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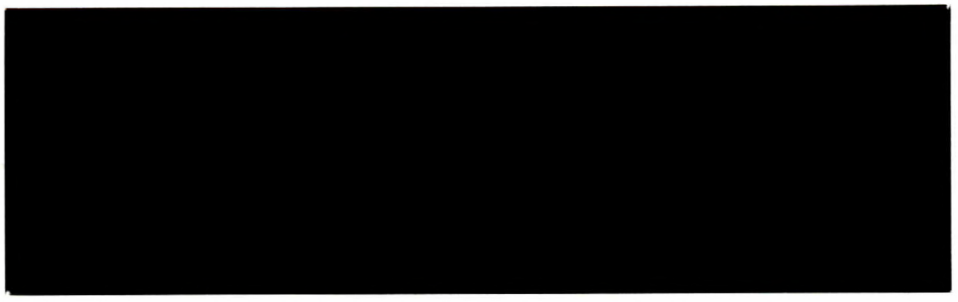

Canada

GRADUATES FROM CANADIAN MINERALS ENGINEERING AND TECHNOLOGY PROGRAMS IN 1989 AND A FORWARD VIEW

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ABSTRACT

Each year, the Education Committee of the Canadian Institute of Mining and Metallurgy conducts a survey to determine the members graduating, and about to graduate, from minerals engineering and technology programs in Canadian institutions of higher learning.

This report presents the results of the 1989-1990 survey and a brief overview of the trends that have been noted.

For the first time, the report also includes details on the numbers of females graduating from such programs.

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Keywords
education, engineering education, graduates, graduate statistics, minerals education, technology education

DIPLOMES DES PROGRAMMES CANADIENS DE GENIE ET DE TECHNOLOGIE DES MINERAUX EN 1989: PERSPECTIVES

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RESUME

Chaque année, le Comité sur l'éducation de l'Institut canadien des mines et de la métallurgie mène une enquête sur le nombre de membres qui viennent de recevoir ou s'apprêtent à recevoir un diplôme d'un programme de génie ou de technologie des minéraux d'un établissement canadien d'enseignement supérieur.

Le présent rapport décrit les résultats de l'enquête de 1989-1990 et passe brièvement en revue les tendances qui ont été observées.

Pour la première fois, le rapport renferme aussi des détails sur le nombre de femmes qui sont diplômées de tels programmes.

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Mots clés

éducation, éducation en génie, diplômés, statistiques supérieures, éducation en minéralogie, éducation en technologie

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INTRODUCTION

There is a crisis in minerals engineering education in many of the important minerals-producing nations of the western world. In Canada, the United States of America, the United Kingdom and Australia one hears very much the same tale: the numbers enroling and graduating from minerals programs are plummeting and, as the result, the continuing existences of the programs are threatened. Some examples: In Australia, the mining engineering program at Melbourne University has been discontinued while that at the University of Sydney has been suspended. In the United Kingdom, the mining engineering programs at both the University College of Cardiff and the University of Newcastle have been discontinued. In the United States of America many mining programs are said to be threatened since the numbers graduating in the nation are approximately equal to those in Canada - a nation with one tenth of its population. Finally, in Canada, the number receiving first degrees in mining engineering has declined to the lowest point in the past twenty years. As a consequence, the viability of some Canadian programs is now being seriously questioned.

The dismal Canadian tale is told in the tables which present the results of the Education Committee's 1989-1990 Survey of Graduates in Canadian Engineering and Technology programs for the minerals industries. The long-term trends, for mining engineering, metallurgy and metallurgical engineering, and the technologies are shown in the three figures.

In retrospect, it is easy to relate the trends to the "boom-and-bust" cycle which seems to characterize our industry. In the most recent cycle, for example, the numbers declined after the recessions of the early sixties, seventies and eighties. With employment prospects grim, fewer numbers chose to try a career in the minerals industry. With renewed prosperity the numbers rose once again.

It has been said that the low numbers that graduated in 1989 represent the bottom of the current trough. The forecasts for this year and the next, however, do not offer much hope of a rapid recovery. One must remember that such forecasts tend to be optimistic and over estimate the numbers. Actual graduations may be from about 10% to 20% less. A "steady state" in numbers graduating for the next year or so may be a reasonable estimate.

