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CANMET

Canada Centre
for Mineral
and Energy
Technology

Centre canadien
de la technologie
des minéraux
et de l'énergie

**INDEX OF
MINING TECHNOLOGY
DEVELOPMENT**

1985

**INDEX SUR LE
DÉVELOPPEMENT EN
TECHNOLOGIE MINIÈRE**

1985

**MINERAL AND
ENERGY TECHNOLOGY**

**MINING RESEARCH
LABORATORIES**

**LA TECHNOLOGIE DES
MINÉRAUX ET DE L'ÉNERGIE**

**LABORATOIRES DE
RECHERCHE MINIÈRE**

**INDEX OF MINING
TECHNOLOGY DEVELOPMENT**

1985

R.J.R. Welwood
Rock Mechanics Laboratory
Mining Research Laboratories

December 1985

**MINERAL AND ENERGY TECHNOLOGY
MINING RESEARCH LABORATORIES**

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**INDEX SUR LE DÉVELOPPEMENT EN
TECHNOLOGIE MINIÈRE**

1985

R.J.R. Welwood
Laboratoire de mécanique des roches
Laboratoires de recherche minière

Décembre 1985

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INDEX OF MINING TECHNOLOGY DEVELOPMENT (1985)**FOREWORD**

The "Mining Technology Development Index" is a service which has been implemented by CANMET/MRL in order to meet the needs for a data base concerning the mining research underway in Canada. It is intended to promote efficiency and technology transfer through making people aware of what others are doing. In order to maximize its usefulness, it is intended that a new edition be issued annually.

The data base has been established in response to a recommendation of the Mining sub-committee of the National Advisory Committee on Mining and Metallurgical Research (NACMMR). The present volume represents the work of Dick Welwood, who has invested much more effort than visualized at the early stages of the project. He is to be congratulated for his fine efforts and for the results.

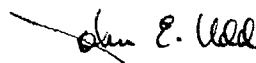
This edition is published in a bilingual format, in which the principal parts of the text are in both official languages and the survey responses are shown in the languages in which these were received. That format will be followed for subsequent editions.

In compiling the first edition of the "Index", MRL approached contacts primarily in the hard rock mining industry. In future years, with the collaboration of its sister division, the Coal Research Laboratories (CRL), it is planned to extend the coverage to the entire Canadian mining industry.

It should be noted that additional data has been made available by the respondents for many, but not all, of the research projects listed. For the present, the details for individual projects are not being published. Discussions will be held with NACMMR, and industrial contacts to determine what the requirements might be for further information and of the best mechanisms for addressing these.

Hopefully, as the "Index" becomes known and its value established, participation in the survey upon which it is founded will increase. The present edition is based on a response of about 50%. While this is considered to be good, greater participation will remain a goal.

Finally, attention is drawn to the "Opinion Poll" forms which are included as the last pages. These are an important mechanism by which we can be advised of comments, and of any errors and omissions. We hope that those using the "Index" will find the time to complete these.



John E. Udd
Director
Mining Research Laboratories

INDEX SUR LE DÉVELOPPEMENT EN TECHNOLOGIE MINIÈRE (1985)

AVANT - PROPOS

L'"index sur le développement en technologie minière" est un service offert par les LRM de CANMET en vue de répondre aux demandes d'informations sur les activités de recherche minière en cours au Canada à partir d'une base de données. Ce service vise à promouvoir l'efficacité et le transfert de la technologie par le biais de la diffusion de renseignements relatifs aux recherches effectuées dans d'autres institutions. Une édition révisée de l'index sera publiée annuellement dans le but d'accroître son utilité.

Cette base de données a été conçue suite à une recommandation du sous-comité des questions minières du Comité consultatif national sur la recherche en génie minier et métallurgique (NACMMR). La publication du présent volume a été rendue possible grâce au travail de Dick Welwood qui a consacré beaucoup plus d'efforts que prévu initialement. M. Welwood mérite nos félicitations les plus sincères pour les efforts qu'il a déployés afin de mener cette tâche à terme.

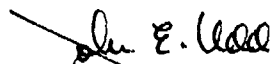
La présente édition de l'index est publiée dans les deux langues officielles et les parties principales du texte sont publiées en anglais et en français; les réponses obtenues lors du sondage apparaissent dans la langue utilisée par la personne qui a rempli le questionnaire. Les éditions subséquentes auront un format et une présentation similaires.

Pour réaliser la première édition de l'"index", les LRM se sont limités à la partie de l'industrie minière oeuvrant à l'extraction en roche dure. Au cours des prochaines années, avec la collaboration des Laboratoires de recherche sur le charbon (LRC), les LRM prévoient étendre le travail à tous les secteurs de l'industrie minière canadienne.

Il est à remarquer que des données additionnelles ont été fournies par des participants sur plusieurs projets de recherche figurant à l'index. Pour l'instant, les détails concernant les projets individuels ne seront pas publiés. Des rencontres au niveau du comité NACMMR et avec des gens de l'industrie sont prévues afin de déterminer les besoins futurs d'information et les moyens à prendre pour y répondre.

Il faut croire que dès que "l'index" sera connu et son utilité précisée, la participation au sondage de base s'accroîtra. La présente édition résulte de la participation de 50% des personnes interrogées. Bien que le nombre de participants au sondage soit intéressant, une participation encore plus grande est essentielle pour en accroître la crédibilité.

En dernier lieu, permettez-moi de rappeler au lecteur que la formule du sondage se trouve aux dernières pages de l'index. Cette formule est d'une importance primordiale car elle nous permet de prendre connaissance de vos commentaires, et des erreurs et omissions notées. Nous espérons que les futurs utilisateurs de l'index disposeront d'un peu de temps pour compléter cette fiche et nous la retourner.



John E. Udd
Directeur
Laboratoires de recherche minière

INDEX OF MINING TECHNOLOGY DEVELOPMENT (1985)

TABLE OF CONTENTS

	Page
FOREWORD	i
INTRODUCTION	1
KEY TO SUBJECT CATEGORIES	5
SECTION I: PROJECT TITLES BY ORGANIZATION	7
MINE OPERATING COMPANIES	9
UNIVERSITIES AND COLLEGES	51
PRIVATE SECTOR RESEARCH AND ASSOCIATIONS	67
PUBLIC SECTOR RESEARCH AND ENGINEERING	75
SECTION II: PROJECT TITLES BY SUBJECT CATEGORIES	97
DRILLING (1)	98
BLASTING (2)	100
GROUND CONTROL (3)	103
MATERIALS HANDLING (4)	114
EQUIPMENT (5)	118
MAINTENANCE (6)	129
BACKFILLING (7)	130
MINE LEACHING (8)	134
INDUSTRIAL ENGINEERING (9)	135
MINE DESIGN (10)	140
HEALTH AND SAFETY (11)	146
COMMUNICATIONS (12)	151
SURFACE ENVIRONMENT AND TAILINGS (13)	153
PERSONNEL DEVELOPMENT (14)	155
MANAGEMENT TECHNIQUES (15)	156
VENTILATION (16)	159
OTHERS (17)	161

