploration of the Tertiary and Preglacial Formations of Alberta, Mineral Aggregate Database and Map Series, and Aggregate Commodity Analysis.

Two projects from the 1994-1995 program, Evaluation of the Mineral Development Potential of Selected Area of Northeastern Alberta, and Surficial Geology Mapping and Quaternary Stratigraphy of the Peace - Winigami Areas of Northern Alberta were completed.

The 1995-1996 period is the final fiscal year of the Canada-Alberta Partnership on Minerals. Technical highlights are listed below:

SHAFTESBURY FORMATION MAPPING, DRILLING AND BUILDING STONE PROJECT

The Geological Survey of Canada, in conjunction with APEX Geoscience Limited and the Alberta Geological Survey, is studying geochemical, stratigraphic and other geological information about the Shaftesbury Formation. The objective is to evaluate the potential of the formation and associated sedimentary successions in northern Alberta to host diamandiferous pyroclastics and diatremes, stratiform lead-zinc, or nickel-zinc± precious metal shales, disseminated sediment hosted gold deposits and volcanogenic massive sulphide deposits.

GOLD AND OTHER MINERAL POTENTIAL IN THE ATHABASCA OIL SAND AND ADJACENT REGIONS

Activities to date have focused primarily on providing a regional geoscience content for the exploration play in the Fort McMurray-Birch Mountain region.

A bedrock log picks database is being used to create structure, isopach, and depth maps and cross sections of the Upper Cretaceous units within the Birch Mountains (top of the Mannville Group to the top of Second White Specks). Description of sections along the northeastern rim of the Birch Mountains was completed. The pre-existing stratigraphy and bedrock geology map will need to be revised. For example, the Pelican Formation is much more extensive than previously believed.

The collection of samples of till (and related sediments) from the Buffalo Head Hills, Caribou Mountains and Birch Mountains has been completed. The carbonate rich till, deposited in the broad lowland between the northern portions of the Buffalo Head Hills and the Birch Mountains contains abundant sulphide nodules in some sections.

RECONNAISSANCE MINERAL AND GEOCHEMICAL SURVEY WITH EMPHASIS ON NORTHERN ALBERTA

Samples were collected for matrix geochemistry (~500) and diamond indicator minerals (~100).

Preliminary analysis indicates:

- anomalous areas are from till that is above stratigraphically, or down glacier from the subcrop of the Shaftesbury Formation; and the three sites having the highest concentrations of Co, Cr, Li, Zn, Sb, V, and Zn are located along a line passing through the NE corner of the Buffalo Head Hills, and the northern margin of the Birch Mountains.

Data from a three till section on the Firebag River revealed vertical variations in the geochemistry: with depth, some elements decrease in concentration; others increase, and some are concentrated in the middle till unit.

Three geographic trends, based on the number and quality of eclogitic and other indicator minerals may be present:

- a southwesterly trend from just north of Peace River townsite to the Birch Hills north-east of Grande Prairie,
- a southerly trend from the lower Wabasca river to the Loon River, and
- a southwesterly trend in the Margureite River to Fort Mackay area.

SURFICIAL GEOLOGY MAPPING AND QUATERNARY STRATIGRAPHY OF THE PEACE RIVER—WINAGAMI AREAS OF NORTHERN ALBERTA

Within the Peace River region (84C/W half) the flutes, and morainal ridges generally situated in the uplands of the Clear and Whitemud Hills are evidence of an unobstructed southerly glacial flow. One till unit has been recognized. Its composition and texture vary both laterally and vertically, likely due to deposition from basal, englacial, and supraglacial positions.

The Quaternary geology of the Wimagami region (NTS 83 N/W half) is consistent with at least one glaciation. Distribution of the surface units and ice directional landforms suggest two major ice movement directions, a strong south to southwest movement, and a weaker, topographically controlled southeasterly one. Most surficial deposits are associated with either ice stagnation and deglaciation, or post-glacial processes. The lowermost diamict is a dark grey, massive, silty-clay, englacial to basal till of Laurentide origin. Upper diamict represent facies changes in the one major till. The thickness of the Quaternary deposits varies from a few metres to over 75 metres.

EVALUATION OF THE MINERAL DEVELOPMENT POTENTIAL OF SELECTED AREAS OF NORTHEASTERN ALBERTA

The sedimentary and volcanic rocks of the Waugh Lake Group form a coherent stratigraphic system. Shear zones in gossanous meta-sediments of the Martyn Lake Formation contain up to 3.2 g/t gold. The 17 mineral occurrences of the Leland Lakes area include two showings. The Myers Lake Gold showing is defined by a grab sample with a gold content of 200 ppb and is probably related to a basic intrusion.

MAPPING AND RESOURCE EXPLORATION OF THE TERTIARY AND PREGLACIAL FORMATIONS OF ALBERTA

Two hundred and twenty-one Tertiary and preglacial sand and gravel deposits have been identified. These deposits tend to be exceptionally large and above average in quality for construction uses. Substantial placer gold is recoverable from deposits in central and northwestern Alberta. Deposits near Edmonton and Peace River contain diamond indicator minerals.

MINERAL AGGREGATE DATABASE AND MAP SERIES

Fifteen 1:250 000 sand and gravel maps are nearing completion using information from a newly developed database.

AGGREGATE COMMODITY ANALYSIS

A survey of producers and users indicates that production of aggregate in Alberta has been underestimated and that available supplies are more limited than expected. Half the counties, municipal districts and improvement districts estimate that their gravel supplies will be exhausted in 20 years. Controversy and restrictions are now part of opening and operating a pit.

MINERAL RESOURCES MAPPING OF MAIN MOUNTAIN CORRIDORS

Compilation of geology, topography and sample analyses of the three mountain corridors in Alberta has been completed. Preparation of sample data is in progress for input into a database for the compilation of mineral deposit maps.

GEOSCIENCE INFORMATION SYSTEMS TEAM

During the past year, a number of formerly separate groups of information-related activities have been brought together and reorganized. The Geoscience Information Systems Team now consists of the following primary activities: Mineral Information System, AGS Information Sales, Library, Outreach/Marketing, AGS Database and Computing Support.

The Mineral Information System has been largely completed. The current main activity is continuing population of the system with information generated by the project funded within the Canada-Alberta Agreement on Mineral Development.

AGS Information Sales have completed their database of AGS holdings. This is currently being used for day-to-day operations, as a tool for inventory control, and as a source of information for publication lists.

The AGS Library has been integrated with the Alberta Department of Energy Library. This included not only a physical move, but also merging collections and catalogues, and integrating service delivery.

AGS Outreach/Marketing activity has been moved administratively into the External Relations and Communications Division in the Department of Energy. It continues to address AGS needs in the production of AGS newsletters, promotional material and organization of events such as this year's 75th Anniversary Open House and Public Lecture Series.

The AGS Databases project has been expanded beyond the previous support of digital data and infrastructure to include a number of hard copy holdings. The change-over of the digital database support from VAX to AXP computing platforms has been completed.

The AGS Computing Support project has transferred from the Alberta Research Council to the Alberta Department of Energy physical and Wide Area Network (WAN) environment. This includes re-establishing links to the Internet as well as setting up a relatively straightforward link to the Alberta Department of Energy WAN. A number of World Wide Web services have been established both for internal departmental communications and for links with external AGS stakeholders. The external service currently allows world-wide access to a publication list, an inventory of information generated as the result of the Canada-Alberta Partnership on Minerals, as well as digital versions of the AGS Rock Chips newsletter. The intent is to increase both the amount and range of AGS information available in this format.

The AGS World Wide Web site is:
http://www.energy.gov.ab.ca/ags/ags 1/ags.html

ALBERTA DEPARTMENT OF ENERGY, MINERAL ACCESS, GEOLOGY AND MAPPING BRANCH OPERATIONS AND SUPPORT DIVISION

GEOLOGY SECTION

The Geology Section's mission is to apply technical expertise to deliver sound recommendations to the Operations and Support Division for the effective management of mineral tenure.

The section's main area of concentration is on petroleum and natural gas (P&NG) lease continuation and sales. Industry inititates postings for P&NG rights that are offered in a public sale every two weeks. This year, almost 9000 agreements will be issued, generating over $600 million in the sale of 4.3 million hectares. The Geology Section reviews postings in geologically complex areas to ensure the accurate description of mineral rights.

Expiring leases are continued based on the productive area of the deepest stratigraphic zone. The section reviewed technical submissions to determine productivity on approximately one third of the 6000 expiring leases in 1995. The lands and deeper zones not found to be productive revert to the Crown and are available for posting.

The section also reviews previously continued leases. The Department serves non-productivity notices on leases, or portions of leases, which are no longer considered productive. The lessees then have one year to prove productivity; failing that, the rights revert to the Crown and are available for posting. In 1994, almost 1000 leases were served notice. In 1995, these leases reach the end of their one-year period. The section reviews technical submissions on many of these, as well as reviewing continued leases to determine if they are still considered productive. In all, over 600 leases or technical submissions will be reviewed this year.

Of particular interest this year is the initiation of Special Places 2000. To date, the Geology Section has assessed the resource potential on over 60 proposed areas. This is a cooperative effort with the AGS which provides expertise on metallic and industrial mineral resources.

The Geology Section is participating in an industry-government P&NG Tenure Review initiated this year. The project's objective is to achieve simplification, greater efficiency and effectiveness to eliminate duplication and provide improved service to the oil and gas industry. A strong relationship with industry will provide a platform for ongoing program review and improvement.

SASKATCHEWAN PROGRAM HIGHLIGHTS, 1995

MINERAL DEVELOPMENT AGREEMENT AND FISCAL RESOURCES

Provincial project activity of the Canada-Saskatchewan Partnership Agreement on Mineral Development 1990-95 (PAMD) was completed on 31 March, 1995. Reporting continued for some projects during the remainder of 1995. The Geological Survey of Canada project component continued through 1995 and is scheduled for completion by 31 March 1996. A joint PAMD report summarizing most the projects was released at the Saskatchewan Geological Survey Open House in November.

The 1995-96 budget for geoscience is the same as 1994-95 ($245,000 operationals, $146,000 for students, plus geologist p.y.'s). As this was designed for a 1994-95 write-up year, our 1995 summer program has been restricted.

MAIN GEOSCIENCE INITIATIVES AND SUCCESSES

PRECAMBRIAN STUDIES

Work continued on a major information package for the Lower Proterozoic sedimentary Wollaston Belt. This summer's third year of mapping defined the presence of an extensive fanglomerate horizon marking a major break in sedimentation. The discovery of several new copper showings in association with the fanglomerate has further strengthened indications of the presence of Zambian Copper Belt redbed mineralization.

DIAMOND STUDIES

Regional sampling and indicator mineral studies continued this summer in the Precambrian Shield region. The provenance of a significant region of anomalous kimberlite indicator minerals is also being investigated in the southern sedimentary basin. Gravity data continues to be compiled at 1:1 million scale across the province. Knowledge of Cretaceous and Lower Paleozoic stratigraphy is being derived from examination of drill cores cutting sedimentary kimberlite facies of the Molanosa Arch region. A further contract involving the GSC and industry in consortium was set up to largely complete the aeromagnetic coverage of the southern sedimentary basin. Although this is mainly for the benefit of diamond exploration, the survey is also of value in the oil and gas exploration field.

PETROLEUM GEOLOGY

Work continues on the production of 1:2 million scale digital maps of a stratigraphic structural/isopach series covering the Phanerozoic Basin. Two more of these were released in November. Due to the voluminous data coming in from industry in connection with horizontal and other drilling, log picking studies are being hard pressed to keep up.

GIS

The CARIS (Universal Systems Ltd.) GIS package acquired in the Spring of 1995 was tested and developed, building upon existing primary mapping systems using AutoCAD, FieldLog, IRMIS, ArcView 2.0 etc. The first full pilot (using cartographic and attribute data) is an index "map" showing the progress of all mapping in the Precambrian Shield area. All data from the Wollaston Belt study is also being entered into this system.

OPEN HOUSE 1995

The Open House was held in Saskatoon on November 21 and 22 as an evening and one day event. Presentations were given by the GSC as well as the Saskatchewan Geological Survey. For the second year presentations were also given by industry operating in the province. A public lecture given by Patrick Pringle of the Washington Department of Natural Resources entitled "Mount St. Helens: A Trip to an Active Volcanic Crater" was judged to be a highly successful part of the program.

EXPLORATION AND DEVELOPMENT TRENDS

Exploration levels for metals in the Shield remain generally low, but mineral revenues are at high levels, particularly for potash. Two gold mines and six major uranium mine projects were in development.

High levels of oil and gas production continued. Two Cretaceous heavy oil regions are being developed: a southern extension in the Marengo Pool west of Kindersley, and a promising new discovery northeast of Lloydminster. There is also renewed exploration in the Mississippian carbonates in southwest Saskatchewan. Although land sales have abated somewhat, historically unprecedented volumes of data continue to pour in from exploratory drilling, especially by the horizontal technique.

Diamond exploration staking has leveled off in the central part of the province, and there have been fewer press releases since last Fall's announcements of gem quality diamond grades. Over 80 kimberlite bodies are now identified, mostly in the "Molanosa Arch" region northeast of Prince Albert, but kimberlitic indicator minerals are also widespread in southern Saskatchewan.

Industry evaluation continues of silica sands, building stone and brines, and of kaolin deposits as a possible source of aluminum metal.

EXPLORATION INCENTIVES AND RESTRICTIONS

The main focus of incentives at the time is the geoscience program. New royalty and other incentives are on hold. Land access continues to be an issue.

OTHER ISSUES AND NEWS

The Chief Geologist has been involved in drafting the National Geoscience Accord, and Survey staff have also been involved in preparations for the Mines Ministers' Conference in Saskatoon, September 1995.

Bob Macdonald, Chief Geologist retires December 31, 1995. The Precambrian Geology branch which he headed is being amalgamated with the Mineral Development branch under a new branch entitled "Northern Geoscience" to be headed by Tom Sibbald.

PROJECTS BY THE SASKATCHEWAN GEOLOGICAL SURVEY REPORTED IN THE SASKATCHEWAN GEOLOGICAL SURVEY SUMMARY OF INVESTIGATIONS 1995

Proj. No.	Title of Project or Paper *Authors*
F.102	The Geological Setting of Mineral Deposits of the Flin Flon-Amisk Lake Area *B.A. Reilly*
F.104	Geology of the Galbraith-Attitti Lakes Area, Attitti Block (part of 63M-1) *K.E. Ashton, S.S. Balzer, and H. Tran*
F.105a	Geological Setting of Sediment-hosted Copper Mineralization in the Janice Lake Area, Wollaston Domain *G.D. Delaney, R.O. Maxeiner, M.L. Rawsthorne, J. Reid, R. Hartlaub, and P.L. Schwann*
F.105b	Lithogeochemistry of Volcanic Rocks from the Lower Proterozoic Courtenay Lake Formation, Wollaston Domain *K. Fossenier, G.D. Delaney and B.R. Watters*
F.106	The Santoy and Brownell Lakes Areas of the Glennie Domain: Oxygen and Rb-Sr Isotope Systematics *Kyle I. Durocher and T. Kurt Kyser*
F.107	Moore Lakes Revisited: Gold and Palladium Concentrations in Altered Diabase from the Moore Lakes Complex (part of NTS 74H-6 and -7) *D.G. MacDougall and L.M.T. Maxemiuk*
F.108	Controversial Rocks in the Hebden-MacKay Lakes Area, Southern La Ronge Domain *R.O. Maxeiner and T.I.I. Sibbald*
F.201	Mineralized Core Collection *A.J. Gracie*
F.103	Wildnest-Tabbernor Transect: Pelican Lake-Tabbernor Fault Area (part of 63M-3) *K.E. Ashton and S.S. Balzer*
G.101	Reconnaissance Sampling for Diamond Indicator Minerals in the Exposed Precambrian Shield (NTS areas 74I and P, 64E, L, and M) *F.J. Swanson and M.R. Gent*
G.202	Review of Industrial Mineral Investigations 1995-96* *M.R. Gent and P. Guliov*

GEOLOGICAL PROGRAM HIGHLIGHTS 1995/96
MANITOBA GEOLOGICAL SURVEY

GENERAL

Manitoba Geological Survey (MGS) programs in 1995 encompassed a broad range of projects supporting the private sector's exploration efforts in the Flin Flon-Snow Lake region, the southwest extension of the Thompson Nickel Belt and in southern Manitoba. Projects supporting exploration elsewhere in the province were conducted in the Lynn Lake region, on Pipestone Lake, near Bissett and in southwest Manitoba.

Relogging of sub-Phanerozoic cores from the Thompson Nickel Belt extension and in Shield marginal areas south of Snow Lake resulted in new preliminary geological reports and maps.

Winnipeg-based activities included increased interaction with land-use staff of the Mines Branch, and close cooperation with expanded programming of the Marketing Branch especially in industrial minerals and commodity studies. Compilation programs continued to develop new map sheets in the 1:250 000 synoptic bedrock geology series, sub-Phanerozoic compilations, revisions to the lower Paleozoic stratigraphic maps and aggregate and crushed stone availability in the Winnipeg region. Two new Mineral Deposit Series reports were released; one for part of the Leaf Rapids region and one for part of the Bissett region. Mineral deposit reports currently in progress include one for the Lynn Lake area, five for the Flin Flon district, one in the Island Lake area and one for the sub-Paleozoic extension of the Flin Flon-Snow Lake region.

Geological Information System projects include production of a new 1:1 000 000 scale Wetlands map for the province based on data and analysis provided by the University of Alberta. A schema for the Minerals Database, developed in preliminary form last year, has been revised and expanded to include further detail on mineralization, alteration and occurrence geology.

The first draft of the 1:100 000 NATMAP compilation of the Shield Margin area is nearing completion. The preliminary geological map for the Reed Lake area will be incorporated into the compilation thereby completing the entire Manitoba segment of the compilation by early 1996. Release of the final maps and accompanying database on CD-ROM is scheduled early 1997.

The MGS has been restructured to give higher profile and effectiveness to digital data management by establishing an expanded Data Management Section. The new section incorporates cartographic staff from the former Graphics Services Section. Enhanced capabilities will be facilitated by accelerated hardware and software acquisition and staff retraining, to ensure a smooth transition to a fully functional Unix-based ARCINFO system prior to conclusion of the NATMAP programs.

A 2 day prospecting course was offered by the Thompson office May 13-14, for 19 registrants. Construction of a rock and core viewing facility has been recently completed at Thompson. The facility is designed to provide clients and staff with a safe and comfortable work area in which drill core and other sample media can be examined year round. Construction of a similar facility at the Centennial Mine base, Flin Flon, is proceeding this fall.

MGS staff gave technical presentations on Manitoba's mineral potential and new exploration concepts to local CIM branches in Manitoba. Talks and displays were also presented in Toronto at the Annual Convention of the Prospectors and Developers Association, and in Montreal, at the International Conference on the Precambrian.

Land-use issues continue to require an increasing involvement from MGS geologists, especially in the context of the Capital Region study. The Branch continued to conduct mineral assessments in areas being considered for land use designations that handicap or preclude mineral development.

Outreach activities have been limited to some degree by budgetary constraints. Nevertheless several staff gave talks to Winnipeg school classes and led tours in provincial parks. At Flin Flon, a committee has been formed in cooperation with the Greenstone Community Futures Development Corporation, to prepare a geological and historical walking tour guide for the Flin Flon region. Talks and field tours were given to both grade and high schools in Flin Flon.

The Mineral Exploration Liaison Committee has been reactivated to provide input to MGS programming, as well as to maintain a watching brief on land-use issues and other matters affecting mineral development. Meetings are to be scheduled biannually.

FEDERAL-PROVINCIAL COOPERATION AND NEW INITIATIVES

Provincial projects and outputs continue to be substantially augmented by contributions from the Geological Survey of Canada (GSC) under programs such as the NATMAP Shield Margin and Southern Prairies projects, the Lake Winnipeg Physical Environment Survey, and projects funded under the Canada-Manitoba Partnership on Mineral Development, the latter now in its last and final year. Final publication of EXTECH initiatives in the Ruttan and Snow Lake districts is scheduled for early 1996. Numerous interim reports, maps and digital databases are being issued by the NATMAP programs in conjunction with the Manitoba Mining, Minerals and Petroleum Convention in November 1995 and the GSC Minerals Colloquium in January 1996. Foremost of these will be a new 1:1 000 000 scale integrated geology, gravity and shaded relief magnetic map of the province, to be issued as a joint GSC-MGS Open File in digital and hard copy formats.

A March workshop involving numerous federal and provincial agencies reviewed progress on the Lake Winnipeg Physical Environment Survey. An interim report on the investigations mounted in Phase One of this program during 1994 was presented to Manitoba Hydro in August, with a more complete report on all findings scheduled for January 1996.

Cancellation of the Mineral Development Agreements (MDA's), announced by the federal government in February 1995, was met with concern across the country by provincial and territorial agencies and also by industry clients who regarded MDA outputs as fundamental to their domestic exploration efforts. The province initiated reviews of its strategic needs and, with strong support from industry, committed to maintaining its level of funding in support of geological surveys and investigations.

The important role of the mineral industry in underpinning the provincial economy was further recognized in mid-year through Manitoba's introduction of a new five-year Strategic Plan embracing commitments to one-stop shopping, a more effective Mineral Exploration Assistance program (MEAP), and an acceleration of geological survey work in the northern Superior Province.

Additional funding for upgrading instrumentation at the Energy and Mines Analytical Laboratory, was provided through a provincial New Initiatives program. Increased productivity and services at the laboratory are being coordinated through internal restructuring.

FIELD ACTIVITIES

LYNN LAKE REGION

In the Pukatawagan Bay area of Southern Indian Lake a mapping and sampling program documented well preserved mafic volcanic rocks and volcaniclastic metasediments similar to those exposed on Partridge Breast Lake. At Franklin Lake, a 4 km^2 area recently affected by forest fires was examined to better characterize structures and gold mineralization associated with a regionally important metallogenic feature, the Johnson Shear Zone. At Cartwright Lake, a small rhyolite body was investigated for geochemical alteration associated with VMS-type mineralization.

Discussions with Granduc Mining Corporation staff provided the impetus for a pilot petrographic and geochemical study of the Burnt Timber gold deposit. The study is designed to characterize the primary lithologies and alteration styles associated with the deposit. Additional sampling for ongoing isotope studies at Lynn Lake are planned for the 1996 field season, in cooperation with the Universities of Montreal and Windsor.

Multimedia vegetation and enzyme leach geochemical orientation surveys were completed on the Eden Lake rare earth element (REE) enriched occurrence. Test sampling of the mineralized zones was also undertaken for follow-up metallurgical studies. Ground scintillometer surveys initiated in 1989 were extended to cover more southerly exposures of the syenite.

FLIN FLON-SNOW LAKE REGION

As in previous years, this region continued to be the principal focus of MGS mapping and investigations in the province, with added emphasis being coordinated through the joint GSC-MGS Shield Margin NATMAP National Mapping Program, now in its final year. Quaternary investigations in the western part of the Flin Flon NATMAP area were completed. The final report on basal till surveys conducted over the last five year period will be released in the Spring of 1996. A structural analysis of the Elbow Lake shear zone (University of New Brunswick) and a structural study of the metavolcanic and metasedimentary rocks in the vicinity of Flin Flon (Queens University) were also completed.

Underground geological investigations at the Callinan deposit continued in cooperation with Hudson Bay Mining and Smelting Co. Ltd. and Hudson Bay Exploration and Development Co. Ltd. Key areas

on surface were mapped to refine the structural and stratigraphic setting of the sequence hosting the Callinan and Main deposits.

Detailed mapping, structural studies and geochemical sampling of rhyolitic rocks in the vicinity of base metal deposits in the Baker Patton Complex provided new insights into the geological setting of this structurally complex, predominantly calc-alkaline volcanic sequence. Mapping continued in the Hotstone-Cleaver Lake area, south of the Baker-Patton Felsic Complex, where subaqueous altered rhyolites have been identified in a previously undifferentiated mafic flow sequence.

A collaborative GSC-MGS mapping project was carried out in the Reed Lake-Tramping Lake area. A major (kilometres wide) tectonite belt discovered on western Reed Lake is regionally continuous to the north, through North Star Lake and into the Kisseynew belt. This shear-mylonite belt juxtaposes a mafic-ultramafic ocean floor plutonic complex east of Reed Lake (*ca.* 1.9 Ga?) against a heterogeneous arc sequence of intermediate-mafic flows, volcaniclastic rocks and rhyolite (*ca.* 1.9 Ga?) on west-central Reed Lake. East of the shear zone the structure is interpreted as a large scale imbricate stack comprising (from west to east) arc volcanic rocks, a fault-bounded slice of File Lake Formation greywacke, and a monotonous sequence of pillow basalts interpreted as ocean floor rocks. These relationships suggest the entire Snow Lake segment of the Flin Flon Belt forms a south-verging allochthon emplaced after deposition (*ca.* 1.84 Ga) of the File Lake Formation. The structural interpretation supports earlier evidence that the Snow Lake and Flin Flon VMS camps are unrelated, and represent remnants of distinct volcanic arcs that have been structurally juxtaposed.

To the north at Dow Lake, the Reed-North Star high strain zone becomes parallel to shallow northeast-dipping foliation in the structural footwall of the Loonhead Lake fault. This fault is a major thrust that separates the Amisk collage from the structurally overlying and younger Burntwood and Missi metasedimentary rocks of the Kisseynew Belt. Consequently, at Dow Lake three fundamentally different assemblages are juxtaposed (*i.e.* Flin Flon-Snow Lake-Burntwood), each with their own unique metallogeny. Further west, where two or more of these three assemblages are structurally interleaved, a detailed mapping project centred on Yakushavich Island, Kississing Lake, demonstrated that refolding of an early recumbent structure has led to tectonic thickening of a potentially mineralized zone in the garnet-biotite gneiss.

The Snow Lake mining camp is included in a new national GSC program studying the relationships between regional scale alteration, subvolcanic intrusions and volcanic-associated massive sulphide deposits. This three-year $1.4 million program is funded by Mining Industry Technology Council of Canada (MITEC), GSC and NSERC, and includes research in four Canadian mining camps. In the Snow Lake camp the program involves continued federal/provincial survey cooperation.

At Photo Lake specific conductance and H+ analyses from outcrop chip samples on the DUB-21 grid were contoured and the interpretation presented at a meeting in Flin Flon. Interpretation and pH-conductivity measurements on the remainder of the samples is proceeding.

A brief geological mapping project at Dion Lake showed that low level base-metal mineralization in quartzofeldspathic paragneisses occurs in 1-10 m wide zones that are locally fault controlled. Mineralization in the basaltic enclave southwest of Dion Lake is characterized by a southeast trending zone with relatively higher values of copper and zinc, that extends across the Lee claims. The most promising mineralization is associated with fine grained quartzofeldspathic gneiss that may be derived from felsic volcanic rocks and coarse grained hornblende-garnet gneiss, of possible alteration zone origin. Future mapping may profitably investigate the significance of the southeast trending Lee Claims Mineral Zone (LCMZ), and investigate geophysical anomalies that occur where this zone is intersected by major faults.

LITHOPROBE activities in the Trans-Hudson Orogen Transect (THOT) followed up work on reflection and refraction surveys conducted in earlier years. Field components were limited to highly focussed geological mapping in the Flin Flon region and ground gravity transects by the GSC along the routes of the earlier seismic surveys.

THOMPSON NICKEL BELT

Geological work in the exposed sector of the Thompson Nickel Belt was largely directed toward initiating a major recompilation of the belt geology at a scale of 1:50 000. This year, work commenced on four sheets surrounding Ospwagan Lake. Elsewhere in the region a geochronological study was initiated in the Split Lake area in cooperation with the University of Montreal. Several Molson dykes and various intrusive

and anatectic phases in the Split Lake block were sampled.

Migmatites and gneisses in the Thompson and Split Lake areas were examined as potential sources of dimension stone but the investigated sites were too intensively fractured.

In the southwest sub-Paleozoic extension of the Thompson Nickel Belt near Grand Rapids, six new holes were drilled to basement in the Buffalo Lake area, giving much better control on the location of the boundary between the Nickel Belt and the neighbouring Superior Province.

NORTHERN SUPERIOR PROVINCE

The Friends of the Nickel Belt field trip returned to the Cross Lake area to examine the titanium-vanadium-iron deposit in the Pipestone Lake Anorthositic Complex. Industry representatives, consultants and Cross Lake Band Members joined staff of the MGS and researchers from the University of Manitoba and Laurentian University. Two days were spent in examining the principle massive oxide bearing zones, the disseminated ilmenite bearing north zone and Gossan Resources' drill core. A third day concentrated on the well preserved and exposed outliers of the anorthosite complex on the west channel of the Nelson River and Kiskitto Lake.

Grid mapping was completed on the main part of the Pipestone Lake Anorthositic Complex where four laterally extensive zones of ilmenite and magnetite have been delineated by exploration drilling. The field investigations represent the initial stages of two related M.Sc. projects to address the geology and genesis of the complex and its Ti-V-Fe oxide mineralization.

A feasibility study for mapping the West Channel Anorthosite Complex showed that detailed mapping of this complex will be severely handicapped by lack of exposure. However, relatively undeformed, unaltered oxide-bearing leucogabbro and gabbro, in association with linear magnetic highs, were intersected in drill core from Gossan Resources' ongoing exploration of the Kiski Zone.

A Mineral Deposit Report was compiled for the Island Lake area together with an accompanying Mineral Deposit map.

INTERLAKE

Mapping and compilation work on Paleozoic carbonates north of Grand Rapids continued as did sampling of spring waters and marls, in an attempt to find evidence of Mississippi Valley Type (MVT) mineralization in the host Silurian dolomites.

Temperature-depth profiles were obtained from seven coreholes in the Grand Rapids area by researchers from the University of North Dakota. The measurements provided information on terrestrial heat flow and fluid flow in the boreholes, and climate change over the past century. Preliminary results of two-dimensional heat conduction models suggest that the heat sinks are wedges of buried discontinuous permafrost located between 40 and 100 m depth.

In the southern Interlake region, a high-resolution gravity survey across the Lake St. Martin structure suggests the extent of structural disturbance associated with the crater may extend to 57 km in diameter, rather than 44 km as previously proposed.

The effectiveness of various geophysical techniques to locate buried kaolin deposits in the Arborg-Sylvan area is being tested. Instruments used in 1993 included EM-31, VLF-EM, time domain electromagnetic, DC-resistivity, seismic refraction and gravity meters. The techniques were successful in outlining the kaolin channels and confirmed the existence of new probable channels delineated in the 1992 surveys. In-house surveys conducted by MGS staff were augmented by new surveys conducted by University of Manitoba field school students.

SOUTHEAST MANITOBA

Geological mapping in the Garner-Beresford lakes region delineated the eastward extension of the komatiites southeast from Beresford Lake, and attempted to subdivide the Gem Lake Subgroup, which currently embraces assemblages with three distinct isotopic ages. The oldest members of the Gem Lake Subgroup compare favourably with Red Lake greenstone assemblages, which bodes well for prospects of nickel and gold mineralization.

Seven bogs in southeast Manitoba, identified from aerial photo interpretation, were sampled to determine their potential as sources of horticultural quality sphagnum. Six of the sphagnum bogs contained sphagnum to a depth of only 0.5 m.

The geochemistry of metal-rich Ordovician black shales and their encrustations on Black Island, was examined as a first step toward initiating a black-shale geochemical database. The results of this program will also have application to gold and base metal exploration and to studies of the bioavailability of constituent metals in environmental baseline and monitoring programs.

SOUTHERN MANITOBA

A reverse population flow from the City of Winnipeg to the surrounding municipalities has been occurring since the 1970s, resulting in a shift from a rural agricultural setting to a semi-urban environment in these municipalities. This has increased land-use and environmental pressures in these municipalities to restrict the extraction of sand, gravel and crushed stone. The MGS is assisting the province's Capital Region strategy by conducting mineral resource assessments in the capital region.

All deep Lower Paleozoic wells in the province have been verified for the interval between the Silurian Interlake Group to the top of Precambrian. The tops conform to stratigraphic nomenclature established by the Western Canada Sedimentary Basin Atlas Project. Several products of interest to exploration geologists are now readily available on demand, including overburden thickness and depth to Precambrian maps. The Stratigraphic database now contains 5140 wells, of which 1052 wells are Lower Paleozoic wells. The database is currently being used to generate a new stratigraphic map series for southwest Manitoba.

Field mapping was completed in the Virden area as the final phase of the Southern Prairies NATMAP project. Data collection emphasized engineering, environmental and groundwater applications and data will be included in a digital database. A biostratigraphical analysis of core from the Wampum area in southeastern Manitoba is in progress. Four preliminary maps at 1:100 000 scale have been released for the NE and SE quarters of the Virden area (NTS 62F) and NW and SW quarters of southeastern Manitoba (NTS 52E). The Manitoba Water Resources water well database has been upgraded to construct 3-D subsurface models for these areas.

Till samples from the Westlake Plain in west-central Manitoba have been analyzed for kimberlite indicator minerals, geochemistry, matrix carbonate content and pebble lithology.

NOTES

ONTARIO MINISTRY OF NORTHERN DEVELOPMENT AND MINES
MINES AND MINERALS DIVISION
ONTARIO GEOLOGICAL SURVEY

INTRODUCTION

The geoscience program in the Ontario government is delivered through two branches in the Ministry of Northern Development and Mines. These are: the Ontario Geological Survey (OGS) and the Ontario GEOservices Centre (OGC). This structure came into being in May 1993.

Budget reductions are ongoing in the Ontario Government as this is being written. Within the Mining and Land Management Branch, the Ontario Mineral Incentive Program (OMIP) has been terminated and the Ontario Prospectors Assistance Program (OPAP) is under review. Announcements were made on November 29th regarding cutbacks in virtually all Ontario government supported programs, including universities, municipalities, hospitals *etc.* as well as, the "direct" civil service. Further announcements are expected in the first half of 1996.

Mineral exploration activities in Ontario in 1995 continued the upward trend that started in mid 1994. Most noticeable is the increase in work being carried out on "grassroots" projects. Several advanced exploration projects are ongoing. These include the Musselwhite Project of Placer Dome Canada Ltd., which awaits an imminent decision on production, and Sudbury Contact Mines Ltd. and AgnicoEagle Mines Ltd. Victoria Creek Project east of Kirkland Lake.

Capital expenditures for 1995 are significant; announced mine development and mine expansion projects, some of which are multi-year, are in the order of $1 billion.

Falconbridge Ltd. officially opened the Craig Mine, and production at the Lockerby Mine should begin by the end of 1995. Hemlo Gold Mines Inc. and Teddy Bear Valley Mines Ltd. should see production at their Holloway Project in 1996. Madsen Gold Corporation is re-opening the Madsen Mine west of Red Lake. River Gold Mines Ltd. will bring their Eagle River Project, located near Wawa, into production in 1995/96. Placer Dome Canada Ltd. are sinking a new shaft, and erecting a new headframe and hoist at the Campbell Mine in Balmertown; in Timmins they are expanding the Dome Mine with the "Super Pit". Kinross Gold Corporation are shaft sinking and mill upgrading at their Hoyle Pond and Bell Creek properties near Timmins. Feasibility studies are being conducted by Outokompu Mines Ltd. and Echo Bay Mines Ltd. on their respective nickel and gold deposits in the Timmins area. Inmet Mining Corporation is developing the Pick Lake deposit from the Winston Lake Mine near Schreiber. These are but a selection of ongoing activities.

BUDGET

The 1994-95 budget for the OGS/OGC, tabulated in detail elsewhere in this report, was $14,473,600. The budget for 1995-96 was initially $12,971,700; an in-year constraint reduced this by $563,600 to $12,408,100. This was supplemented by $1,651,100 from the Northern Ontario Development Agreement (NODA), and $2,500,000 from the Jobs Ontario program; funding from these sources will be minimal in 1996. Further significant base budget reductions are expected in 1996.

GEOSCIENCE PROGRAM

The budget reductions that have happened over the last 4 years led the Survey to look strategically at where it could most effectively and efficiently invest its efforts for the benefit of its clients. Three principal areas of focus were identified. These are: the Abitibi Greenstone Belt and the area north of it to James Bay; the Hemlo area, in cooperation with researchers sponsored by MITEC; and the western part of the Superior Province within Ontario in conjunction with Lithoprobe sponsored research.

ECONOMIC DEVELOPMENT

The Survey over the last year has been paying closer attention to the effects of its program on the private sector, and has been compiling information for use in a results management context. This year has been promising from the cause and effect perspective; two examples follow.

At the time of the 1995 PDAC meeting, the OGS issued a press release and Open File Report on a lake sediment geochemistry sampling program north of Sault Ste Marie. When the data were released, there,

were 13 active claims in the area. As of the time of writing, 614 additional claims had been staked. Two junior companies Avalon Ventures Ltd. and Starcore Resources Ltd., on November 15 announced their intent to option their contiguous properties to Cominco Ltd.. Under the proposed terms of the agreement, cash settlements to both companies, and planned exploration expenditure total $1,500,000. Falconbridge Ltd. holds adjacent property to the east and north; planned expenditures are currently undisclosed. In the Rainy Lake area, Nuinsco Resources Limited over the last two years have been quietly following up on the results of an overburden drilling program carried out by the Survey in 1986-88. Their base metal intersection this summer has inspired more interest than their gold exploration; both are pleasant results.

The 1995 field program saw one geologist working on kimberlites and one on magmatic sulphide occurrences, two working on base metal projects, three working on gold related projects, seven doing regional bedrock mapping, two doing data compilation, two working on surficial geochemistry surveys, two working on aggregate inventory, and two doing surficial geology mapping with mineral exploration as the primary focus.

The resident geologists continue to be involved primarily with the mineral exploration industry, several are producing reports giving up-to-date inventories of mineral occurrences in their districts. Several Head Office geologists were report writing.

RESOURCE MANAGEMENT

The passage earlier this year of Bill 163 dealing with planning reform tremendously increased the workload of the resident geologists in London and Tweed, and just increased it for the others because of the geoscience input required to ensure sound land-use planning. The various protection programs (including Parks) for Crown Land kept most of the residents geologists busy doing Mineral Resource Appraisals. One Head Office geologist was fully occupied on MRAs and their methodology; the Survey now has a methodology that it considers appropriate for Ontario.

PUBLIC INFORMATION/EDUCATION

Most of this program is delivered by another Branch in MNDM, however, the resident geologists and the Mines and Minerals Information Centre in Toronto, continue to deliver a local program particularly to school children, as well as giving prospecting courses. The Survey's Aboriginal geologist delivers prospecting courses to Aboriginal communities in Northwestern Ontario; he also provides background information on exploration, mining and associated issues.

ENVIRONMENTAL APPLICATIONS

Although the bulk of the Survey's efforts were devoted to Economic Development and Resource Management, one geologist continued his work on the Oak Ridges Moraine, north of Toronto, where interest in ecosystems and hydrogeology remains high. A number of staff were involved to varying degrees on environmental matters.

ONTARIO GEOSERVICES CENTRE

PUBLICATION SERVICES SECTION

A total of 86 geoscience publications, 20 digital data sets, 1 index publication and 3 "popular" publications were released during the 1995 calendar year.

The transition from a system of paper publications at subsidized prices to one of electronic distribution and cost recovery should be complete by the end of fiscal 1995-96. All new final publications are now being produced totally digitally. The maps are being generated on the section's colour electrostatic plotter, while the reports are being printed via the Xerox Docutech system at Laurentian University.