Regrettably, the CIM Survey does not provide data for geology or the geological sciences and engineering. A few years ago, at the request of the Committee of Chairpersons of Canadian Earth Sciences Departments (CCCESD), our survey was not sent to the various geology departments across Canada. The view was that there were too many surveys and that ours was not needed. While there are views on both sides of this issue, and the writer disagrees with the CCCESD viewpoint, the CIM Education Committee, as a service group, has acceded to the request.

All that can be said is that all of the hearsay is that many geology programs are in similar difficulties. From the CIM perspective it is a pity not to have the data when these could be of the greatest use - i.e., now, when the industry needs the hard data to assist in finding possible approaches to solving the crisis.

A new feature of the CIM Survey this year is that respondents have been asked to indicate the numbers of both men and women graduating from the various programs. Our desire has been to measure the extent to which women, an under-represented group, are entering the earth sciences. These data are also shown, for 1989, in the tables. About 13% of last year's bachelors' recipients were women, while the percentage at the masters' and doctorate levels were about 10% and 0%, respectively. Hopefully, the data can be interpreted to indicate that increasing numbers of women are entering the minerals engineering professions.

TABLE 1

MINING ENGINEERING - DEGREES RECEIVED IN 1989 - FORECAST FOR 1990-1991

UNIVERSITY	BACHELOR					MASTER					DOCTORATE				
	1989			1990	1991	1989			1990	1991	1989			1990	1991
	M	F	T			M	F	T			M	F	T		
Alberta	2	1	3	2	11	1	0	1	4	3	0	0	0	0	2
British Columbia	8	0	8	6	6	2	0	2	2	1	1	1	1	0	0
Laurentian	6	0	6	4	6	-	-	-	-	-	-	-	-	-	-
Laval	3	0	3	10	15	1	1	2	1	1	1	0	1	0	0
McGill	8	0	8	10	6	9	0	9	11	14	5	0	5	7	6
Polytechnique (Montreal)	7	1	8	7	7	2	0	2	-	-	2	0	2	-	-
Nova Scotia	4	0	4	4	3	0	0	0	2	4	0	0	0	0	0
Queen's	14	3	17	12	12	8	0	8	10	10	0	0	0	3	2
TOTAL (8 Universities)	52	5	57	55	66	23	1	24	30	33	9	0	9	10	10

TABLE 2

METALLURGICAL ENGINEERING AND METALLURGY - DEGREES RECEIVED IN 1989

FORECASTS FOR 1990-1991

UNIVERSITY	BACHELOR					MASTER					DOCTORATE				
	1989			1990	1991	1989			1990	1991	1989			1990	1991
	M	F	T			M	F	T			M	F	T		
Alberta	8	1	9	10	9	2	3	5	8	3	0	0	0	2	1
British Columbia	8	1	9	14	20	7	2	9	10	10	11	0	11	12	10
Laval	5	1	6	9	17	6	0	6	4	4	2	0	2	2	2
McGill	-	-	14	14	17	-	-	9	11	13	-	-	6	7	9
McMaster	19	2	21	23	18	3	1	4	4	6	3	0	3	3	3
Polytechnique (Montreal)	11	5	16	18	16	5	1	6	9	7	2	0	2	14	9
Nova Scotia	5	5	10	11	5	2	0	2	4	5	0	0	0	0	3
Queen's	12	4	16	20	26	1	0	1	1	2	1	0	1	1	1
Toronto	-	-	5	19	22	-	-	9	-	-	-	-	7	5	5
Western Ontario (a)	5	0	5	9	12	1	0	1	2	3	0	0	0	1	1
Windsor (b)	4	0	4	5	4	2	0	2	2	5	1	0	1	3	3
TOTAL (10 Universities)	77	19	115	152	166	29	7	54	55	58	20	0	33	50	47

Notes: (a) Program in Engineering Materials
(b) Program in Engineering Materials. Dept. Materials Engineering has merged into Mechanical Engineering and the B.A.Sc. program discontinued. Mechanical Engineering program now includes a materials option.