INDEX SUR LE DÉVELOPPEMENT EN TECHNOLOGIE MINIÈRE

TABLE DES MATIÈRES

	Page
AVANT-PROPOS	i
INTRODUCTION	1
TABLEAU DES CLASSES DE PROJETS	5
SECTION I: TITRES DES PROJETS PAR ORGANISATION	7
COMPAGNIES MINIÈRES	9
COLLÈGES ET UNIVERSITÉS	51
ASSOCIATION ET CENTRES PRIVÉS	67
ORGANISMES DU SECTEUR PUBLIC	75
SECTION II: TITRES DES PROJETS PAR CATÉGORIE	97
FORAGE (1)	98
SAUTAGE (2)	100
SOUTÈNEMENT (3)	103
MANUTENTION DES MATÉRIAUX (4)	114
ÉQUIPEMENT GÉNÉRAL (5)	118
ENTRETIEN (6)	129
REMBLAYAGE (7)	130
LIXIVIATION (8)	134
GÉNIE INDUSTRIEL (9)	135
CONCEPTION (10)	140
SANTÉ ET SÉCURITÉ (11)	146
COMMUNICATIONS (12)	151
ENVIRONNEMENT MINIER (13)	153
ENCADREMENT DU PERSONNEL (14)	155
ADMINISTRATION (15)	156
VENTILATION (16)	159
AUTRES (17)	161

INDEX OF MINING TECHNOLOGY DEVELOPMENT (1985)

INTRODUCTION

As recommended by the Mining Sub-Committee of the National Advisory Committee on Mining and Metallurgical Research (NACMMR), CANMET's Mining Research Laboratories have established an on-going national multi-lateral mining technology information exchange database. This is a current awareness self-help service in which all involved in Canadian mining are invited to participate.

Essentially this activity will provide an exchange mechanism, pertaining to mine productivity improvement, technology development and research projects in Canada. A CANMET computer information base for Canadian mining technology has been established. The resulting periodic Index Reports may be described as "Yellow page" directories. Participants, in this way, may review what is taking place in Canada and make direct contact with organizations which have projects of common interest.

Future plans for the Index involve contacting all relevant organizations in Canada at regular intervals. This will be accomplished by visits, telephone and/or mail. However we hope, as the value of this report becomes clearer, that the larger industrial R&D groups in mining technology will voluntarily submit information at regular intervals.

The CANMET Mining Technology information base contains current project titles, with brief descriptions and other relevant information for each. From this source, Index Reports will be compiled at regular intervals (initially annually), for national distribution. As noted, these Index Reports will assemble current mining technology developments for mutual sharing. This is not a library service; participants will be responsible for making their own contacts to obtain specific information of interest to them.

This Index Report is the result of cooperation by members of many organizations involved in Canadian mining and represents an encouraging beginning. It contains all inputs received up to the end of 1985, available in CANMET's computer information base. New information will routinely be placed in computer storage. In the intervals between major Index Reports, specific project information, in designated organizations or categories, will be made available on request, with an appropriate charge for this service.

The usefulness of CANMET's Mining Technology Development Index will depend on a high level of participation, as well as continuity in the assembly and distribution of results. Hopefully, the Index will expand to encompass all possible contributors in Canada and effectively contribute to productivity improvement and cost reduction in Canadian mining operations.

INDEX SUR LE DÉVELOPPEMENT EN TECHNOLOGIE MINIÈRE (1985)

INTRODUCTION

Conformément aux recommandations du sous-comité des questions minières du Comité consultatif national sur la recherche en génies minier et métallurgique (NACMMR), les Laboratoires de recherche minière de CANMET ont mis sur pied une banque de données nationale et multi-latérale permanente dans le but de favoriser la diffusion de l'information portant sur la technologie minière. Cette banque de données se veut un service individuel d'information que peuvent utiliser toutes les personnes qui s'intéressent à l'industrie minière.

La banque de données doit essentiellement servir aux échanges de renseignements en ce qui a trait à l'amélioration de la productivité des mines, le développement technologique et les projets de recherche dans le secteur au Canada. CANMET s'est doté d'une banque de données automatisée sur la technologie minière. Il s'ensuit que l'index sera produit régulièrement, une peu comme les "pages jaunes" de l'annuaire téléphonique; il permet donc aux clients de se renseigner sur les tendances actuelles au Canada et de contacter directement les organismes qui partagent des intérêts communs.

À l'avenir, le groupe de travail projette de contacter à intervalles réguliers tous les organismes canadiens concernés, par téléphone ou par la poste et occasionnellement en se rendant sur place, en vue de faciliter la mise à jour, du répertoire des projets en cours. Il est cependant anticipé qu'en prenant conscience de l'importance de l'index, les groupes principaux de R - D sur la technologie minière seront incités à fournir, de leur propre chef, des informations de façon régulière.

La banque de données sur la technologie minière de CANMET comprend les titres des projets en cours ainsi que de brèves descriptions de ceux-ci et autres renseignements pertinents. L'index des projets en cours sera compilé à intervalles réguliers (annuellement, au début) à partir de la banque de données, en vue d'être diffusé à l'échelle nationale. Ainsi qu'il en a été fait mention, l'index comprendra des renseignements sur les développements en cours dans le domaine de la technologie minière. Ce service n'est pas un

service de bibliothèque; il incombera aux utilisateurs d'établir leurs propres contacts en vue d'obtenir les informations particulières qui les intéressent.

L'élaboration de l'index a été rendue possible grâce à la collaboration des membres d'un grand nombre d'organismes intéressés à l'industrie minière canadienne et constitue un début prometteur. L'index comprend toutes les données reçues avant la fin de l'année 1985 et est disponible à CANMET sous forme de banque de données informatisée. Toutes les nouvelles données seront intégrées dès leur réception. Entre deux mises à jour de l'index, des renseignements particuliers sur les projets classés par organismes ou catégories seront disponibles sur demande moyennant certains frais.

L'utilité de l'index des projets relatifs à la technologie minière dépendra du niveau de participation de même que de la continuité du service de compilation et de diffusion des renseignements. Il est à espérer que le répertoire prenne de l'envergure afin d'inclure les contributions de tous les chercheurs canadiens reliés au secteur et contribuer ainsi à l'amélioration de la productivité et à la réduction des frais d'exploitation minière au Canada.