Prices for both are based on full recovery of reproduction and distribution costs, plus an allowance for maintenance and recapitalization of systems. We must now function as a business so that operating expenses can be paid from revenues, a necessity brought about by the loss of the entire publishing budget on April 1, 1995.

Electronic distribution of the complete publication release on CD-ROM should begin in June 1996. We began posting our Publication Release Notices on the Internet in December 1994, and the Ministry hopes to have a home page on the World Wide Web in early 1996.

INFORMATION SERVICES SECTION

Progress continued on development and deployment of the Earth Resources and Land Information System (ERLIS), a state-of-the-art computerized facility to access all geoscientific and mining information held by the Ministry of Northern Development and Mines. Client service continued at the Toronto and Sudbury sites despite some interruptions due to load-

ing and reorganization of databases, and two new ERLIS delivery sites became operational in Thunder Bay and Timmins at the end of June.

A total of 36,500 assessment files, or 97% of all files in the original Toronto repository, had been loaded into the system as of October 1995. Hard copy continues to be available for those files which have not been loaded.

Digitizing of detailed drill hole information from the assessment files was completed and 105,000 data records were released on diskette in August 1995. Conversion and editing of analytical data from the PETROCH lithogeochemical database, plus addition of new records accumulated in spreadsheets and paper files, was completed by March 1995. These databases are being integrated into the ERLIS environment.

Digitizing of the 1:250 000 bedrock geology and 1:1 000 000 surficial geology maps, plus 950 vector and 8020 raster OGS geological maps, was completed. Raster scanning of 2150 OGS publications and conversion of those images to live text was also completed. Integration of these databases into the ERLIS environment has begun. The compact disk recording system acquired through this project will enable the ministry to begin releasing all new reports and maps on CD-ROM in mid-1996.

Reprocessing and remastering of 31 high resolution aeromagnetic/electromagnetic surveys continued. Individual surveys will be released as they are completed, beginning in early 1996, on CD-ROM together with a Windows-compatible viewing program.

Work has begun on revamping the Mineral Occurrences Database (the old MDI3 and associated data capture and viewing applications for the ERLIS workstations and PC platforms.

Finally, the building of the Automated Claim Maps application for the Sudbury Mining Division continued with digitizing of mining claims, dispositions and alienations on a 1:20 000 digital OBM topographic underlay and completion of a prototype application to provide claim boundary generation and maintenance capabilities for the Mining Recorder staff and viewing capabilities for the clients.

GEOSCIENCE LABORATORIES SECTION

Provision of analytical services for the Mines and Minerals Division has remained the core of the Laboratories' activities, while new initiatives are providing analytical services to a variety of Ontario universities, research organisations and private industry under the auspices of GEO Enterprises Ontario. The focus of the operational program has been the development of new analytical methods, and the ongoing refinement and improvement of the higher volume existing methods. The number of analytical determinations completed by the Laboratories set new record highs, with a continuing focus on improving turnaround while maintaining data quality and integrity to meet the requirements of the core client group.

The Laboratories have provided high quality geochemical data in support of many OGS programs, several of which were the subject of high-profile press releases this year or resulted in staking rushes (*e.g.*, for diamonds in the Wawa area). A major thrust of the Laboratories' quality assurance program has been the initiation of the documentation suitable for ISO Guide 25 accreditation, a result of which was an invitation to document the current quality program for Geostandards Newsletter. The Laboratories participated in round-robin exercises run by the International Working Group for Reference materials, as well as in a monthly proficiency testing program run by LQSI for gold ore and limestone.

A series of scientific presentations by staff at both national and international conferences have helped to promote the Laboratories as an analytical Centre of Excellence, a reputation confirmed by comments from the numerous international delegations that have toured the facility during the year. The Laboratories have also hosted regional demonstrations and co-operative research projects for new equipment designed and/or marketed by Ontario companies. As well, five M. Sc. and Ph.D. students from Ontario universities are currently working on projects which utilize data from the Laboratories' instruments.

NOTES

MINISTÈRE DES RESSOURCES NATURELLES
GOUVERNEMENT DU QUÉBEC
SECTEUR DES MINES

RECHERCHE GÉOLOGIQUE ET ASSISTANCE À L'EXPLORATION MINIÈRE

LE RÔLE ET LA MISSION DES DIRECTIONS DE LA RECHERCHE GÉOLOGIQUE ET DE L'ASSISTANCE À L'EXPLORATION MINIÈRE

Le Secteur des mines, du ministère des Ressources naturelles du Québec, a pour mission d'appuyer et de promouvoir le développement d'une industrie minérale innovatrice et concurrentielle à l'échelle mondiale et de contribuer, ainsi, au développement économique du Québec.

À l'intérieur de cette mission globale du Secteur des mines, les deux directions de la recherche géologique et de l'assistance à l'exploration minière ont pour mandat:

- d'acquérir, de traiter et de diffuser des connaissances géoscientifiques sur les ressources minérales du Québec dans le but d'évaluer et de promouvoir le potentiel minéral des régions dans une perspective de développement durable;
- de fournir une aide à l'industrie minière grâce à la gestion de divers programmes d'assistance financière à la prospection et à l'exploration.

Ce mandat est réalisé en acquérant et en rendant disponibles auprès des intervenants en exploration minérale:

- une information géoscientifique intégrée, accessible et de qualité;
- une expertise technique en matière de connaissances géoscientifiques;
- divers programmes d'assistance financière.

Ce mandat est accompli avec le souci constant de satisfaire les besoins de la clientèle et de développer l'expertise du personnel.

LA DIRECTION DE LA RECHERCHE GÉOLOGIQUE (DRG)

La Direction de la recherche géologique (DRG) a pour mission de définir et de promouvoir le potentiel minéral des différentes régions du Québec. Elle le réalise essentiellement par un programme de levés et d'études géoscientifiques qu'elle a adapté aux besoins de sa clientèle minière. La mise en oeuvre de ce programme relève de deux services géologiques et de leurs sept bureaux régionaux. Elle nécessite aussi la contribution de spécialistes regroupés à l'intérieur de divisions. La DRG dispose, en 1995-1996, d'un budget annuel de 7,8 M$.

LE SERVICE GÉOLOGIQUE DE QUÉBEC (SGQ)

Le Service géologique de Québec dessert les deux tiers du territoire québécois dont les Appalaches, les Basses-Terres du Saint-Laurent, la majeure partie du Grenville et l'ensemble du territoire du Nouveau-Québec situé au nord du 55° parallèle. Il gère quatre bureaux régionaux localisés à Montréal, Sherbrooke, Sept-îles et Sainte-Anne-des-Monts. Ces bureaux animés chacun par un géologue résident permettent à la clientèle de l'industrie minérale: 1) d'accéder facilement et rapidement à la banque de données géoscientifiques; 2) de réaliser toutes les transactions relatives aux titres miniers. Une équipe constituée d'une vingtaine de géologues situés dans les bureaux régionaux et à Charlesbourg réalise des levés ou des inventaires et des études.

Au cours de l'année 1995-1996, le Service géologique de Québec dispose d'un budget de 3,24 M$ pour la réalisation d'une vingtaine de projets et l'opération des bureaux régionaux.

Au niveau des faits saillants, mentionnons la mise en oeuvre, dans le cadre du nouveau Programme du Moyen-Nord, d'un important levé (1:50 000) dans la région de Wakeham sur la Côte-Nord. L'objectif visé est d'attirer l'attention des compagnies d'exploration sur un vaste secteur peu connu où il est possible de trouver des gisements de classe mondiale. D'autres levés géologiques ont été réalisés au cours de l'été dans la province géologique de Grenville, c'est-à-dire dans les régions de Fort-Coulonge en Outaouais et de St-Fulgence au Saguenay/Lac-St-Jean. Le Service a également été actif en Gaspésie (22 B/08 et 22 A/12) et en Estrie (21 L/04). Bien qu'en 1995-1996 l'emphase ait été mise sur la réalisation des inventaires, quelques études figurent à la programmation (Complexe de Sept-Îles, Haut-Plateau de Manicouagan).

En 1995-1996, les travaux expérimentaux d'évaluation du potentiel minéral se poursuivent sous la forme de l'élaboration d'un prototype. Par ailleurs, les travaux visant à compléter les banques de données géoscientifiques avant l'évaluation se poursuivent dans la région de Mont-Laurier et en Gaspésie (22 A et 22 B).

Ajoutons que plusieurs projets d'inventaire ou des études sont réalisés pour le compte du Service par la Division des minéraux industriels, en particulier dans les régions de la Côte-Nord (tourbières), de Montréal (granulats, minéraux) et d'Estrie-Beauce (tourbières, carrières).

Il faut noter que tous les projets géoscientifiques du programme 1995-1996 sont inscrits dans l'Entente auxiliaire Canada-Québec sur le développement minéral.

LE SERVICE GÉOLOGIQUE DU NORD-OUEST (SGNO)

Le Service géologique du Nord-Ouest dessert tout le Nord-Ouest québécois. Les divisions de Rouyn-Noranda, de Val-d'Or et de Chibougamau, chacune animée par un géologue résident, sont logées dans les bureaux régionaux des mines. Le personnel de la direction du Service et trois métallogénistes de la Division des gîtes minéraux sont regroupés dans le bureau de Val-d'Or. Un métallogéniste est basé au bureau de Chibougamau. Le Service compte également un géochimiste dans ses rangs.

Le SGNO dispose, pour l'année 1995-1996, d'un budget de 2,66 M$ pour la réalisation de 26 projets dont 16 sont des levés ou des études requérant des travaux de terrain.

Au niveau des faits saillants, mentionnons l'amorce de nouveaux levés géologiques détaillés (1:20 000) dans les régions de Lebel-sur-Quévillon et de Val-d'Or et l'achèvement du levé géologique dans la région de Cléricy. Le Service a également participé à la réalisation d'un levé géochimique de till dans la région de Caopatina.

Les principales études ont été réalisées dans le domaine de la gîtologie et ont fait l'objet de cinq ententes de partenariat avec l'industrie (Cambior, Inmet, Ressources Aur, Ressources MSV, SOQUEM) et l'UQAC. Citons comme exemple l'amorce d'une étude du gisement de Grevet (Cambior-UQAC-MRNQ) et l'achèvement du projet métallogénique du camp minier de Chibougamau.

La mise en opération du SIGÉOM (système d'information géominière du Québec) a forcé la réalisation de plusieurs projets de compilation, dont deux en partenariat avec l'industrie. Cette année, la priorité a été accordée à la production de fonds géologiques.

Au niveau de l'évaluation du potentiel minéral, le fait saillant est l'achèvement du projet pilote visant l'évaluation du potentiel des minéralisations de type SMV sur le feuillet 32G/15 (Chibougamau).

Finalement, la mise en oeuvre du programme d'exploration du Moyen-Nord nous a permis de réaliser un levé géologique majeur (1:50 000) des feuillets 32J/11 et 32J/12 dans la région du lac Assinica, un levé géochimique majeur (sédiments de lac, région du lac Evans), une synthèse métallogénique (1:250 000) du bassin de la Grande Rivière et des études métallogéniques des conglomérats uranifères du lac Sakami et des formations de fer aurifères de la rivière Eastmain. Le SGNO a également participé à deux projets de partenariat (industrie-UQAM) de levés géochimiques de till.

Soulignons que la plupart des projets ci-haut mentionnés ont été réalisés dans le cadre de l'Entente auxiliaire Canada-Québec sur le développement minéral, les autres étant issus du programme fédéral-provincial de soutien au secteur minier de Chapais—Chibougamau.

LA DIRECTION DE L'ASSISTANCE À L'EXPLORATION MINIÈRE (DAEM)

Le mandat de la Direction de l'assistance à l'exploration minière est de fournir une aide à l'industrie de l'exploration minière grâce au traitement, à la gestion et à la diffusion de l'information géoscientifique et grâce à la gestion de certains programmes d'assistance financière à la prospection et à l'exploration.

En 1995-1996, le Programme d'assistance financière à la prospection minière dans l'Est du Québec et le Programme de soutien du secteur minier de la région Chapais—Chibougamau bénéficient de l'Entente auxiliaire Canada-Québec sur le développement économique des régions du Québec (EADRQ) intervenue entre Québec et Ottawa. Le projet de géomatique du Ministère est financé en majeure partie par le gouvernement fédéral dans le cadre de l'Entente auxiliaire Canada-Québec sur le développement minéral.

LE SERVICE DE LA GÉOINFORMATION

En 1994-1995, le Service de la géoinformation a révisé et préparé pour publication 109 nouveaux documents géoscientifiques faisant état des résultats de travaux géologiques, géochimiques et géophysiques réalisés par le Ministère. Parmi ceux-ci, on retrouve le

désormais célèbre document intitulé **Géologie du Québec** diffusé en concertation avec Les Publications du Québec au coût de 24,95$. Pour 1995-1996, on prévoit que le nombre de nouveaux documents traités sera de l'ordre de 80. Ces documents sont diffusés à la clientèle par le Service d'information et de soutien à l'exploration minière.

Le Service a poursuivi l'implantation du SIGÉOM, un système intégré d'information géominière à référence spatiale. Une fois complété, ce système comprendra la géologie, la géochimie, la géophysique, les gîtes minéraux, les blocs erratiques ainsi que la localisation des travaux et des données issues des rapports géoscientifiques ministériels et des dossiers d'exploration minière de l'entreprise privée.

L'implantation du système s'est poursuivie en consultation étroite avec les représentants de la clientèle; à cet effet, le Ministère a créé un comité consultatif SIGÉOM-industrie. Les infrastructures informatiques du SIGÉOM ont été installées dans les bureaux de Charlesbourg, Montréal, Val-d'Or, Rouyn et Chiboumau.

Un nombre sans précédent de fichiers numériques a été intégré au système. Nonobstant cet effort, la clientèle souhaite que le Ministère accélère le rythme d'intégration des données. Aussi, dans le cadre d'un exercice d'amélioration de processus, une importante opération a été planifiée pour compléter en trois ans la mise à jour des compilations géominières pour l'ensemble de la province (forages au diamant, sites minéralisés, blocs erratiques et localisation des travaux).

Les courbes d'isovaleurs du champ magnétique résiduel à une élévation de 300m sont complétées pour tout le Québec et ces produits sont disponibles en format papier et numérique. Des données aéroportées captées à une altitude de 100m seront également disponibles pour l'Abitibi et d'autres, à une altitude de 30m, pour la région de Chibougamau (MAG et EM). De plus, l'exercice 1995-1996 marque le début de la production de nouvelles cartes géologiques dans le SIGÉOM (les cartes de terrain de l'été 1995). C'est aussi le début de la numérisation des cartes géologiques compilées dans divers secteurs de la province (Abitibi, Fosse du Labrador, etc.)

LE SERVICE D'INFORMATION ET DE SOUTIEN À L'EXPLORATION MINIÈRE (SISEM)

Le Service d'information et de soutien à l'exploration minière (SISEM) est constitué de la Division des données géoscientifiques et de la Division des programmes d'aide.

LA DIVISION DES DONNÉES GÉOSCIENTIFIQUES

La Division des données géoscientifiques regroupe les activités du Centre de diffusion, les activités ayant trait à la gestion d'une base de données documentaires (banque EXAMINE) et d'une base de données sur les gîtes minéraux (banque COGITE) ainsi que les travaux de l'équipe des cartes de localisation.

Au 31 mars 1995, la banque EXAMINE contenait 52 830 références de rapports d'exploration minière publiés, 3 596 références de publications de la direction générale et 1 702 références de thèses universitaires.

La Division des données géoscientifiques ne fait que diffuser la banque COGITE dans laquelle les indices répertoriés comprennent au-delà de 7 500 gîtes et indices minéralisés.

L'équipe des cartes de localisation a complété la numérisation des aires de levés et des forages au diamant (environ 4 000 sondages) du feuillet 32D/06. La mise à jour en continu des cartes de localisation et des forages a débuté en septembre 1995. En tout, près de 210 feuillets SNRC ont été touchés par cette mise à jour.

LA DIVISION DES PROGRAMMES D'AIDE

La Division des programmes d'aide a pour mandat de concevoir et d'administrer des programmes d'assistance financière à la prospection et à l'exploration minière.

Pour l'année financière 1995-1996, un budget de 3M$ a été consacré à la mise en oeuvre de trois programmes d'aide. Deux de ces programmes, qui se termineront le 31 mars 1996, s'inscrivent dans le cadre de l'Entente auxiliaire Canada-Québec sur le développement économique des régions du Québec (EADRQ), soit:

- le Programme d'assistance financière à la prospection minière dans l'Est du Québec (Bas-Saint-Laurent et Gaspésie—Îles-de-la-Madeleine);
- le volet II (assistance à l'exploration) du Programme de soutien du secteur minier de la région de Chapais—Chibougamau.

Le troisième programme, qui s'adresse aux autres régions du Québec, fait partie de l'Entente auxiliaire Canada-Québec sur le développement minéral (EADM); il s'agit du volet III (assistance à la prospec-

tion et à l'exploration minière) du Programme exploration géologique et minière.

L'assistance financière octroyée dans le cadre des trois programmes se répartit comme suit:

- 1,3 M$ à 300 prospecteurs pour quelques 240 projets de prospection;
- 1,3 M$ à 23 compagnies pour 26 projets d'exploration;
- 0,43 M$ à 3 Fonds miniers régionaux (Bas-Saint-Laurent, Saguenay—Lac-Saint-Jean et Estrie—Chaudière—Appalaches).

Le Programme du Moyen-Nord, qui vise les territoires de la Baie-James et de la Basse-Côte-Nord, a débuté en janvier 1995. Au cours de l'année financière 1995-1996, 17 projets ont été accordés dans le cadre du volet 2 (assistance financière) pour un budget total de 1,2 M$.

NEW BRUNSWICK DEPARTMENT OF NATURAL RESOURCES AND ENERGY
MINERALS AND ENERGY DIVISION

INTRODUCTION

Geoscience programs of the New Brunswick Minerals and Energy Division are delivered by the Geological Surveys, Mineral Development, and Energy branches. By March 31, 1996, the amount spent on geoscience projects will be $3,434,497. The Geological Surveys Branch will have funded $2,828,257 (82%).

GEOSCIENCE PROGRAM

A multiparameter helicopter geophysical survey of the Bathurst mining camp (Figure 1) was the most talked about project in New Brunswick in 1995. Funded by the Canada-New Brunswick Cooperation Agreement on Economic Diversification, the survey gathered radiometric, electromagnetic, and magnetic data over approximately 3400 km2 (22 235 km of flight line). Flight lines were spaced 200 m apart and flown at a terrain clearance of 50 m. The survey was completed by Aerodat Inc. in November 1995 and the results will be published in June or July 1996.

Also in northern New Brunswick, the second field season of the EXTECH-II program in the Bathurst mining camp (Figure 1) was completed. The joint Geological Survey of Canada-New Brunswick Geological Surveys project entails a total expenditure of $6.8 million over five years, involving more than 28 geoscientists. The New Brunswick contribution comprises 1:20 000 bedrock mapping by Les Fyffe, Reginald Wilson, Susan Gower, John Langton, and Steve McCutcheon; mineral deposit studies by David Lentz, James Walker, Rao Irrinki, and Paul Rennick; and surficial geology and till geochemistry projects involving Michael Parkhill.

In the Tobique-Chaleur Zone, several chalcopyrite-bearing skarn deposits in the McKenzie Gulch area were investigated by contract geologist Carolyn Moore (Figure 1). These occurrences are associated with Devonian felsic dyke swarms that intrude Late Ordovician sedimentary rocks.

In southeastern New Brunswick, Malcolm McLeod and Susan Johnson continued 1:50 000 mapping in the Carboniferous platform (Figure 1) as part of the Magdalen Basin NATMAP project (Figure 1). Bedrock mapping was also carried out in the Queen Brook and New River belts (Figure 1) to clarify the geological environment of the spectacular gold showings found in this region in recent years.

Clinton St. Peter (Energy Branch) renewed his study of the Carboniferous Hopewell and Cumberland groups in southeastern New Brunswick (Figure 1). This work entails assessment of the fuel-mineral potential of the region and is also part of the provincial contribution to the Magdalen Basin NATMAP project.

Allan Seaman completed follow-up till geochemistry in the Canterbury area, York County (Figure 1) in an effort to trace gold and copper till anomalies obtained in previous years. Surficial mapping and till geochemistry commenced in the Millville area, York and Carleton counties (Figure 1).

Greg Crouse supervised the renovations to the Madran drill core storage facility and collected almost 15 000 m of core.

The New Brunswick Exploration Assistance Program was introduced in 1994/95 to encourage exploration by junior mining companies in New Brunswick. The three-year program will cost $1.2 million and is administered by Greg Crouse. The program is complemented by the Mineral Exploration Stimulation Program that provides grants to *bona fide* prospectors working in the province.

MINERAL INDUSTRY

The value of mineral production in 1994 rose to $813.7 million. Zinc, lead, copper, and silver, the biggest contributors, were derived from two mines, Brunswick No. 12 and Heath Steele (Figure 1), both operated by Brunswick Mining and Smelting Corporation Limited. Industrial minerals and structural materials made up 35% of the total. Two potash mines operated in the Sussex area (Figure 1) and a record 1.45 million tonnes of product were shipped to China in 1994.

In 1994, exploration investment totalled about $10 million, with Noranda Exploration Company, Limited, Brunswick Mining and Smelting Corporation Limited, and Teck Corporation being the main contributors. In 1995, International Minerals and Chemical Corporation submitted a successful proposal to evaluate the Millstream potash deposit (Figure 1). The company will spend $575 000 in the next year.

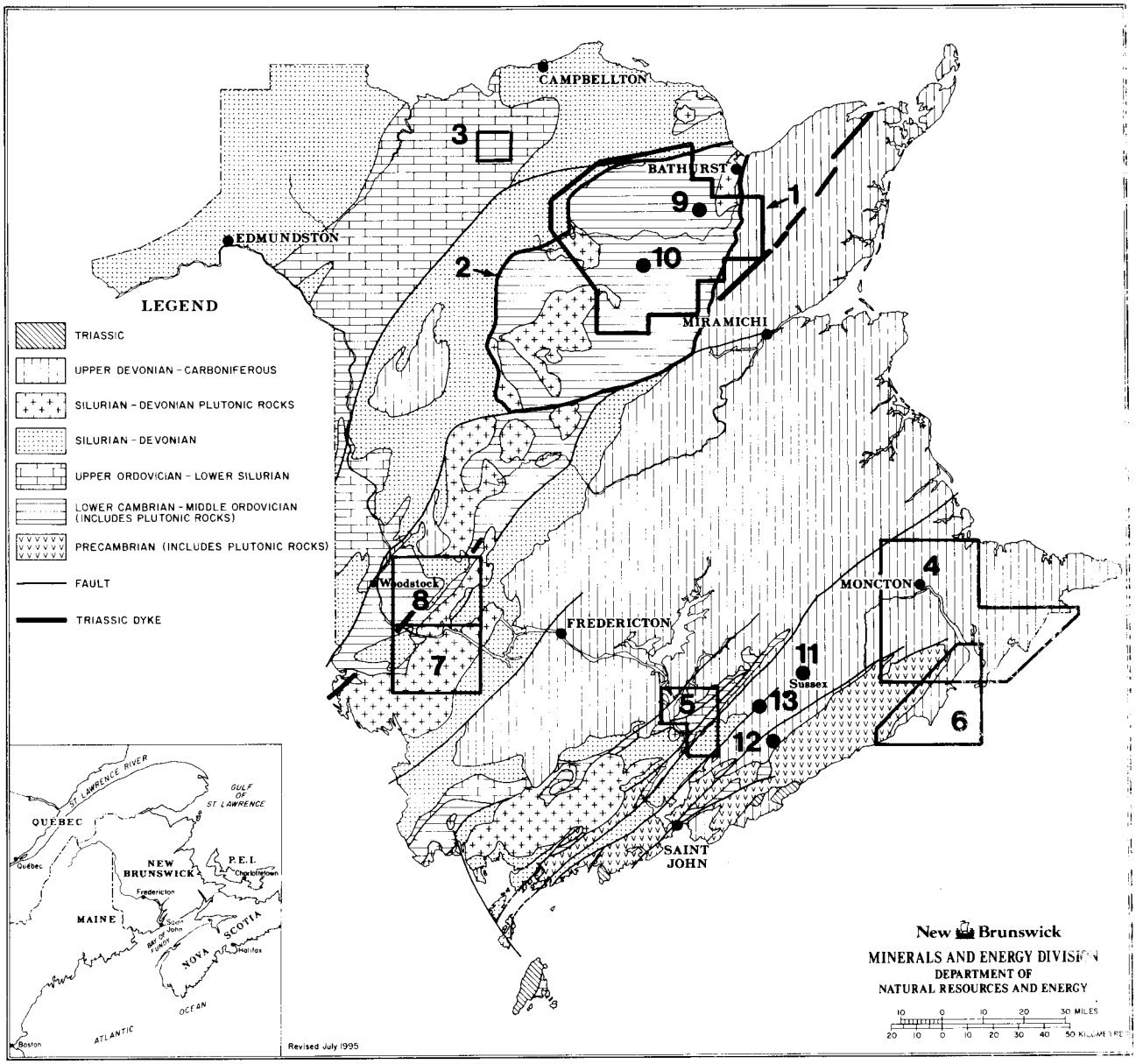


Figure 1. Geoscience projects and mineral properties in New Brunswick.

1. Airborne geophysical survey
2. Bathurst mining camp (EXTECH-II program)
3. McKenzie Gulch area, copper skarn investigation
4. Magdalen Basin bedrock mapping (NATMAP project)
5. Queen Brook-New River belt, bedrock mapping
6. Hopewell and Cumberland groups, bedrock mapping (Magdalen Basin, NATMAP project)
7. Canterbury area, till geochemistry
8. Millville area, till geochemistry
9. Brunswick Mining and Smelting Corporation Limited, No. 12 mine (Pb, Zn)
10. Heath Steele mine (Cu, Pb, Zn, Ag)
11. Potash Corporation of Saskatchewan Inc. (New Brunswick Division) mine (potash, salt)
12. Potacan Mining Company mine (potash, salt)

NOVA SCOTIA DEPARTMENT OF NATURAL RESOURCES

The Minerals and Energy Branch of the Department of Natural Resources has a dual mandate to encourage research and development leading to enhanced documentation of mineral and energy resources and to promote their orderly regulation and use. Two divisions in the Department administer geoscience projects: Mineral and Energy Resources and Mines and Energy Development. Nova Scotia is in the final year of a Canada-Nova Scotia Cooperative Agreement on Mineral Development (CNSCAMD). This agreement provides $10 million over three years (1993-1996) to encourage the economic development of the mineral industry in Nova Scotia.

GEOSCIENCE ACTIVITIES

A wide variety of geoscience activities are undertaken by the staff of the Department including: regional mapping; metallic and non-metallic resource assessments and deposit studies; coal resources studies; and services to industry and the public. During the past year, most of these activities were supported by the complementary projects funded by the CNSCAMD. The geoscience activities and resultant information help promote opportunities for mineral exploration and development, and provide valuable information for excercise of public policy in areas such as health, environment and land use planning.

Nova Scotia has a high standard of coverage by geological mapping, geophysical surveys, geochemical surveys and mineral resource information. Much of this has been generated over the past 20 years and is readily available in hard copy as well as digital compilations.

The Geological Mapping Section is responsible for developing a comprehensive understanding of the bedrock and surficial geology of Nova Scotia, determining the broad geological potential for mineral resources, and publicizing the results of geological mapping.

Current mapping activities have focused on the central Meguma Zone as part of the Central Meguma Coordinated Project Area; they are co-ordinated with GSC programs under the CNSCAMD and the NATMAP Magdalen Basin project. Previous comprehensive mapping of the Meguma Group and the Musquodoboit Batholith dates from the early 1900s when the basic stratigraphic and structural configuration was defined. The current work utilized the computer based Fieldlog program, diamond-drilling and contract aeromagnetic mapping and interpretation. Significant advances have been made in understanding the stratigraphy and structure of the Meguma Group. Mapping continued in the Carboniferous Kennetcook Basin west of the former Walton Mine, a past producer of barite, base metals and silver. Surficial mapping of Cretaceous and Quartenary deposits near Shubenacadie and Musquodoboit in conjunction with seismic surveys (GSC) as well as accompanying drilling has identified potentially interesting deposits of silica sand and clay including kaolinite.

The Geochemistry Section applies exploration geochemical and other methods to a variety of media, including water in streams and wells, recent sediments in streams and lakes, glacial deposits, and living vegetation. Geochemical projects range in scope from Province-wide surveys to site-specific, detailed investigation of anomalous metal concentrations which might indicate a hidden mineral deposit.

Multi-media geochemical follow-up studies for gold in the Meguma Zone continued in several areas including North Brookfield, Queens County; Steves Road, Halifax County; Ardoise Hill, Hants County; Ten Mile Lake, Halifax County; and Beach Meadows, Queens County. A regional scale biogeochemical sampling survey using spruce bark and balsam fir twigs was completed in Queens and Lunenburg Counties, and the Geological Survey of Canada recently completed a biogeochemical and hydrogeochemical survey in the Central Meguma Project Area. A small humus and biogeochemical survey has been conducted in the Cobequid Highlands. The detailed sampling will use various media, *ie.* biogeochemistry, red spruce bark and balsam fir limbs. Contract studies on gold potential in the Meguma Zone continued, funded by the CNSCAMD. Follow-up anomaly studies have been undertaken in selected prospective areas such as St. Mary's Basin east of Truro, Lake Ainslie and Mount Uniacke and reconnaissance vegetation and water geochemistry undertaken in central Cape Breton Island. A compilation of Seabright Inc.'s 4000 sample, regional till and soil geochemistry survey of major anticlines was released. Ten detailed survey sites were recommended for testing; Ardoise, Beach Meadows

and Ten Mile Lake were subsequently sampled for gold using till, soil, humus and vegetation.

The Mineral and Energy Resource Evaluation Section provides information specific to mineral and energy deposits and resource appraisal. It conducts detailed studies of mineral deposits and occurrences and areas with high mineral potential.

Active projects include geological investigations of the East Kemptville tin deposit; geological and geochemical investigations of the past-producing Gays River and Walton mines, including comparative studies of Pb-Zn deposits in Ireland; detailed geological investigations of Meguma Group gold deposits with emphasis on the significance of bulk mineable gold deposits; mineral inventory compilation of metallic mineral occurrences, focusing on the gold occurrences in the Meguma Zone, Cu-Co-Au deposits associated with the Cobequid-Chedabucto Fault Zone; Cu-Ni-Co occurrences associated with mafic and ultramafic intrusions in Cape Breton Island; and bedrock and granular aggregate survey in the Annapolis Valley; field investigations of building stone and zeolites.

Coal geology programs were incorporated in the Minerals and Energy Resources Division during 1995. Coal geoscience projects conducted during 1995 include both mapping and applied research in collaboration with colleagues at Saint Mary's University, Dalhousie University, University College of Cape Breton, Kansas State University, Center for Applied Energy Research (University of Kentucky), Royal Holloway University of London, Geological Survey of Canada and Kentucky Geological Survey. A new initiative begun during the year was the 1:10 000 scale mapping of Paleozoic and Mesozoic rocks south of the Cobequid Highlands.

Applied research projects included detailed sedimentological analysis of strata overlying the Foord coal seam in the Stellarton Basin and Phalen coal seam in the Sydney Basin which comprise two of the most economically strategic coal resources in Nova Scotia. Results of these studies will help to define the geological templates for subsequent mine planning. Co-ordination of coal bed methane research under the CNSCAMD was complimented by industry drilling in the Stellarton and Cumberland basins. Predictive stratigraphic models for coal-bearing strata in the Cumberland and Sydney basins have been refined by paleontological investigations of key stratigraphic intervals. Research on coals at Joggins in the Cumberland Basin has led to the discovery of their anomalous enrichment in sulphide minerals, particularly sphalerite, lead and arsenic. Modelling of these metalliferous coals is continuing.

SERVICE TO INDUSTRY AND THE PUBLIC

LIBRARY SERVICE

Results of departmental geoscience projects are made available through published reports and maps, by open files and by published papers and articles in external journals and other publications. The departmental library in Halifax provides access to all published and open file material and is the sales office for all geoscience publications of the department. Assessment reports submitted by industry are also available on microfiche. Limited library service is also provided in the Stellarton office. In addition, geoscience staff are available for individual consultation.

DIGITAL DATABASES

All departmental geoscience publications, maps, open files and assessment reports are indexed and input into the national GEOSCAN system. Searches of the GEOSCAN database are provided on request at no charge. Databases dedicated to mineral occurrences (both metallic and industrial), to drillholes and to geological and geophysical maps have been developed and are also available for custom searching. Studies are underway to determine which desktop PC system to adopt for a departmental geoscience GIS.

DRILL CORE LIBRARY

The departmental core library is based in Stellarton and holds more than 500,000m of core from thousands of drillholes as well as chip samples from off-shore hydrocarbon exploration, rock slabs, building stone samples and geochemical pulps. Much of the drill core in the core library was obtained from drill programs carried out by the department's own diamond drill section. Although in the past drilling was often done under contract to exploration companies, this activity is now exclusively restricted to departmental geoscience programs, both to assist in regional studies and to test mineral occurrences (coal, gypsum, building stone, aggregates, industrial minerals, metallic minerals, *etc.*). All core is maintained on a non-confidential basis and may be accessed for study and sampling on request.

PROSPECTOR

The Prospectors Assistance Program is a Federally funded plan under the CNSCAMD that provides direct

financial aid to individual prospectors and explorationists. The total allocation for grants for the period of July 1993 to March 1996 is $400 000. Recipients of grants are required to submit reports and results of their activities to the department.

The department organizes and sponsors a number of Prospecting Courses for the public at various locations in the Province.

LAND USE AND RESOURCE MANAGEMENT

The Integrated Land Use project provides information needed to formulate policy to ensure the protection, conservation and management of energy and mineral resources. Mineral Resource Land Use (MRLU) map and reports are being compiled to provide input for all strategic land and resource planning in Nova Scotia. The intent is to promote multi-purpose or sequential land use and to avoid sterilization of resources. The issue of setting aside large areas of land as protected wilderness before a comprehensive evaluation of the mineral potential is receiving attention. A policy for Integrated Resource Management Planning on Crown lands is being developed.

PUBLIC AWARENESS

Various publications, projects and displays targeted towards the general public and school children promote a greater appreciation for the mining industry and mineral development.

NOTES

GEOLOGICAL SURVEY
DEPARTMENT OF NATURAL RESOURCES
GOVERNMENT OF NEWFOUNDLAND AND LABRADOR

INTRODUCTION

The mineral exploration industry in Newfoundland and Labrador experienced major growth in 1995-96, following the announcement of the Ni-Cu-Co discovery at Voisey's Bay late in 1994. Exploration expenditures jumped from $12 million in 1994 to an estimated $50 million in 1995-96; the number of mineral claims in good standing increased from 25,000 to 280,000 over the same period. This boom in exploration resulted in greatly increased demand for geoscience data. The Geological Survey increased staff in the information area, and opened a temporary regional office in Goose Bay to meet this demand.

The Survey's budget in 1995-96 was just over $4 million. Almost $800,000 of this amount came from the Canada-Newfoundland Agreement on Mineral Development. The Agreement ends on March 31, 1996.

PROGRAM HIGHLIGHTS

REGIONAL GEOLOGY PROGRAM

Bedrock mapping under the regional geoscience program was carried out in eastern Grenville Province in Labrador, and on the west coast of the Island of Newfoundland. The Labrador project concentrated on the Mealy Mountains, continuing the Survey's 1:100,000 scale mapping program in Labrador. Four 1:50,000-scale map sheets were completed in this area, with the assistance of Dr. Ron Emslie of the Geological Survey of Canada. The area mapped includes components of the Mealy Mountains anorthosite suite, and high grade metamorphic rocks representing various terranes of Grenville Province.

Mapping in western Newfoundland concentrated on the Corner Brook area, continuing the Survey's long-term program to provide complete 1:50,000 scale coverage of the western Cambro-Ordovician carbonate belt. The stratigraphy established in the relatively undisturbed areas further north was extended into the structurally complex terranes south of Corner Brook. The stratigraphic-structural picture emerging from the mapping has helped create and sustain the current interest in oil exploration off western Newfoundland.

MINERALS PROGRAM

The highlight of the minerals program in 1995 was the completion of field work in two multidisciplinary projects focused on major mineral belts in the province, the Buchans-Roberts Arm belt on the Island, and the Florence Lake belt in Labrador. The objective of these two projects is to present the exploration industry with a comprehensive, up-to-date digital database for these two areas. Field work included detailed (1:10,000, 1:25,000 and 1:50,000) bedrock mapping, regional and detailed surficial mapping, detailed mineral occurrence studies, and regional and detailed geochemical surveys. The new information will be compiled with all previously existing data, using the Survey's CARIS GIS.

The Survey continued its emphasis on industrial minerals, carrying out field work on refractory and abrasive minerals in the Corner Brook area, industrial carbonates in western White Bay, and soapstone between Nain and Hopedale on the Labrador coast. Mineral aggregate surveys were carried out on the western Avalon, to identify aggregate resources for use in twinning of the Trans-Canada Highway in that area, and on the Great Northern Peninsula, to relieve pressure on beaches and other environmentally unacceptable aggregate sources there.

The Mineral Inventory project provides information on the known mineral occurrences in the Province, in the form of a computerized mineral inventory database, mineral inventory maps, and a manual mineral inventory file. The project reached a milestone this year, with the publication of the final mineral inventory map for the Island of Newfoundland.

ENVIRONMENTAL PROGRAM

The Survey has conducted regional geochemical surveys for mineral resource appraisal since 1973, and has reanalysed archived samples for many additional elements. Today a suite of 30 elements is available for more than 16,000 sample sites, and this is being expanded to over 40 elements. Many elements of economic interest are also of environmental concern, and the demand for the geochemical database for environmental studies has been increasing. This summer a cooperative project between the Survey and Parks

Canada completed geochemical coverage in Terra Nova National Park, one of the few remaining gaps in the provincial geochemical database.

An appraisal of the mineral potential of the study area for a proposed national park in the Torngat Mountains in northern Labrador was prepared, and formed the basis for extensive discussions with Parks Canada. Public hearings for the proposed park were held throughout the province late in 1995.

INFORMATION PROGRAM

The Survey expanded its information program to meet the requirements of increased exploration activity in Labrador. A temporary regional office, staffed by a senior geologist with considerable experience in Labrador, was opened in Goose Bay-Happy Valley from mid-June to mid-September. This office dealt with numerous requests for information on Labrador geology and mineral potential, and the regional geologist visited many exploration camps in the area. Three new temporary staff members were added to the information section in St John's.

The highlight of the year from the perspective of the Information Program was the annual Review of Activities in late October. The review this year attracted a record 550 participants, and featured a workshop on the geology and mineral potential of Labrador. Other highlights included the publication of a brochure describing the Survey, and the establishment of a Newfoundland Geological Survey Home Page on the Internet. The Survey's home page is located at URL http://www.geosurv.gov.nf.ca

NWT GEOLOGICAL MAPPING DIVISION (GMD) DEPARTMENT OF INDIAN AFFAIRS AND NORTHERN DEVELOPMENT, NWT REGION

The NWT Act assigns to the Minister of the Department of Indian Affairs and Northern Development responsibility for Science and mineral resources in the north. The NWT Geological Mapping Division (GMD) functions within the Operations Directorate,(DIAND) as the departmental geoscience organization for NWT and has been assigned responsibility under the Canada Mining Regulations (CMR) for the review and acceptance of the assessment reports that are required to keep mineral claims and Prospecting Permits in good standing. We maintain and provide public assess to an Archive of these assessment records and to other data sources, both digital and paper, on the geology and mineral deposits of the territories as part of our mandate to assist in the orderly development of NWT mineral resources. The GMD has also been assigned responsibility for monitoring diamond drilling including the review of drilling proposals and the issuance and monitoring of Authorities for mineral exploration drilling in non-Precambrian sedimentary basins. The latter type of drilling is controlled by the Canada Oil and Gas Act and pursuant regulations that deal with drilling saftey and the maintainance of the integrety of permiable strata.