TABLE 3

MINERAL PROCESSING - DEGREES RECEIVED IN 1989 - FORECAST FOR 1990-1991

UNIVERSITY	BACHELOR					MASTER					DOCTORATE				
	1989			1990	1991	1989			1990	1991	1989			1990	1991
	M	F	T			M	F	T			M	F	T		
Alberta	4	1	5	1	3	1	1	2	0	3	0	0	0	1	0
British Columbia	3	0	3	1	5	1	0	1	2	3	1	0	1	1	3
Laurentian	6	0	6	5	4	-	-	-	-	-	-	-	-	-	-
Laval	2	0	2	5	4	2	0	2	2	3	2	0	2	1	2
Queen's	3	1	4	2	3	0	0	0	3	2	0	0	0	0	0
Toronto	-	-	4	0	3	-	-	1	-	-	-	-	0	1	0
TOTAL (6 Universities)	18	2	24	14	22	4	1	6	7	11	3	0	3	4	5

TABLE 4

PETROLEUM ENGINEERING - DEGREES RECEIVED IN 1989 - FORECAST FOR 1990-1991

UNIVERSITY	BACHELOR					MASTER					DOCTORATE				
	1989			1990	1991	1989			1990	1991	1989			1990	1991
	M	F	T			M	F	T			M	F	T		
Alberta	30	5	35	22	35	1	0	1	9	9	1	0	1	4	0
TOTAL (1 University)	30	5	35	22	35	1	0	1	9	9	1	0	1	4	0

TABLE 5

TECHNOLOGY - GRADUATES IN 1989 - FORECASTS FOR 1990-1991

COMMUNITY COLLEGE, CEGEP, OR TECHNICAL SCHOOL	GAS-OIL OPTIONS					GEOLOGY OPTIONS					METALLUGRY OPTIONS					MINING OPTIONS					OTHER OPTIONS				
	1989			1990	1991	1989			1990	1991	1989			1990	1991	1989			1990	1991	1989			1990	1991
	M	F	T			M	F	T			M	F	T			M	F	T			M	F	T		
B.C. Institute of Technology (x)	5	0	5	9	9						10	1	11	11	11	10	0	10	10	10					
Cambrian College						5	0	5	9	13	4	1	5	10	5	9	0	9	15	18					
College de l'Abitibi-Temiscamingue						6	0	6	-	-	3	0	3	-	-	10	2	12	-	-					
College de la Region de l'Amiante						3	1	4	4	7	2	0	2	3	7	3	0	3	7	7					
College de Trois Rivières (x)																									
College du Vieux Montréal											2	0	2	2	0										
Fanshawe College											7	5	12	11	9										
Mohawk College											6	1	7	8	0						6	5	11	6	12(a)
Northern Alta. Inst. of Technology	22	0	22	25	30	4	1	5(b)	10(b)	8(b)	10	0	10(c)	16(c)	22(c)						6	1	7(d)	8(d)	15(d)
Northern College (Haileybury) (x)																									
Sault College						5	1	6	4	1															
Southern Alta. Inst. of Technology	50	4	54	66	78	6	0	6	12	16															
University College of Cape Breton																		0	2	3					
Sir Sandford Fleming College						7	1	8	8	-											1	4	5	17	23(e)
Western Community College (x)																									
TOTALS (17 Colleges)	77	4	81	100	117	36	4	40	47	45	44	8	52	61	54	32	2	34	34	38	13	10	23	31	50

Notes: (a) Materials Testing
(b) Geology/Exploration
(c) Materials Engineering
(d) Ground Water
(e) Geotechnique (see sheet for details)

(x) estimate not provided

GENERAL SUMMARY

GRADUATES IN 1989 - FORECASTS FOR 1990-1991

TABLE	DESCRIPTION	TECHNOLOGY					BACHELOR					MASTER					DOCTORATE				
		1989			1990	1991	1989			1990	1991	1989			1990	1991	1989			1990	1991
		M	F	T			M	F	T			M	F	T			M	F	T		
1	Mining Engineering						52	5	57	55	66	23	1	24	30	33	9	0	9	10	10
2	Metallurgical Engineering						77	19	115	152	166	29	7	54	55	58	20	0	33	50	47
3	Mineral Processing (Engineering)						18	2	24	14	22	4	1	6	7	11	3	0	3	4	5
4	Petroleum Engineering						30	5	35	22	35	1	0	1	9	9	1	0	1	4	0
5	Technology																				
	Gas - Oil	77	4	81	100	117															
	Geology	36	4	40	47	45															
	Metallurgy	44	8	52	61	54															
	Mining	32	2	34	34	38															
	Other	13	10	23	31	50															
TOTALS 1987 - 753		202	28	230	273	304	177	31	231	243	289	57	9	85	101	111	33	0	46	68	62
1989 - 592																					