**INDEX OF MINING
TECHNOLOGY DEVELOPMENT (1985)**

**INDEX SUR LE DÉVELOPPEMENT EN
TECHNOLOGIE MINIÈRE (1985)**

KEY TO SUBJECT CATEGORIES		CLASSIFICATION DES PROJETS	
			Page
1.	DRILLING	FORAGE	98
2.	BLASTING	SAUTAGE	100
3.	GROUND CONTROL	SOUTÈNEMENT	103
4.	MATERIALS HANDLING	MANUTENTION DES MATÉRIAUX	114
5.	EQUIPMENT	ÉQUIPEMENT GÉNÉRAL	118
6.	MAINTENANCE	ENTRETIEN	129
7.	BACKFILLING	REMBLAYAGE	130
8.	MINE LEACHING	LIXIVIATION	134
9.	INDUSTRIAL ENGINEERING	GÉNIE INDUSTRIEL	135
10.	MINE DESIGN	CONCEPTION	140
11.	HEALTH AND SAFETY	SANTÉ ET SÉCURITÉ	146
12.	COMMUNICATIONS	COMMUNICATIONS	151
13.	SURFACE ENVIRONMENT AND TAILINGS	ENVIRONNEMENT MINIER	153
14.	PERSONNEL DEVELOPMENT	ENCADREMENT DU PERSONNEL	155
15.	MANAGEMENT TECHNIQUES	ADMINISTRATION	156
16.	VENTILATION	VENTILATION	159
17.	OTHERS	AUTRES	161



INDEX OF MINING
TECHNOLOGY DEVELOPMENT (1985)

INDEX SUR LE DÉVELOPPEMENT EN
TECHNOLOGIE MINIÈRE (1985)

SECTION I

SECTION I

PROJECT TITLES
BY ORGANIZATION

TITRE DES PROJETS PAR
ORGANISATION



INDEX OF MINING
TECHNOLOGY DEVELOPMENT (1985)

INDEX SUR LE DÉVELOPPEMENT EN
TECHNOLOGIE MINIÈRE (1985)

MINE OPERATING COMPANIES/COMPAGNIES MINIÈRES

	Page
BRITISH COLUMBIA and TERRITORIES/COLOMBIE BRITANNIQUE ET TERRITOIRES	
WESTMIN RESOURCES LTD., MYRA FALLS OPERATIONS	11
COMINCO LTD, VALLEY COPPER MINE	12
LORNEX MINING CORPORATION LTD.	13
AFTON OPERATING CORPORATION	14
COMINCO LTD., SULLIVAN MINE	15
TECH CORPORATION LTD. (VANCOUVER)	16
CANADA TUNGSTEN MINING CORPORATION LTD.	17
PRAIRIE PROVINCES/PRAIRIES	
NORANDA INC., CENTRAL CANADA POTASH	18
INTERNATIONAL MINERALS AND CHEMICAL CORPORATION (CANADA) LTD.	19
POTASH CORPORATION OF SASKATCHEWAN, R&D MINING DEPARTMENT	20
CIGAR LAKE MINING CORPORATION	21
INCO LTD., MANITOBA DIVISION	22
HUDSON BAY MINING AND SMELTING CO. LTD., FLIN FLON/SNOW LAKE OPERATIONS .	24
ONTARIO/ONTARIO	
CAMPBELL RED LAKE MINES LTD., (BALMERTOWN)	25
NORANDA INC., LYON LAKE DIVISION	26
DOME MINES LTD.	27
KIDD CREEK MINES LTD.	28
CAMPBELL RED LAKE MINES LTD., DETOUR LAKE MINE	29
LAC MINERALS LTD., MACASSA DIVISION	30
THE ALGOMA STEEL CORPORATION LTD., ALGOMA ORE DIVISION	31
DENISON MINES LTD., ELLIOT LAKE OPERATIONS	32
RIO ALGOM LTD., ELLIOT LAKE OPERATIONS	33
FALCONBRIDGE LTD., (FALCONBRIDGE)	34
INCO LTD., ONTARIO DIVISION	35
DOMTAR CHEMICALS GROUP, SIFTO SALT DIVISION, GODERICH MINE	37
CANADIAN SALT COMPANY LTD., OJIBWAY MINE	38

**INDEX OF MINING
TECHNOLOGY DEVELOPMENT (1985)**

**INDEX SUR LE DÉVELOPPEMENT EN
TECHNOLOGIE MINIÈRE (1985)**

MINE OPERATING COMPANIES/COMPAGNIES MINIÈRES

	Page
QUEBEC/QUÉBEC	
MINERAIS LAC LIMITÉE, DIVISION BOUSQUET	39
LES MINES D'OR KIENA LIMITÉE	40
LES MINES SIGMA (QUÉBEC) LIMITÉE	41
LA COMPAGNIE MINIÈRE QUÉBEC CARTIER	42
LES MINES SELEINE INC., ÎLES-DE-LA-MADELEINE	43
SOCIÉTÉ ASBESTOS LIMITÉE, KING-BEAVÉR MINE	44
J.M. ASBESTOS INC., JEFFREY MINE	45
NORANDA INC., CENTRE DE RECHERCHE NORANDA	46
ATLANTIC PROVINCES/PROVINCES DE L'ATLANTIQUE	
BRUNSWICK MINING AND SMELTING CORPORATION LTD. (BATHURST)	48
DENISON-POTACAN POTASH COMPANY (DPPC), (SUSSEX)	49
RIO ALGOM LTD., EAST KEMPTVILLE MINE.....	50

**INDEX OF MINING
TECHNOLOGY DEVELOPMENT (1985)**

**INDEX SUR LE DÉVELOPPEMENT EN
TECHNOLOGIE MINIÈRE (1985)**

**WESTMIN RESOURCES LIMITED
MYRA FALLS OPERATIONS**
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C. De Seta,
Planning Engineer
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PROJECT LISTING/LISTE DE PROJETS

1. LOG-NORMAL ORE RESERVE CALCULATIONS (CAT. 10)
2. MINING 30° DIP OREBODIES WITH TRACKLESS EQUIPMENT (CAT. 5,10)
3. SUB-LEVEL RETREAT MINING WITH WASTE FILL (CAT. 7,10)

**INDEX OF MINING
TECHNOLOGY DEVELOPMENT (1985)**

**INDEX SUR LE DÉVELOPPEMENT EN
TECHNOLOGIE MINIÈRE (1985)**

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VALLEY COPPER MINE
P.O. Box 3070
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(604)575-2424

PROJECT LISTING/LISTE DE PROJETS

1. HEAP LEACHING - SOLVENT EXTRACTION (CAT. 8)
2. RUBBER TRUCK BOX (CAT. 4,5)
3. LAKE DEWATERING (CAT. 10,13)
4. OVERBURDEN DEWATERING (CAT. 10,13)
5. TAILINGS DAM CONSTRUCTION (CAT. 10,13)

**INDEX OF MINING
TECHNOLOGY DEVELOPMENT (1985)**

**INDEX SUR LE DÉVELOPPEMENT EN
TECHNOLOGIE MINIÈRE (1985)**

LORNE MINING CORPORATION LTD.
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PROJECT LISTING/LISTE DE PROJETS

1. TROLLEY ASSIST TRUCK HAULAGE (CAT. 4,5)
2. ROCK GRINDING INDEX (CAT. 17)
3. SCALPING/SCREENING OF MILL FEED (CAT. 4,5)
4. COMPUTERIZED MINE MAINTENANCE (CAT. 6)
5. HAULAGE TRUCK FUEL EFFICIENCY STUDY (CAT. 4,5)
6. COMPUTER ASSISTED TRUCK DISPATCH (CAT. 4,5)
7. SHOVEL PAYLOAD WEIGHING SYSTEM (CAT. 4,5)