The Division has a primary role in fostering mineral development in the NWT. It provides information and geological advice to prospectors, explorationists, other government organizations, native groups, and the public, including media organizations who regularly seek first-hand information on mineral developments in NWT.

GMD ACTIVITIES IN 1995

During 1995 GMD staff completed mapping of four 15 minute quadrangles in the Slave Province (at 1:30,000) and released numerous maps including: a map of the Slave Province kimberlite locations at 1:500,000; a 1:250,000 compilation of 4 maps sheets in the northern Slave (76 L & E, and 86H&I); a 1:125,000 compilation of the Eokuk Uplift (85P); eight 1:50,000 map sheets some of which cover more than one 15 minute quadrangle; one 1:30,000 map covering four 15 minute quads; one 1:20,000 map and one 1:10,000 map. As well one digital database (on NWT Kimberlites), and 7 papers were released as open files.

During 1994 GMD staff completed mapping of two 15 minute quadrangles at 1:30,000, and released numerous maps and reports including: mineral deposit and gold-showing zoning maps of the Slave Province in paper and digital formats; these are overlain on a lithological compilation of the Slave Province; one 1:250,000 compilation of Archean rocks in 86 I &P; two 1:125,000 compilations of Archean rocks (76 L & 86 P); seven 1:50,000 preliminary maps; one 1:30,000 preliminary map: and 6 reports on various mapping and mineral deposit studies.

During 1994 and 95 Valerie Jackson mapped in the Napaktulik area (86 I) and in the Kikerk uplift (86 P) to complete 1:50,000 coverage of these areas wich lie along the northwestern edge of the Slave Structural Province. Once completed the whole of the northwest part of the Slave (60, 15-minute quadrangles) will have been mapped at 1:30,000 or 1:50,000. John Brophy and Jennifer Pell mapped the Labrish Lake area (85 N/9), the start of a long term project to complete the 1:30 to 50,000 mapping of the western edge of the Slave Province and the adjacent Bear Province.

Jennifer Pell and John Brophy completed mapping of the Labrish Lake map area (85 N/9) at 1:30000.

District Geologists John Brophy, Karen Gochnauer, Stephen Goff, Jennifer Pell and Pamela Strand worked on various mineral showings in various parts of the territories. GMD's 5 District Geologists spend about 1/3 of their time reviewing claim and permit assessment submissions which must be reviewed to ensure that the owners of the mineral resource are receiving acceptable returns from the "Economic Rent" (*i.e.* the exploration) "paid" by the claim or permit holder. Data that is incomplete or unintelligible is of little use in future interpretation of mineral resource potential. Brophy continued work on iron-formation-hosted gold deposits in Slave Province turbiditic sediments, Goff continued evaluations of gold deposits in the Rankin Ennadi belt, Pell monitored diamond exploration and studied kimberlites, and Gochnauer and Strand began a compilation of mineral showings in the mainland part of the Bear Structural Province.

University contractors and other researchers were assisted by the GMD as follows. Wulf Mueller and Patricia Corcoran, Université of Québec á Chicoutimi, mapped in the Beaulieu Rapids Formation (85 P/1), the Raquette Lake Formation and adjacent units (85 I/11), the southernmost exposures of the Jackson Lake Formation (in the Sub Islands 85 J/8), and in the Keskarrah Bay Formation on Cyclops Peninsula in Point Lake (86 H/3). These rocks are all believed to represent the last phases of Archaean sedimentation in the Slave Structural Province. W. K. Fyson, University of Ottawa, studied structures in turbiditic sediments of the Burwash Formation in the Yellowknife Domain. He also continued work on 1:1,000,000 and 1:500,000 compilations of the lithology and structure of the Slave Province. Samuel A. Bowring and associates from MIT continued work on the Acasta Gneisses, the oldest rocks in the world (mainly in 86 G/5). Recently single crystal U/Pb zircon-ages from these rocks of circa 4.01 Ga have been obtained by Dr. Bowring. Dr. Lee Groat of the University of British Columbia continued research on the Little Nahanni lithium-bearing pegmatites in the Mackenzie Mountains north of Tungsten (95 E/NW). Professor Stephen Moorbath of Oxford University, Professor Kip Hodges of MIT, Professor Simon Wilde of Curtin University (Perth Australia) and Dr. John Myers of the Geological Survey of Western Australia were assisted in studies of the Acasta Gneisses.

An expediting service was operated jointly by GMD, the Canada-NWT MIO and the GSC. This provided service to government and university supported geological operations in areas tributary to Yellowknife.

Two of the GMD's 10 pys are spent on management of the NWT Mineral Exploration Database. The Archives Geologist and Archives Technician ensure that information in or flowing into the Archive is properly indexed and stored so it can be recovered for use. They ensure that database users find what they are seeking, and ensure that documents are returned to proper storage after use.

The GMD is in the process of taking responsibility for the Northwest Territories Mineral Deposits Database (NWTMINFILE) which is under development as a Mineral Initiative (MDA) project. NWTMINFILE is designed to allow ready access (in FOXPRO) through a personal computer to a part of the information in the Archive knowledge base. It is expected that three person years of work will be required to input the "historical record" now lodged in the Archive. District Geologists will replace Mineral Industry Report (MIR) preparation, which required summarizing exploration work and results, with input of new assessment data into NWTMINFILE. Future MIRs will be produced by printing out (or providing in digital format) an index to the newly released assessment work.

CANADA-NWT MINERAL INITIATIVES

In 1994 fifteen geoscience field projects were supported. Five of these were operated through the Mineral Initiatives Office (MIO) Yellowknife and 10 through the Geological Survey of Canada. A number of the latter were joint projects with GMD, or MIO. Four of the MIO mapping projects were in the Slave Province (M. Stubley, 85 P, C. Relf 76 M, J. Gebert 86 H and I, and R. Johnstone 75 M) and one in the Rankin-Ennadai volcanic belt of the Keewatin (D. Irwin 55 L). In addition to 1:50,000 scale mapping of favourable mineral belts the MIO continued development of the NWTMINFILE, a computerized mineral showings database base on FOXPRO (V. Sterenberg). Project Rocks a "Mining Sector Information Initiative" produced resource kits on the mineral industry and geology which will be distributed to NWT schools. A prospector's assistance plan was conducted under which 13 prospectors were assisted and one prospectors training course was given. A Mining Productivity Initiative saw its last year of effective operation in 1994.

In 1995 the Mineral Initiatives was in its last year with considerably reduced funding and activity. Stubly and Irwin mapped in the same general areas as is 1994 and Relf mapped in the Rankin-Ennadai Belt. Prospector's assistance, and Project Rocks functioned mainly with funds from the Department of Energy Mines and Petroleum Resources, Government of the NWT.

Maps resulting from MIO and GMD mapping are made available in the EGS open file series available from the GMD DIAND Box 1500 Yellowknife, X1A 2R3 NT.

MINING AND MINERAL EXPLORATION

Eight mines operated in the NWT in 1994 and 1995. Two, in the high Arctic (Polaris and Nanisivik) produce mainly lead and zinc from Mississippi Valley like deposits, the other 6 are gold mines in the Slave Structural Province. One of the latter is an open pit mine working low-grade ore at more that 8,000 tonnes/day. The others are underground mines including two circa 100 tpd 15g/t operations and, three operating

in the 1400 to 2300 tpd range at circa 10g/t. A number of gold deposits in the Slave have been tested underground or await that testing in the near future. One or more of these are expected to see production in this decade. All currently operating mines and important recent discoveries resulted from initial discoveries made by conventional prospecting followed by drilling and geophysics.

Diamond exploration continues to be a major feature of the NWT minerals scene. Environmental approval for at least one group of open-pit mines is expected in the near future. Others may follow if exploration results continue to be as encouraging in the future.

Mainly as a result of diamond discoveries in the Lac de Gras area of the Slave Structural Province the NWT has seen an unprecedented boom in claim staking, Prospecting Permit aquisitions, and in general mineral exploration. A record 737 prospects, 622 of them in the Slave, were explored in 1994. Over 100 of these were drilled, 64 of these were diamond targets. In 1994 just over 3700 claims covering 28,500 square kilometeres were staked. In 1995 over 3900 claims were staked covering 30,000 square kilometeres including almost all areas that had lapsed. As a result of gold discoveries in the Labrish Lake area by GMD geologists Brophy and Pell and diamond discoveries in minnette dykes in the Keewatin by GMD contractors claim staking and permit aquisition was widespread in those areas as well. Fewer prospects were tested in 1995 (about 306) but more were drilled (at least 206) including at least 156 targets for diamond. Six drill projects involved more than 10,000m of drilling; (one Ag-base metal, two diamond, and four gold). Projects involving more than 1000m of drilling (35) included 11 for diamond, 14 for gold, 2 for uranium, and 8 for base metals. Five deposits have reached the feasibility stage and await financing or environmental approval for further progress. At least one gold deposit awaits underground testing. In 1995 fewer prospects were tested for diamonds (190) but more (157) were drilled. At least 116 prospects were tested for other commodities and 46 of these were drilled.

NOTES

YUKON
COMBINED GOVERNMENT PROGRAMS

INTRODUCTION

At the present time, Yukon's government geoscience programs are delivered by three agencies: DIAND, Government of Yukon, and the Canada-Yukon Geoscience Office. In 1994-95 a total of $3.26 million was spent in support of the Yukon mining industry, including $1.65 million in support of geoscientific research contributed by the Canada-Yukon Mineral Development Agreement, and $726 000 from Government of Yukon for prospector assistance.

DIAND administers the Yukon Quartz and Placer Mining Acts, maintains a database of Yukon mineral occurrences, compiles and publishes information on Yukon mineral exploration and development, assists with environmental reviews, and maintains a reference library, core library and publication sales outlet. Mineral deposit, mineral potential, placer and environmental studies are also carried out as resources permit.

Government of Yukon provides financial support to the mining industry through the Yukon Mining Incentives Program, and technical and regulatory support to mining companies through its Mining Facilitator. Under the Northern Accord on oil and gas, Government of Yukon is also preparing to take over responsibility for oil and gas administration.

The Canada-Yukon Geoscience Office carries out geoscientific research under the Canada-Yukon Mineral Development agreement, funded 70% by DIAND and 30% by Government of Yukon. Day to day administration of the Geoscience Office is done by Government of Yukon.

GEOLOGICAL MAPPING PROGRAM

Six regional bedrock mapping programs were carried out in 1994-95 by geologists of the Canada-ukon Geoscience Office and affiliated scientists. These projects are part of a 5-year plan to create detailed geological maps in areas of significant mineral potential, in several of Yukon's main tectonic belts.

In the Mt McClintock area east of Whitehorse (105D/16), Craig Hart and Julie Hunt (CanadaYukon Geoscience Office) undertook a detailed subdivision of Triassic and Jurassic sedimentary rocks, and separated volcanic rocks in the area into a mafic submarine suite of Middle Triassic age and a felsic, subaerial suite of Middle Cretaceous age.

Northwest of Carmacks, Steve Johnston (Canada-Yukon Geoscience Office) and Rob Shives (Geological Survey of Canada) compiled and reinterpreted the geology of three map sheets in the Dawson Range (115J/9,10,115V12) at a 1:100 000 scale with the assistance of data from a 1993 spectrometric survey. The survey successfully outlined alteration haloes characterized by low Th/K ratios and total field magnetic highs which may be related to porphyry style mineralization in dykes and high level potassium-rich intrusions associated with the Late Cretaceous Carmacks Group volcanics. Volcanic rocks previously assigned to the mid-Cretaceous Mt Nansen Group were found to be continuous into and indistinguishable from Carmacks Group rocks.

In the Seattle Creek area near Mayo (NTS 115P/16) Don Murphy and Daniele Heon (Canada-Yukon Geoscience Office) mapped highly deformed rocks in the hanging wall of the Tombstone Thrust Fault and identified several new areas of gold-arsenic mineralization related to buried and exposed intrusions of the 92 Ma Tombstone Suite.

In the Wernecke Mountains (NTS 106C/14), Derek Thorkelson and Carol Wallace (Canada-Yukon Geoscience Office) mapped sedimentary rocks which span about a billion years of time from Middle Proterozoic to Early Paleozoic. These rocks host copper-uranium-cobalt-gold-silver occurrences in hematite-cemented breccias which resemble the Olympic Dam deposit in Australia, and are believed to be related to an episode of Middle Proterozoic mafic to intermediate volcanism.

In the Selwyn Basin, Grant Abbott (DIAND) collaborated with Charlie Roots, Steve Gordey and Mike Cecile (Geological Survey of Canada) to remap the east half of the Lansing map area (105N).

QUATERNARY GEOLOGY PROGRAM

Ted Fuller and Diane Brent (Canada-Yukon Geoscience Office) mapped preglacial terraces along the Yukon and Sixtymile River valleys (1 150/5,12; 115N/9). The terraces are inferred to be Miocene and Pliocene in age, and are possibly coeval with White Channel gravel in the Klondike area. Small amounts

of fine gold were recovered from test pits excavated in these terrace gravels.

Tiffani Fraser (University of Fairbanks) was funded by DIAND to study the sedimentology of Pleistocene black muck sequences in the Klondike goldfields.

MINERAL POTENTIAL STUDIES

Trevor Bremner (DIAND) released the results of a preliminary study of mineral potential in the area around Tombstone Mountain, proposed for a Territorial Park. The study highlighted the presence of porphyry-style uranium and gold mineralization within one of the phases of the Tombstone Stock and drew attention to the highly anomalous concentrations of lithophile elements associated with the stock, including high concentrations of rare earth elements. The area has been withdrawn from staking pending a settlement of Land Claims in the area and a final decision on the park boundary.

In April, 1995 Daniele Heon (Government of Yukon) commenced a detailed mineral potential study to assist with selection of land for another Territorial Park in the Eagle Plains area.

REGIONAL SURVEYS

A combined airborne radiometric, magnetic and VLF survey was flown in the Dawson Range (11I/3, 5, 6) by Rob Shives (Geological Survey of Canada) with funding from the Canada-Yukon

Mineral Development Agreement. The purpose of the survey is to identify alteration zones associated with centres of porphyry-style mineralization in an area of known high mineral potential.

Fifty kilometres southeast of Whitehorse, the Yukon Prospectors Association, funded by the Canada-Yukon Mineral Development Agreement, conducted an airborne EM-magnetic survey over volcanic rocks of the Cache Creek Terrane, to identify favourable structures for mesothermal gold deposits.

OTHER RESEARCH

Other programs funded by the Canada-Yukon Mineral Development Agreement included a pilot project to test light auger drilling for placer prospecting in the Klondike district, carried out by Diane Brent of the Canada-Yukon Geoscience Office, and a study of lithium-bearing pegmatites on the Yukon-NWT border by Lee Groat (University of British Columbia).

ENVIRONMENTAL GEOSCIENCE

Diane Emond and Hugh Copland (DIAND) assisted with land use screenings required under the Territorial Lands Act, and with environmental reviews of major projects required by the Canadian Environmental Assessment Act.

On behalf of DIAND, Mougeot Geoanalysis compiled a comprehensive set of maps and data files covering permafrost distribution, surficial geology, earthquake epicentres, slumps, landslides and other terrain hazards in Yukon. This Geological Processes Inventory is used to help with environmental screenings and provides useful baseline data for companies planning to submit projects for screening. The files and maps will ultimately all be available in digital format.

Mougeot Geoanalysis also carried out a reclamation study to select the most appropriate methods for rehabilitating disturbed exploration sites above and below beeline in permafrost and nonpermafrost areas.

MINERAL DEPOSIT INVENTORY

Yukon Minfile is a text file containing information on more than 2500 Yukon mineral occurrences. It is maintained by DIAND and updated annually in November based on field visits, company reports (with permission), information filed with the Mining Recorder, scientific publications and media reports. The dataset consists of a set of 38, 1:250 000 scale maps and approximately 7500 pages of text which are also available as a set of computer files. The text contains a detailed work history, geological description and a list of references for each occurrence.

A compiled database version of Yukon Minfile is now available. This version is a licensed Foxbase application which runs under DOS and contains structured data and the provision for sophisticated searches and six different report formats. It is modelled on B.C.'s Minfile. As of 1995, a full time geologist (Robert Deklerk) has been assigned to maintaining this database.

OIL AND GAS

Government of Yukon has created an Oil and Gas Resources Branch to administer oil and gas in Yukon after the Northern Accord takes effect. As Land Claims are settled, areas withdrawn from oil and gas development over the last two decades will be reopened for exploration. To assist government planners and provide baseline information for potential investors, Government of Yukon commissioned the National Energy

Board to prepare studies of the Liard Basin and the Eagle Plains Basin, where all of Yukon's known oil and gas reserves are concentrated. Future studies will look at the potential of other Yukon sedimentary basins, beginning with the Whitehorse Trough.

YUKON MINING INCENTIVES PROGRAM

TheYukon Mining Incentives Program (YMIP) is administered by Karen Pelletier (Government of Yukon). This program provides part of the risk capital required to locate and explore mineral deposits. Grassroots programs (Prospecting and Grubstake categories) are conducted on open ground, and Target Evaluation programs are conducted on newly discovered prospects covered by mineral claims, placer claims, placer prospecting leases, and coal licences and leases. Technical assistance is provided to prospectors on request.

Program funding in 1994-95 was $725 800, covering 58 separate projects. This figure includes the cost of adminstration and investment promotion.

H.S. BOSTOCK CORE LIBRARY

The H.S. Bostock Core Library houses approximately 123 000 m of diamond drill core from 179 Yukon properties. Diamond saws, a core splitter and microscopes are available for use in heated examination rooms, and there is no charge for use of the facilities. Permission from the owner is required to view confidential core. The facility is administered by Mike Burke (DIAND).

NOTES

SURVEY OF HARD ROCK DRILL-CORE PROGRAMS 1994-1995

NOTES

SURVEY OF HARD ROCK DRILL CORE PROGRAMS IN CANADA 1994-1995

PROVINCE:	B.C.**	ALBERTA	SASK.	MAN.	ONT.	QUE.	N.B.	N.S.	NFLD. & LAB.	P.E.I.	YUKON	N.W.T.	Totals
No. of facilities	1	1	1	4	6	5	3	4	6	n/a	1	1	33
Staff-Person Days Work	10	100	120.5	90	330	20	650	953	580	n/a	0.25	0	2,853.75
Capital Cost	$5,400	$16,400	$1,400	$26,000	$60,000	n/a	n/a	$156,000	$28,000	n/a	$70,000	n/a	$363,200
Operating Cost	$5,000	$16,000	$18,100	$3,100	$42,000	$72,500	$95,000	$20,000	$30,000	n/a	$11,100	n/a	$312,800
Core Collected and/or Delivered (in metres)	n/a	747.5	1 841.9	687	20 360	n/a	18 000	31 795	5 461	n/a	1 350	n/a	0
Core Reduction*	n/a	nil	nil	nil	nil	n/a	nil	nil	nil	n/a	nil	n/a	0
Use of Facilities person days-pd; visits-v	20 pd	41.5 pd	27.5 pd	20 v	340 v	16 pd	250 - 300 v	306 pd	304 pd	n/a	50 v	20 v	1,445
Total Core in Storage (from all years; in metres)	15,000	30,920	81,104	205,697	1,056,000	221,924	448,000	626,510	877,316	,	120,000	30,517	3,712,988
Total Exploration Drilling (in metres)	8061	confidential	137,993	55,129	750,000	381,331	50,000	4,000	49,000	,	55,629	,	1,491,143

* *Over last year*

***There are no facilities for hard rock core in B.C.*

Data compiled by Province of Manitoba

NOTES

DISCOVERY METHODS FOR CANADIAN METAL MINES THAT OPENED IN 1994

NOTES

DISCOVERY METHODS FOR CANADIAN METAL MINES THAT OPENED IN 1994

PROVINCE: ONTARIO

Mine:	Garson
Company:	Inco Ltd.
Discovery Techique:	General Prospecting
Discovery:	Old
Date of Original Discovery:	1891
NTS:	41I10
Location:	Garson Township
Discovered (reassessed) Reserves:	
Mining Type:	Underground
Commodities:	Ni, Cu, Co, PGM
Deposit Classification	Mafic Intrusive

Mine:	Victoria
Company:	Victoria Graphite Inc.
Discovery Techique:	General Prospecting
Discovery:	Old
Date of Original Discovery:	early 1930s
NTS:	
Location:	Bastard Township
Discovered (reassessed) Reserves:	750,000 t @ 7% graphite
Mining Type:	Open Pit
Commodities:	Graphite
Deposit Classification	?????

Mine:	Whistle
Company:	Inco Ltd.
Discovery Techique:	?????
Discovery:	Old
Date of Original Discovery:	last mined 1988-91 (???)
NTS:	?????
Location:	Norman Township
Discovered (reassessed) Reserves:	
Mining Type:	Open Pit
Commodities:	Ni, Cu, Co, PGM
Deposit Classification	Mafic Intrusive

NOTES

SURVEY OF GEOSCIENCE DATA BASE

STATE OF THE CANADIAN GEOSCIENCE DATABASE

A workshop on the "*Canadian Geoscience Database: Direction, Challenges and Needs*" was held at the 1995 Annual Mines Ministers Conference in Saskatoon. The workshop was organized largely in response to a brief to Ministers from the Prospectors and Developers Association of Canada, which drew attention to sharp decline in government funding for geoscience activities since 1989, and the critical importance of the geoscience database to sustain the economic well being of the mining industry in Canada.

The workshop advised governments not to make disproportionate cuts to geoscience and challenged the federal and provincial survey organizations to examine the state of the exploration database. The compendium of index maps in this volume is a step in this assessment on a national basis.

The full report of the workshop follows.

Workshop Report
Presented to the 52nd Annual Mines Minister's Conference, Saskatoon, Sept., 1995
Canadian Geoscience Database: Direction, Challenges and Needs

INTRODUCTION

The geoscience knowledge and expertise provided by government agencies in Canada rank among the best in the world. The knowledge base, which includes both data and people, has been a key factor in maintaining a strong competitive advantage for Canada in attracting exploration investment. The value of Canada's geoscientific data base is estimated at about $100 billion. For every dollar spent in acquiring this information, about $1000 of new wealth has been created. The overall societal value of this knowledge far exceeds its costs.

The workshop participants wish to stress to Ministers, in the strongest possible terms, that the Canadian geoscience knowledge base is of critical importance for the future well-being of the mining exploration industry. We are alarmed by the recent drastic budget cuts to federal and provincial geological surveys. Provision of this knowledge is an essential government service, as recognized in the Whitehorse Mining Initiative. Geological mapping and related research is the basic R&D for exploration and discovery. Government geological surveys are the only organizations that can efficiently coordinate and deliver this type of knowledge.

We welcome the National Geoscience Accord as an attempt to define more clearly the roles of the provincial surveys and their national counterpart, while at the same time committing to find ways in which to cooperate, increase efficiency and avoid duplication of services. Bilateral accords will now be established between the Geological Survey of Canada and each provincial/territorial survey, that will define the actual activities and deliverables. Industry input will be an essential component of this bilateral process.

We also recognize the wide use of geoscience in other fields, such as environmental stewardship, and the protection of the health and safety of Canadians. Such uses are of great benefit to our industry.

RECOMMENDATIONS:

1: While recognizing the need to reduce deficits, we recommend that governments accept that they do not make disproportionate cuts to geoscience. Governments must not erode these services, which include a critical mass of expertise, that are essential to underpinning a healthy domestic mineral industry.

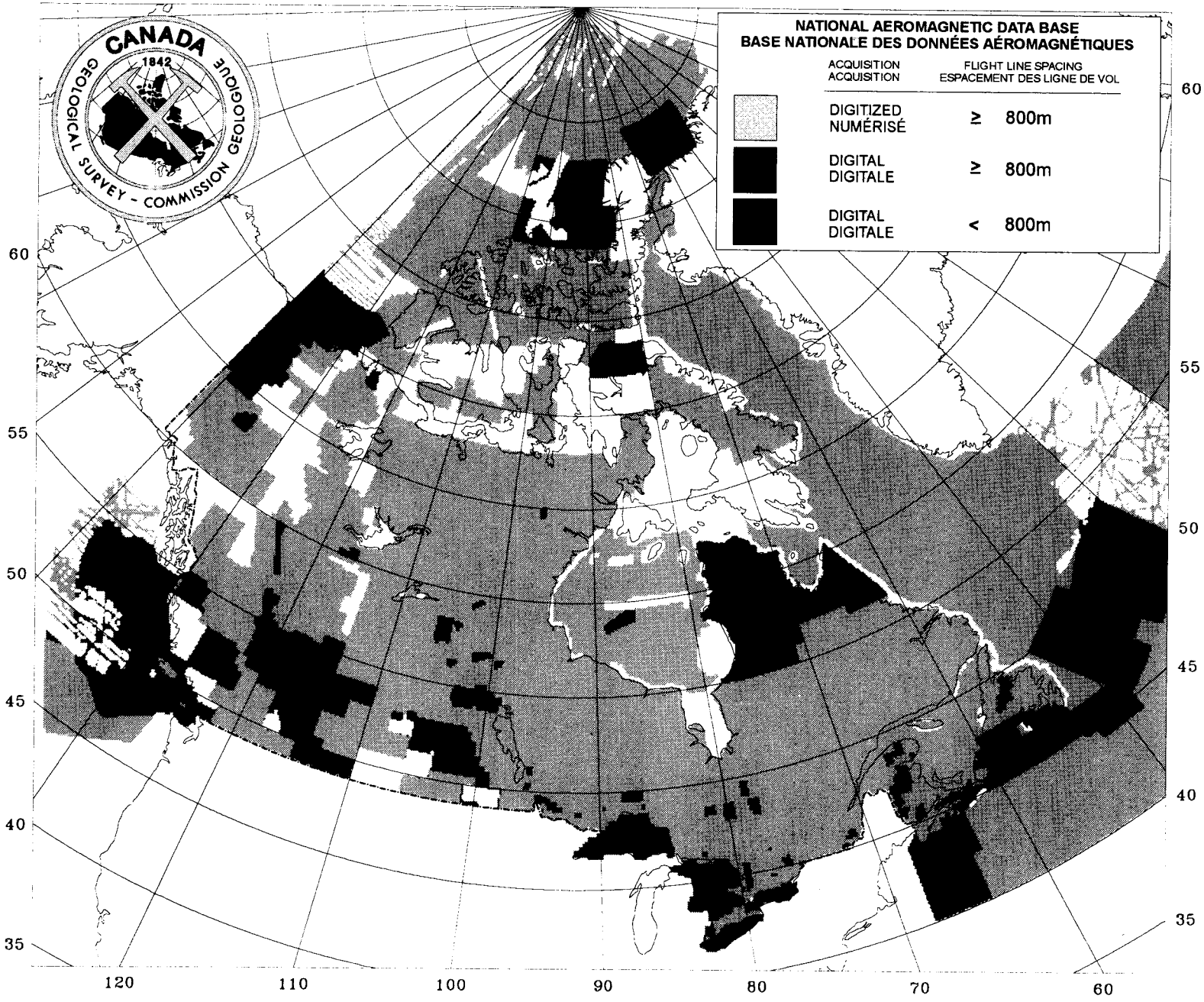
2: In planning future geoscience programs, Ministers should design a process of national consultation with all stakeholders, following the directives of the Whitehorse Mining Initiative.

3: A National Geoscience Mapping Action Plan should be established, within the framework of the new National Geoscience Accord. We ask that Ministers assign an appropriate amount of program support to new data acquisition, and particularly to field based programs.

4: Ministers should require an accountability for money spent on geoscience activities. We suggest that this accountability be undertaken by the National Geological Surveys Committee, via an annual report to the Intergovernmental Working Group.

5: We suggest that all geological surveys should adopt digital information and technology practices, while maintaining traditional paper outputs. Geological surveys should optimize and maximize the acquisition, integration and distribution of data from all sources, including governments, industry and universities.

6: Continual rejuvenation of the expertise in both government surveys and industry is essential. Close ties between government and university programs, with continued support from industry (through student hiring and research support) will facilitate this rejuvenation. Industry will be encouraged to volunteer data, in order to ensure that it is properly archived.


CANADA
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GEOLOGICAL SURVEY - COMMISSION GEOLOGIQUE
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BASE NATIONALE DES DONNÉES AÉROMAGNÉTIQUES
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ACQUISITION
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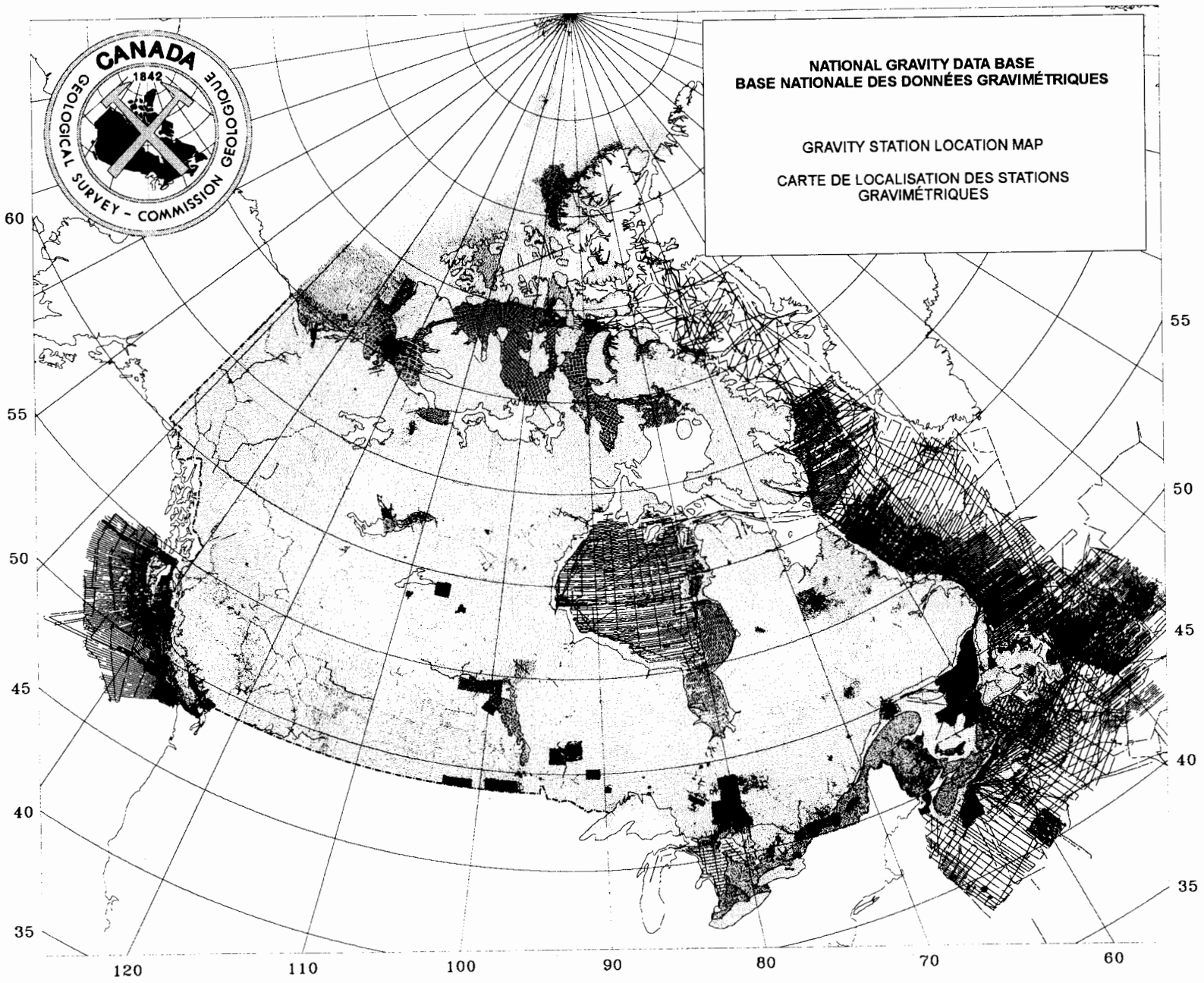
CANADA
1842
GEOLOGICAL SURVEY - COMMISSION GEOLOGIQUE
NATIONAL GRAVITY DATA BASE
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GRAVITY STATION LOCATION MAP
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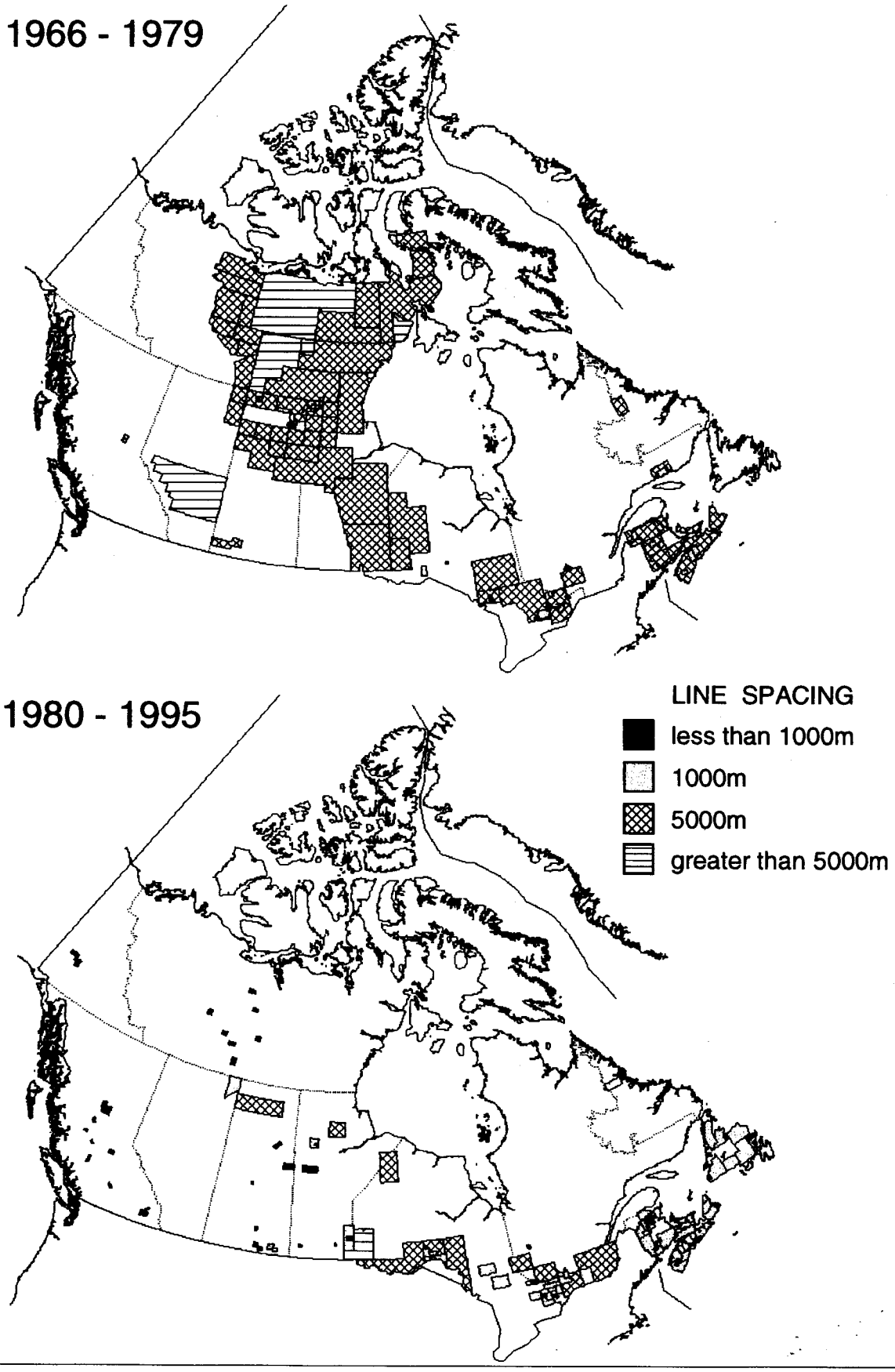
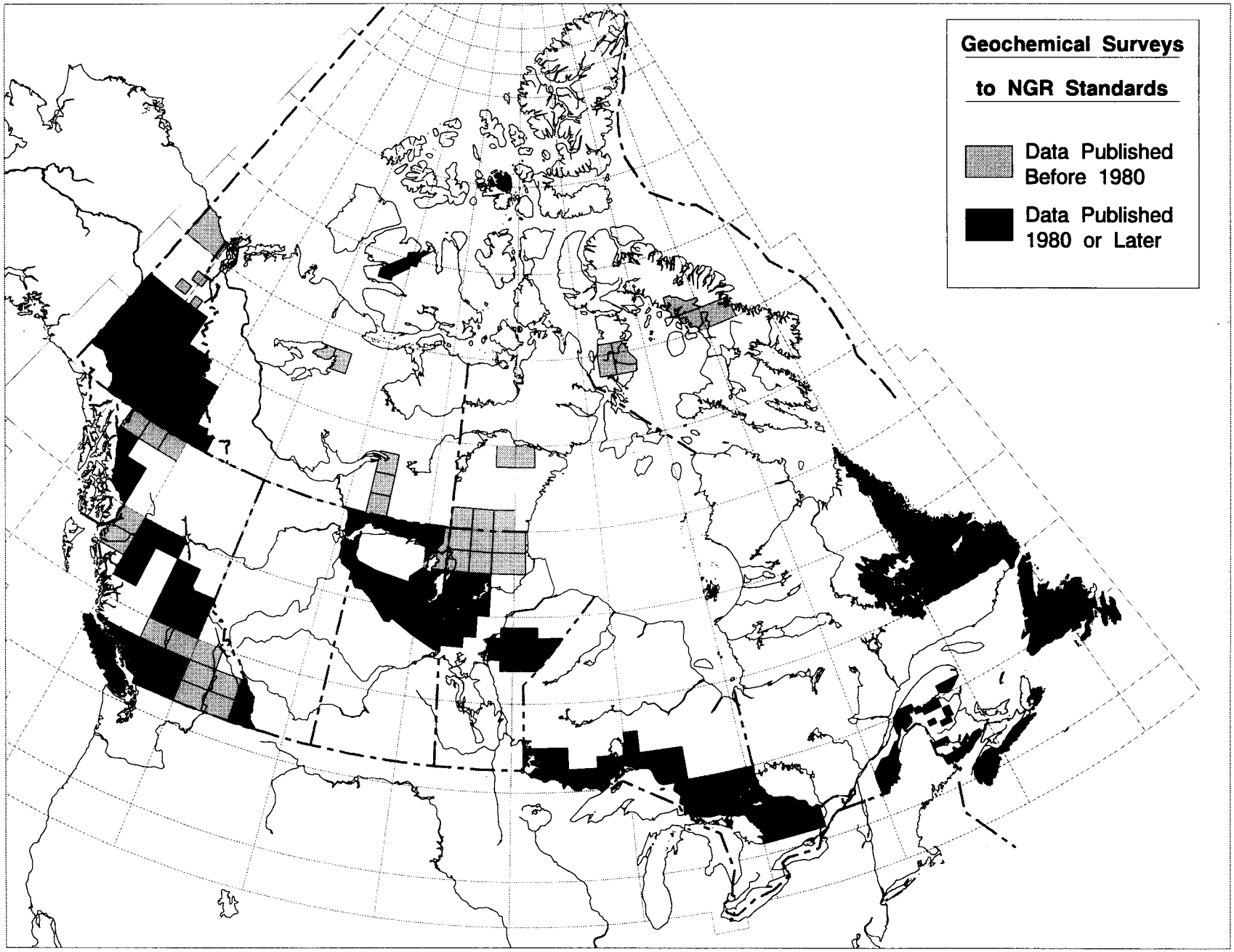
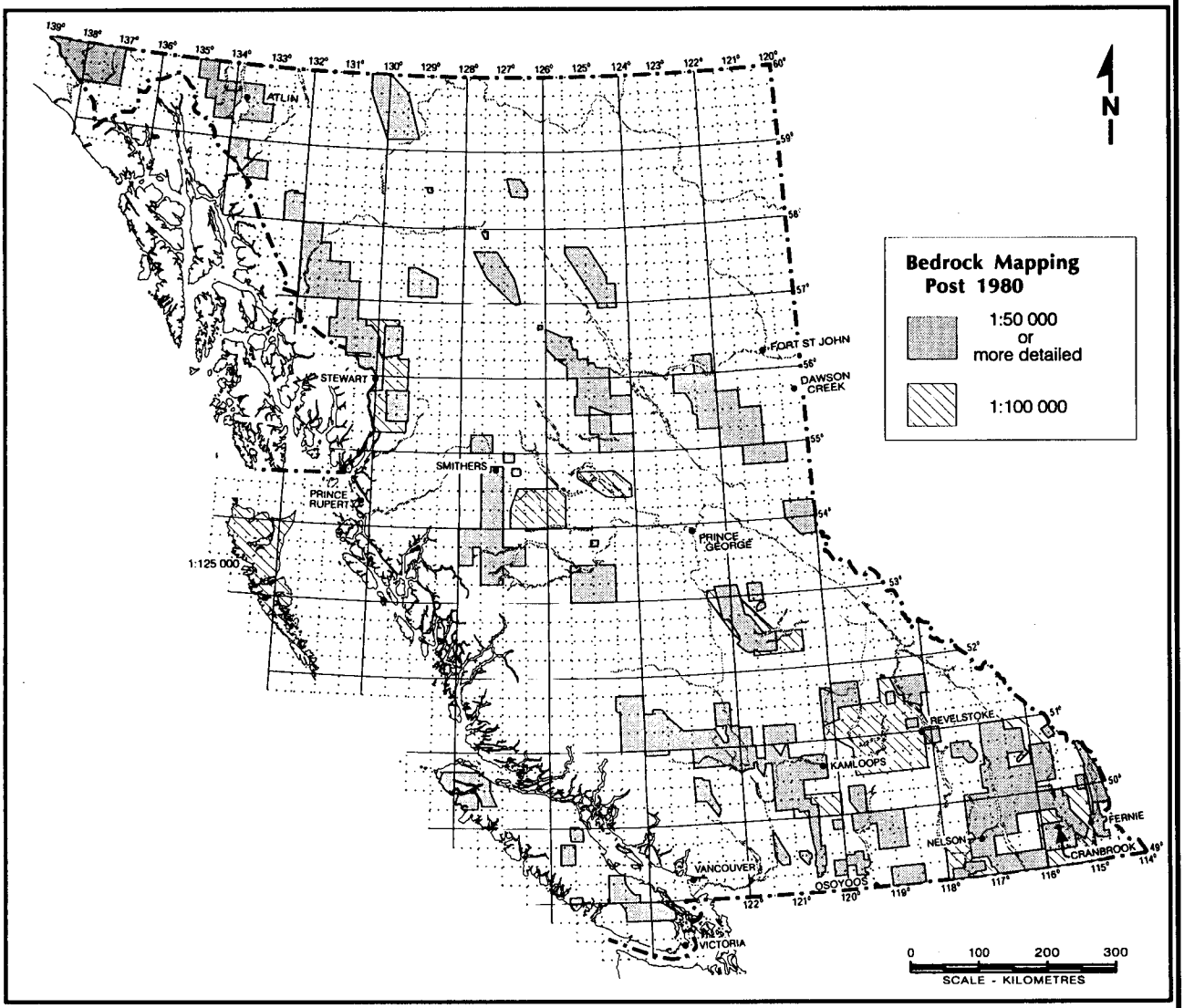
AIRBORNE GAMMA RAY SPECTROMETRY