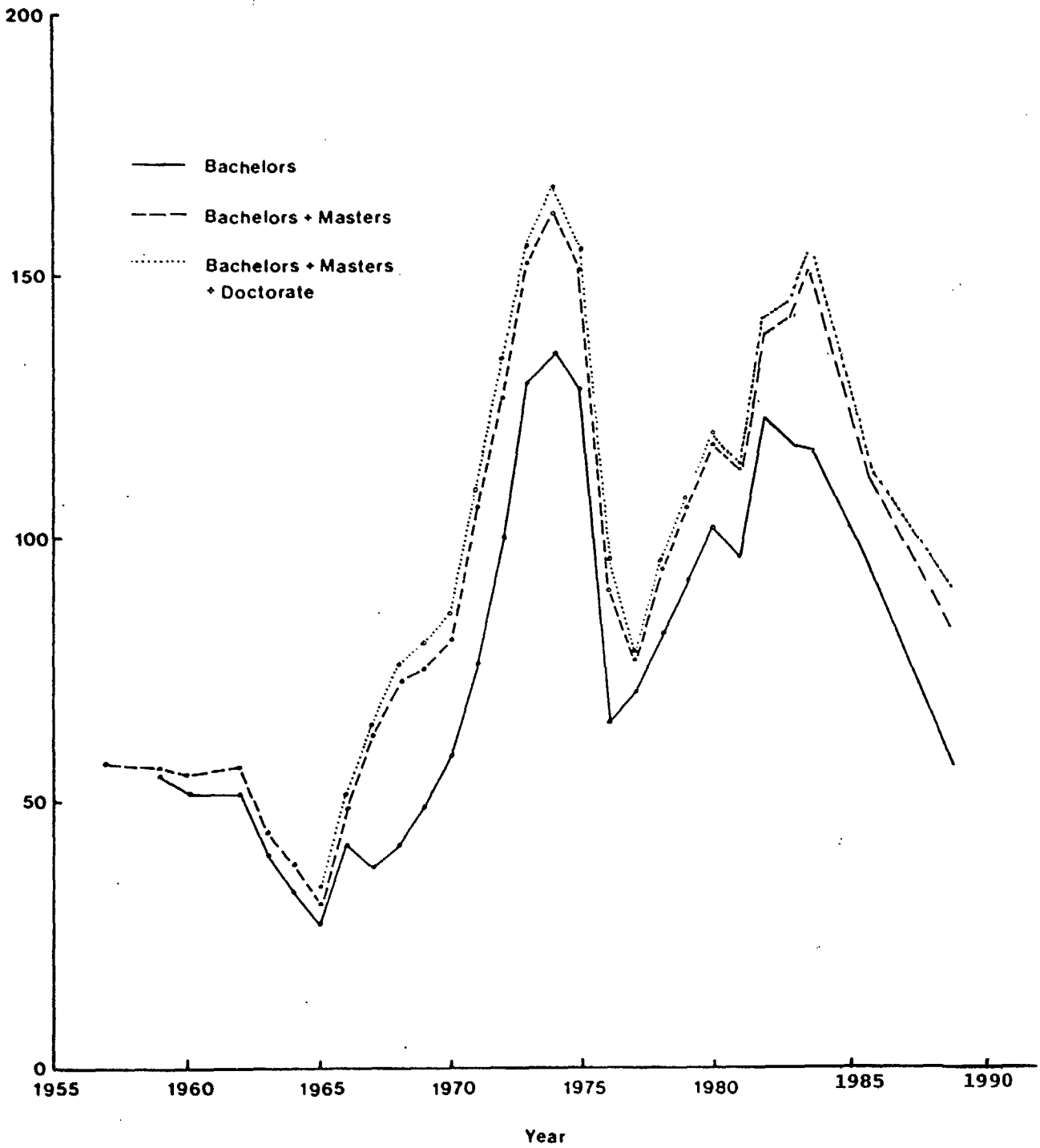

FIGURE 1. Numbers graduating in mining engineering.