**INDEX OF MINING
TECHNOLOGY DEVELOPMENT (1985)**

**INDEX SUR LE DÉVELOPPEMENT EN
TECHNOLOGIE MINIÈRE (1985)**

AFTON OPERATING CORPORATION
P.O. Box 937
Kamloops, B.C. V2C 5N4

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PROJECT LISTING/LISTE DE PROJETS

1. VACUUM ENHANCED DRAINAGE (CAT. 10,13)
2. OREBODY EVALUATION - PIT OPTIMIZATION (CAT. 9,10)

**INDEX OF MINING
TECHNOLOGY DEVELOPMENT (1985)**

**INDEX SUR LE DÉVELOPPEMENT EN
TECHNOLOGIE MINIÈRE (1985)**

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Technical Development
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PROJECT LISTING/LISTE DE PROJETS

1. FIELD TESTING 4 1/2 INCH AND 3 1/2 INCH IN-THE-HOLE DRILLING SYSTEM (CAT. 1,5)
2. CONTINUING RESEARCH ON EXPLOSIVES AND EXPLOSIVES TECHNOLOGY (CAT. 2)
3. UNDERGROUND COMPUTER TERMINALS FOR SHIFT BOSS REPORTING (CAT. 15)
4. LEAKY CABLE UNDERGROUND COMMUNICATION SYSTEM (CAT. 12)
5. INTRODUCTION OF FIRE RESISTANT HYDRAULIC FLUIDS (CAT. 5,11)
6. CONTROL OF DIESEL EMISSIONS (CAT. 5,11)
7. METHODS TO STABILIZE PERMAFROST (CAT. 3,10)
8. MECHANICAL MINING MACHINES: SHAFTS, RAISES, DRIFTS (CAT. 5,17)

**INDEX OF MINING
TECHNOLOGY DEVELOPMENT (1985)**

**INDEX SUR LE DÉVELOPPEMENT EN
TECHNOLOGIE MINIÈRE (1985)**

TECK CORPORATION LIMITED
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PROJECT LISTING/LISTE DE PROJETS

1. A STRATEGY FOR MINE COMPUTERIZATION (CAT 9, 10)

- MINING ASSOCIATION OF CANADA REFERENCE PUBLICATION: "PLANNING
FOR TECHNOLOGICAL CHANGE".

**INDEX OF MINING
TECHNOLOGY DEVELOPMENT (1985)**

**INDEX SUR LE DÉVELOPPEMENT EN
TECHNOLOGIE MINIÈRE (1985)**

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PROJECT LISTING/LISTE DE PROJETS

1. TAILINGS BACKFILL DE-WATERING (CAT. 7)
2. VCR ORE EXTRACTION (CAT. 10)

**INDEX OF MINING
TECHNOLOGY DEVELOPMENT (1985)**

**INDEX SUR LE DÉVELOPPEMENT EN
TECHNOLOGIE MINIÈRE (1985)**

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PROJECT LISTING/LISTE DE PROJETS

1. A FIELD TEST PROGRAM TO EVALUATE THE USE OF WASTE SALT BACKFILL
IN SASKATCHEWAN POTASH MINES (CAT. 7)

**INDEX OF MINING
TECHNOLOGY DEVELOPMENT (1985)**

**INDEX SUR LE DÉVELOPPEMENT EN
TECHNOLOGIE MINIÈRE (1985)**

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PROJECT LISTING/LISTE DE PROJETS

1. STUDY OF OVERBURDEN MOVEMENT AND PILLAR BEHAVIOUR IN EXTRACTED AREAS (CAT. 3)
2. SEISMIC MONITORING (CAT. 3)

**INDEX OF MINING
TECHNOLOGY DEVELOPMENT (1985)**

**INDEX SUR LE DÉVELOPPEMENT EN
TECHNOLOGIE MINIÈRE (1985)**

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Rocanville Division
Rocanville, Saskatchewan SOA 3L0

W.E.G. Taylor, Manager
(306)645-2870

PROJECT LISTING/LISTE DE PROJETS

1. EVALUATION OF COMMUNICATIONS SYSTEMS, ESPECIALLY THOSE WITH FREQUENCIES WHICH PASS THROUGH SALT (CAT. 12)
2. AN EVALUATION STUDY OF A MINING MACHINE BIT (CAT. 1,5)
3. BACKFILL PROJECT INVESTIGATING UNDERGROUND FILL TRANSPORT, FILL PLACEMENT, DROP PIPES AND BACKFILL COMPACTION (CAT. 7)
4. FIELD TESTS OF A DEVICE FOR ON-BOARD MONITORING K-40, AS A PROJECTED MACHINE MOUNTED ORE ANALYZER (CAT. 5,17)
5. STUDIES PERTAINING TO THE SONAR GUIDANCE OF MINING MACHINES (CAT. 9,17)
6. "ON-GOING" SEISMICITY STUDY ENCOMPASSING SURFACE AND UNDERGROUND MONITORING TO DETECT MINING INDUCED EARTH MOVEMENT (CAT. 3)

**INDEX OF MINING
TECHNOLOGY DEVELOPMENT (1985)**

**INDEX SUR LE DÉVELOPPEMENT EN
TECHNOLOGIE MINIÈRE (1985)**

CIGAR LAKE MINING CORPORATION
410-224 4th Ave. South
Saskatoon, Saskatchewan S7K 5M5

G.A. Peebles,
General Manager
(306)665-2628

PROJECT LISTING/LISTE DE PROJETS

1. DEVELOPMENT OF AN UNDERGROUND MINING APPROACH FOR A VERY HIGH GRADE URANIUM DEPOSIT (CAT. 17)

**INDEX OF MINING
TECHNOLOGY DEVELOPMENT (1985)**

**INDEX SUR LE DÉVELOPPEMENT EN
TECHNOLOGIE MINIÈRE (1985)**

INCO LIMITED
MANITOBA DIVISION
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Mines Research
(204)677-5242
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Chief Engineer
M.L. Goble, Manager***
Process Technology

PROJECT LISTING/LISTE DE PROJETS

1. DEVELOPMENT OF A GEOMECHANICAL DATABASE AND NUMERICAL MODEL FOR PREDICTING GROUND BEHAVIOUR AT DEPTH* (CAT. 3,10)
2. V.B.M. DESIGN GUIDELINES FOR STEEPLY-DIPPING OREBODIES AND SCALING TECHNIQUES* (CAT. 3,10)
3. MODIFICATION OF ROCKBOLT SHELLS FOR IMPROVED ANCHORING IN SOFTER ROCK AND ORE FORMATIONS* (CAT. 3,9)
4. ROCK BREAKING WITHOUT THE CONVENTIONAL USE OF EXPLOSIVES* (CAT. 5,17)
5. OVERBURDEN STABILIZATION* (CAT. 3,13)
6. MINING METHODS OPTIMIZATION** (CAT. 9,10)
7. MINE AIR/WATER-WASTE HEAT RECOVERY** (CAT. 16)