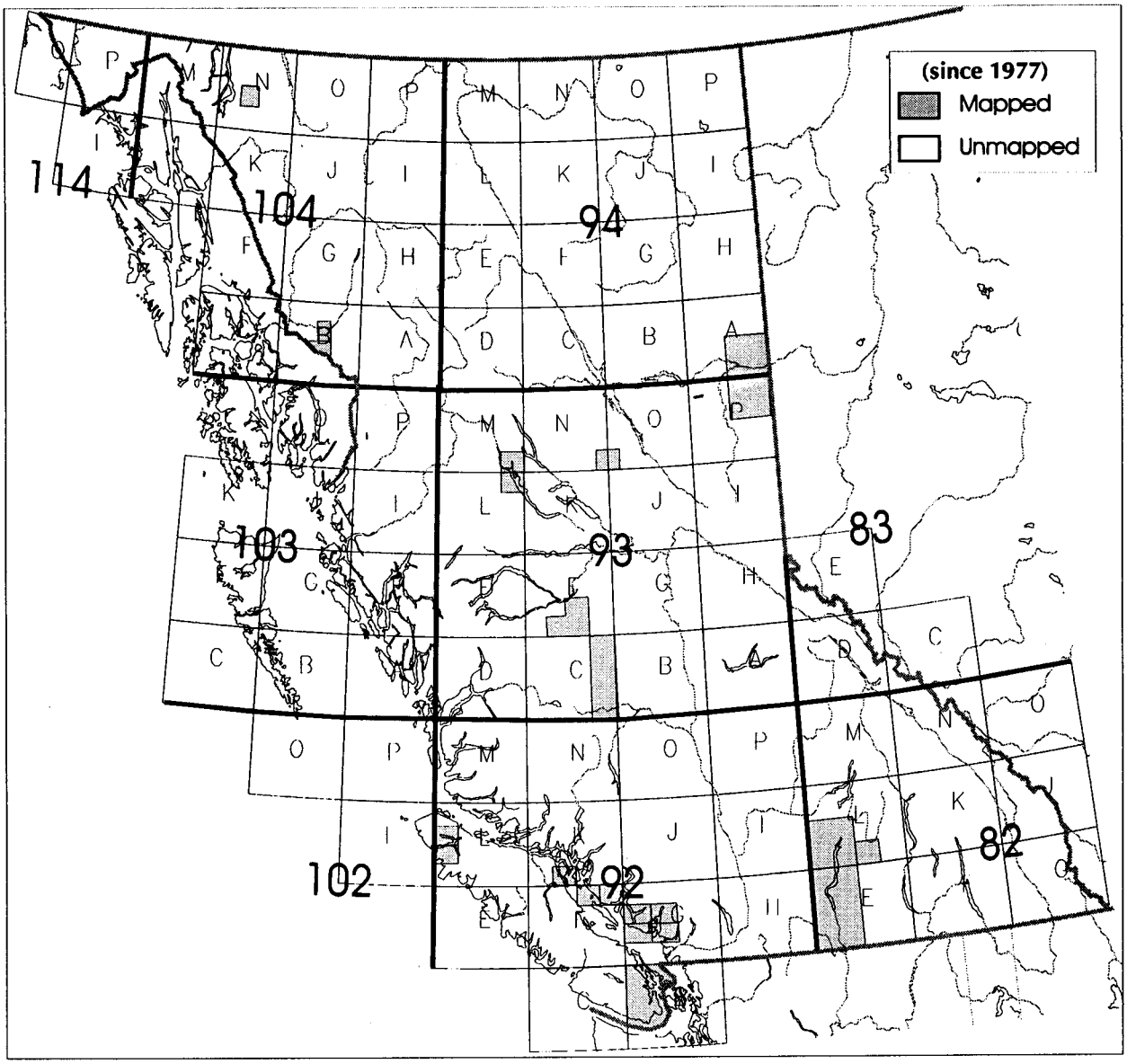

Geochemical Surveys
to NGR Standards
Data Published
Before 1980
Data Published
1980 or Later

British Columbia
Bedrock Geological Mapping



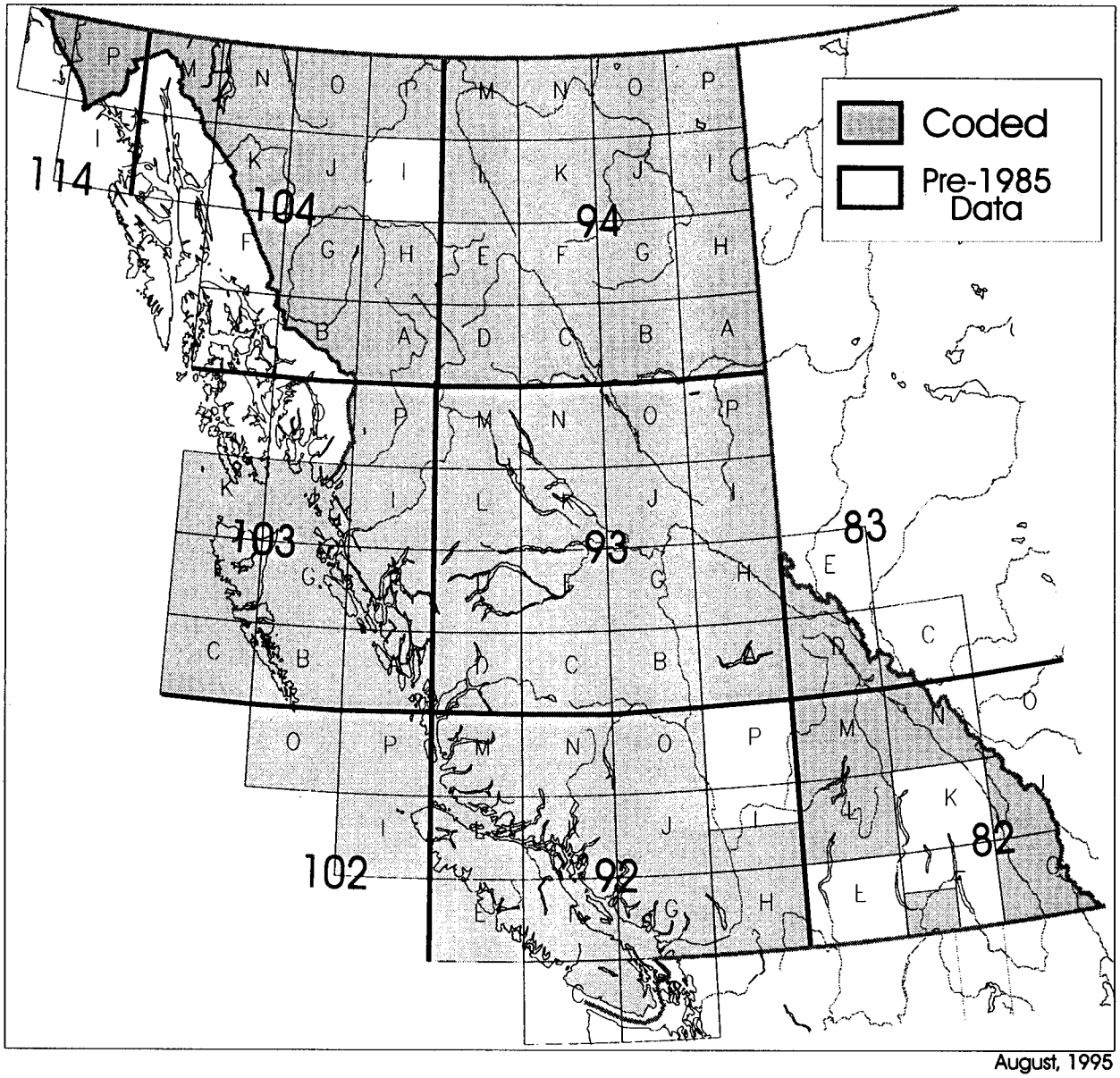
Province of British Columbia
Ministry of Energy, Mines and Petroleum Resources
Mineral Resources Division
Geological Survey Branch

British Columbia
Surficial Geological Mapping



Province of British Columbia
Ministry of Energy, Mines and Petroleum Resources
Mineral Resources Division
Geological Survey Branch

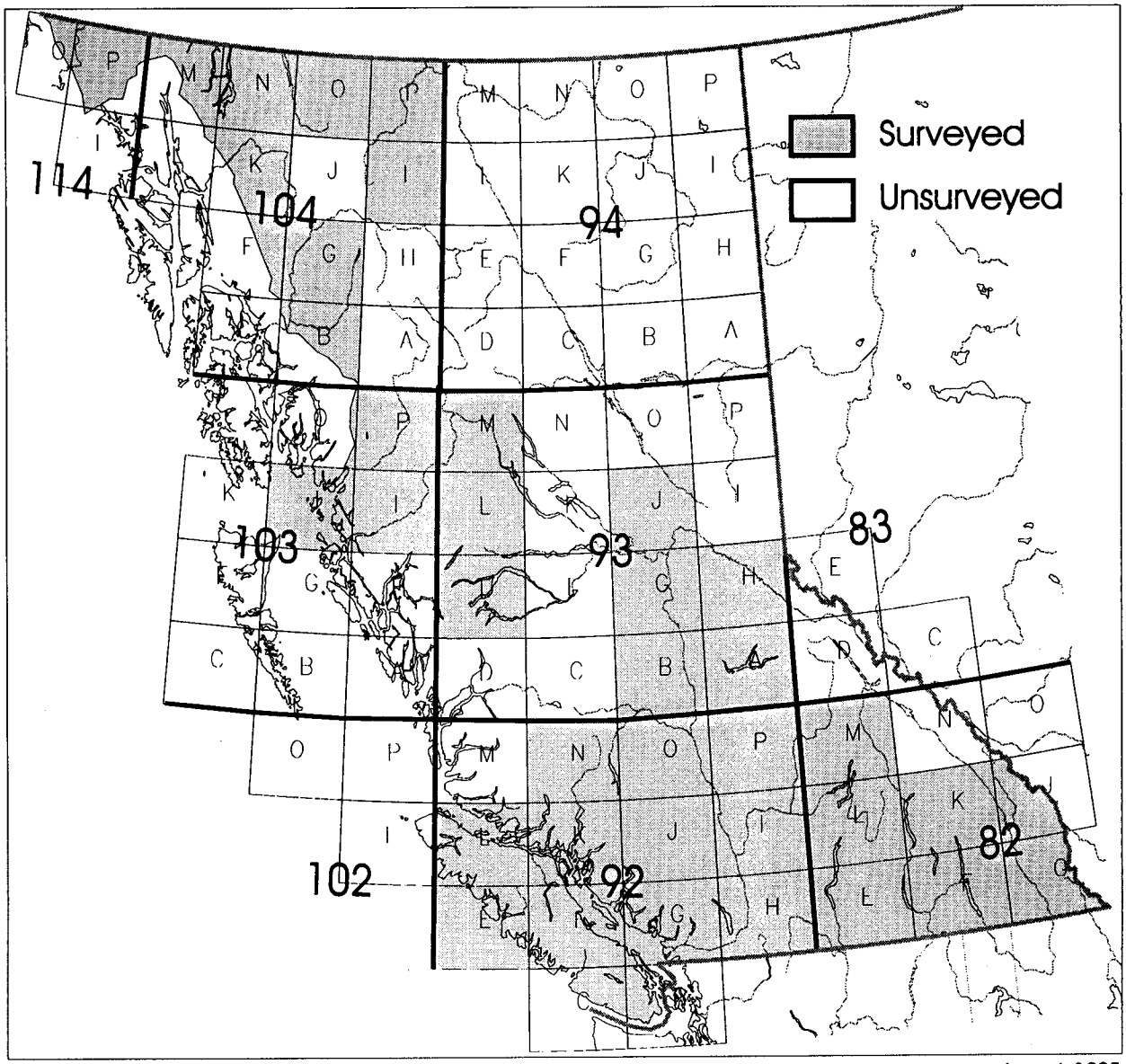
British Columbia
Mineral Occurrence Database
MINFILE



August, 1995

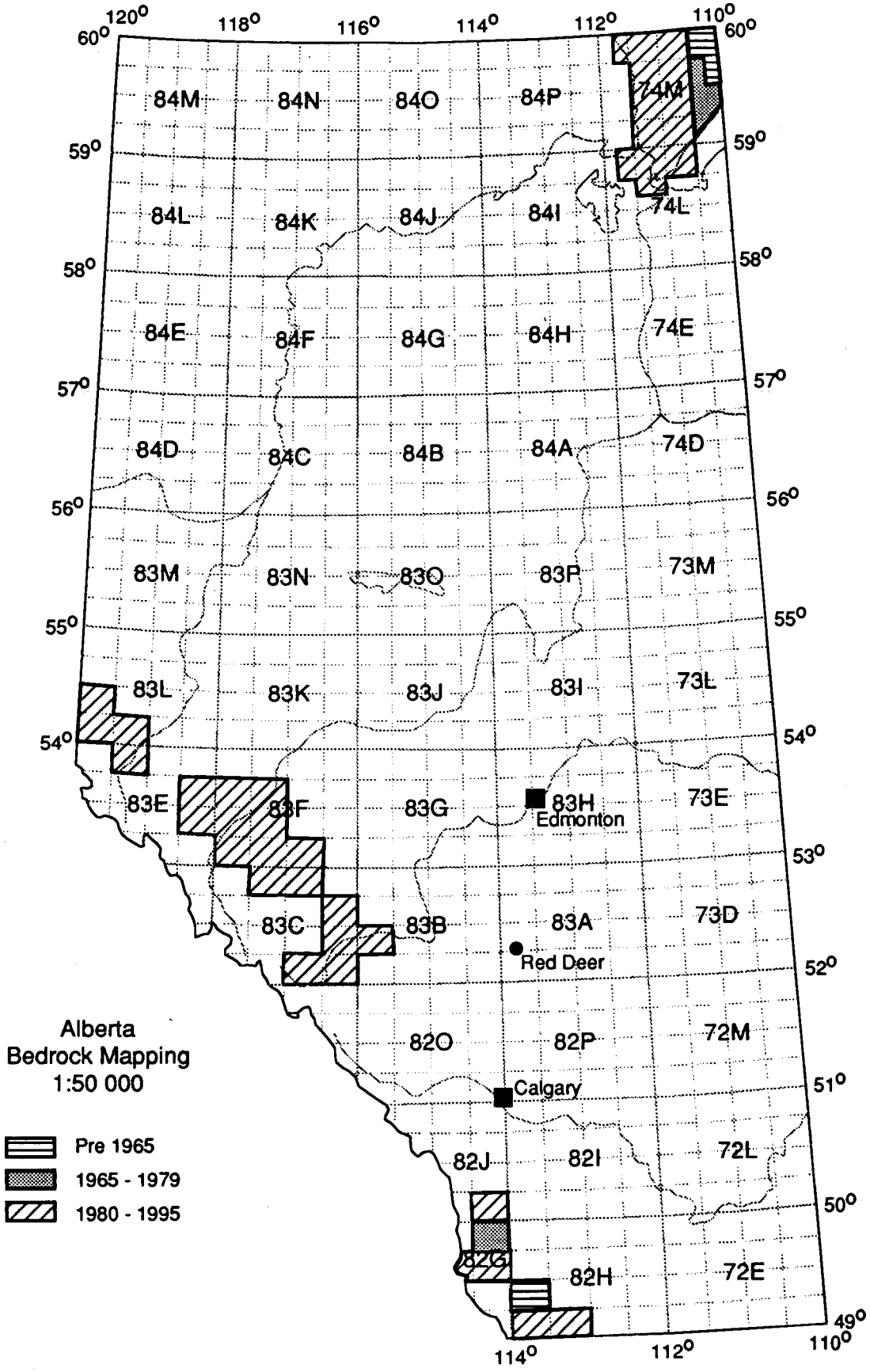
Province of British Columbia
Ministry of Energy, Mines and Petroleum Resources
Mineral Resources Division
Geological Survey Branch

British Columbia
Regional Geochemical Surveys



August, 1995

Province of British Columbia
Ministry of Energy, Mines and Petroleum Resources
Mineral Resources Division
Geological Survey Branch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Bedrock Mapping
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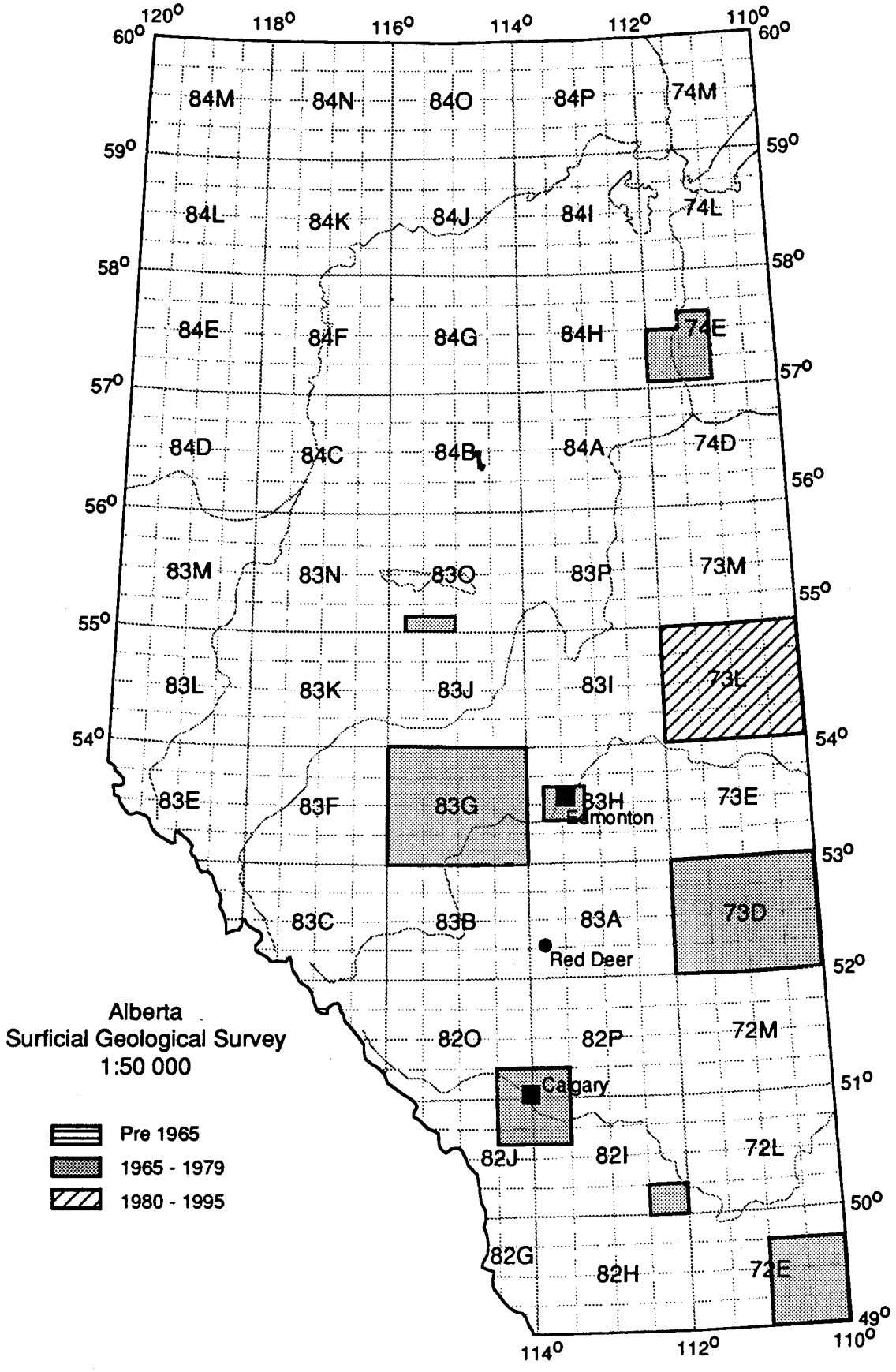
Pre 1965
1965 - 1979
1980 - 1995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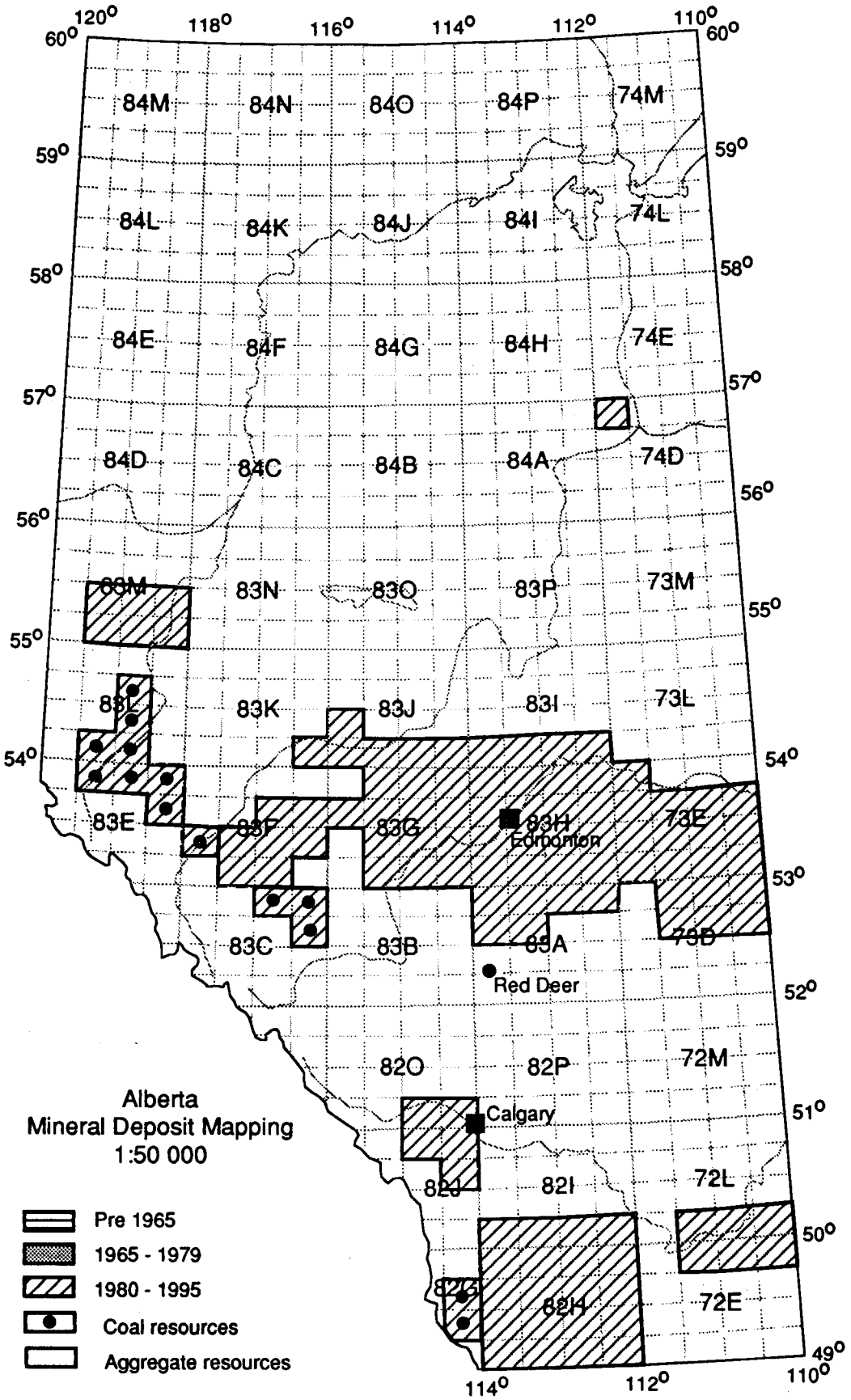
Pre 1965
1965 - 1979
1980 - 1995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Edmonton
Red Deer
Calgary
Alberta
Mineral Deposit Mapping
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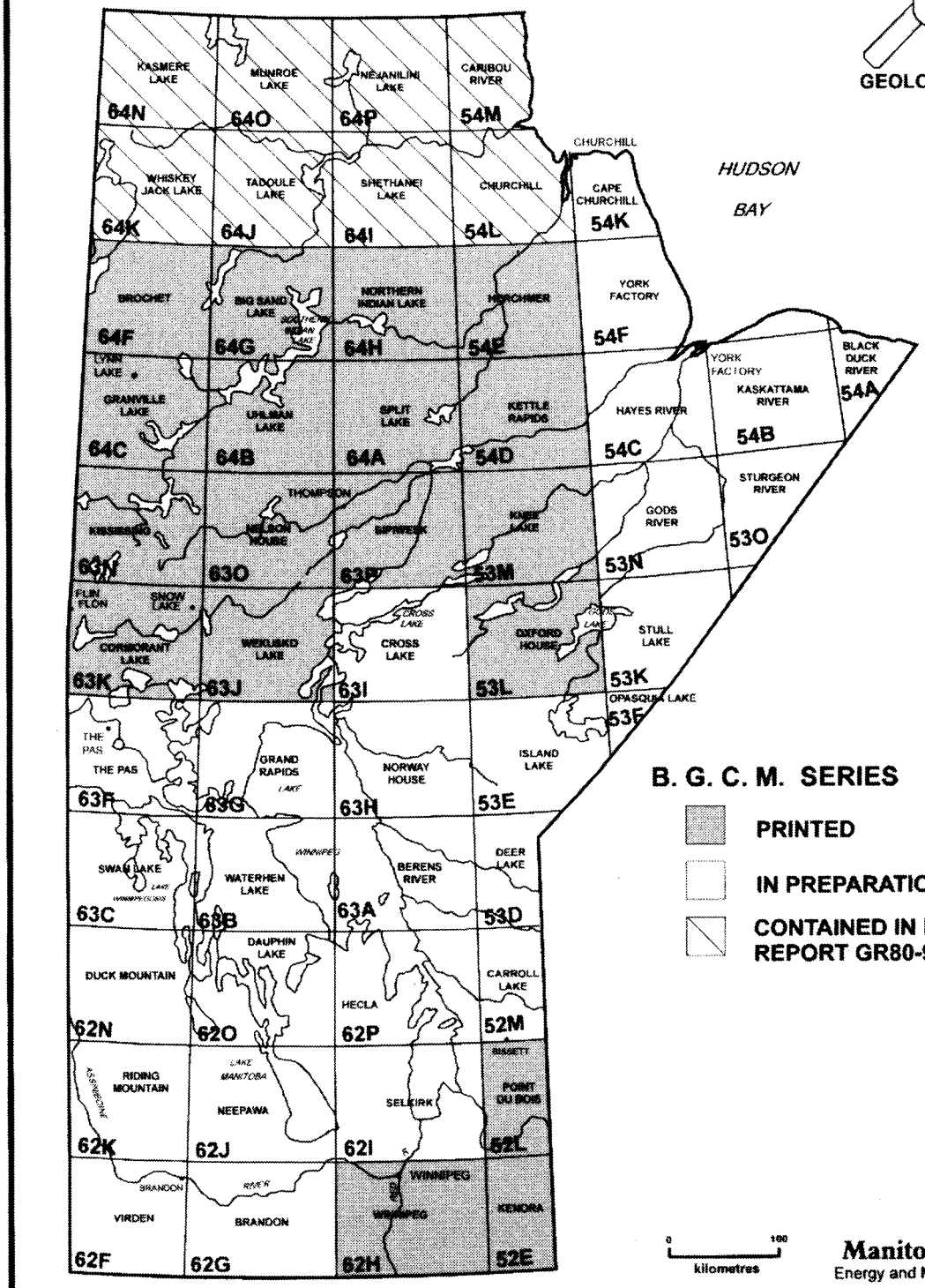
Pre 1965
1965 - 1979
1980 - 1995
Coal resources
Aggregate resources