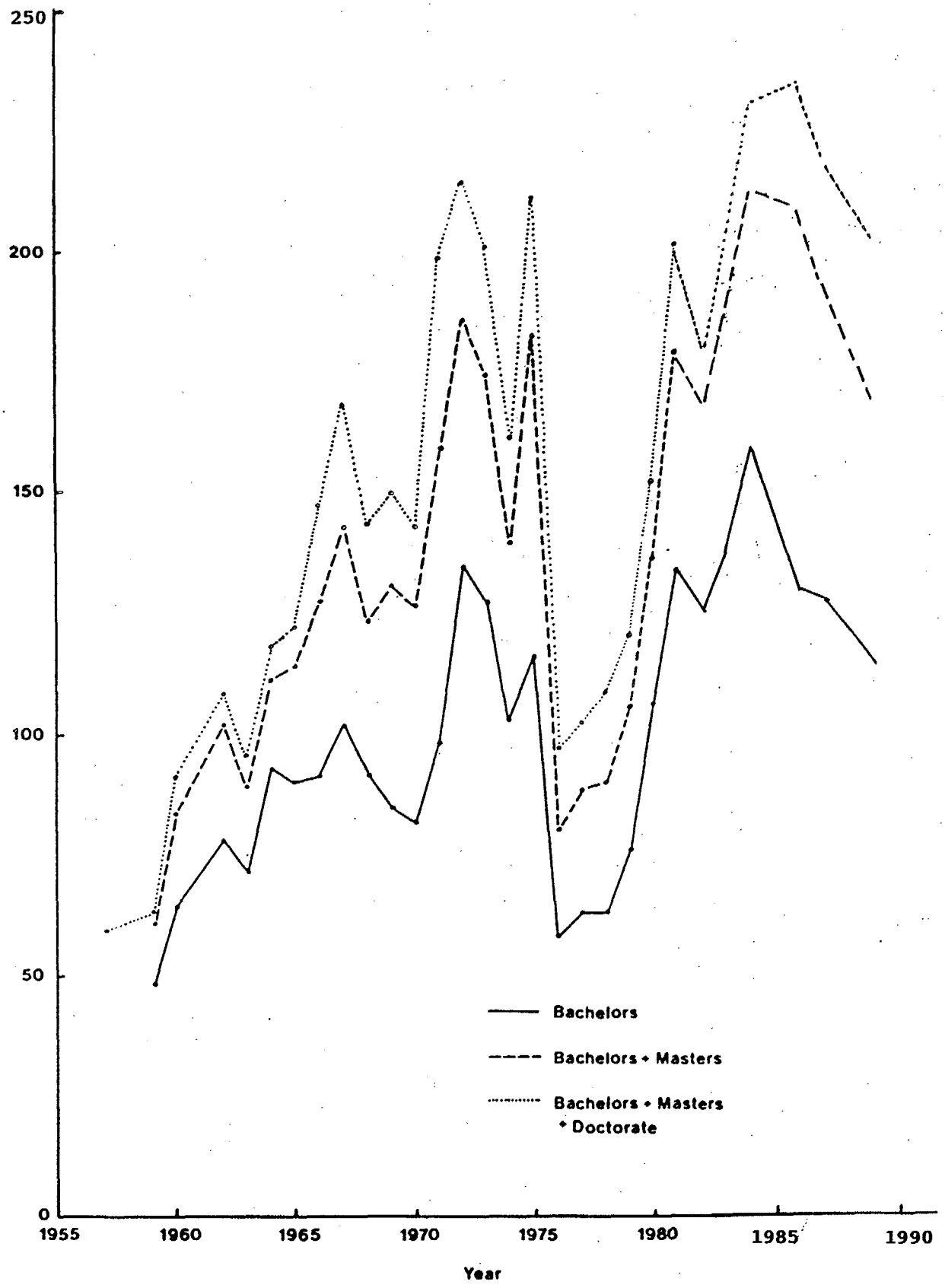

FIGURE 2. Numbers graduating in metallurgy and metallurgical engineering.