.../

INDEX OF MINING
TECHNOLOGY DEVELOPMENT (1985)

INDEX SUR LE DÉVELOPPEMENT EN
TECHNOLOGIE MINIÈRE (1985)

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PROJECT LISTING/LISTE DE PROJETS

8. SOUND AND VIBRATION SUPPRESSION ON COMPRESSED AIR EQUIPMENT
(JACKLEGS, STOPERS)* (CAT. 1,5)
9. POLYURETHANE APPLICATION IN THE UNDERGROUND ENVIRONMENT* (CAT. 9)
10. DEVELOPMENT OF SULPHUR REDUCING MINERAL BENEFICIATION
TECHNIQUES*** (CAT. 17)
11. CONCEPTUAL STUDIES ON USING GRANULATED SLAG AS BACKFILL IN BULK
MINING STOPES* (CAT. 7)

INDEX OF MINING
TECHNOLOGY DEVELOPMENT (1985)

INDEX SUR LE DÉVELOPPEMENT EN
TECHNOLOGIE MINIÈRE (1985)

HUDSON BAY MINING AND SMELTING
COMPANY, LIMITED
FLIN FLON/SNOW LAKE OPERATIONS
P.O. Box 1500
Flin, Flon, Manitoba R8A 1N9

F. Youngwirth
(204) 687-5396

PROJECT LISTING/LISTE DE PROJETS

1. MINING METHOD SELECTION, BLAST DESIGN AND LAYOUT FOR FLAT DIPPING OREBODY (CAT. 10)
2. BACTERIAL-LEACH ASSISTED MINING (CAT. 8)
3. MINE DESIGN CADD SYSTEM (CAT. 10)
4. TERTIARY RECOVERY ADJACENT TO UNCONSOLIDATED BACKFILL (CAT. 10, 3)

**INDEX OF MINING
TECHNOLOGY DEVELOPMENT (1985)**

**INDEX SUR LE DÉVELOPPEMENT EN
TECHNOLOGIE MINIÈRE (1985)**

CAMPBELL RED LAKE MINES LTD.
P.O. Box 10
Balmertown, Ontario POV 1C0

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PROJECT LISTING/LISTE DE PROJETS

1. SILL PILLAR DESTRESSING (CAT. 3)

2. MICROSEISMIC MONITORING (CAT. 3)

**INDEX OF MINING
TECHNOLOGY DEVELOPMENT (1985)**

**INDEX SUR LE DÉVELOPPEMENT EN
TECHNOLOGIE MINIÈRE (1985)**

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Ignace, Ontario POT 1T0

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A. Menard**
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PROJECT LISTING/LISTE DE PROJETS

1. LONG HOLE CUT AND FILL* (CAT. 10)
2. HYDRAULIC BACKFILL* (CAT. 7)
3. REMOTE SCOOP RETRIEVAL SYSTEM** (CAT. 4,5)

**INDEX OF MINING
TECHNOLOGY DEVELOPMENT (1985)**

**INDEX SUR LE DÉVELOPPEMENT EN
TECHNOLOGIE MINIÈRE (1985)**

DOME MINES LIMITED

South Porcupine, Ontario PON 1H0

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J. Vehkala*
Chief Mine Engineer
B. Robertson**
Mine Superintendent
R.H. Colquhoun***
Mill Superintendent

PROJECT LISTING/LISTE DE PROJETS

1. TAILSPINNER BACKFILL PROJECT (CAT. 7)*
2. MECHANICAL NARROW VEIN MINING (CAT. 5,17)**
3. ACTIVATED CARBON TOWERS TREATING TAILING DAM EFFLUENTS FOR GOLD RECOVERY (CAT. 13,17)***

**INDEX OF MINING
TECHNOLOGY DEVELOPMENT (1985)**

**INDEX SUR LE DÉVELOPPEMENT EN
TECHNOLOGIE MINIÈRE (1985)**

KIDD CREEK MINES LTD.
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Senior Engineer Mining R&D
M. Walter**, Associate Engineer
J.B. Gibb***
Instrumentation Supervisor
D.B. Counter****
Rock Mechanics Engineer

PROJECT LISTING/LISTE DE PROJETS

1. THE USE OF WATER UNDER PRESSURE FOR ROCK WORK (FOR MINING APPLICATIONS IN COMMON HARD ROCK) (CAT. 5,17)*
STUDY AREA #1: CUTTING AND SLOTTING
STUDY AREA #2: SECONDARY BREAKAGE
2. LOOSE ROCK SENSING SYSTEM FOR MECHANIZED SCALING (CAT. 3,5)*
3. UNDERGROUND MINE DRAINAGE SYSTEM - SLIMES HANDLING METHODS EVALUATION (CAT. 4,17)**,*
4. UNDERGROUND COMMUNICATION IMPROVEMENT (CAT. 12)***
5. TRACK HAULAGE REMOTE CONTROL (CAT. 4,5)***
6. BALLISTIC "HANG-UP" CLEARANCE SYSTEM FOR ORE PASSES AND DRAWPOINTS (CAT. 2,4)*
7. PARTIAL REPLACEMENT OF PORTLAND CEMENT IN CONSOLIDATED BACKFILL (CAT. 7)****
8. INTEGRATED MAINTENANCE SYSTEM (CAT. 6)
- MINING ASSOCIATION OF CANADA REFERENCE PUBLICATION: "PLANNING FOR TECHNOLOGICAL CHANGE".

**INDEX OF MINING
TECHNOLOGY DEVELOPMENT (1985)**

**INDEX SUR LE DÉVELOPPEMENT EN
TECHNOLOGIE MINIÈRE (1985)**

CAMPBELL RED LAKE MINES LTD.
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130 Wilson Avenue
Timmins, Ontario P4N 2S9

Garry Alexa
Personnel and Support
Services Superintendent
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PROJECT LISTING/LISTE DE PROJETS

1. EXPERIENCES WITH A REMOTE FLY-IN MINING OPERATION (CAT. 15)
2. COMPUTERIZED DRILL AND BLAST OPTIMIZATION (CAT. 1,2)
3. PRESHEAR BLASTING WITH LARGE DIAMETER HOLES (CAT. 2)
4. MINING SEQUENCES AND BLASTING FOR GRADE CONTROL PURPOSES (CAT. 2,9)

**INDEX OF MINING
TECHNOLOGY DEVELOPMENT (1985)**

**INDEX SUR LE DÉVELOPPEMENT EN
TECHNOLOGIE MINIÈRE (1985)**

LAC MINERALS LTD.
MACASSA DIVISION
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Kirkland Lake, Ontario P2N 3J7

Bill Glover,
Technical Superintendent
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PROJECT LISTING/LISTE DE PROJETS