INDEX MAP - BEDROCK GEOLOGY
COMPILATION MAP SERIES
SCALE 1:250 000



B. G. C. M. SERIES

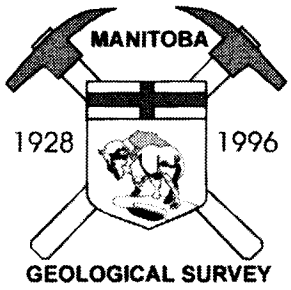
- PRINTED
- IN PREPARATION
- CONTAINED IN E&M REPORT GR80-9

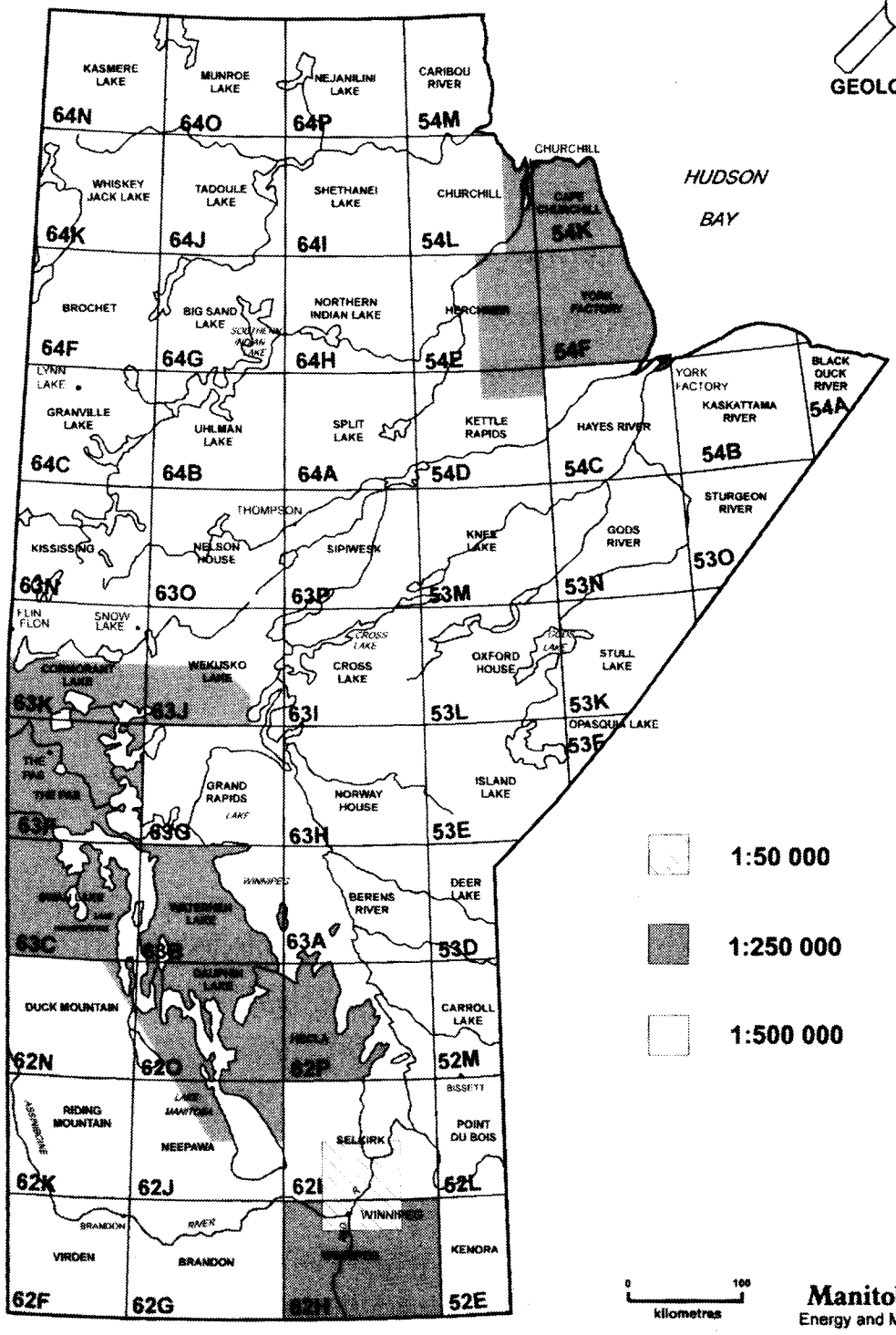
0 100 kilometres

Manitoba
Energy and Mines

DECEMBER 1996

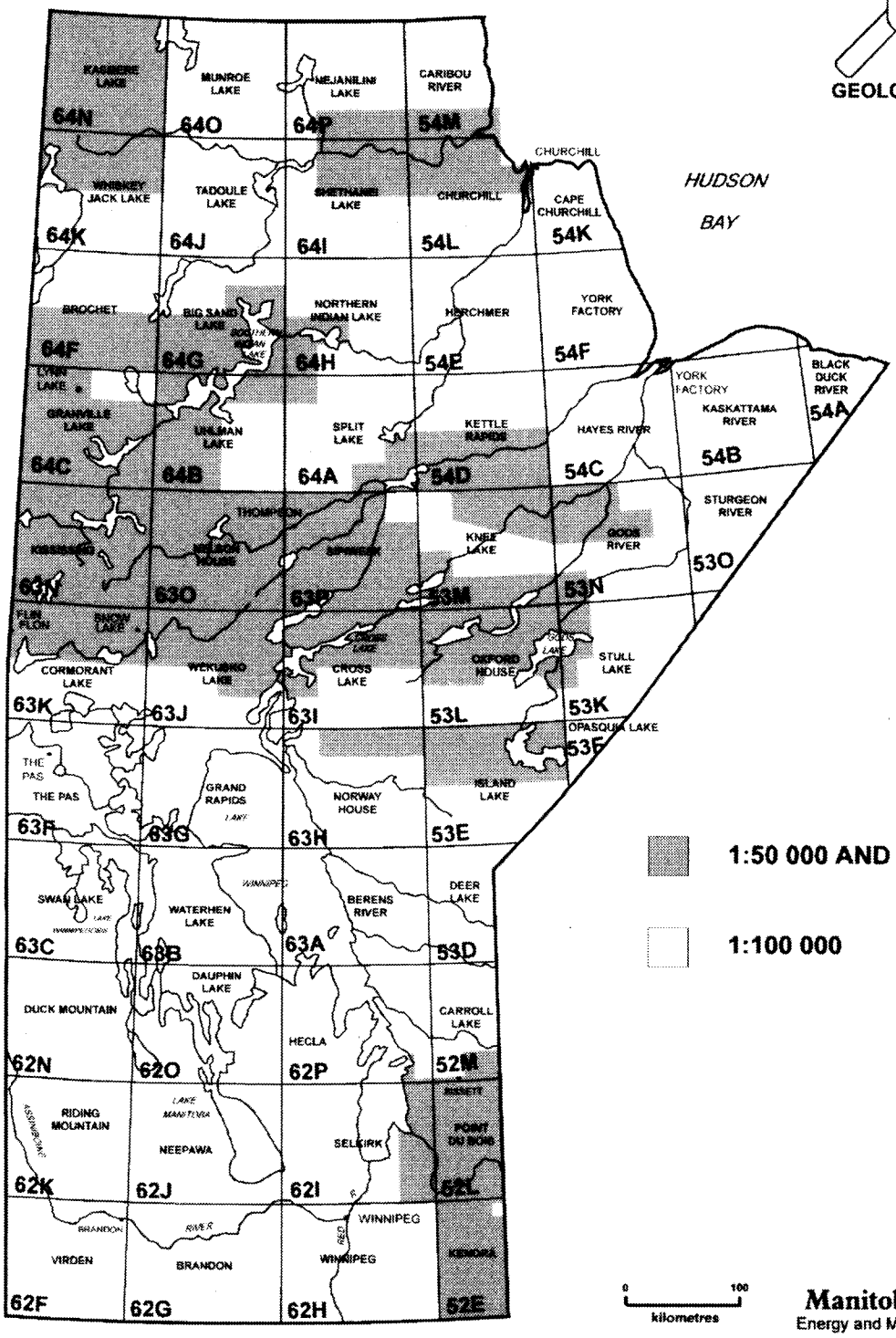
PHANEROZOIC BEDROCK MAPPING





DECEMBER 1995

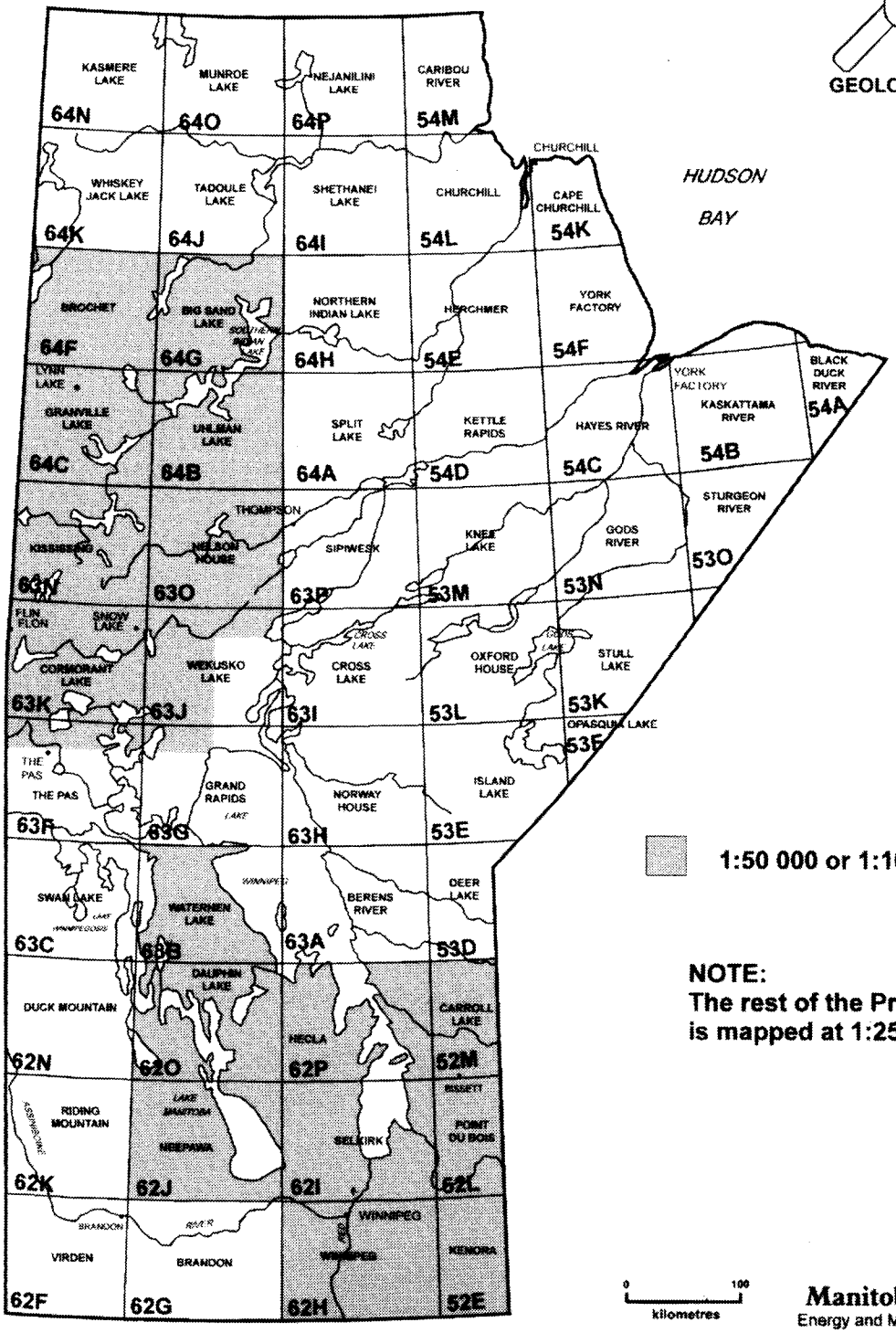
PRECAMBRIAN BEDROCK MAPPING



Manitoba
Energy and Mines

DECEMBER 1995

SURFICIAL GEOLOGY MAPS



MANITOBA

1928 1996

GEOLOGICAL SURVEY

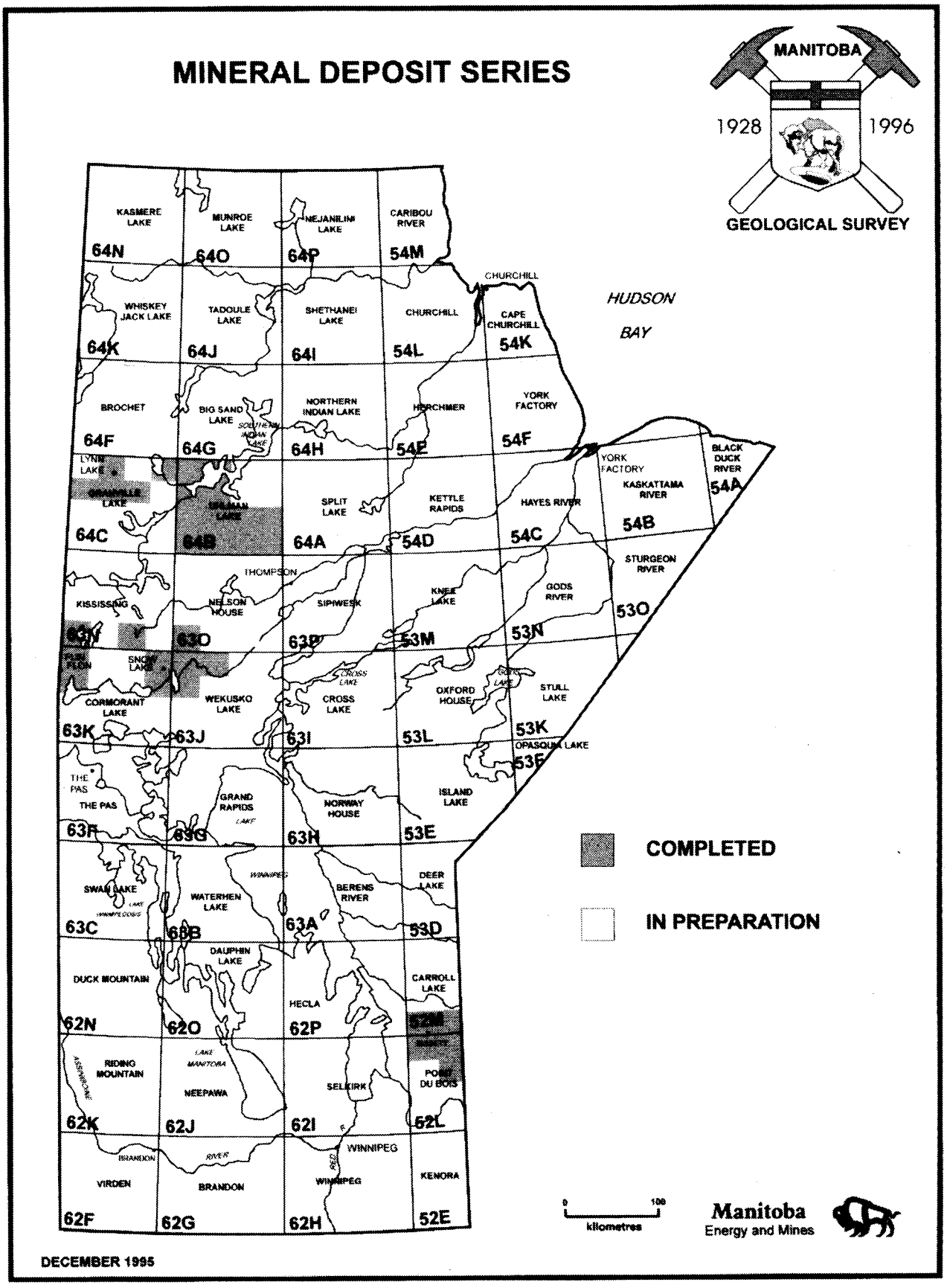
1:50 000 or 1:100 000 maps

NOTE:
The rest of the Province is mapped at 1:250 000

0 100
kilometres

Manitoba
Energy and Mines

DECEMBER 1995


MINERAL DEPOSIT SERIES
MANITOBA
1928
1996
GEOLOGICAL SURVEY
KASMERE LAKE
MUNROE LAKE
NEJANILINI LAKE
CARIBOU RIVER
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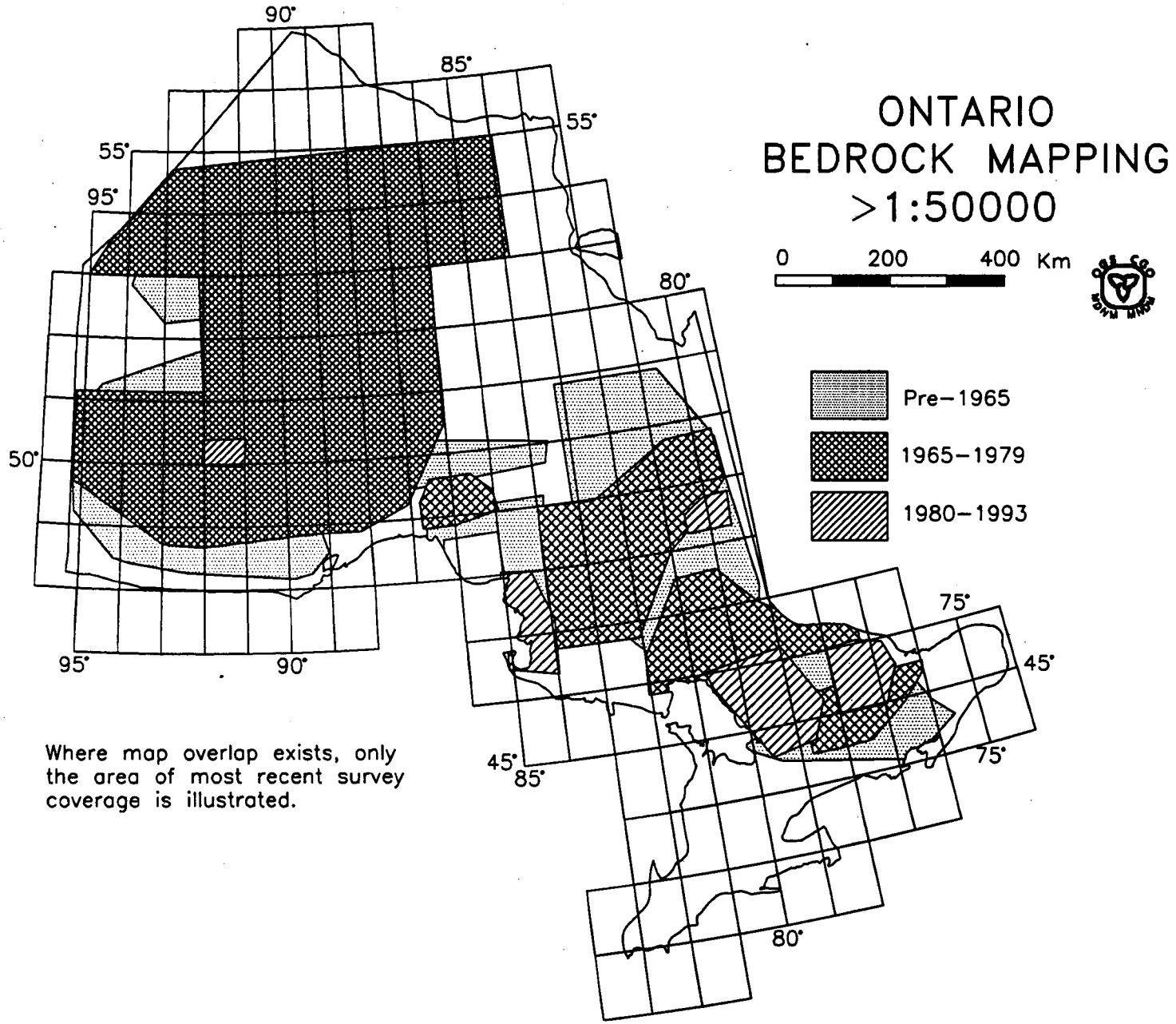
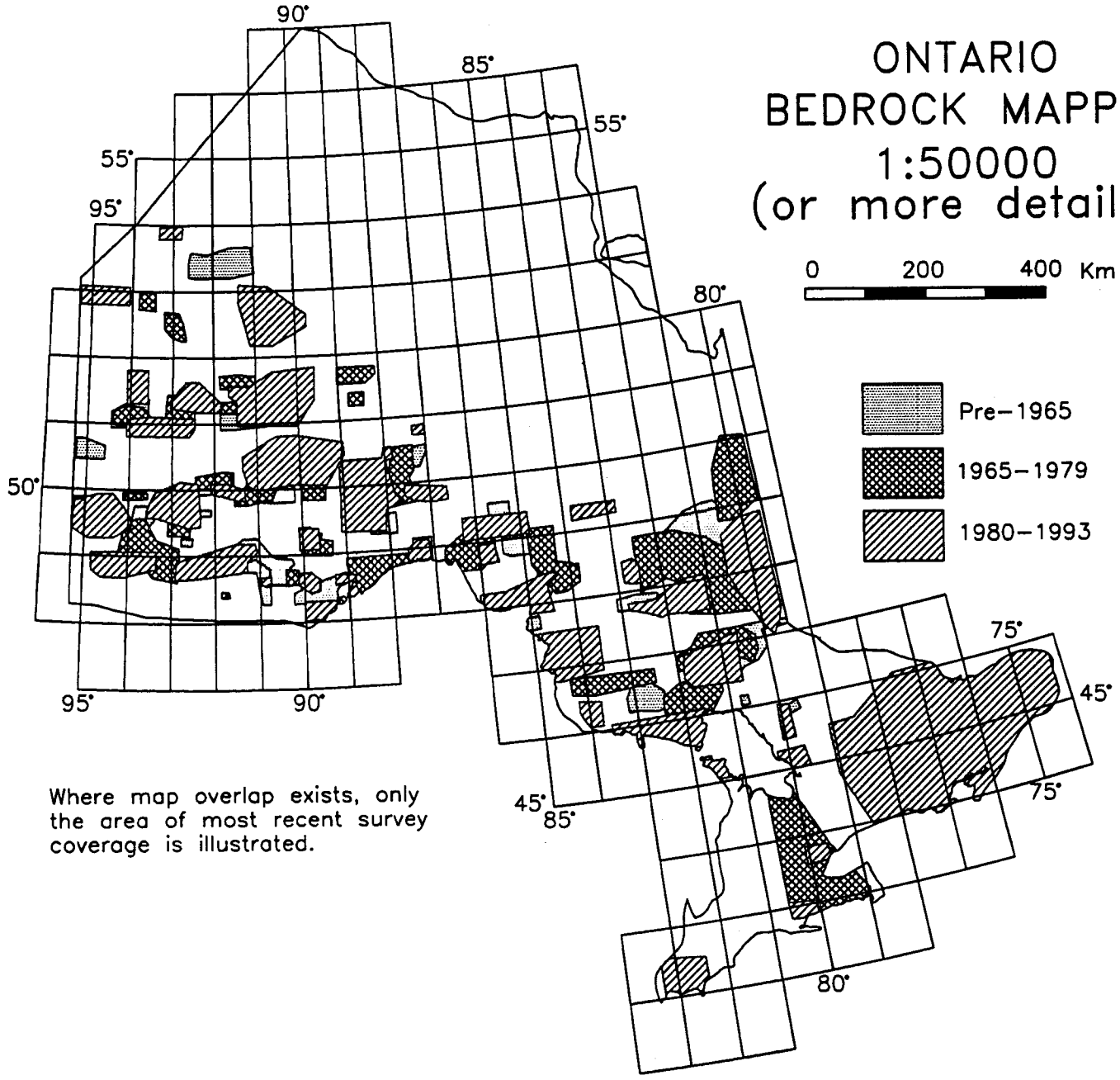
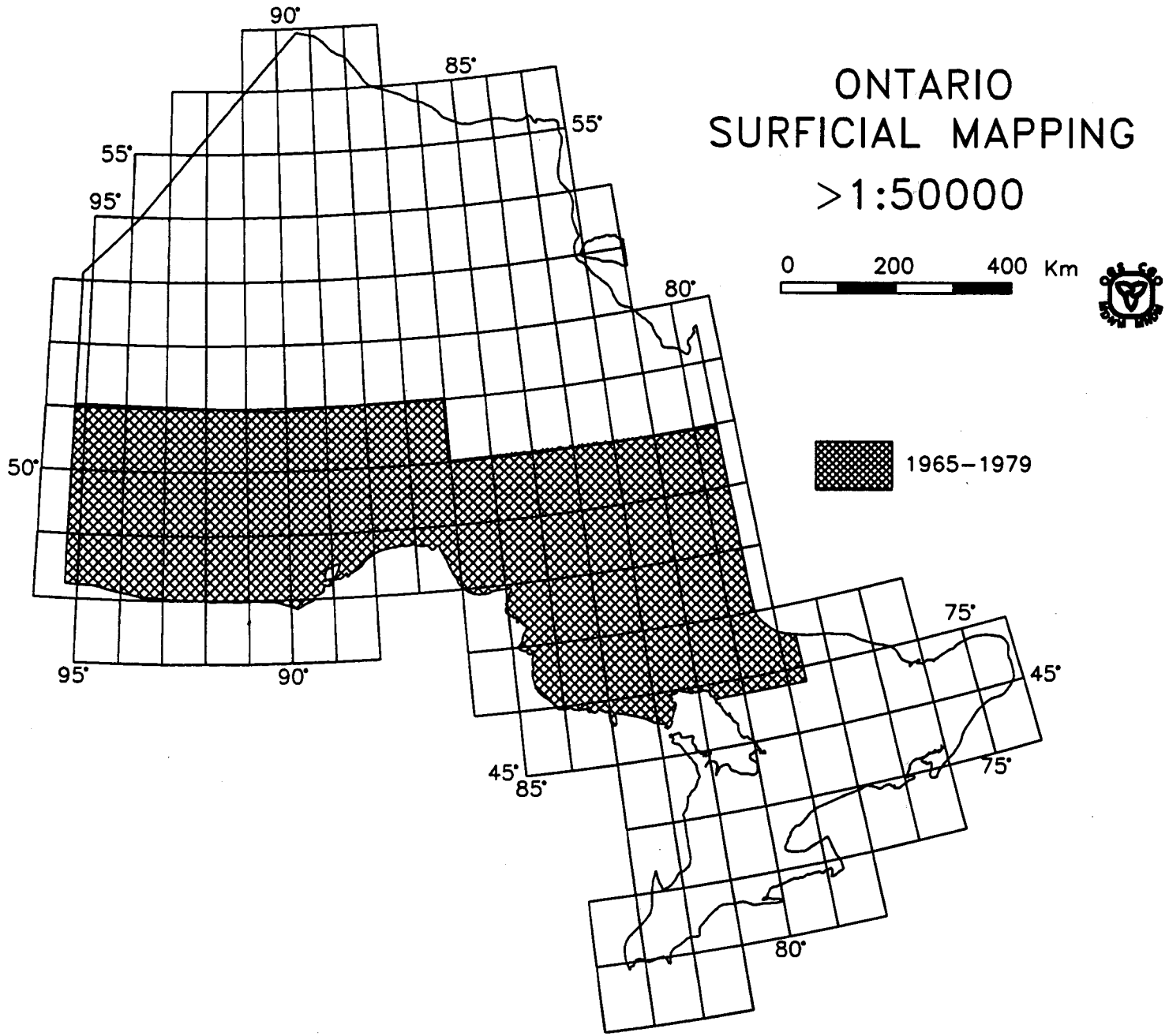
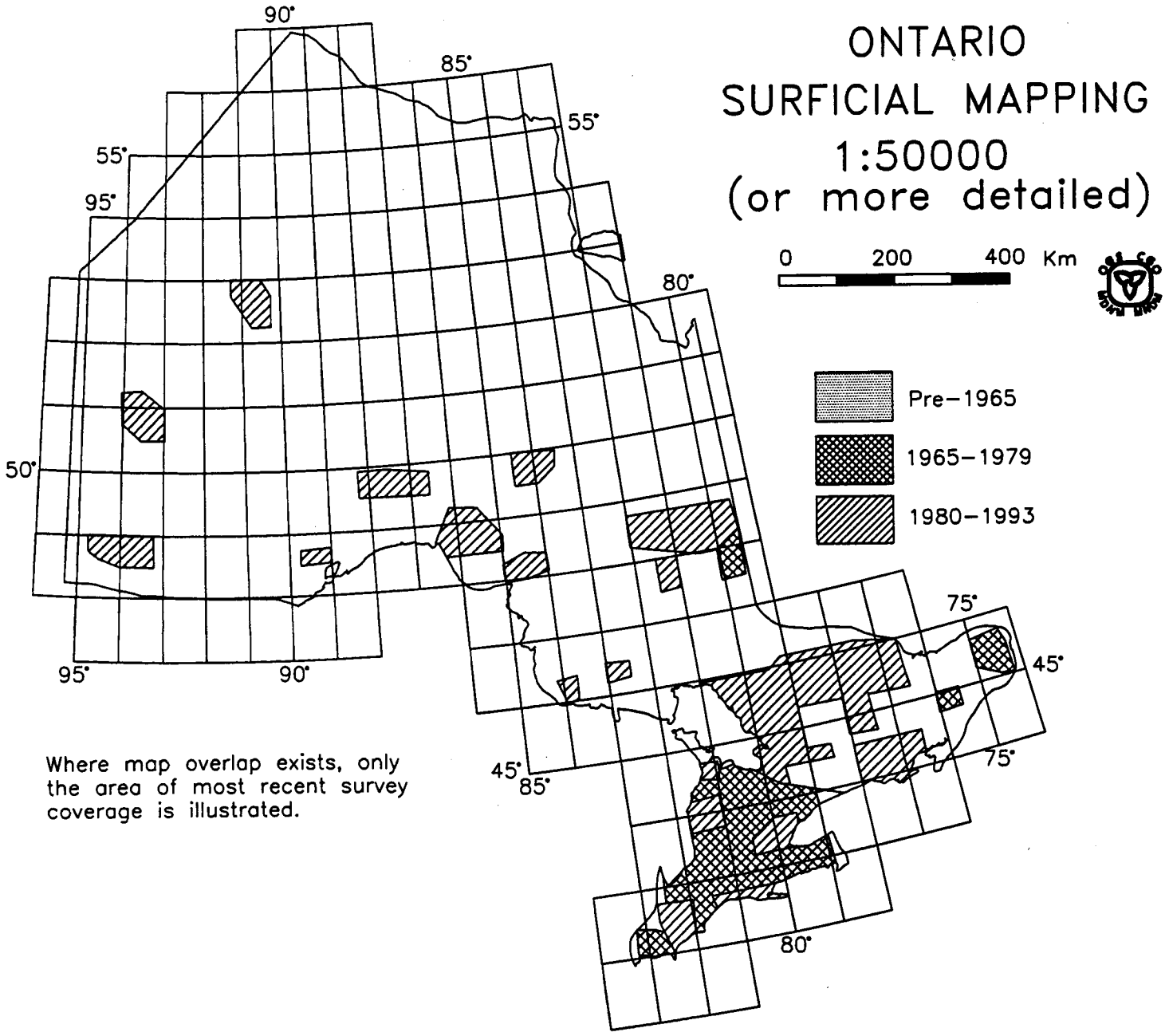
CHURCHILL
HUDSON BAY
WHISKEY JACK LAKE
TADOULE LAKE
SHETHANEI LAKE
CHURCHILL
CAPE CHURCHILL
64K
64J
64I
54L
54K
BROCHET
BIG SAND LAKE
NORTHERN INDIAN LAKE
HERCHMER
YORK FACTORY
64F
64G
64H
54E
54F
LYNN LAKE
SPRUCE LAKE
SPLIT LAKE
KETTLE RAPIDS
HAYES RIVER
YORK FACTORY
KASKATTAMA RIVER
BLACK DUCK RIVER
54A
64C
64B
64A
54D
54C
54B
THOMPSON
STURGEON RIVER
KISSISSING
NELSON HOUSE
SIPIWESK
KNEE LAKE
GODS RIVER
53O
63N
63O
63P
53M
53N
SNOW LAKE
CROSS LAKE
OXFORD HOUSE
STULL LAKE
CORMORANT LAKE
WEKUSKO LAKE
CROSS LAKE
63K
63J
63I
53L
53K
OPASQUIA LAKE
53F
THE PAS
GRAND RAPIDS
NORWAY HOUSE
ISLAND LAKE
63F
63G
63H
53E
SWAN LAKE
WATERHEN LAKE
BERENS RIVER
DEER LAKE
63C
63B
63A
53D
DAUPHIN LAKE
DUCK MOUNTAIN
CARROLL LAKE
HECLA
62N
62O
62P
RIDING MOUNTAIN
LAKE MANITOBA
NEEPAWA
SELKIRK
POINT DU BOIS
62K
62J
62I
62L
WINNIPEG
BRANDON
RIVER
VIRDEN
BRANDON
WINNIPEG
KENORA
62F
62G
62H
52E
COMPLETED
IN PREPARATION
0
100
kilometres
Manitoba
Energy and Mines
DECEMBER 1995

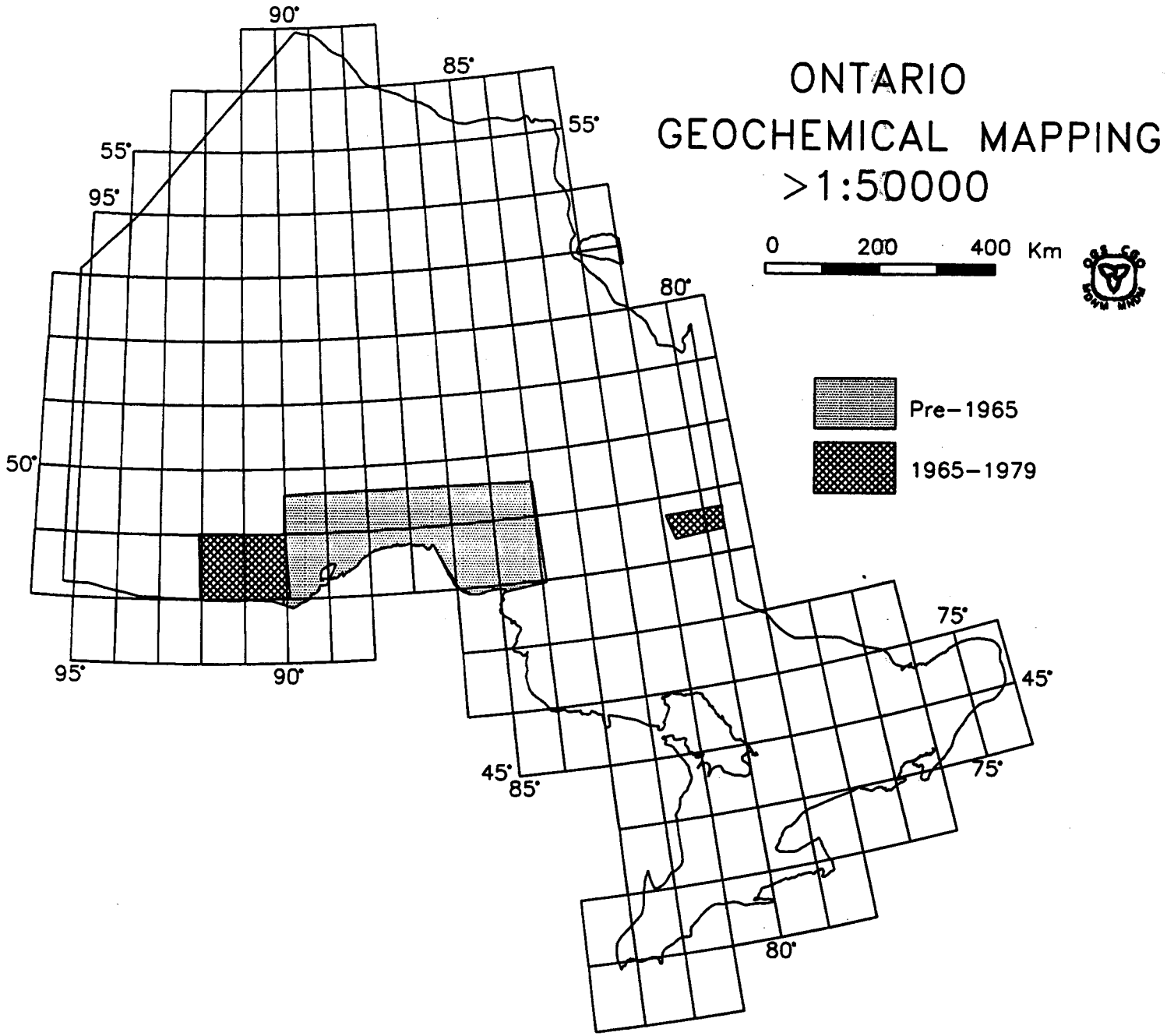

ONTARIO
BEDROCK MAPPING
>1:50000
0 200 400 Km
Pre–1965
1965–1979
1980–1993
90°
85°
55°
95°
80°
50°
75°
45°
Where map overlap exists, only the area of most recent survey coverage is illustrated.

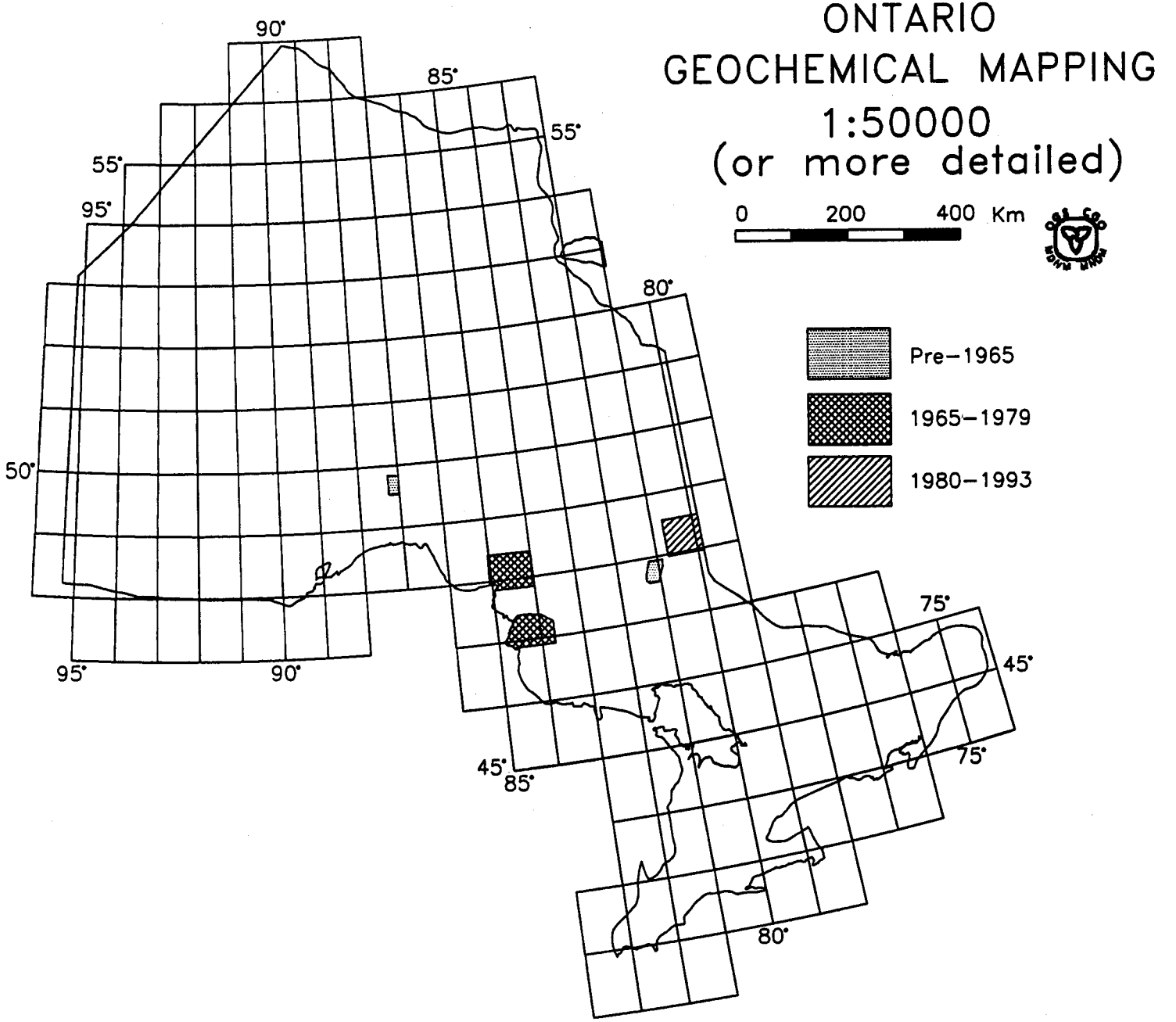


Where map overlap exists, only the area of most recent survey coverage is illustrated.

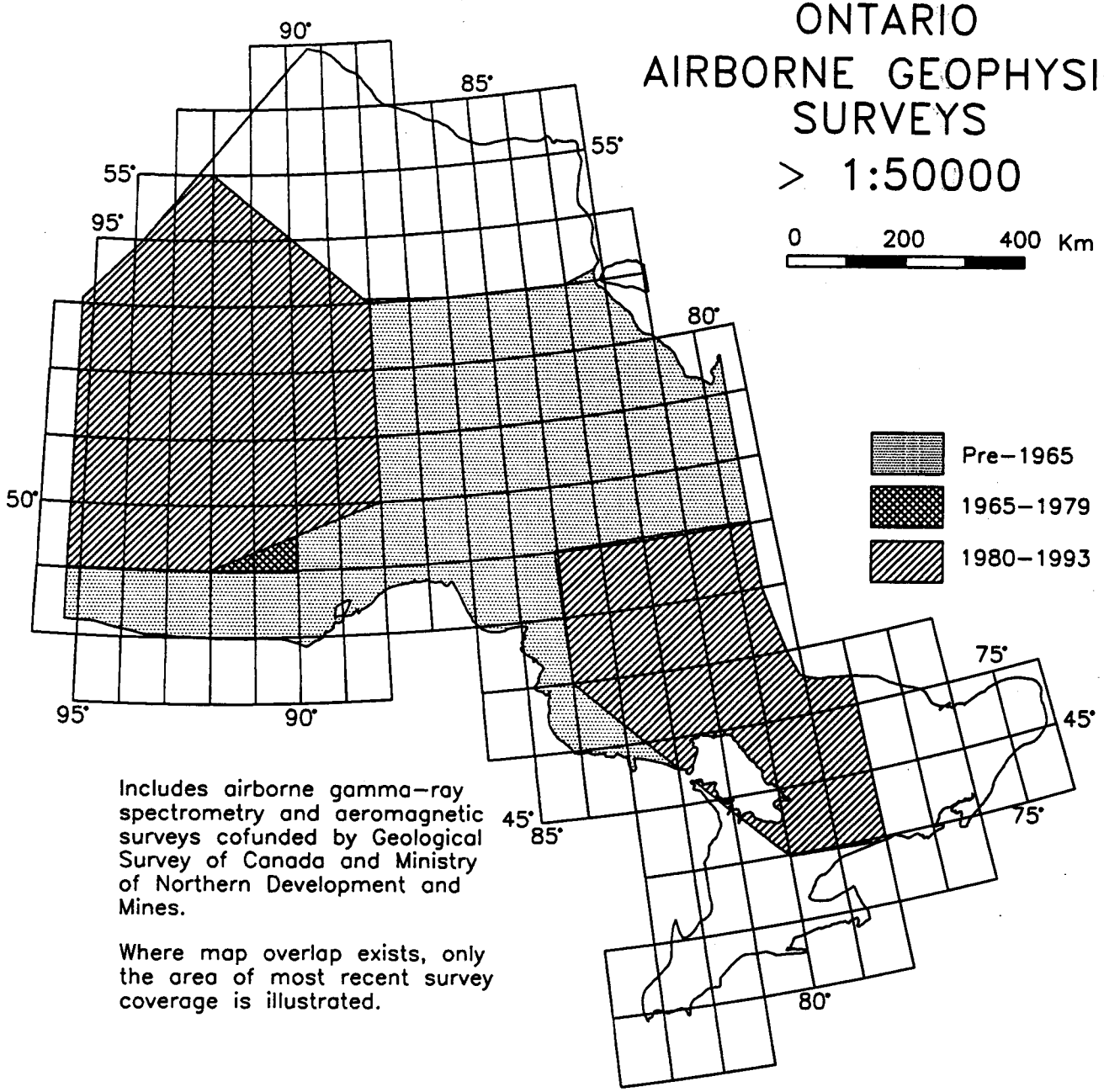

ONTARIO
SURFICIAL MAPPING
>1:50000
0 200 400 Km
1965–1979
90°
85°
55°
55°
95°
80°
50°
95°
90°
75°
45°
45°
85°
75°
80°


ONTARIO
SURFICIAL MAPPING
1:50000
(or more detailed)
0 200 400 Km
Pre–1965
1965–1979
1980–1993
90°
85°
55°
55°
95°
80°
50°
95°
90°
75°
45°
45°
85°
75°
80°
Where map overlap exists, only the area of most recent survey coverage is illustrated.