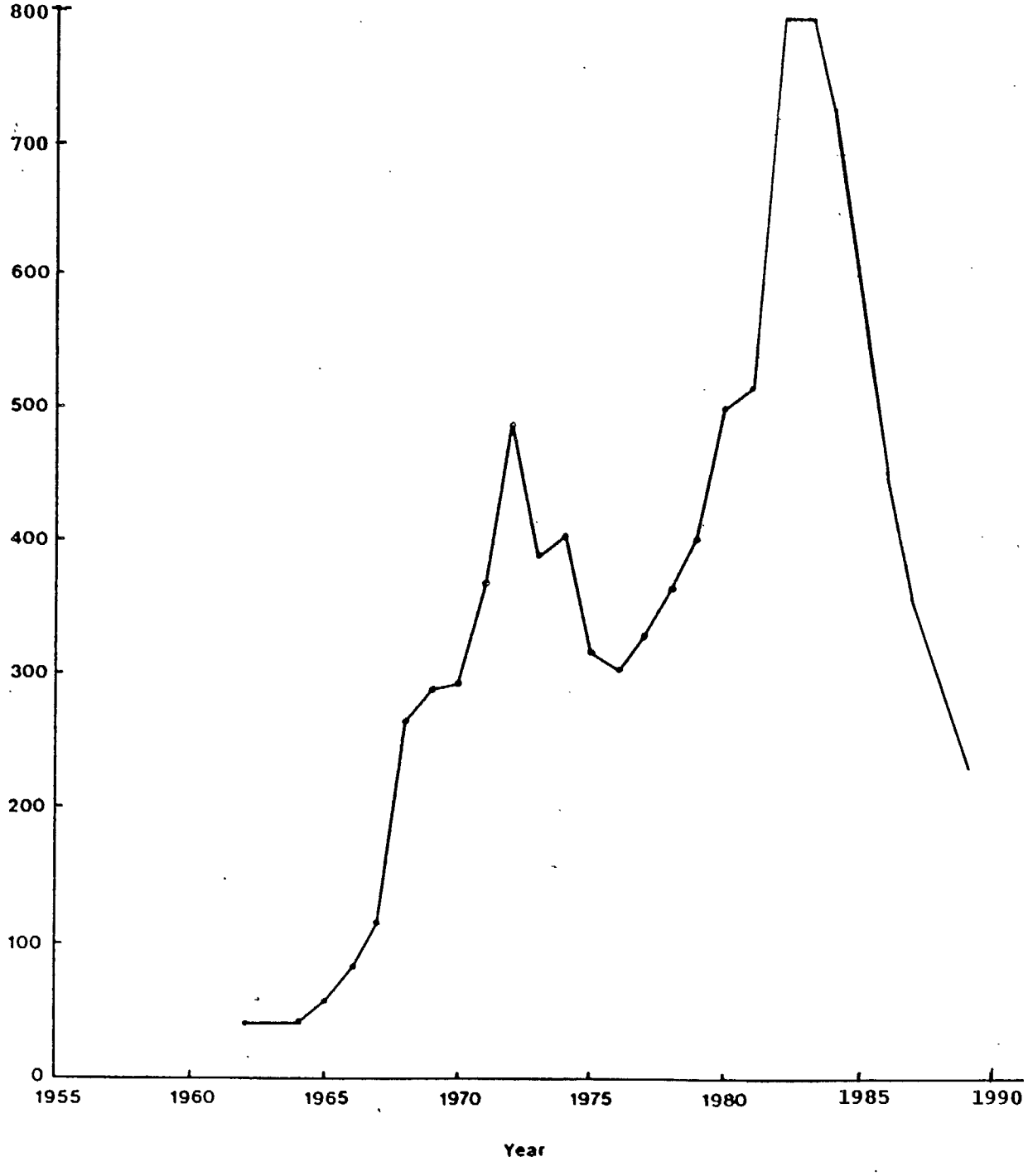

FIGURE 3. Numbers graduating in mineral technologies.