1. MACASSA No. 3 SHAFT PROJECT (CAT. 17)

**INDEX OF MINING
TECHNOLOGY DEVELOPMENT (1985)**

**INDEX SUR LE DÉVELOPPEMENT EN
TECHNOLOGIE MINIÈRE (1985)**

THE ALGOMA STEEL CORP. LTD.
ALGOMA ORE DIVISION
Wawa, Ontario POS 1K0

D. Szekely, Manager
Mine Engineering
(705)856-2311

PROJECT LISTING/LISTE DE PROJETS

1. NON-ELECTRIC SEQUENTIAL BLASTING (CAT. 2)
2. SELF-CONTAINED SCOOPTRAM DUST SUPPRESSION SYSTEM (CAT. 5,11)
3. DEVELOP CONCEPTS AND PROCURE A MOBILE SCALER/ROCKBOLTER/
BLOCKHOLER UNIT (CAT. 3,5)

**INDEX OF MINING
TECHNOLOGY DEVELOPMENT (1985)**

**INDEX SUR LE DÉVELOPPEMENT EN
TECHNOLOGIE MINIÈRE (1985)**

DENISON MINES LIMITED
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Elliot Lake, Ontario P5A 2K2

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PROJECT LISTING/LISTE DE PROJETS

1. PROGRAM OF LARGE-SCALE UNDERGROUND TESTING OF HEAP LEACHING
(CAT. 8)
2. BACKFILL MINING PROGRAM, INVOLVING TESTING OF OPEN AND FREE
DRAINAGE FILL FENCES, FILTER MEDIA AND VARIOUS TYPES OF DRAINAGE
PIPES (CAT. 7)
3. TESTING OF TWO DRILL JUMBOS WHICH HAVE BEEN CONVERTED FOR
UP-HOLE DRILLING (CAT. 1,5)
4. CONTINUING SEARCH AND EVALUATION OF LOW PROFILE MINING EQUIPMENT
(CAT. 5)
5. RECOVERY OF HIGH GRADE FINES FROM MINE SUMPS (CAT. 17)

**INDEX OF MINING
TECHNOLOGY DEVELOPMENT (1985)**

**INDEX SUR LE DÉVELOPPEMENT EN
TECHNOLOGIE MINIÈRE (1985)**

RIO ALGOM LIMITED
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Elliot Lake, Ontario P5A 2K1

S.N. Muppalaneni,
Superintendent Mining Services
(705)461-2528

PROJECT LISTING/LISTE DE PROJETS

1. INTRODUCTION OF A SAFETY SYSTEM (CAT. 11)
2. INSTALLATION OF A NEW RAIL HAULAGE SYSTEM (CAT. 4,5)
3. STUDY OF MICROSEISMIC GROUND MONITORING (CAT. 3)
4. STUDY OF LOW PROFILE HAULAGE EQUIPMENT (CAT. 4,5)
5. DEVELOPMENT OF COMPUTERIZED WAREHOUSING AND MAINTENANCE SYSTEMS
(CAT. 6,15)

INDEX OF MINING
TECHNOLOGY DEVELOPMENT (1985)

INDEX SUR LE DÉVELOPPEMENT EN
TECHNOLOGIE MINIÈRE (1985)

FALCONBRIDGE LTD.
Falconbridge, Ontario POM 1S0

Stan Bharti,
Superintendent
Mines Technical Services
(705)693-2761

PROJECT LISTING/LISTE DE PROJETS

1. OVERSEEING A HDRK PROJECT TO AUTOMATE DRILL ROD HANDLING
(CAT. 1,5)
2. PLANS TO DEVELOP AUTOMATED DOWN-THE-HOLE DRILLING (CAT. 1,5)
3. PROGRAM IN PLACE TO OPTIMIZE BIG-HOLE BLASTING BY MONITORING
VIBRATION AND BY MINE WIDE MICROSEISMIC MONITORING OF GROUND
MOVEMENTS (CAT. 2,3)
4. METHODS BEING STUDIED TO IMPROVE ORE RECOVERY FROM PILLARS
BETWEEN FILLED STOPEs (CAT. 9,10)
5. TEST WORK UNDERWAY TO REDUCE THE CEMENT CONTENT OF BACKFILL AND
INCREASE THE SLAG CONTENT (CAT. 7)

**INDEX OF MINING
TECHNOLOGY DEVELOPMENT (1985)**

**INDEX SUR LE DÉVELOPPEMENT EN
TECHNOLOGIE MINIÈRE (1985)**

INCO LTD.
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Copper Cliff, Ontario POM 1N0

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PROJECT LISTING/LISTE DE PROJETS

1. EVALUATION OF SMOOTH WALL BLASTING TECHNIQUES (CAT. 2)
2. DEVELOPMENT OF A "SPRAY-ON" COATING FOR GROUND SUPPORT (CAT. 3)
3. INVESTIGATION OF NICKEL SLAG AS A BINDING AGENT FOR FILLS
(CAT. 7)
4. FIELD TESTING OF BLASTING CHARGES (CAT. 2)
5. EVALUATION OF ROLLER COMPACTED CONCRETE FOR UNDERGROUND ROADWAY
PAVING (CAT. 4,17)
6. BLAST VIBRATION MONITORING (CAT. 2,3)
7. INVESTIGATION OF STRENGTHS OF CONSOLIDATED FILLS (CAT. 7)
8. HIGH-DENSITY FILL (CAT. 7)
9. SURVEYING DEVIATIONS IN LONG LARGE DIAMETER (6 1/2 in.) DRILL
HOLES (CAT. 1)
10. BLAST SIMULATION BY COMPUTER MODEL (CAT. 2,9)

.../

**INDEX OF MINING
TECHNOLOGY DEVELOPMENT (1985)**

**INDEX SUR LE DÉVELOPPEMENT EN
TECHNOLOGIE MINIÈRE (1985)**

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PROJECT LISTING/LISTE DE PROJETS

11. TESTING OF "DOUBLE-DECKED" CRATER BLASTING (CAT. 2)
12. EVALUATION OF WATER EMULSION EXPLOSIVES (CAT. 2)
13. DEVELOPMENT OF AN ITH MACHINE WITH COMPONENT BREAKDOWN TO A
24 x 24 in. SIZE (CAT. 1,5)
14. DEVELOPMENT OF A "TIMBERLESS" UNDERCUT AND FILL MINING METHOD
(CAT. 7,10)
15. INVESTIGATION OF GROUTS TO CONSOLIDATE IN SITU FILL MATERIALS
(CAT. 7,9)
16. MICROSEISMIC MONITORING (CAT. 3)
17. DEVELOPMENT OF A 3-D NUMERICAL MODELLING SYSTEM FOR ROCK
MECHANICS (CAT. 3,9)
18. INVESTIGATION OF IRON ORE BLAST FURNACE SLAG AS A BINDING AGENT
FOR FILLS (CAT. 7)
19. REMOTE CONTROLLED SCOOPTRAM (CAT. 4,5)
- MINING ASSOCIATION OF CANADA REFERENCE PUBLICATION: "PLANNING
FOR TECHNOLOGICAL CHANGE"

**INDEX OF MINING
TECHNOLOGY DEVELOPMENT (1985)**

**INDEX SUR LE DÉVELOPPEMENT EN
TECHNOLOGIE MINIÈRE (1985)**

**DOMTAR CHEMICALS GROUP
SIFTO SALT DIVISION
GODERICH MINE
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Goderich, Ontario N7A 4C6**