ONTARIO
GEOCHEMICAL MAPPING
>1:50000
0 200 400 Km
Pre-1965
1965-1979
90°
85°
80°
75°
55°
95°
50°
45°

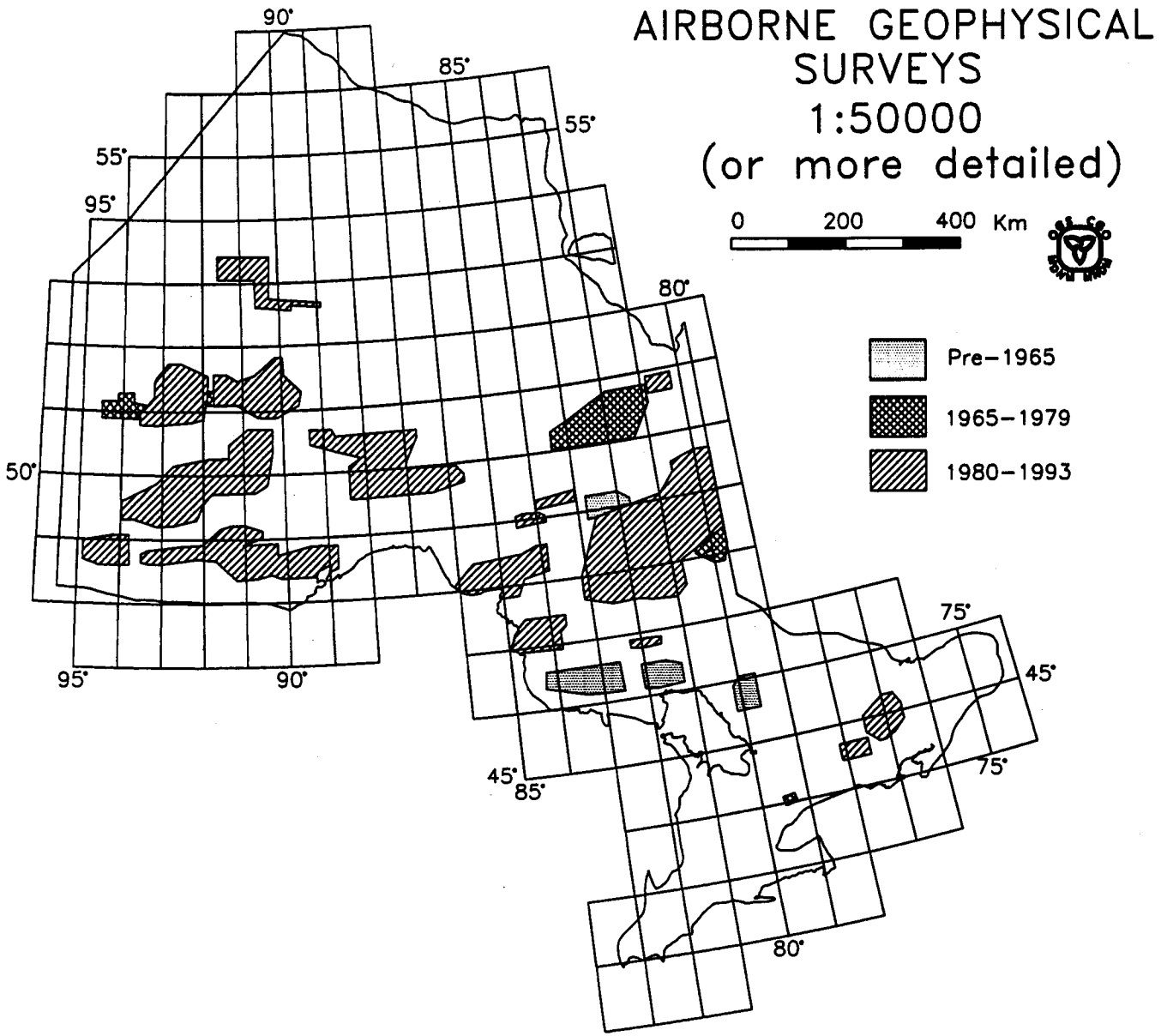

ONTARIO
GEOCHEMICAL MAPPING
1:50000
(or more detailed)
0 200 400 Km
Pre–1965
1965–1979
1980–1993
90°
85°
55°
95°
80°
50°
75°
45°

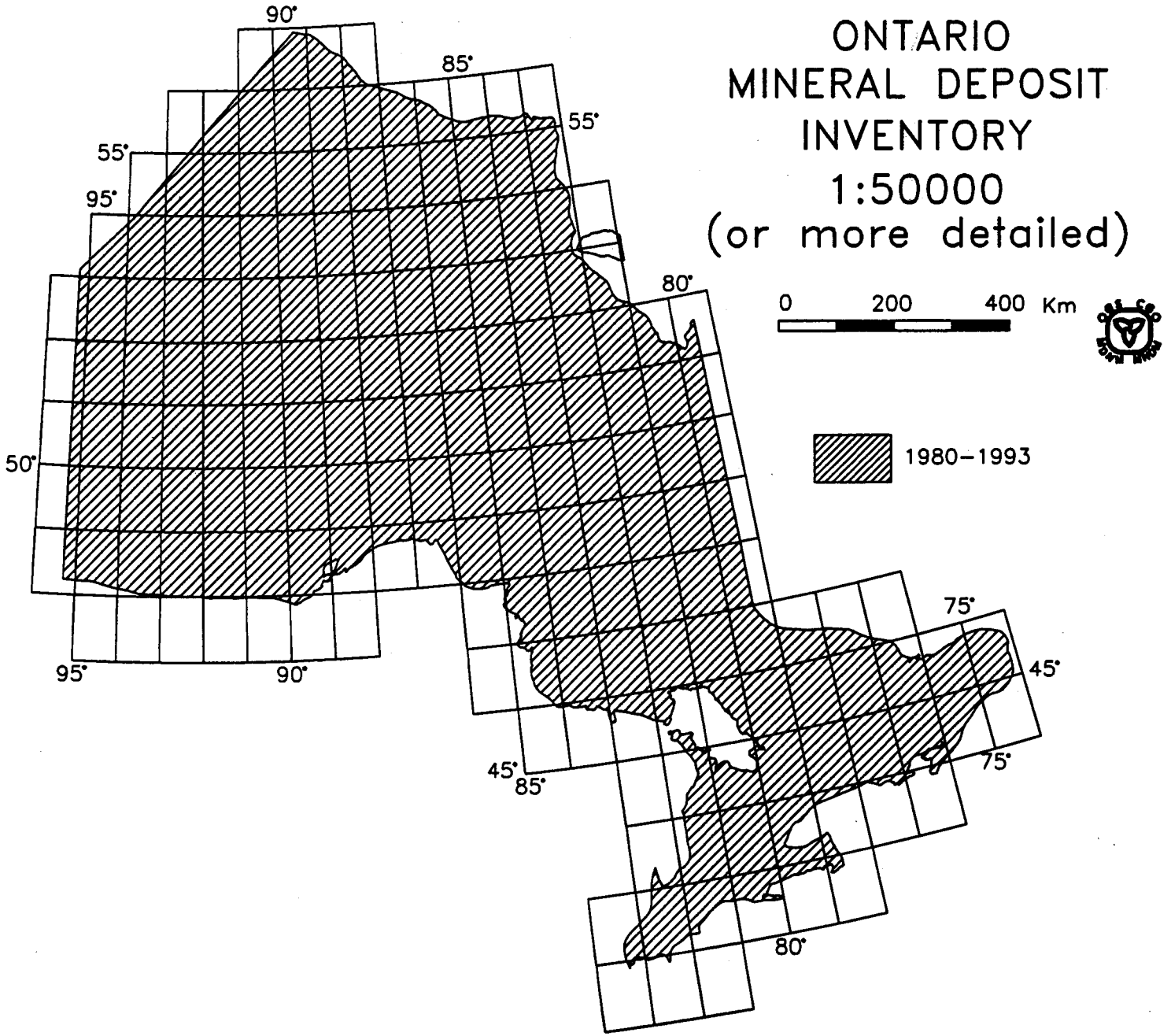
ONTARIO AIRBORNE GEOPHYSICAL SURVEYS > 1:50000



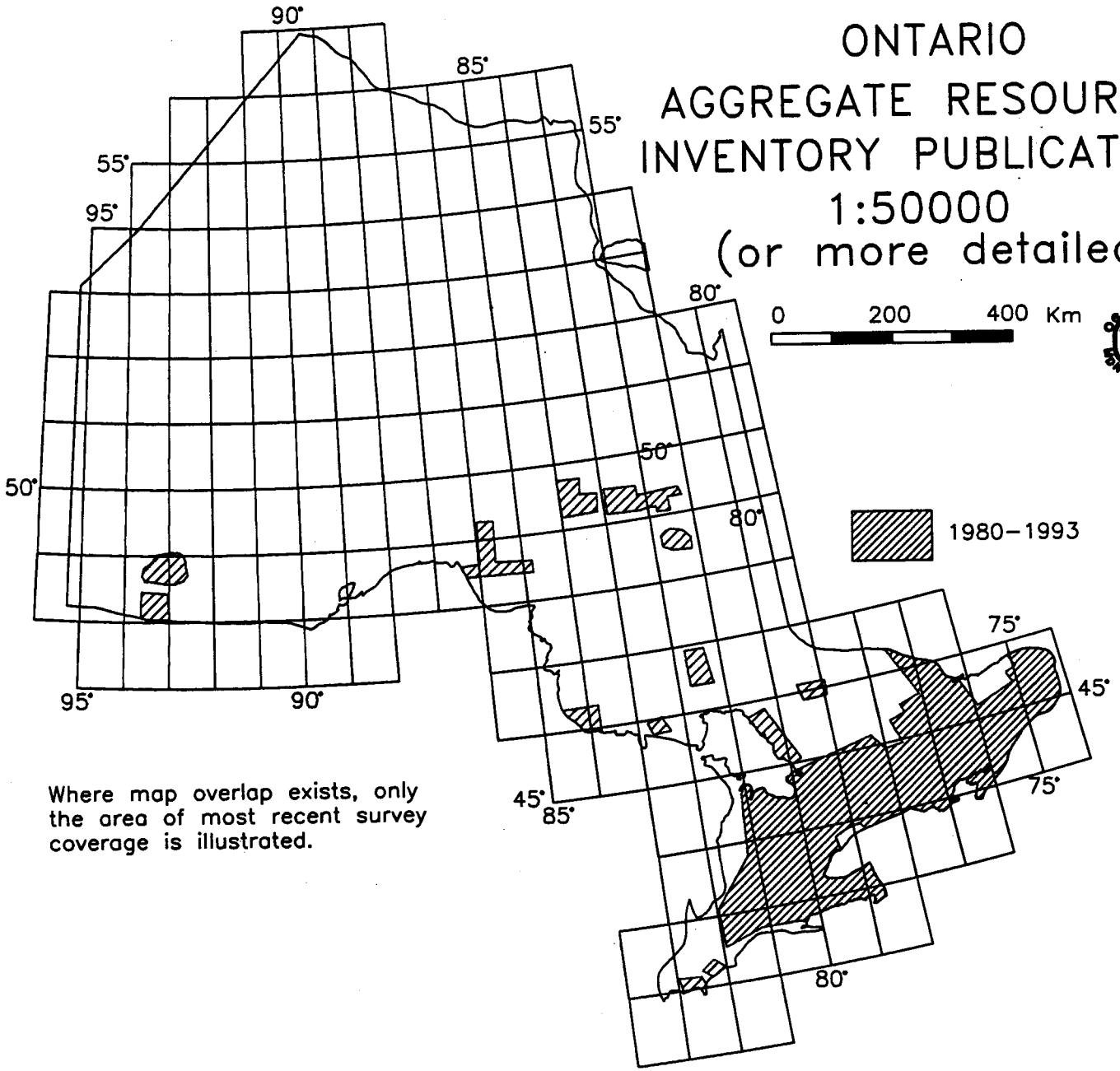
Includes airborne gamma–ray spectrometry and aeromagnetic surveys cofunded by Geological Survey of Canada and Ministry of Northern Development and Mines.

Where map overlap exists, only the area of most recent survey coverage is illustrated.


ONTARIO
AIRBORNE GEOPHYSICAL
SURVEYS
1:50000
(or more detailed)
0 200 400 Km
Pre-1965
1965-1979
1980-1993
90°
85°
55°
95°
80°
50°
75°
45°


ONTARIO
MINERAL DEPOSIT
INVENTORY
1:50000
(or more detailed)
0 200 400 Km
1980–1993
90°
85°
55°
95°
80°
50°
75°
45°

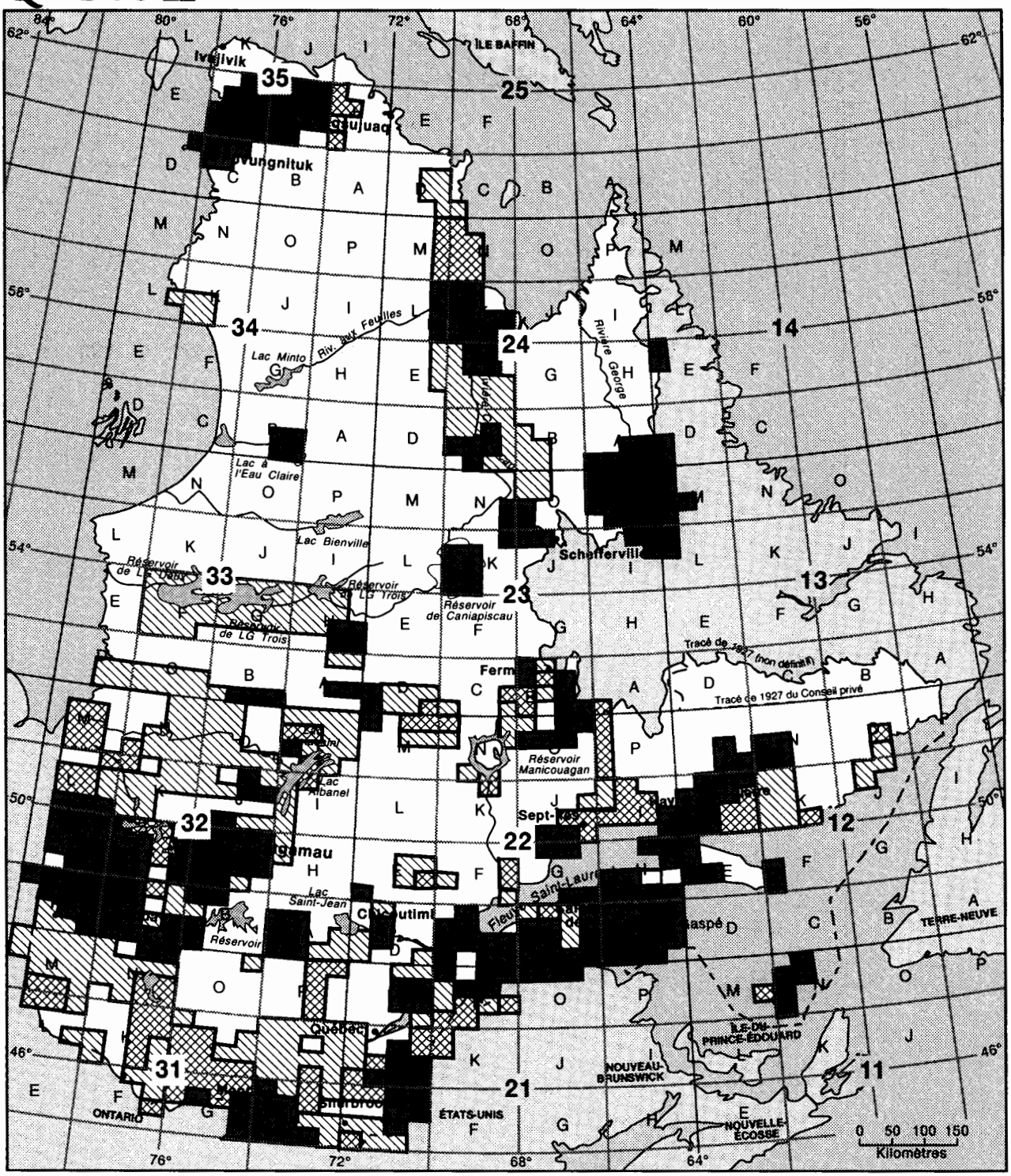
ONTARIO
AGGREGATE RESOURCES INVENTORY PUBLICATIONS
1:50000
(or more detailed)



Where map overlap exists, only the area of most recent survey coverage is illustrated.

Québec

Ministère des Ressources naturelles



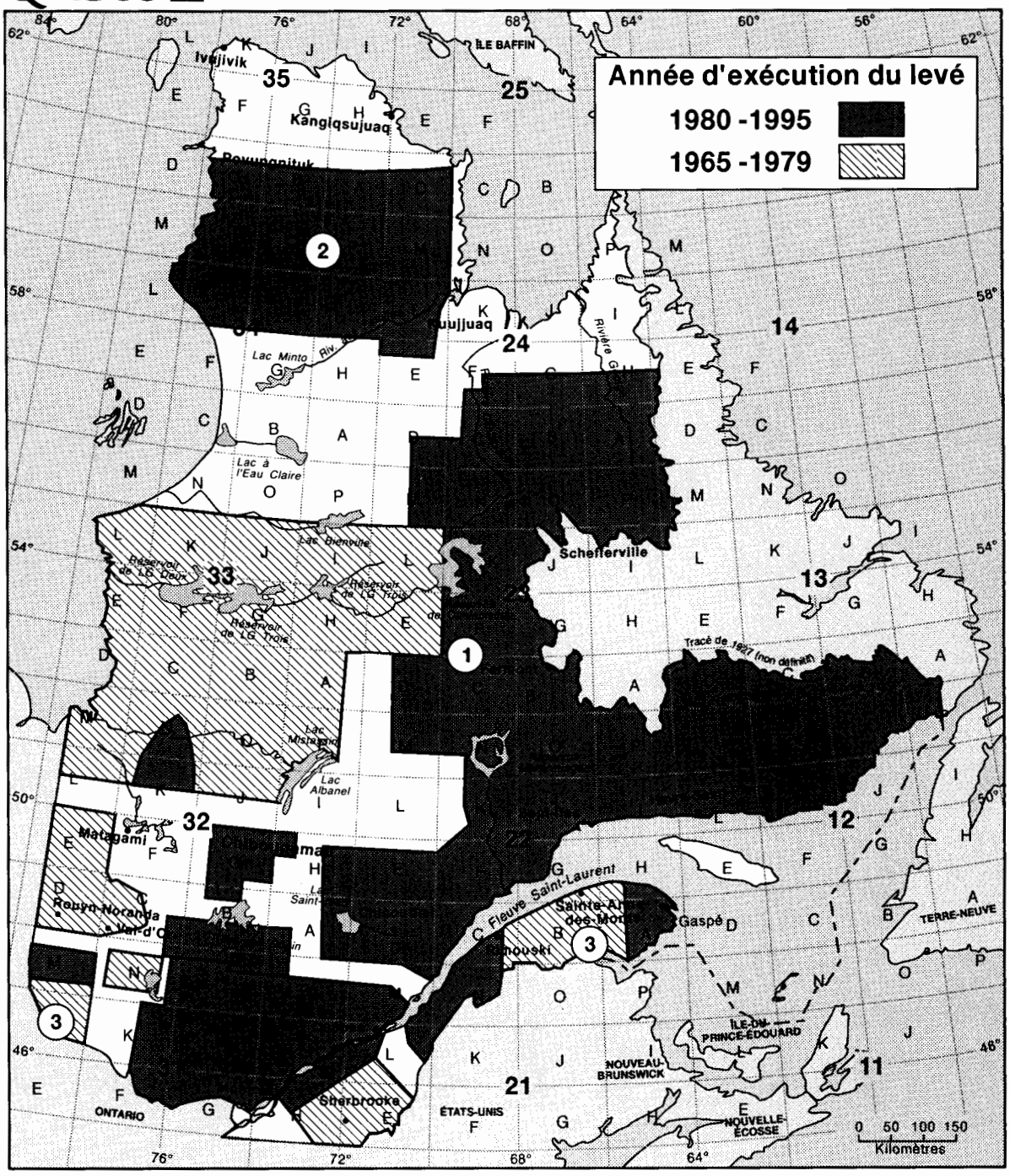
CARTOGRAPHIE GÉOLOGIQUE AU 1: 50 000 (OU PLUS DÉTAILLÉ)

Année d'exécution du levé

1980 -1995 | 1965 -1979 | Avant 1965

Québec

Ministère des Ressources naturelles



LEVÉS D'EXPLORATION GÉOCHIMIQUE RÉGIONAUX

(1) **Levé de sédiments de lac 1: 250 000 (à l'exception de la Fosse du Labrador et du Groupe de Wakeham qui sont au 1: 125 000)**

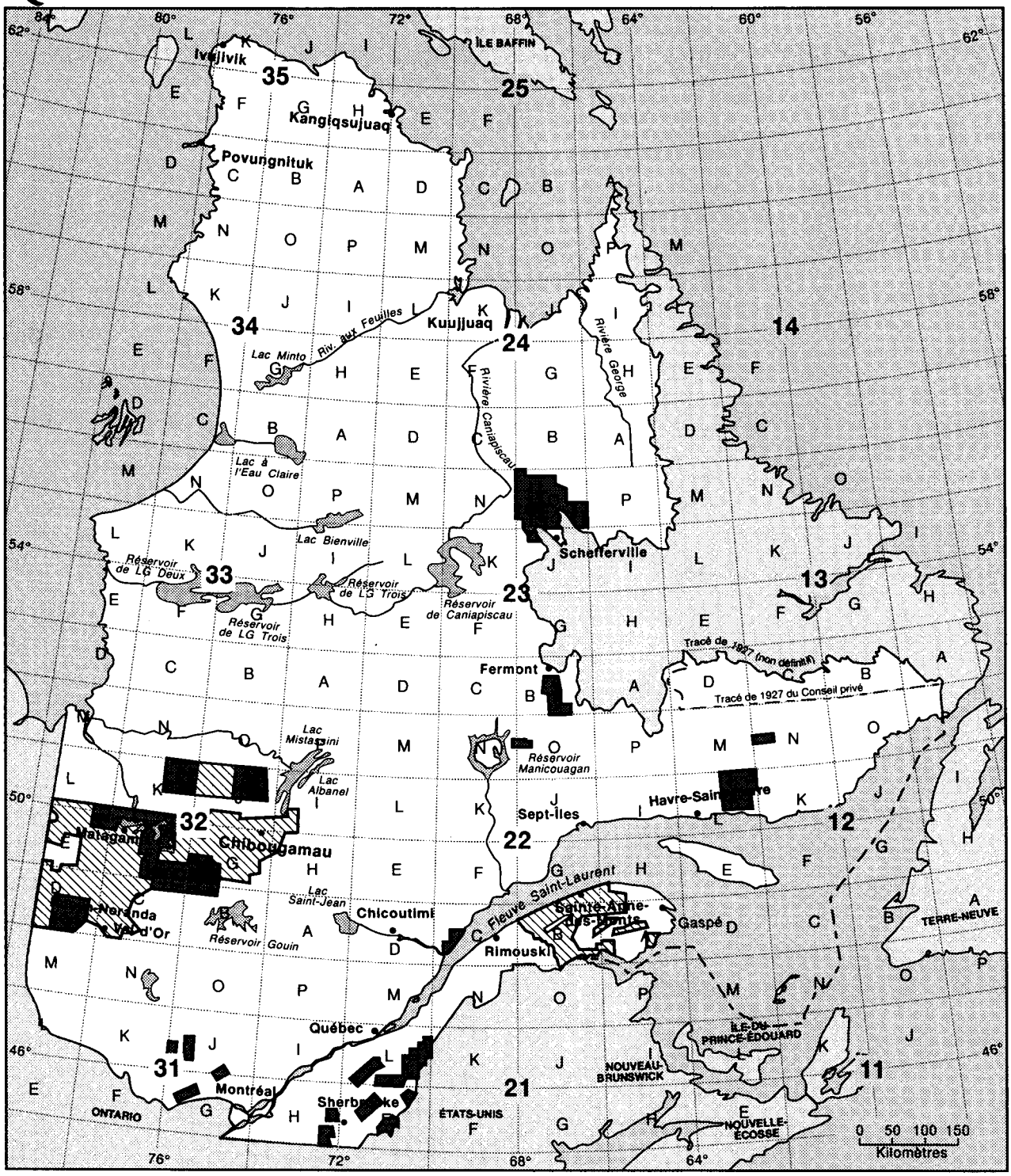
(2) **Levé suprarégional de till à l'échelle 1: 2 000 000 (projet conjoint entre la CGC et Monopros Ltée.)**

(3) **Levé de sédiments de ruisseau (Appalaches et Témiscamingue) à l'échelle de 1: 50 000**

N.B.: Certains levés ont été effectués par SOQUEM et la S.D.B.J.

Québec

Ministère des Ressources naturelles



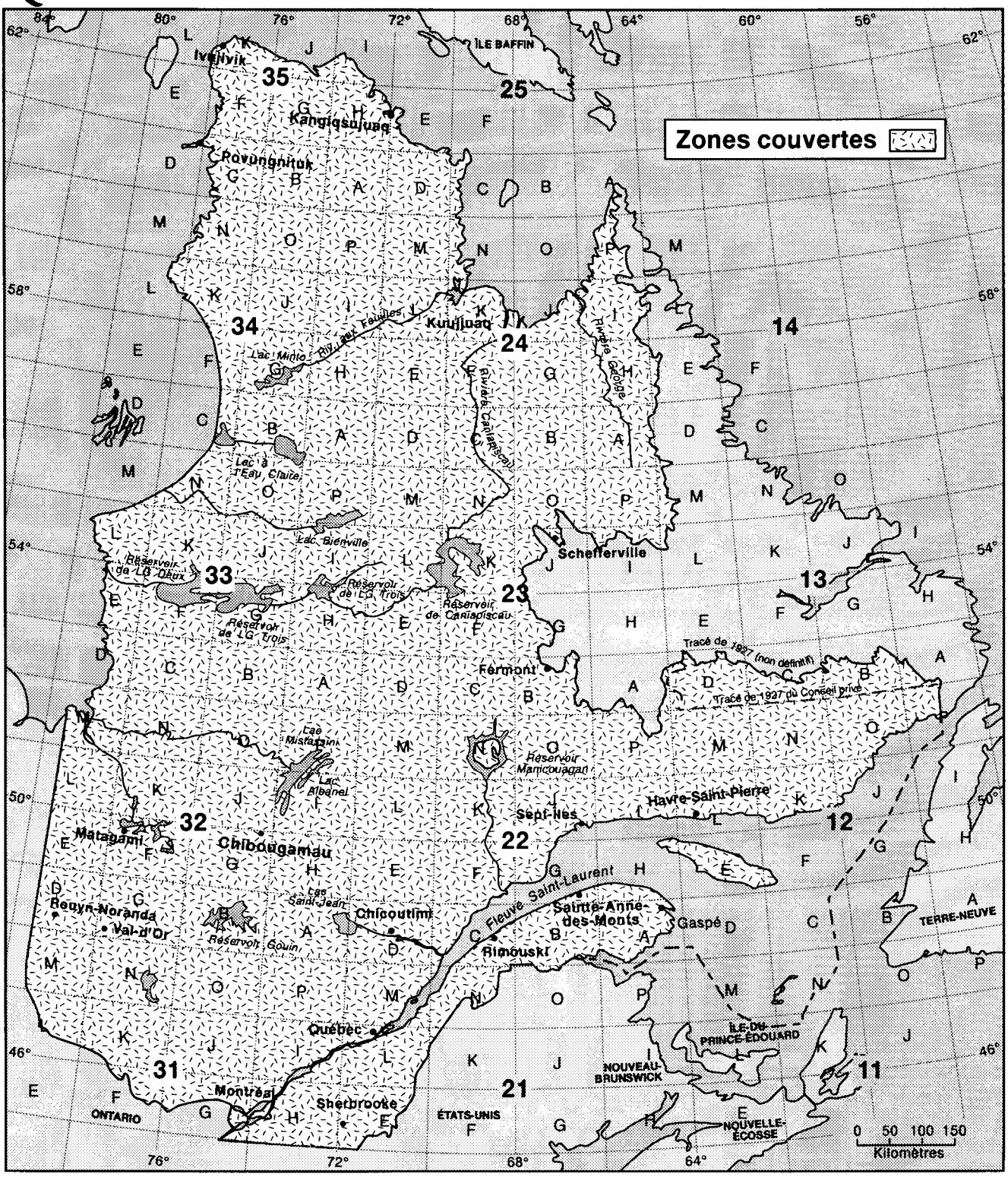
LEVÉS ÉLECTROMAGNÉTIQUES AÉRIENS PROVINCIAUX

Année d'exécution du levé

1980 -1995 ■ 1965 -1979 ▨

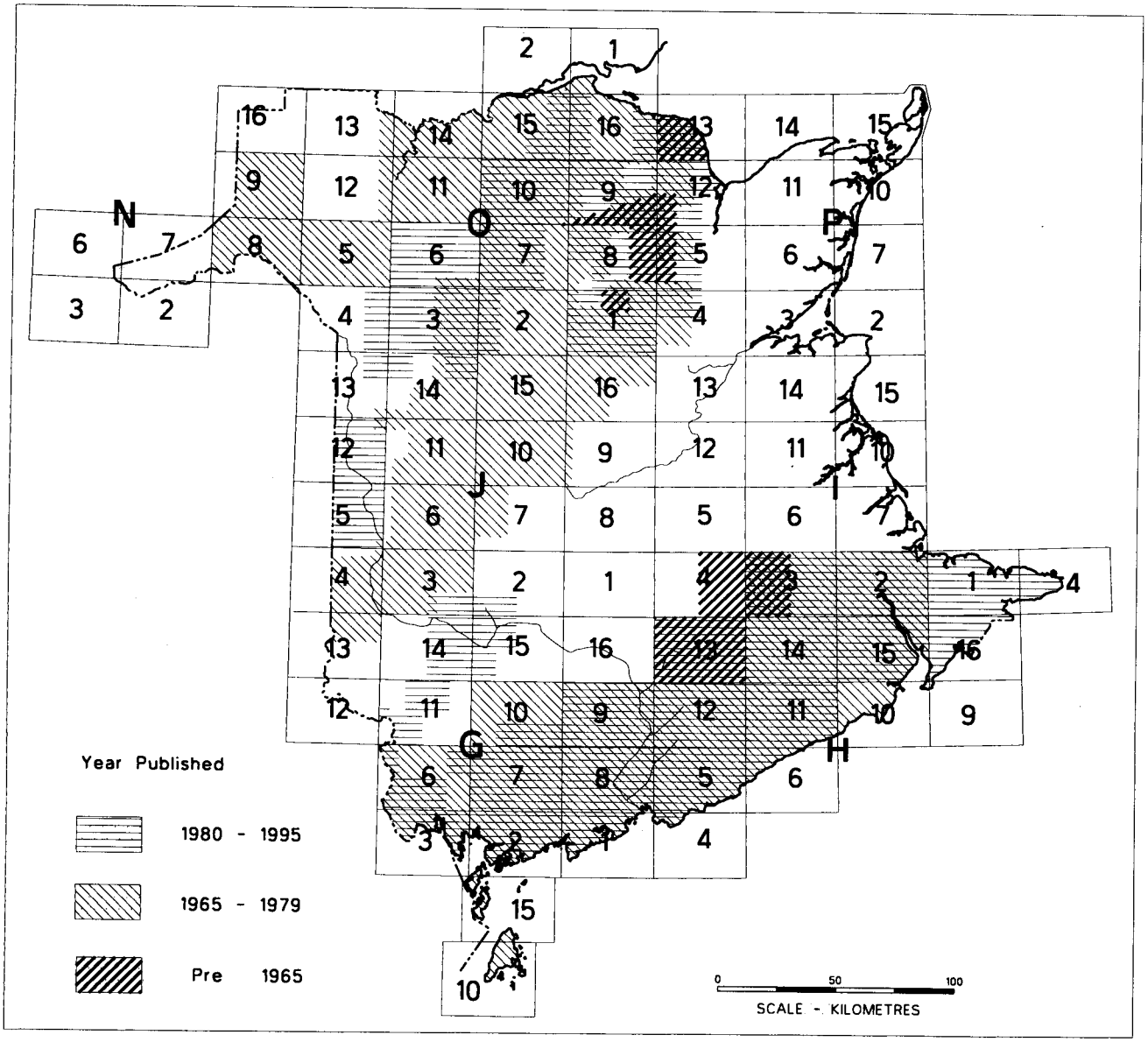
Québec

Ministère des Ressources naturelles

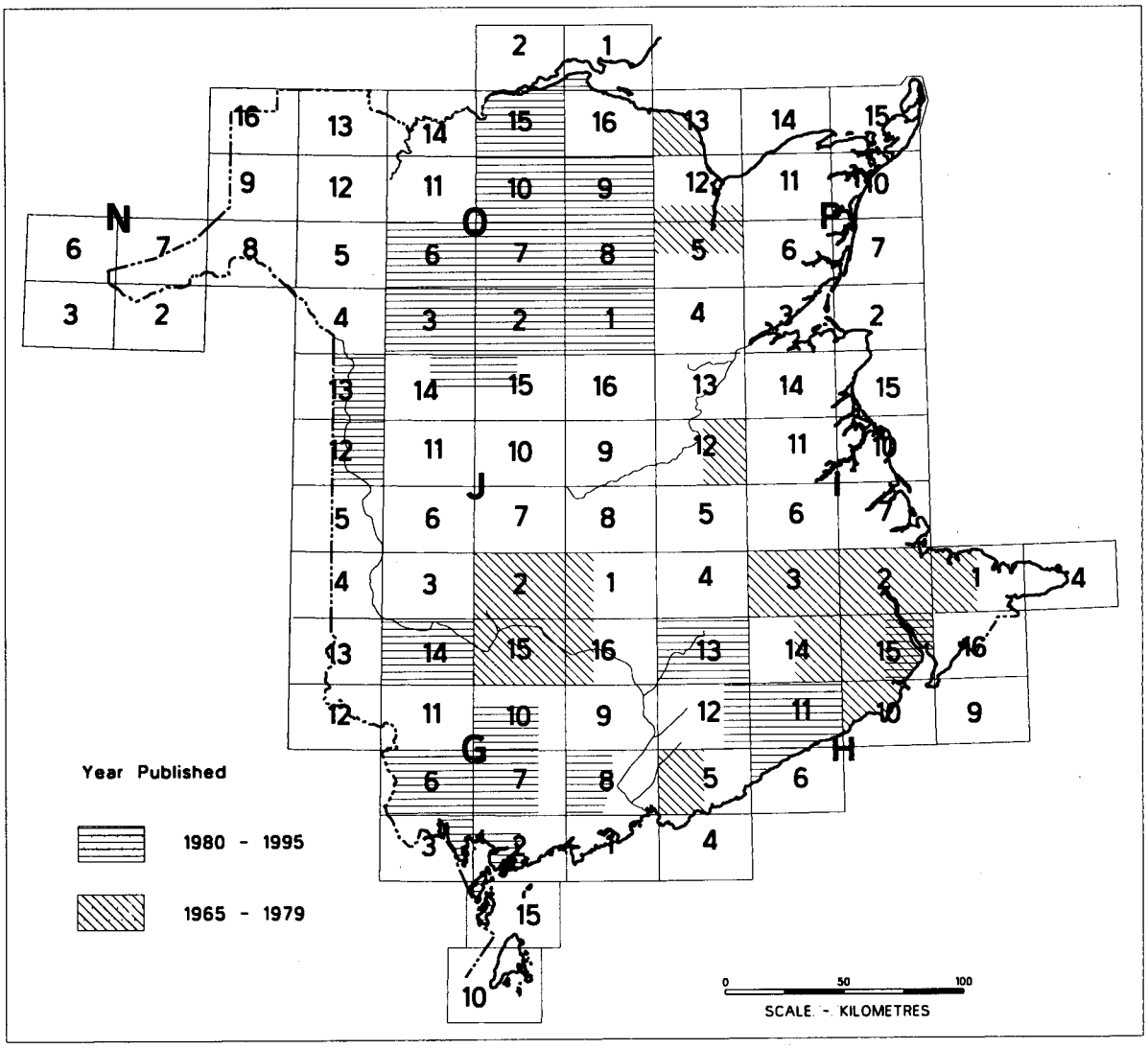


BANQUE DE DONNÉES SUR LES GÎTES MINÉRAUX (COGÎTE)

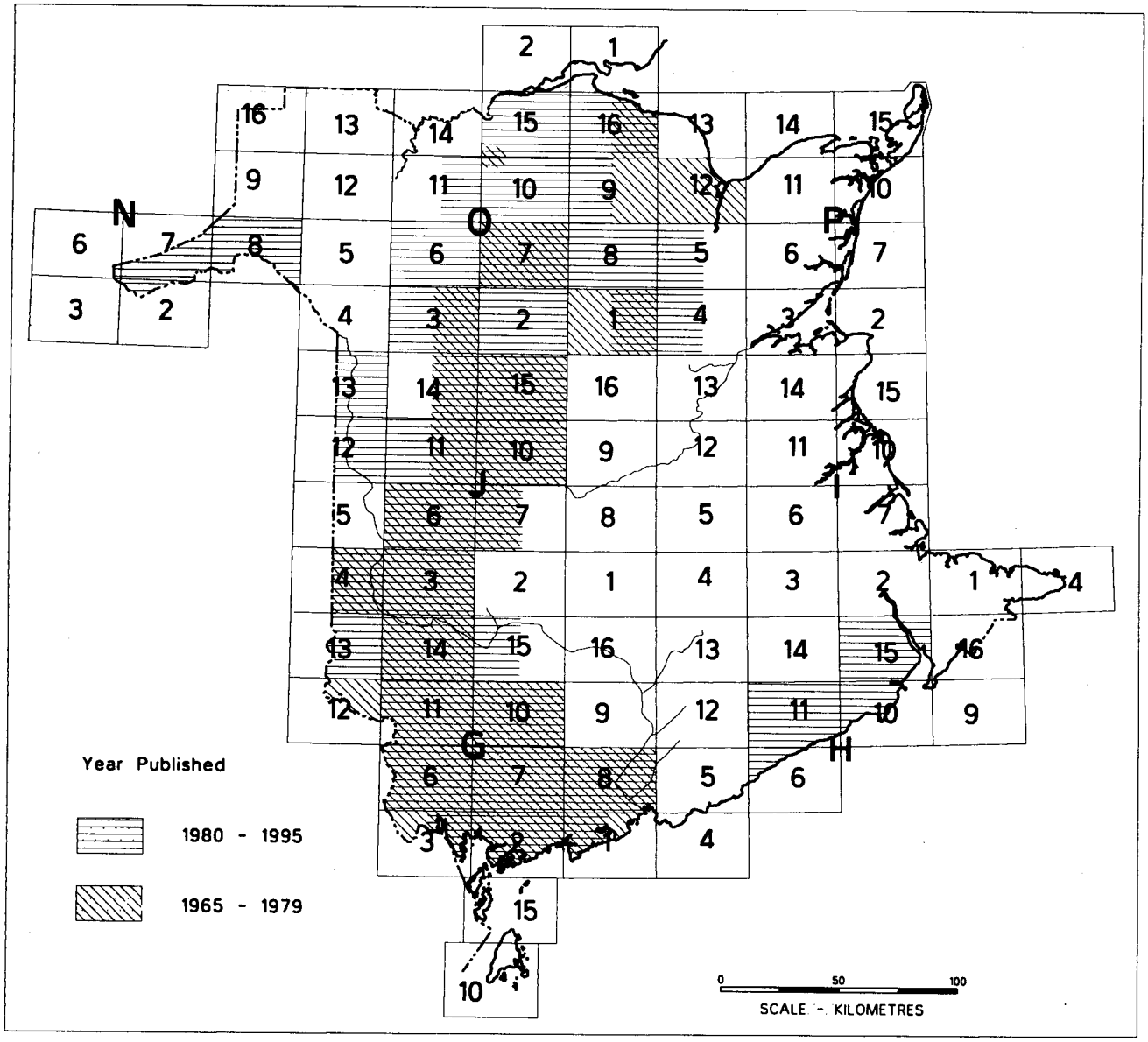
New Brunswick 1:50 000 (or more detailed) Geology Surveys