G. Brousseau,* Mine Manager
(519)524-8351
D. Bray,** Manager, Maintenance
Planning & Engineering
J. Cove,*** Project Engineer

PROJECT LISTING/LISTE DE PROJETS

1. GROUND CONTROL RESEARCH AND TESTING (CAT. 3)*
2. MECHANICAL SCALING (CAT. 3,5)**
3. UNDERGROUND RADIO COMMUNICATIONS (CAT. 12)***
4. VACUUM-BLOWER UNIT (CAT. 16)***

**INDEX OF MINING
TECHNOLOGY DEVELOPMENT (1985)**

**INDEX SUR LE DÉVELOPPEMENT EN
TECHNOLOGIE MINIÈRE (1985)**

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OJIBWAY MINE
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PROJECT LISTING/LISTE DE PROJETS

1. BOAT LOADING FACILITIES STUDY (CAT. 4,17)
2. L.H.D. FLEET REPLACEMENT (CAT. 4,5)
3. INSTALLATION OF TWO 100 TON TRUCK SCALES (CAT. 4,5)

**INDEX OF MINING
TECHNOLOGY DEVELOPMENT (1985)**

**INDEX SUR LE DÉVELOPPEMENT EN
TECHNOLOGIE MINIÈRE (1985)**

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DIVISION BOUSQUET
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Malartic, Québec JOY 1Z0

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PROJECT LISTING/LISTE DE PROJETS

1. TIME STUDY REGARDING LONG HOLE DRILL (CAT. 1,5)
2. SWELLEX BOLTS (CAT. 3,5)
3. CONTINUOUS MINER (CAT. 5,17)

**INDEX OF MINING
TECHNOLOGY DEVELOPMENT (1985)**

**INDEX SUR LE DÉVELOPPEMENT EN
TECHNOLOGIE MINIÈRE (1985)**

LES MINES D'OR KIENA LIMITÉE
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PROJECT LISTING/LISTE DE PROJETS

1. ADHESION OF FLOCCULANT IN MINING BACKFILL (CAT. 7)
2. TUNNEL BORING MACHINE (CAT. 5,17)
3. COMMUNICATION SYSTEMS FOR UNDERGROUND WORKERS (CAT. 12)
4. SCALER MACHINE IN UNDERGROUND MINE (CAT. 3,5)

**INDEX OF MINING
TECHNOLOGY DEVELOPMENT (1985)**

**INDEX SUR LE DÉVELOPPEMENT EN
TECHNOLOGIE MINIÈRE (1985)**

LES MINES SIGMA (QUÉBEC)LIMITÉE
Val D'Or, Québec J9P 4N8

Marc G. Tremblay,
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PROJECT LISTING/LISTE DE PROJETS

1. IN SITU STRESS MEASUREMENT IN 1305-W DRIFT (CAT. 3)

2. PURCHASE OF COMPUTER EQUIPMENT AS WELL AS APPROPRIATE SOFTWARE IN MINING (CAT. 5,9)

**INDEX OF MINING
TECHNOLOGY DEVELOPMENT (1985)**

**INDEX SUR LE DÉVELOPPEMENT EN
TECHNOLOGIE MINIÈRE (1985)**

**LA COMPAGNIE MINIÈRE
QUÉBEC CARTIER**
Port Cartier, Québec G5B 2H3

Raynald Fournier, Director
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PROJECT LISTING/LISTE DE PROJETS

1. COMPUTERIZED SYSTEM TO IMPROVE CONCENTRATE FEED BLENDING
(DEVELOPED AT MCMASTER UNIVERSITY) (CAT. 4,9)

2. MEANS OF RELATING DRILL HOLE CUTTINGS FROM EACH ORE BLOCK TO ORE
REACTIONS IN THE MILL, TO IMPROVE THE PREDICTABILITY OF
CONCENTRATE GRADES (CAT. 9,17)

3. AUTOMATIC TRUCK DISPATCH SYSTEM (CAT. 4,5)
- MINING ASSOCIATION OF CANADA REFERENCE PUBLICATION: "PLANNING
FOR TECHNOLOGICAL CHANGE".

**INDEX OF MINING
TECHNOLOGY DEVELOPMENT (1985)**

**INDEX SUR LE DÉVELOPPEMENT EN
TECHNOLOGIE MINIÈRE (1985)**

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Denis C. Gagnon
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PROJECT LISTING/LISTE DE PROJETS

1. ROCK MECHANICS COMPUTER SIMULATION MODEL (CAT. 3,9)

**INDEX OF MINING
TECHNOLOGY DEVELOPMENT (1985)**

**INDEX SUR LE DÉVELOPPEMENT EN
TECHNOLOGIE MINIÈRE (1985)**

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PROJECT LISTING/LISTE DE PROJETS

1. EXPLOSIVE CONSUMPTION AT THE KING MINE (CAT. 2)*
2. DEDUSTING OF ASBESTOS FIBRE (CAT. 11)**

INDEX OF MINING
TECHNOLOGY DEVELOPMENT (1985)

INDEX SUR LE DÉVELOPPEMENT EN
TECHNOLOGIE MINIÈRE (1985)

J.M. ASBESTOS INC.
ASBESTOS FIBRE DIVISION
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Asbestos, Québec J1T 3N2

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PROJECT LISTING/LISTE DE PROJETS

1. COLLABORATION WITH HYDRO-QUÉBEC AND GENERAL ELECTRIC TO EVOLVE A TROLLEY-TRUCK HAULAGE OPERATION (CAT. 4,5)
2. INSTALLATION AND EVALUATION OF 20 ft STRESSED CABLE BOLTS IN PRE-SHEARED PIT WALLS (CAT. 3,5)
3. ANALYSIS OF AUTOMATIC SKIP LOADING, NOT CURRENTLY ECONOMIC (CAT. 4,5)
4. HYDRAULIC LEVELLING AND ALARM SYSTEM ON A BENCH IN THE OPEN PIT MINE (CAT. 11)
5. REMOTE SURVEILLANCE OF PLANT ENTRANCES (CAT. 15)
6. REMOTE CONTROL OF PRIMARY CRUSHER OPERATION (CAT. 4,5)
7. REMOTE SURVEILLANCE OF THE CENTRAL AIR AND STEAM PLANT OPERATION (CAT. 15)
8. PROGRAM TO ELIMINATE PRODUCT CONTAMINATION BY IMPROVED HOUSEKEEPING PRACTICES (CAT. 15)
9. PROGRAMMABLE CONTROLLER FOR PACKAGING OPERATION (CAT. 4,5)

**INDEX OF MINING
TECHNOLOGY DEVELOPMENT (1985)**

**INDEX SUR LE DÉVELOPPEMENT EN
TECHNOLOGIE MINIÈRE (1985)**

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240 Hymus Boulevard
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PROJECT LISTING/LISTE DE PROJETS