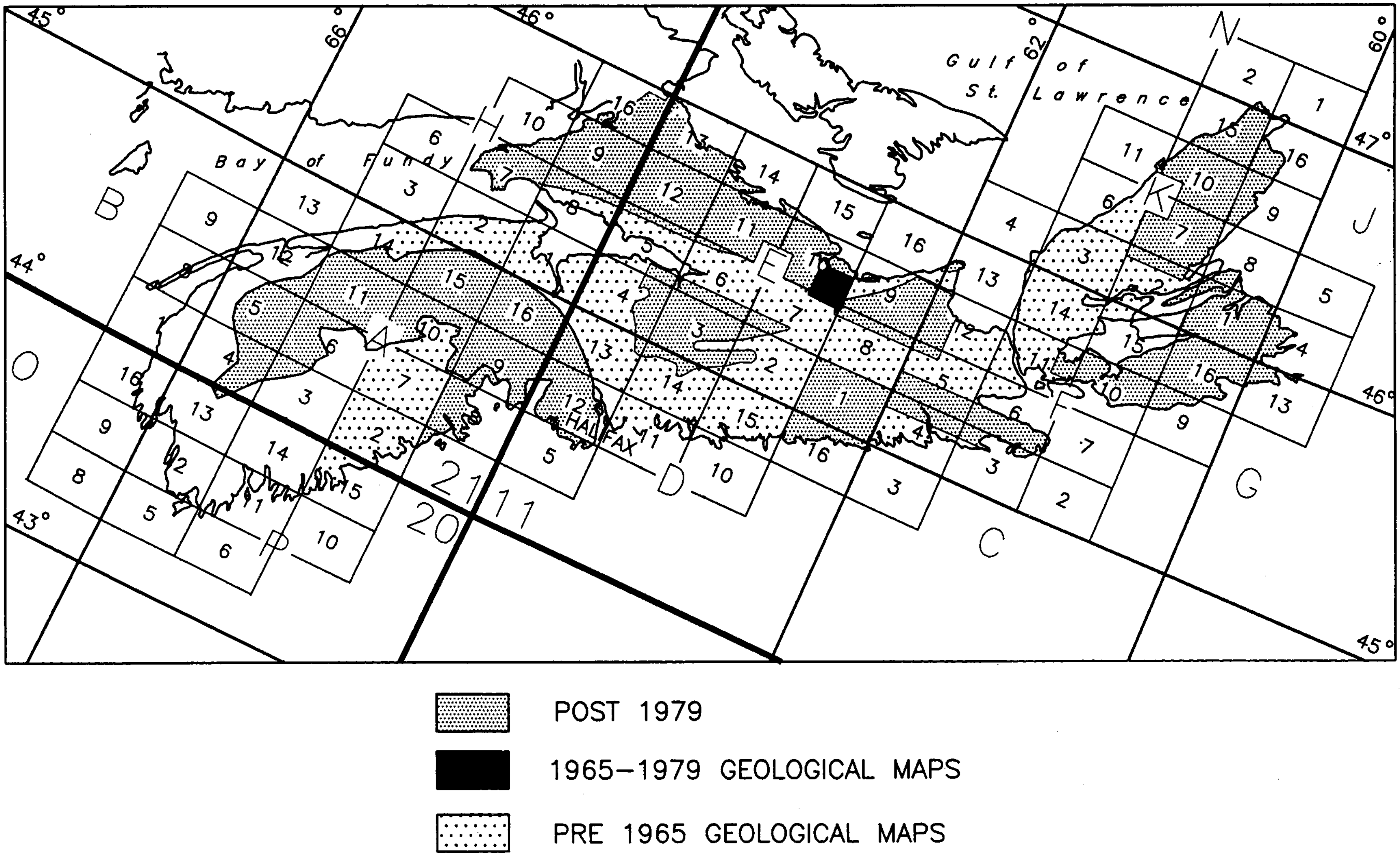
New Brunswick 1:50 000 (or more detailed) Surficial Geology Mapping

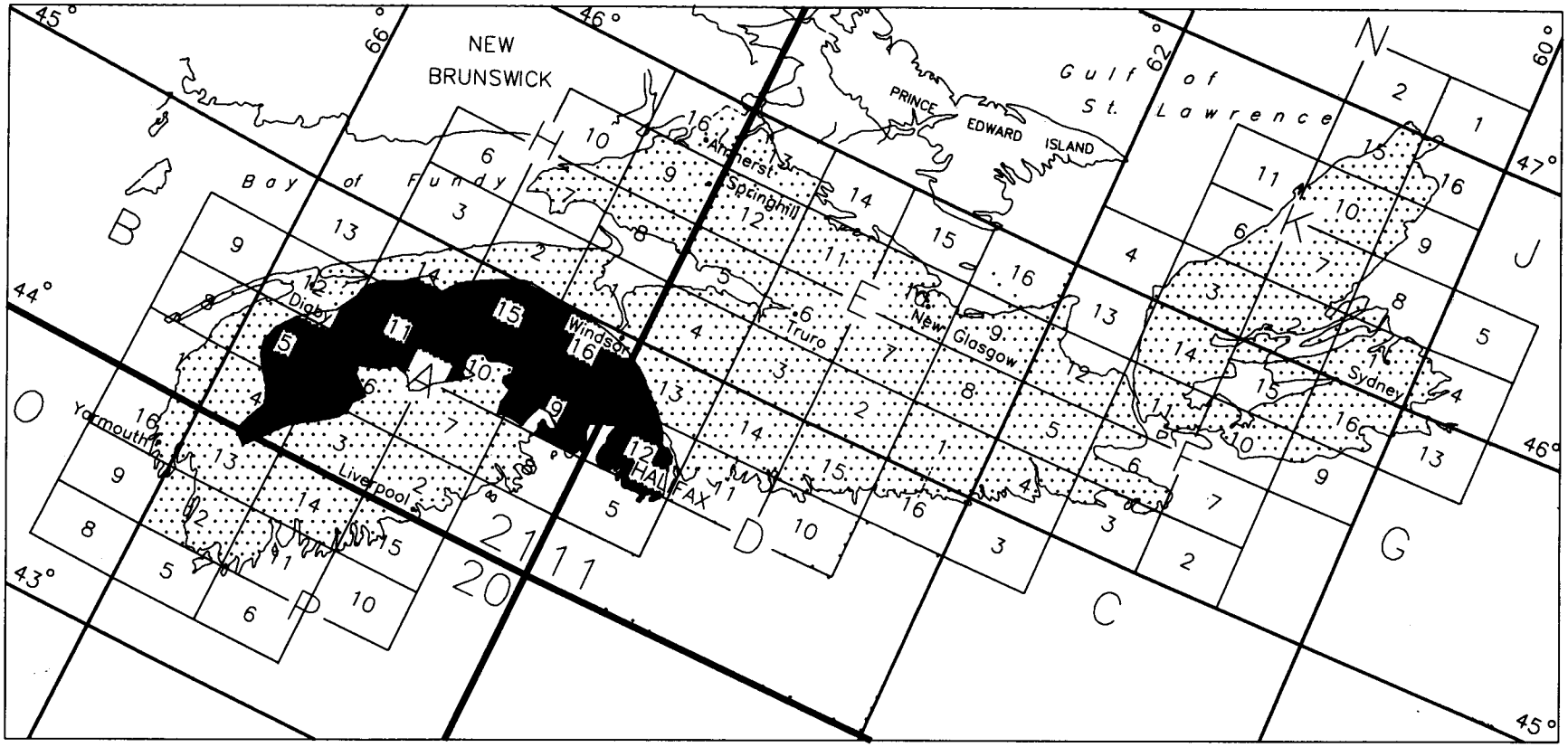


New Brunswick 1:50 000 (or more detailed) Geochemical Surveys



NOVA SCOTIA


Bay of Fundy
Gulf of St. Lawrence
HALIFAX
45°
46°
47°
44°
43°
66°
62°
60°
21
20
11
POST 1979
1965–1979 GEOLOGICAL MAPS
PRE 1965 GEOLOGICAL MAPS



1:100,000 or 1:125,000 PLEISTOCENE GEOLOGICAL MAPS 1975–1989

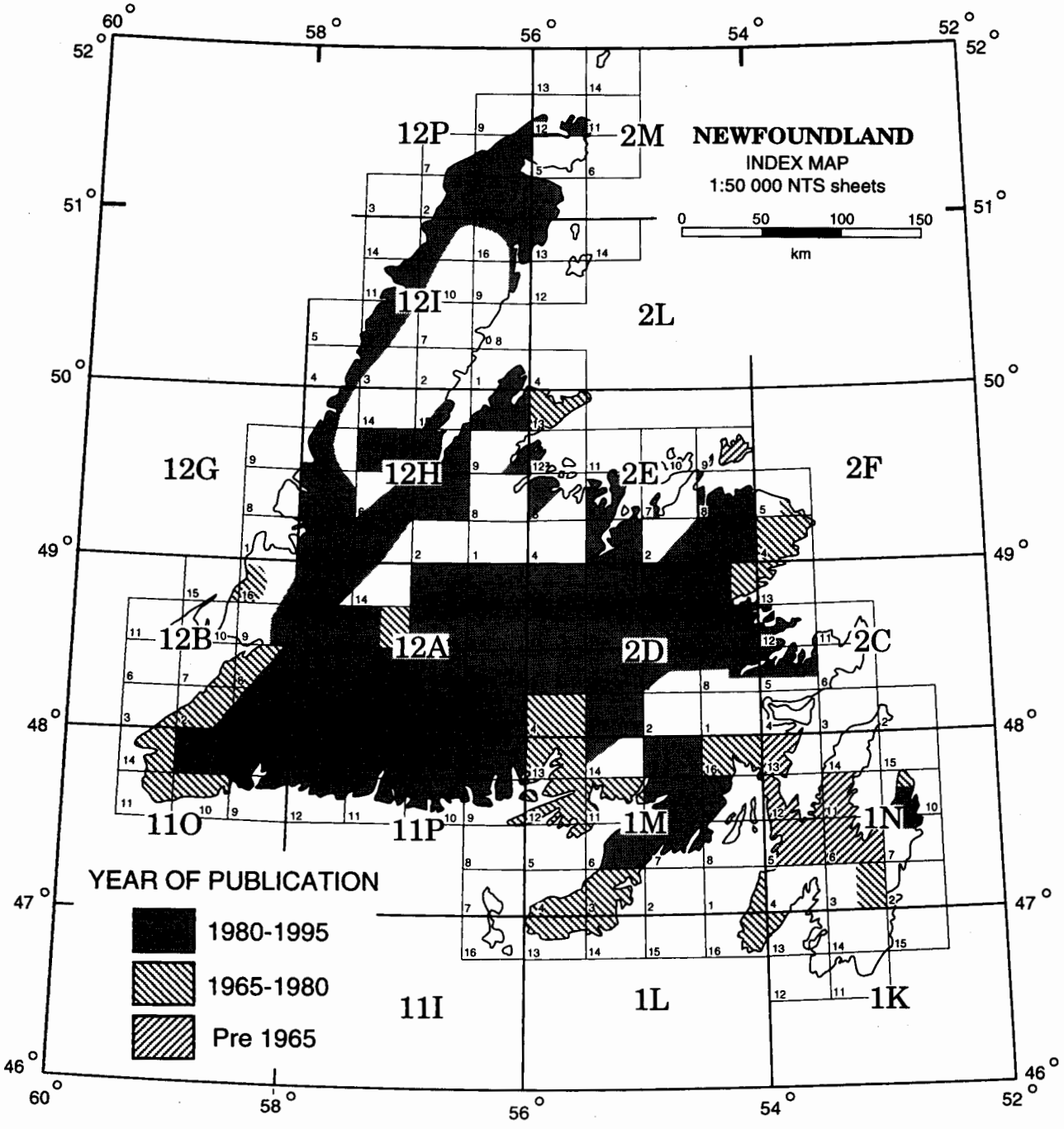
1:50,000 PLEISTOCENE MAPS 1984–1989

NOVA SCOTIA

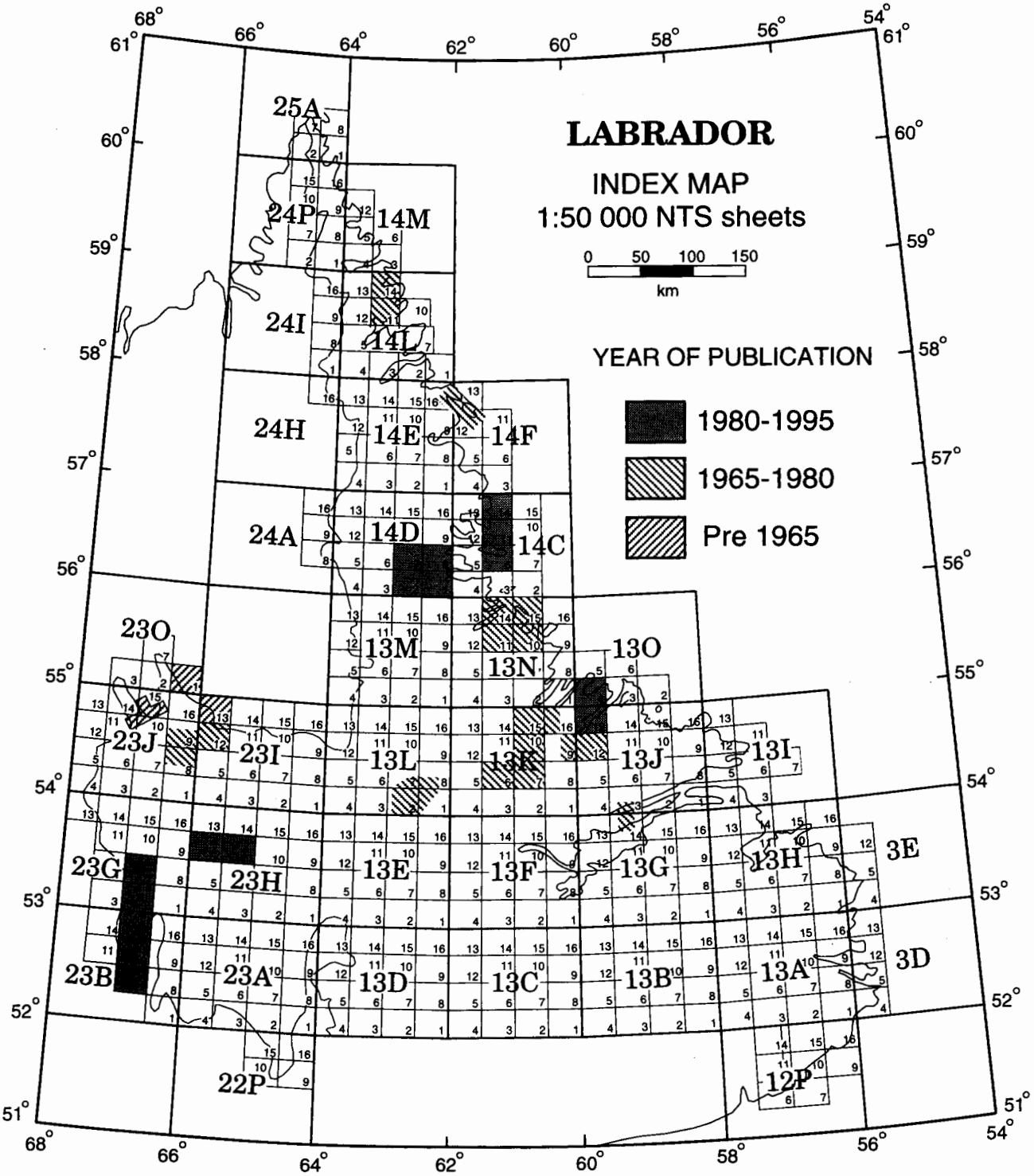
MINERAL INVENTORY PROGRAM

POST 1979 MINERAL OCCURRENCE INFORMATION

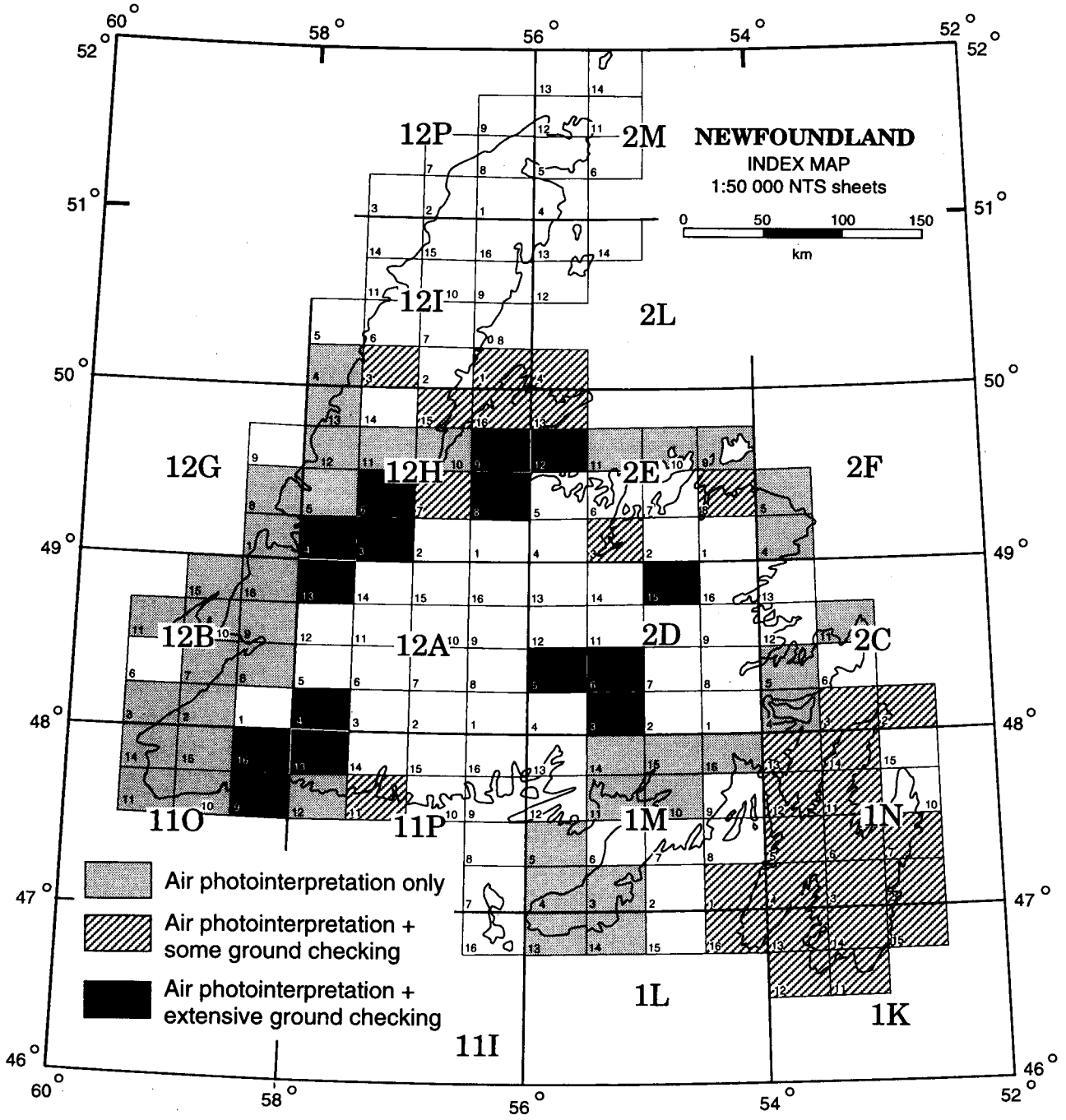
1965–1979 MINERAL OCCURRENCE INFORMATION



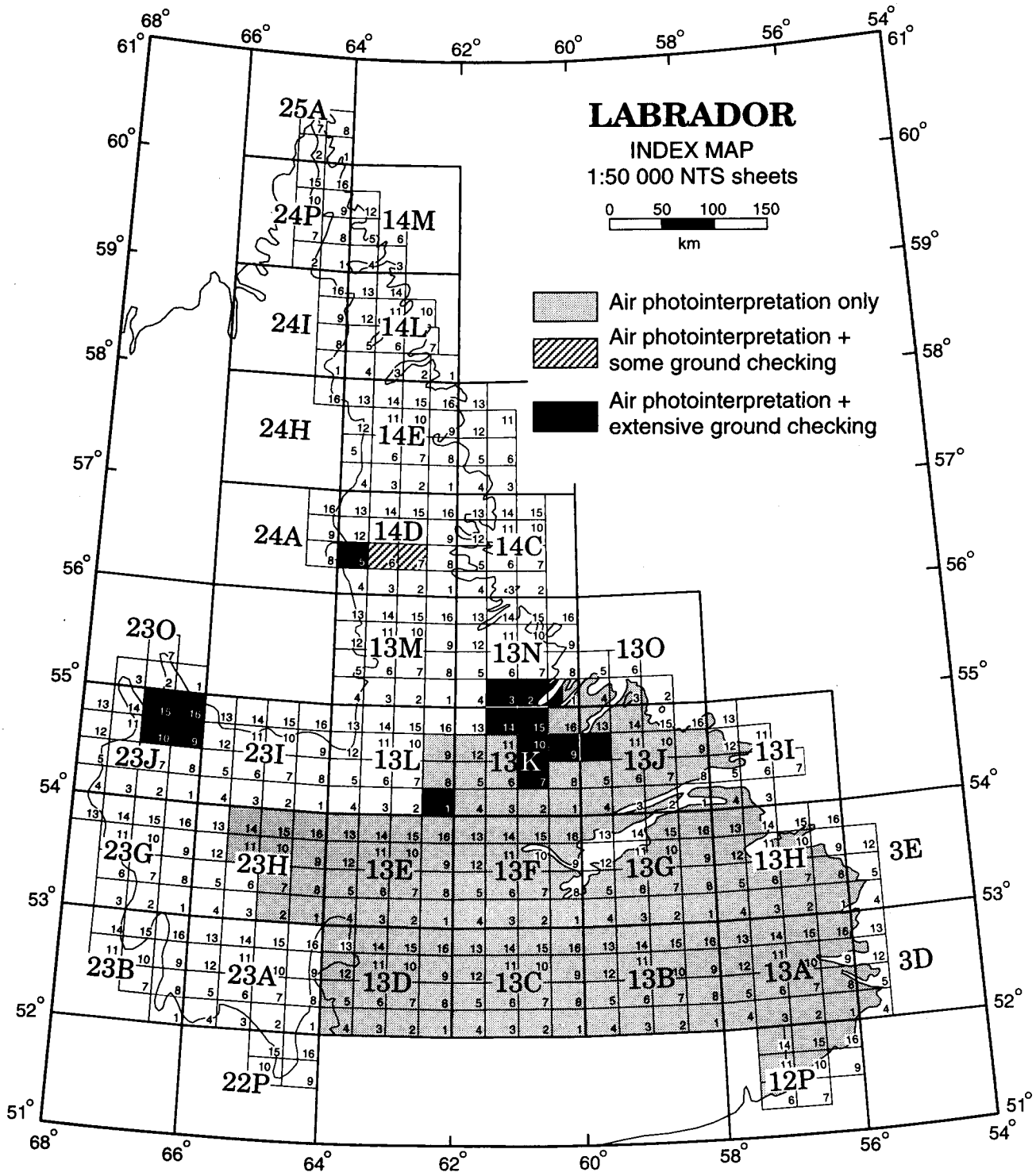
1:50 000 SCALE BEDROCK MAPPING (OR MORE DETAILED), NEWFOUNDLAND



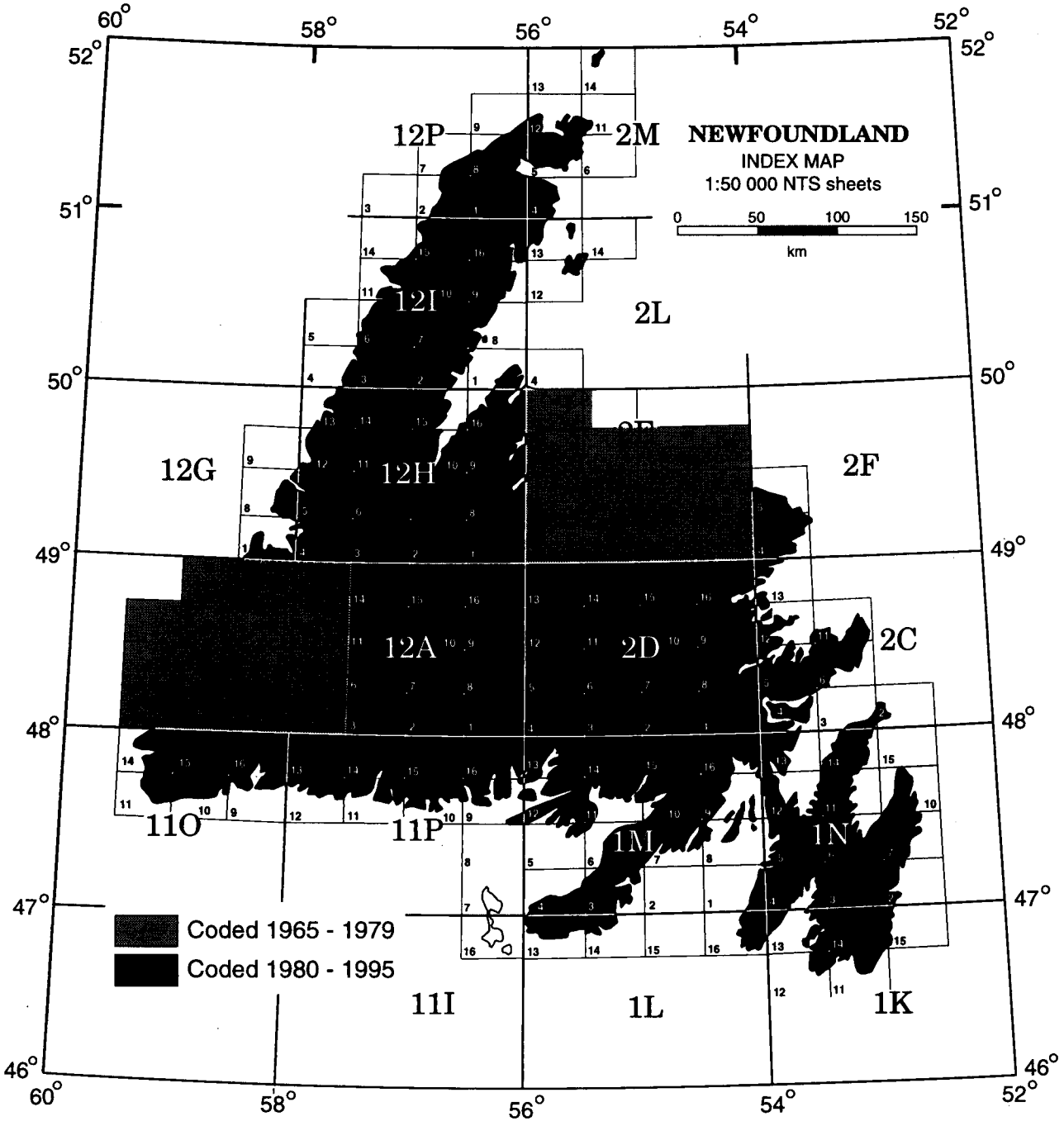
1:50 000 SCALE BEDROCK MAPPING (OR MORE DETAILED), LABRADOR



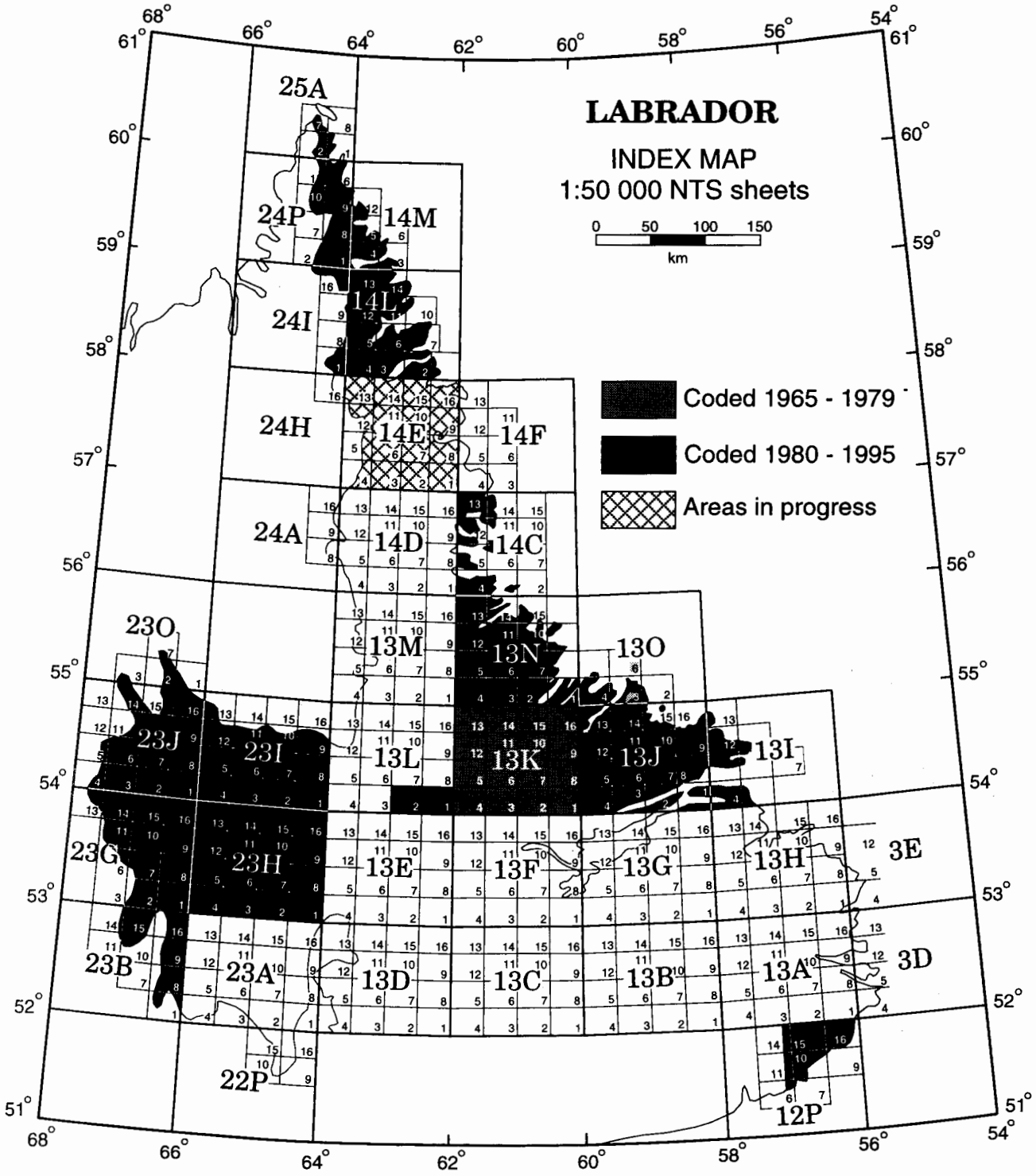
SURFICIAL GEOLOGICAL SURVEYS, NEWFOUNDLAND



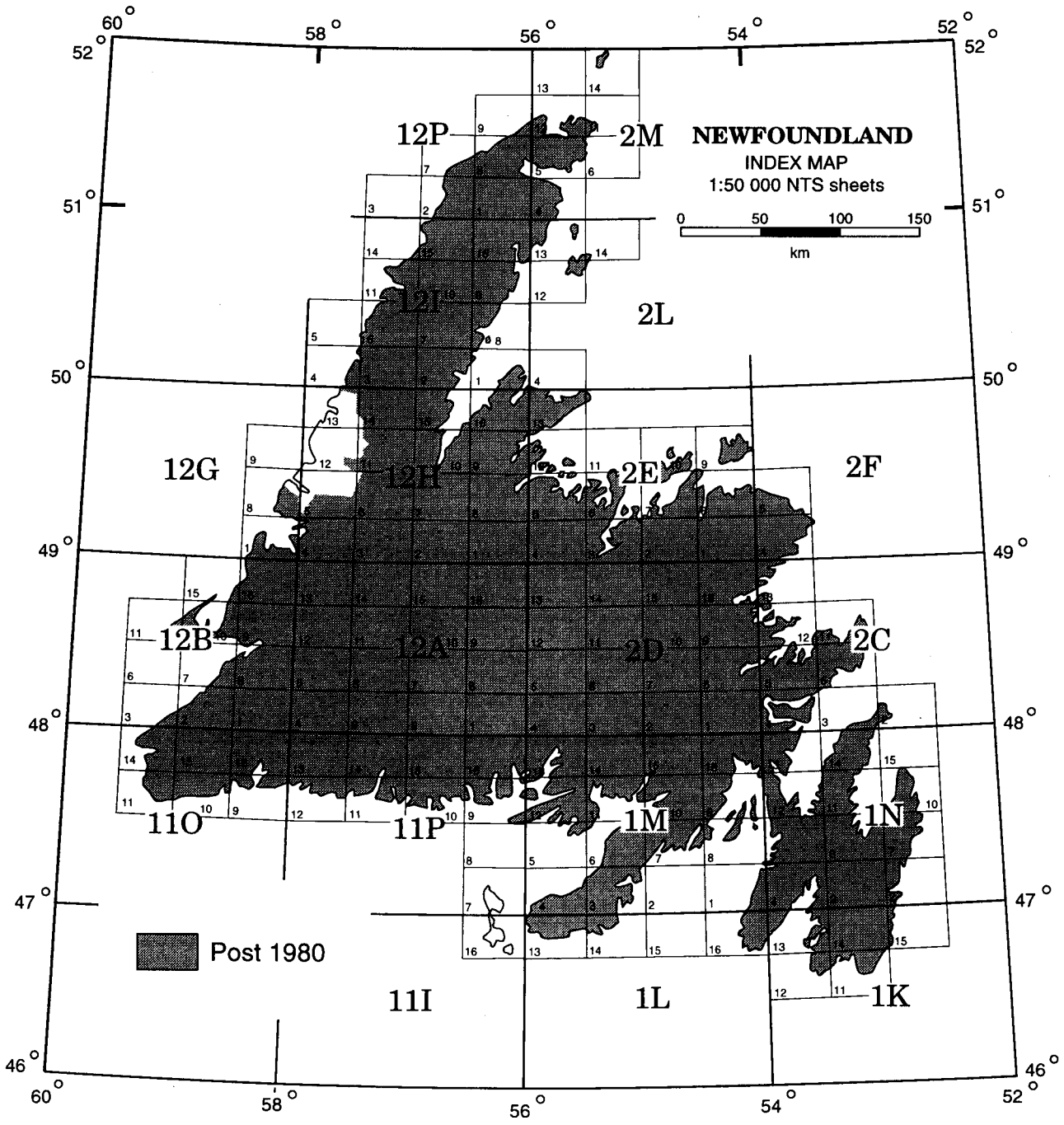
SURFICIAL GEOLOGICAL SURVEYS, LABRADOR



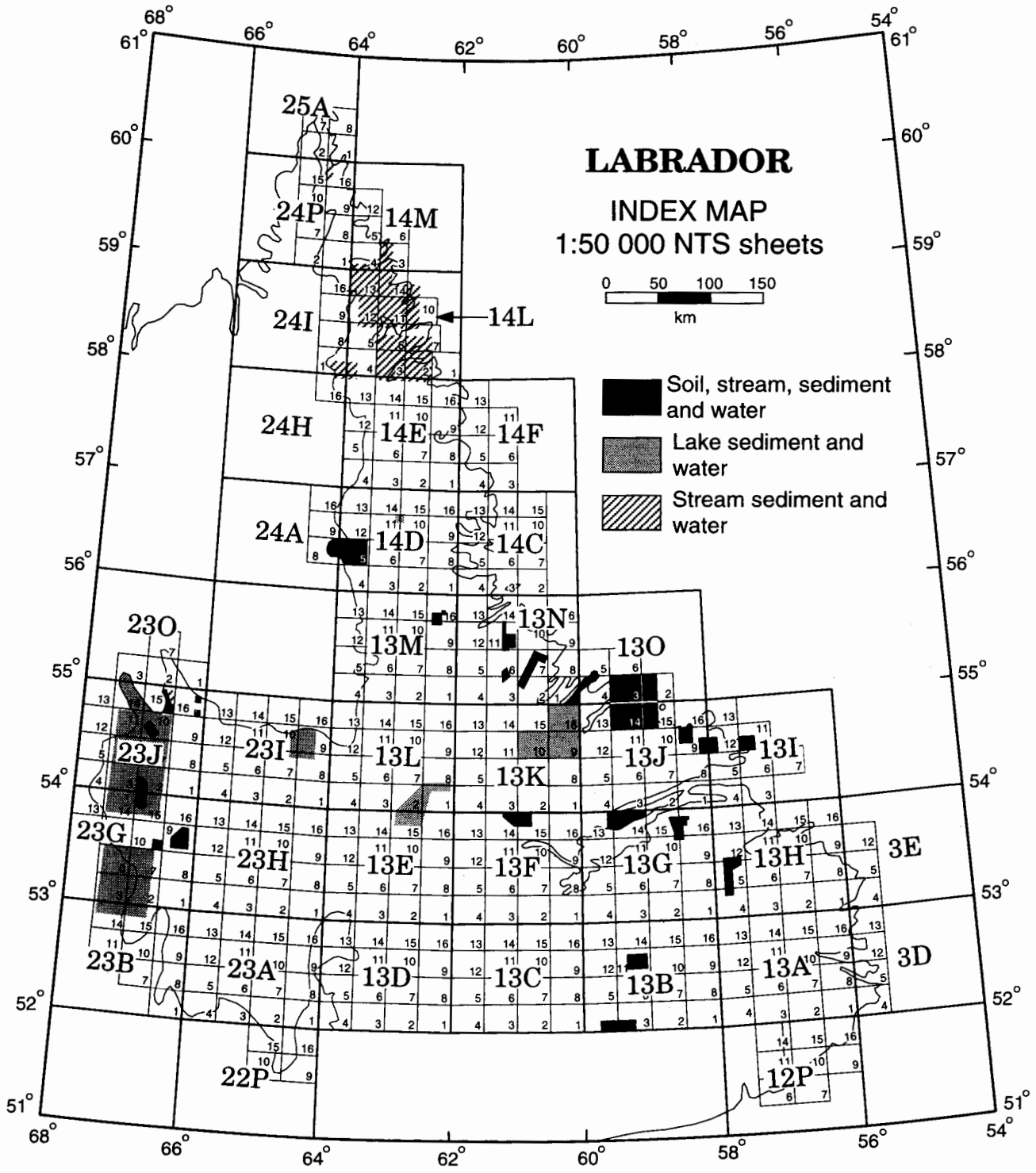
MINERAL OCCURRENCE DATA SYSTEM, NEWFOUNDLAND



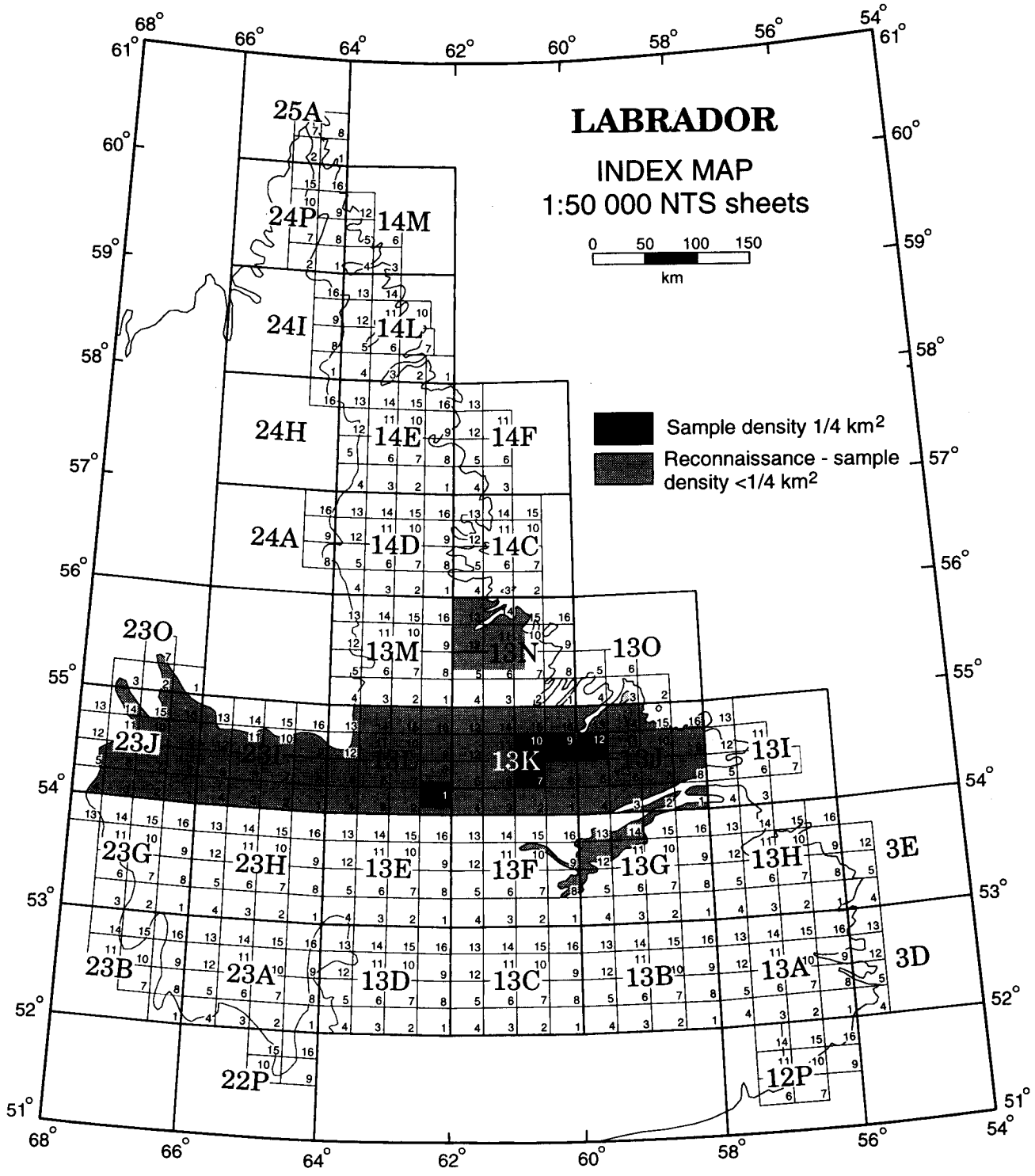
MINERAL OCCURRENCE DATA SYSTEM, LABRADOR



REGIONAL GEOCHEMICAL COVERAGE, NEWFOUNDLAND



GEOCHEMICAL SURVEYS IN LABRADOR, SAMPLE DENSITY > 1/4 KM ^{2}



TILL GEOCHEMICAL SURVEYS IN LABRADOR

FIGURE I. GEOLOGICAL MAPPING IN THE SLAVE, BEAR, AND WESTERN RAE STRUCTURAL PROVINCES, NWT

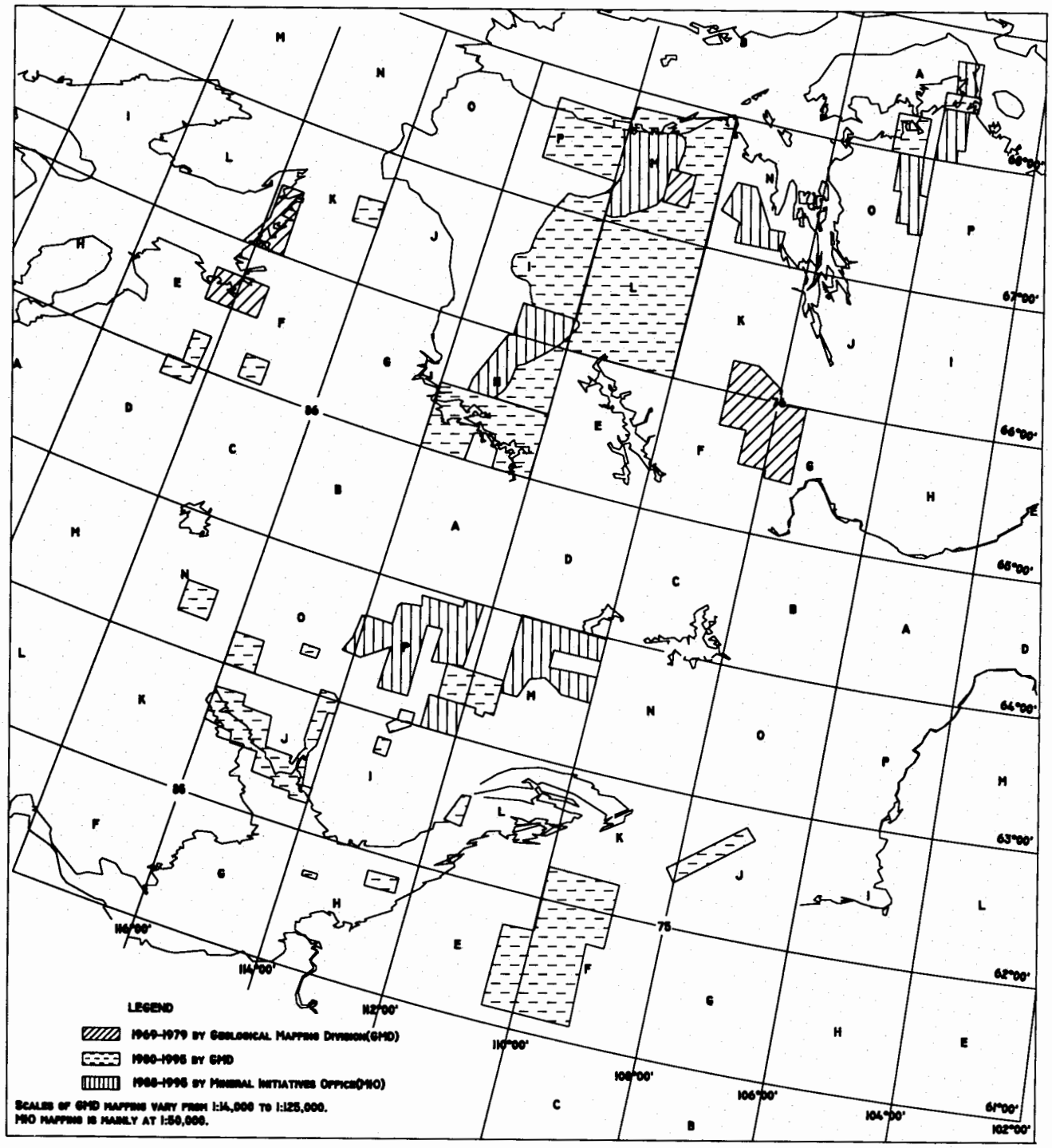


FIGURE 2. GEOLOGICAL MAPPING IN THE RAE AND HEARNE STRUCTURAL PROVINCES(CHURCHILL PROVINCE),NWT

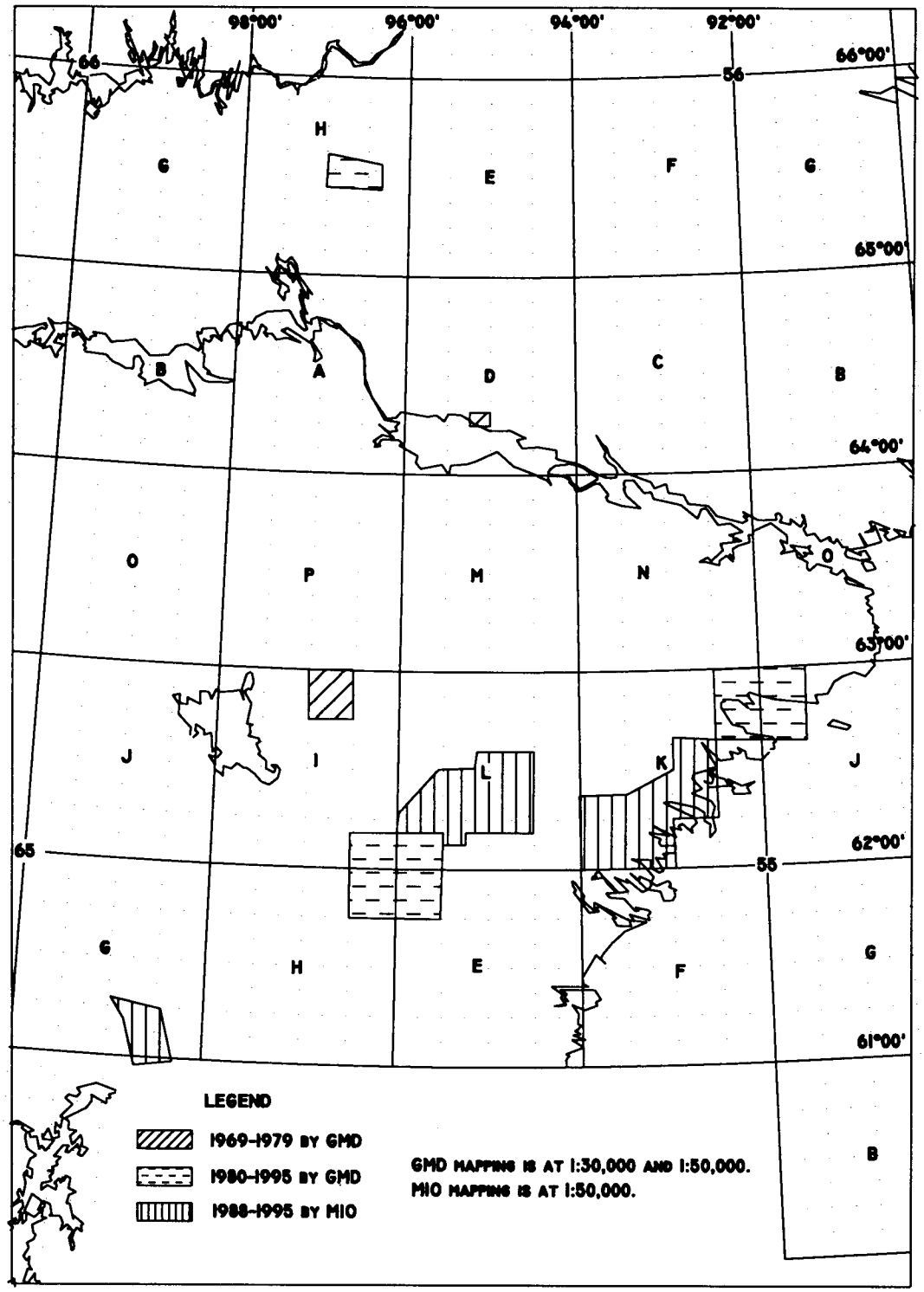
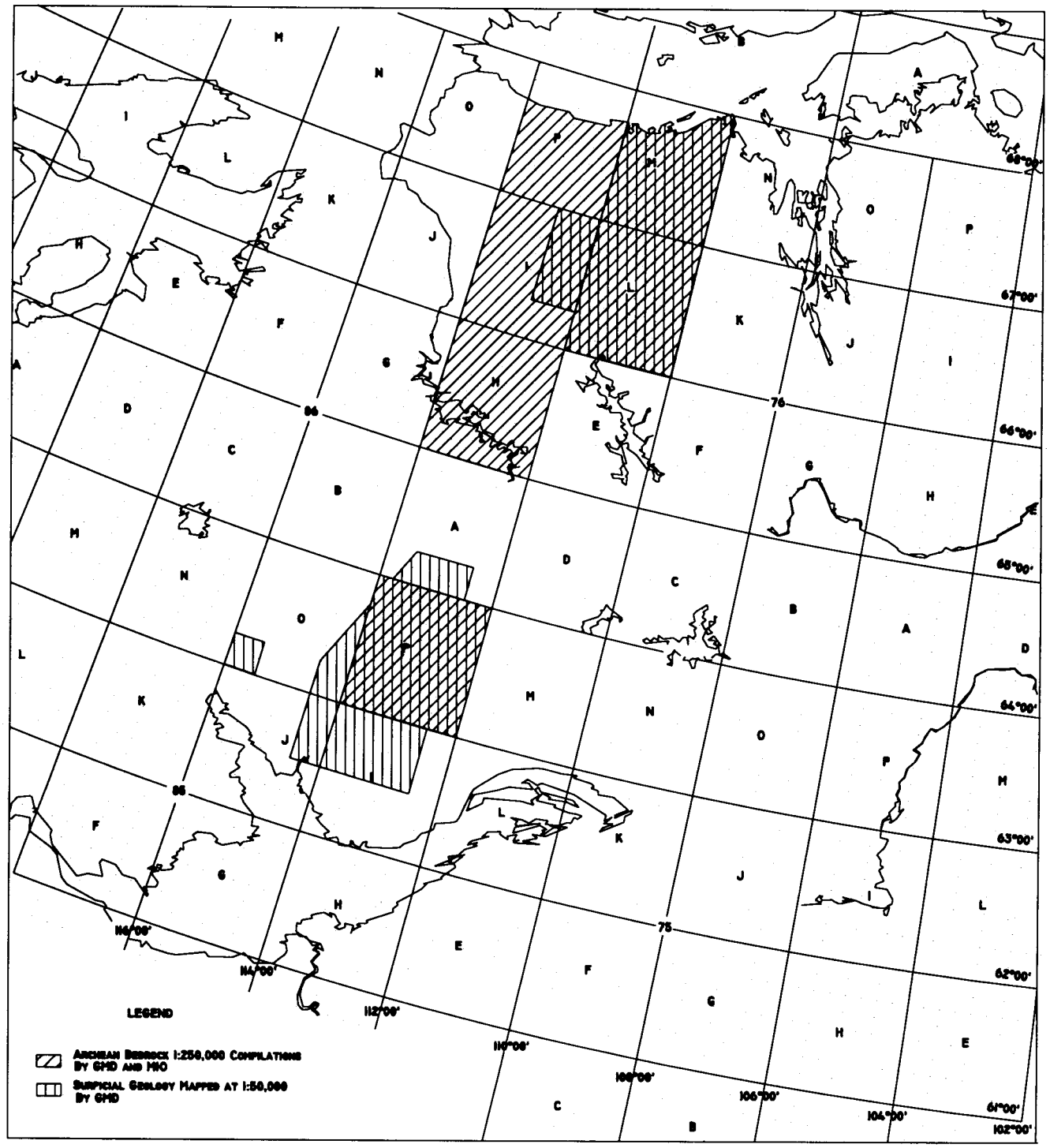
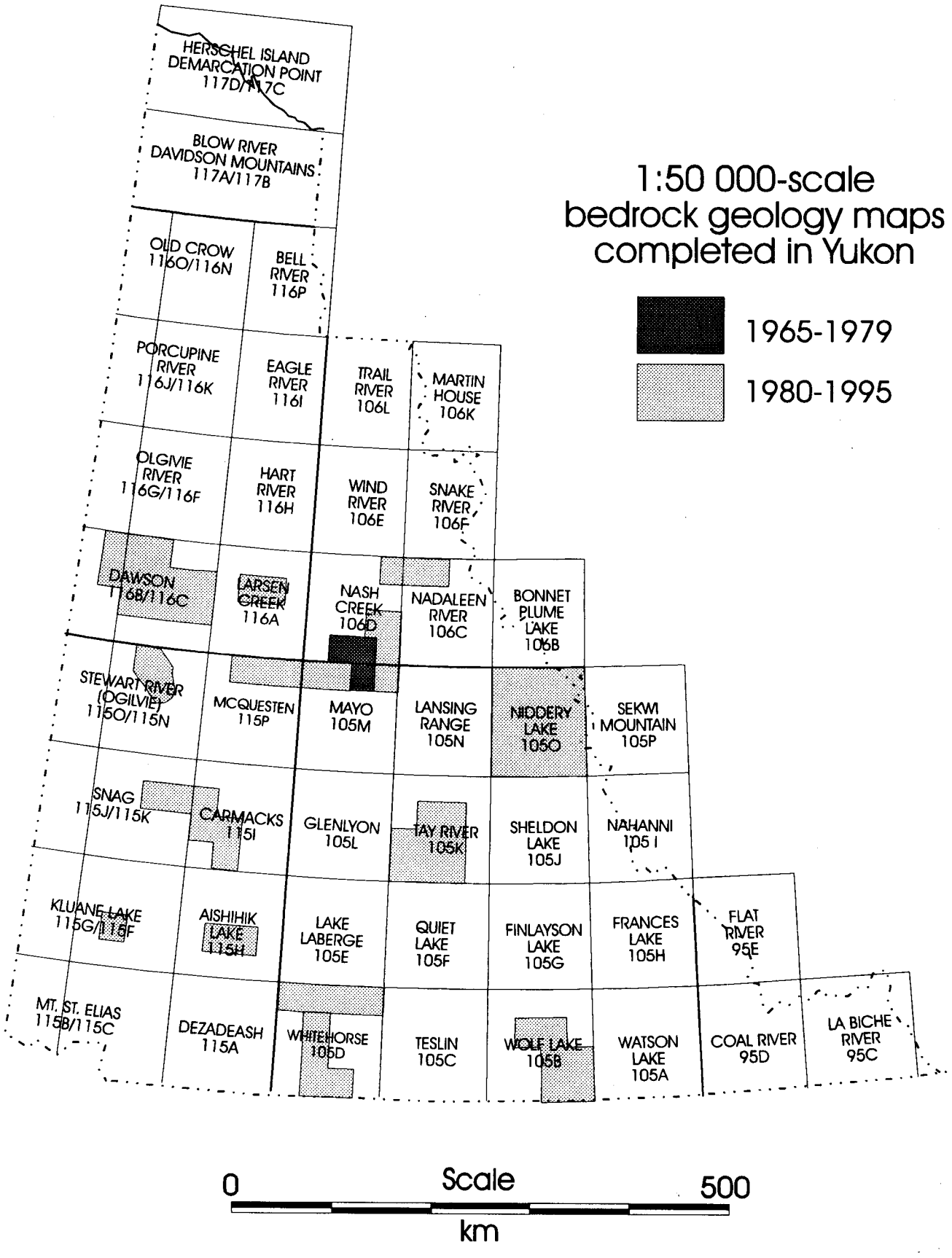
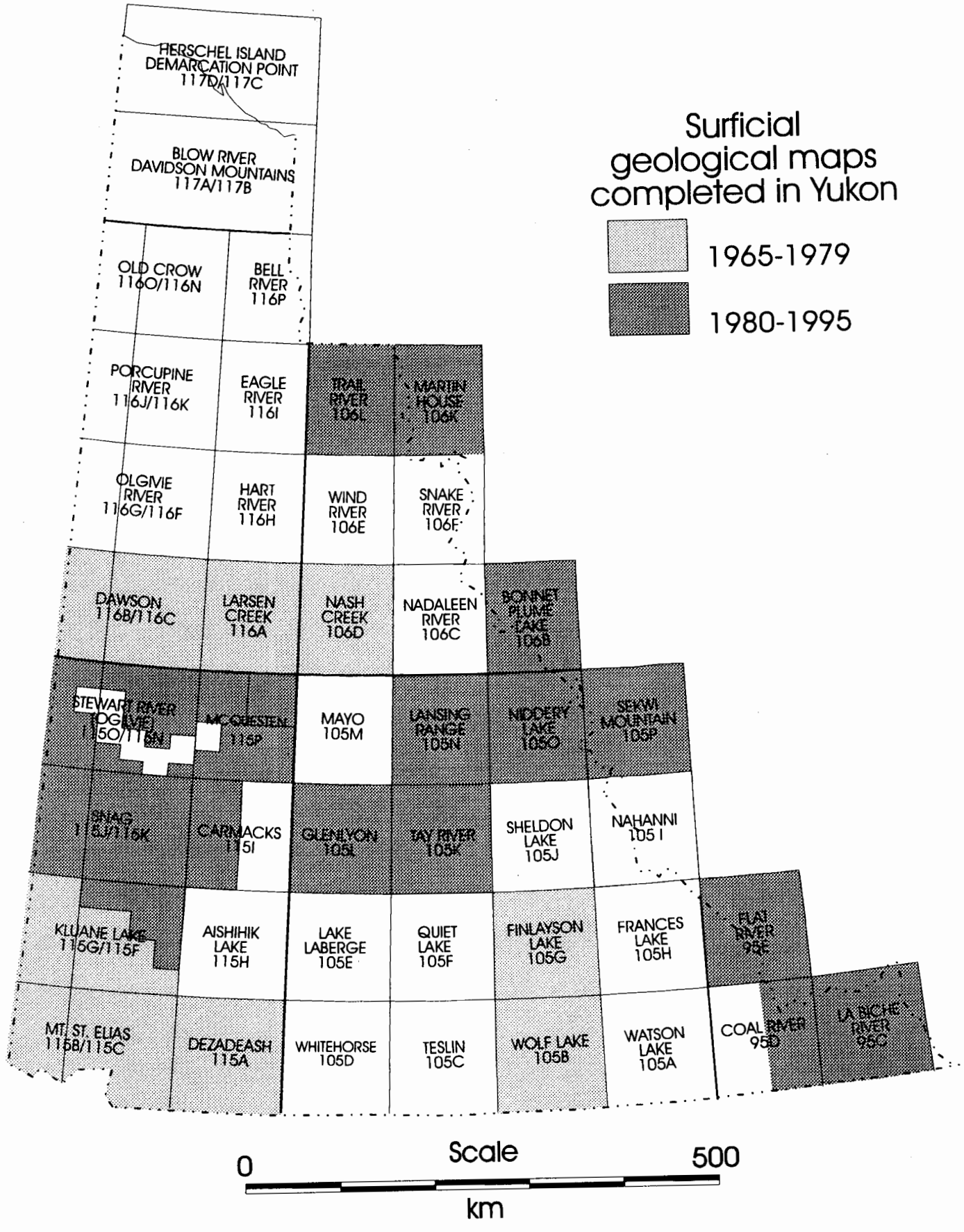
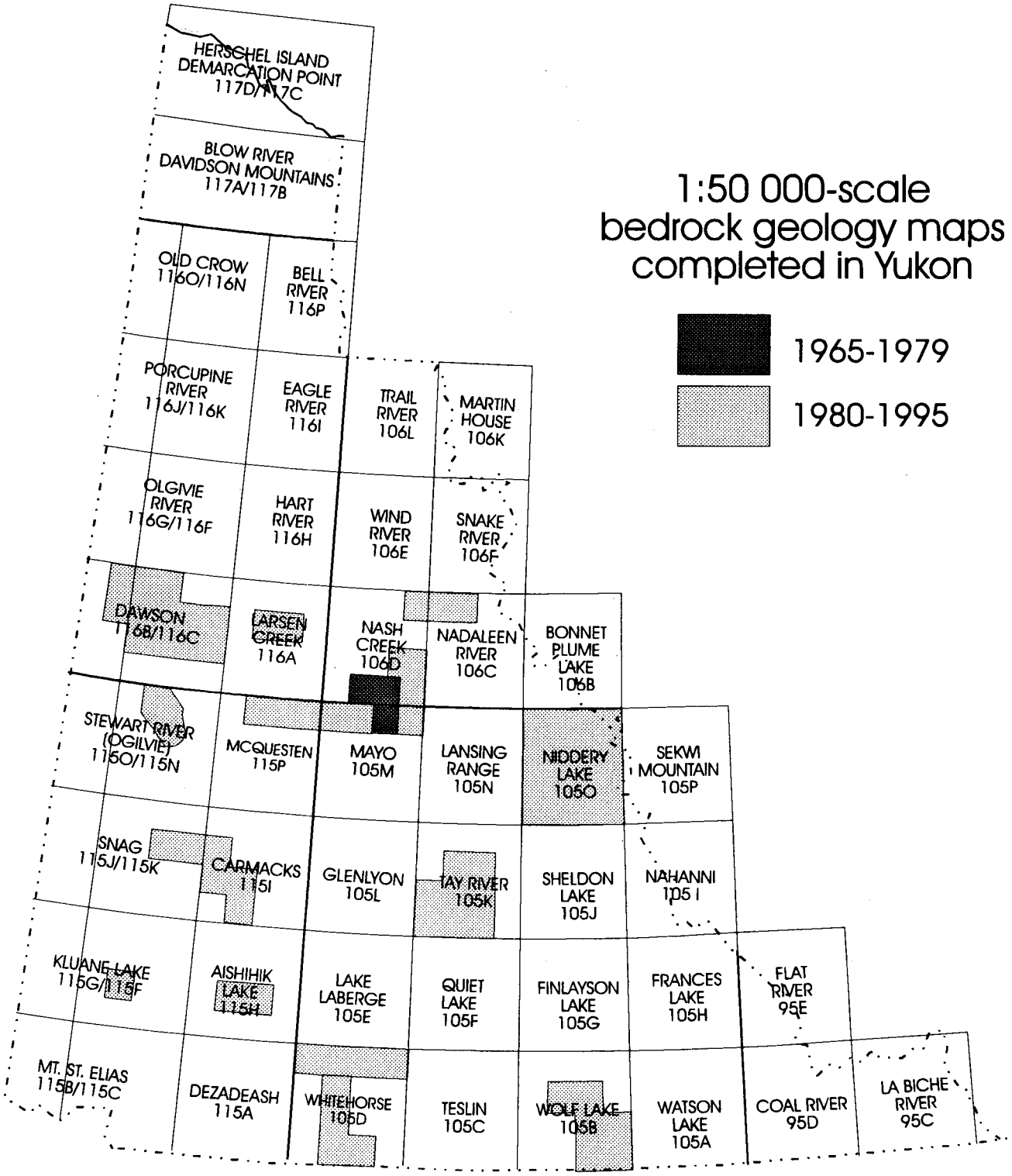


FIGURE 3. COMPILATIONS AND SURFICIAL GEOLOGY BY GEOLOGICAL MAPPING DIVISION AND MINERAL INITIATIVES OFFICE.




HERSCHEL ISLAND
DEMARCATION POINT
117D/117C
BLOW RIVER
DAVIDSON MOUNTAINS
117A/117B
OLD CROW
116O/116N
BELL
RIVER
116P
PORCUPINE
RIVER
116J/116K
EAGLE
RIVER
116I
TRAIL
RIVER
106L
MARTIN
HOUSE
106K
OLGIVIE
RIVER
116G/116F
HART
RIVER
116H
WIND
RIVER
106E
SNAKE
RIVER
106F
DAWSON
116B/116C
LARSEN
CREEK
116A
NASH
CREEK
106D
NADALEEN
RIVER
106C
BONNET
PLUME
LAKE
106B
STEWART RIVER
(OGILVIE)
116O/115N
MCQUESTEN
115P
MAYO
105M
LANSING
RANGE
105N
NIDDERY
LAKE
105O
SEKWI
MOUNTAIN
105P
SNAG
115J/115K
CARMACKS
115I
GLENLYON
105L
TAY RIVER
105K
SHELDON
LAKE
105J
NAHANNI
105 I
KLUANE LAKE
115G/116F
AISHIHIK
LAKE
115H
LAKE
LABERGE
105E
QUIET
LAKE
105F
FINLAYSON
LAKE
105G
FRANCES
LAKE
105H
FLAT
RIVER
95E
MT. ST. ELIAS
115B/115C
DEZADEASH
115A
WHITEHORSE
105D
TESLIN
105C
WOLF LAKE
105B
WATSON
LAKE
105A
COAL RIVER
95D
LA BICHE
RIVER
95C
1:50 000-scale
bedrock geology maps
completed in Yukon
1965-1979
1980-1995
0
Scale
500
km


HERSCHEL ISLAND
DEMARCATION POINT
117D/117C
BLOW RIVER
DAVIDSON MOUNTAINS
117A/117B
OLD CROW
116O/116N
BELL
RIVER
116P
PORCUPINE
RIVER
116J/116K
EAGLE
RIVER
116I
TRAIL
RIVER
106L
MARTIN
HOUSE
106K
OLGIVIE
RIVER
116G/116F
HART
RIVER
116H
WIND
RIVER
106E
SNAKE
RIVER
106F
DAWSON
116B/116C
LARSEN
CREEK
116A
NASH
CREEK
106D
NADALEEN
RIVER
106C
BONNET
PLUME
LAKE
106B
STEWART RIVER
105G/105F
115O/115N
MC QUESTEN
115P
MAYO
105M
LANSING
RANGE
105N
NIDDERY
LAKE
105O
SEKWI
MOUNTAIN
105P
SNAG
115J/116K
CARMACKS
115I
GLENLYON
105L
TAY RIVER
105K
SHELDON
LAKE
105J
NAHANNI
105 I
KLUANE LAKE
115G/115F
AISHIHIK
LAKE
115H
LAKE
LABERGE
105E
QUIET
LAKE
105F
FINLAYSON
LAKE
105G
FRANCES
LAKE
105H
FLAT
RIVER
95E
MT. ST. ELIAS
115B/115C
DEZADEASH
115A
WHITEHORSE
105D
TESLIN
105C
WOLF LAKE
105B
WATSON
LAKE
105A
COAL RIVER
95D
LA BICHE
RIVER
95C
Surficial
geological maps
completed in Yukon
1965-1979
1980-1995
0
Scale
500
km


HERSCHEL ISLAND
DEMARCATION POINT
117D/117C
BLOW RIVER
DAVIDSON MOUNTAINS
117A/117B
OLD CROW
116O/116N
BELL
RIVER
116P
PORCUPINE
RIVER
116J/116K
EAGLE
RIVER
116I
TRAIL
RIVER
106L
MARTIN
HOUSE
106K
OLGIVIE
RIVER
116G/116F
HART
RIVER
116H
WIND
RIVER
106E
SNAKE
RIVER
106F
DAWSON
116B/116C
LARSEN
CREEK
116A
NASH
CREEK
106D
NADALEEN
RIVER
106C
BONNET
PLUME
LAKE
106B
STEWART RIVER
(OGILVIE)
115O/115N
MCQUESTEN
115P
MAYO
105M
LANSING
RANGE
105N
NIDDERY
LAKE
105O
SEKWI
MOUNTAIN
105P
SNAG
115J/115K
CARMACKS
115I
GLENLYON
105L
TAY RIVER
105K
SHELDON
LAKE
105J
NAHANNI
105 I
KLUANE LAKE
115G/115F
AISHIHIK
LAKE
115H
LAKE
LABERGE
105E
QUIET
LAKE
105F
FINLAYSON
LAKE
105G
FRANCES
LAKE
105H
FLAT
RIVER
95E
MT. ST. ELIAS
115B/115C
DEZADEASH
115A
WHITEHORSE
105D
TESLIN
105C
WOLF LAKE
105B
WATSON
LAKE
105A
COAL RIVER
95D
LA BICHE
RIVER
95C
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bedrock geology maps
completed in Yukon
1965-1979
1980-1995
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Scale
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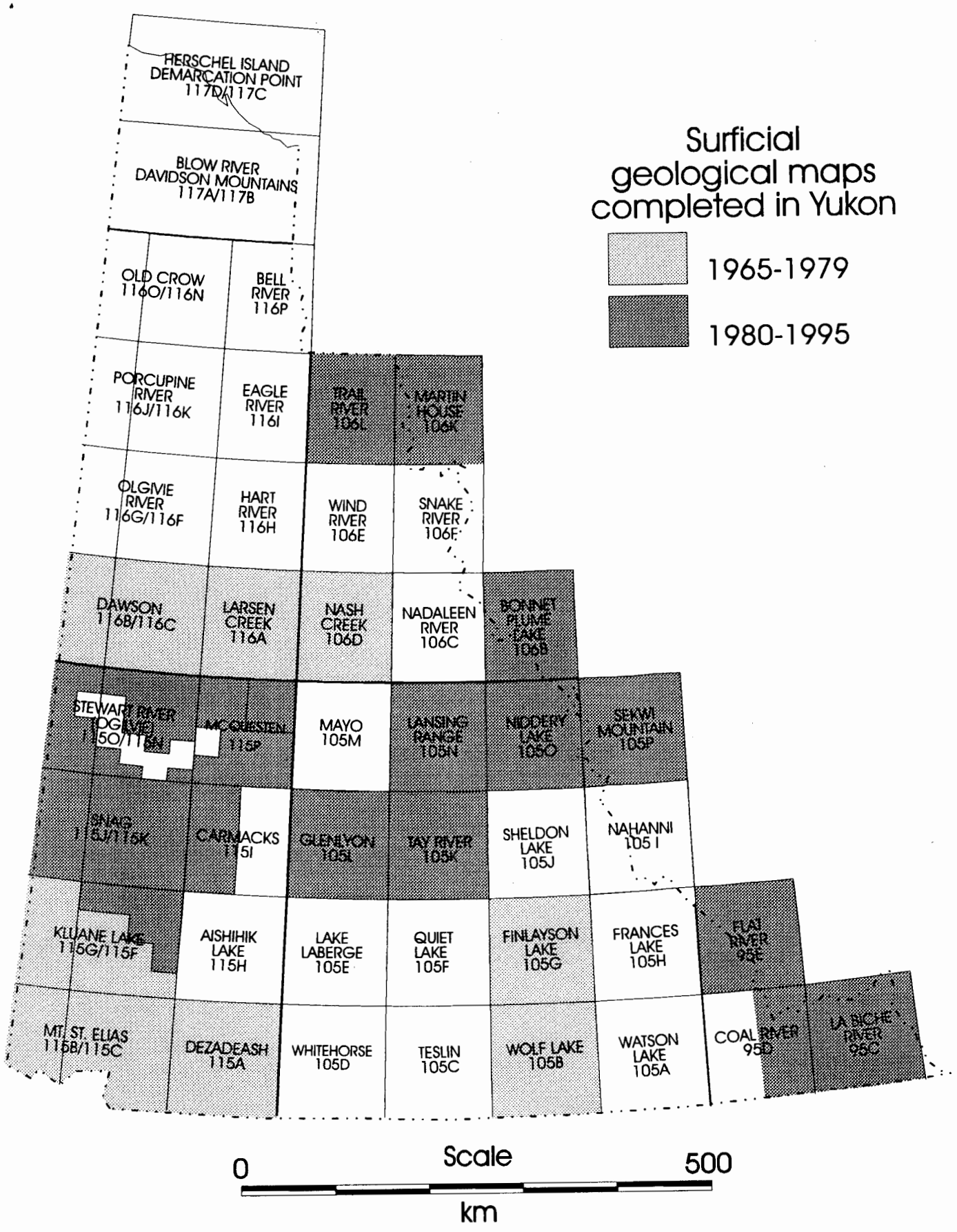
km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DAVIDSON MOUNTAINS
117A/117B
OLD CROW
116O/116N
BELL RIVER
116P
PORCUPINE RIVER
116J/116K
EAGLE RIVER
116I
TRAIL RIVER
106L
MARTIN HOUSE
106K
OLGIVIE RIVER
116G/116F
HART RIVER
116H
WIND RIVER
106E
SNAKE RIVER
106F
DAWSON
116B/116C
LARSEN CREEK
116A
NASH CREEK
106D
NADALEEN RIVER
106C
BONNET PLUME LAKE
106B
STEWART RIVER (OGILVIE)
115O/115N
MCQUESTEN
115P
MAYO
105M
LANSING RANGE
105N
MIDDERY LAKE
105O
SEKWI MOUNTAIN
105P
SNAG
115J/115K
CARMACKS
115I
GLENLYON
105L
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NAHANNI
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KLUANE LAKE
115G/115F
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LAKE LABERGE
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QUIET LAKE
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105D
TESLIN
105C
WOLF LAKE
105B
WATSON LAKE
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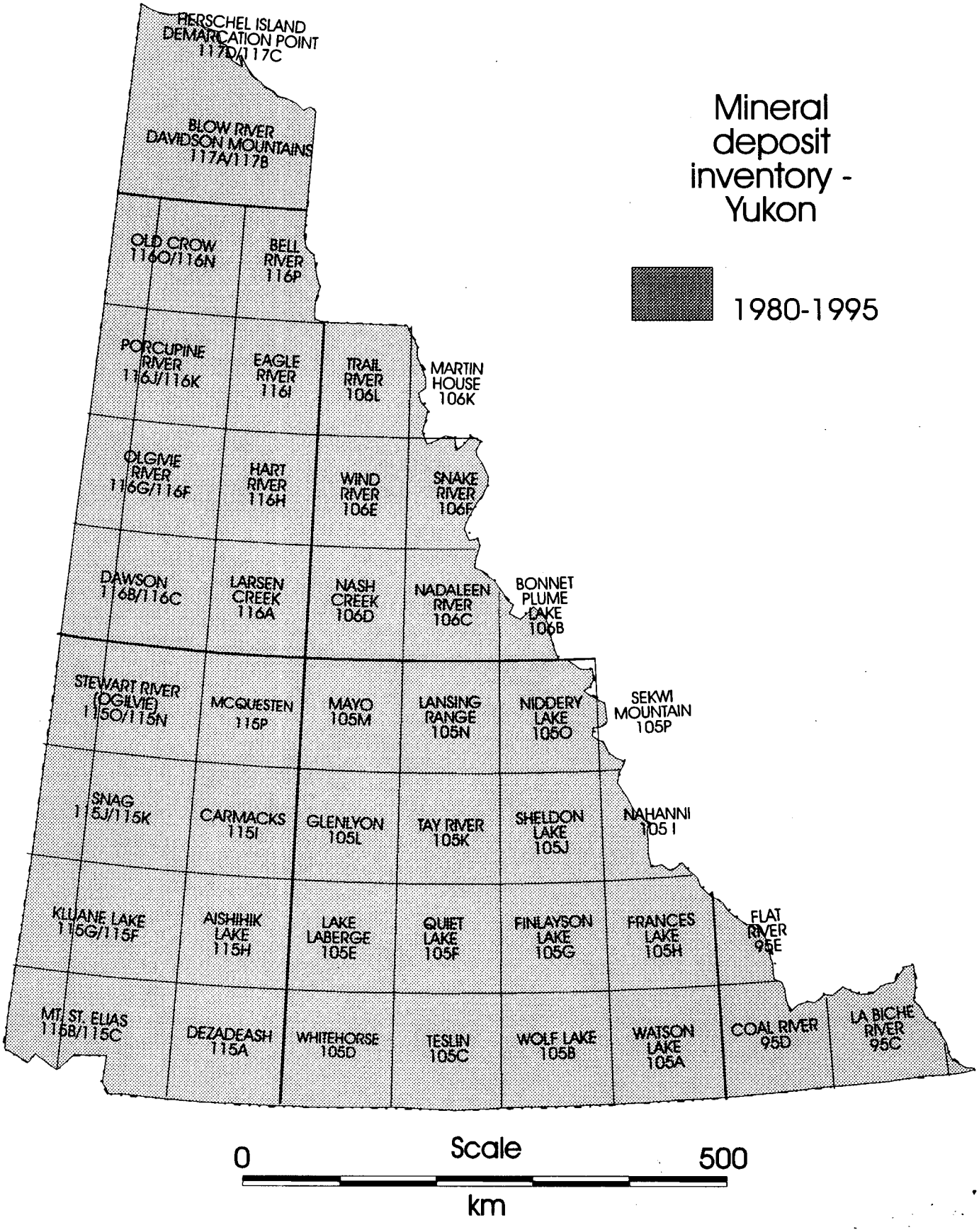
95C
Surficial geological maps completed in Yukon
1965-1979
1980-1995
0
Scale
500
km


HERSCHEL ISLAND
DEMARCATION POINT
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WATSON LAKE
105A
COAL RIVER
95D
LA BICHE RIVER
95C
Mineral deposit inventory - Yukon
1980-1995
0
Scale
500
km

NOTES

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