1. PREPARATION OF A PROPOSAL TO DEVELOP A NEW MINING METHOD WITH ONE OF THE MAIN OBJECTIVES BEING TO REDUCE OR ELIMINATE THE CYCLIC ELEMENTS OF MINING (CAT. 10,17)
2. STUDY OF THE IN SITU CONSOLIDATION OF BACKFILL BY FREEZING, INJECTIONS, ETC., TO REDUCE CEMENT COSTS AND THE DILUTION OF PILLAR ORE (CAT. 7)
3. STUDY OF THE IN SITU MINING OF COPPER OXIDE ORE BY LEACHING (CAT. 8)
4. DEVELOPMENT OF A CAD SYSTEM FOR MINE DESIGN, UTILIZING PERSONAL COMPUTERS RATHER THAN COSTLY MAIN FRAME EQUIPMENT (CAT. 10)
5. NUMERICAL MODELLING FOR MINE DESIGN (CAT. 10)
6. MICROSEISMIC MONITORING TECHNOLOGY (CAT. 3)
7. OPTIMIZATION OF UNDERGROUND STOPE BLASTS (CAT. 2)
8. ROCK MECHANICS FIELD DATA ACQUISITION (CAT. 3)
9. BACTERIALLY-ASSISTED UNDERGROUND LEACHING OF COPPER SULPHIDE (CAT. 8)

.../

**INDEX OF MINING
TECHNOLOGY DEVELOPMENT (1985)**

**INDEX SUR LE DÉVELOPPEMENT EN
TECHNOLOGIE MINIÈRE (1985)**

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PROJECT LISTING/LISTE DE PROJETS

10. ICE AS A BACKFILL IN UNDERGROUND MINES (CAT. 7)
11. DEVELOPMENT OF NOVEL GROUND CONTROL INSTRUMENTATION (CAT. 3,5)
12. ULTRASONIC MINE SURVEY PROBE (CAT.3,5)
13. DEVELOPMENT OF A COMPUTERIZED RAMP DESIGN PROGRAM (CAT. 9,10)

**INDEX OF MINING
TECHNOLOGY DEVELOPMENT (1985)**

**INDEX SUR LE DÉVELOPPEMENT EN
TECHNOLOGIE MINIÈRE (1985)**

**BRUNSWICK MINING AND SMELTING
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F.W. Hermann*
Senior Project Engineer
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D. Gagnon**

PROJECT LISTING/LISTE DE PROJETS

1. LASER SURVEYING* (CAT. 17)
2. AUTOMATIC FAN CONTROL* (CAT. 5,16)
3. "HANG-UP" CHARGES* (CAT. 2,4)
4. LOAD MONITORING SYSTEM* (CAT. 4,5)
5. RECESSING ATTACHMENT/CABLE BOLTING** (CAT. 3,5)
6. CABLE BOLT CUTTING WITH EXPLOSIVES** (CAT. 2,3)
7. MODIFIED ROCK BOLT DOLLIE WRENCH** (CAT. 3,5)
8. MUCK PILE WATER SPRAYS** (CAT. 4,5)
9. FRICTION WASHERS FOR SCREEN SUPPORT** (CAT. 3,5)

INDEX OF MINING
TECHNOLOGY DEVELOPMENT (1985)

INDEX SUR LE DÉVELOPPEMENT EN
TECHNOLOGIE MINIÈRE (1985)

DENISON-POTACAN POTASH CO.
(DPPC)
P.O. Box 5005
Sussex, N.B. EOE 1PO

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(506)839-2146

PROJECT LISTING/LISTE DE PROJETS

1. ROCK MECHANICS INSTRUMENTATION FOR AN UNDERGROUND POTASH MINE
UTILIZING BACKFILLING OPERATIONS (CAT. 3,7)
2. USE OF BACKFILL IN POTASH MINING (LABORATORY AND IN SITU
TESTING) (CAT. 7)
3. USE OF BACKFILL IN POTASH MINING (MODELLING) (CAT. 7)

**INDEX OF MINING
TECHNOLOGY DEVELOPMENT (1985)**

**INDEX SUR LE DÉVELOPPEMENT EN
TECHNOLOGIE MINIÈRE (1985)**

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PROJECT LISTING/LISTE DE PROJETS

1. JOB ROTATION (CAT. 14)

2. ELIMINATION OF SLURRY EXPLOSIVE (CAT. 2)

**INDEX OF MINING
TECHNOLOGY DEVELOPMENT (1985)**

**INDEX SUR LE DÉVELOPPEMENT EN
TECHNOLOGIE MINIÈRE (1985)**

UNIVERSITIES AND COLLEGES/ COLLÈGES ET UNIVERSITÉS

	Page
BRITISH COLUMBIA and TERRITORIES/COLOMBIE BRITANNIQUE ET TERRITOIRES	
UNIVERSITY OF BRITISH COLUMBIA, DEPARTMENT OF MINING AND MINERAL PROCESS ENGINEERING	52
PRAIRIE PROVINCES/PRAIRIES	
UNIVERSITY OF ALBERTA DEPARTMENT OF MINING, METALLURGICAL AND PETROLEUM ENGINEERING	55
UNIVERSITY OF SASKATCHEWAN, DEPARTMENT OF GEOLOGICAL SCIENCES	56
ONTARIO/ONTARIO	
LAKEHEAD UNIVERSITY, SCHOOL OF ENGINEERING	57
QUEEN'S UNIVERSITY, DEPARTMENT OF MINING ENGINEERING	58
QUEBEC/QUÉBEC	
ÉCOLE POLYTECHNIQUE, DÉPARTEMENT DE GÉNIE MINÉRAL	60
ÉCOLE POLYTECHNIQUE, CENTRE DE DÉVELOPPEMENT TECHNOLOGIQUE	61
MCGILL UNIVERSITY, DEPARTMENT OF MINING AND METALLURGICAL ENGINEERING ...	62
UNIVERSITÉ LAVAL, CITÉ UNIVERSITAIRE	64
UNIVERSITÉ DU QUÉBEC À CHICOUTIMI	66

**INDEX OF MINING
TECHNOLOGY DEVELOPMENT (1985)**

**INDEX SUR LE DÉVELOPPEMENT EN
TECHNOLOGIE MINIÈRE (1985)**

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PROJECT LISTING/LISTE DE PROJETS

1. COMPUTER MODELLING AND SIMULATION OF THE INTERACTION OF TECHNOLOGICAL AND ECONOMIC PARAMETERS INFLUENCING SUCCESSFUL MINING IN B.C. (CAT. 17)
2. A COMPUTER PROGRAM HAS BEEN DEVELOPED BY USE OF THE MONTE CARLO TECHNIQUE TO ESTIMATE OPERATIONAL TIMES OF A DRILL-BLAST-MUCK SUPPORT TUNNELLING SYSTEM (CAT. 9,17)
3. ESTIMATION OF OPTIMUM STOPE SPAN DIMENSIONS GIVEN ITS ROCK QUALITY, STRESS CONDITIONS, AS WELL AS EXCAVATION METHOD AND RATE (CAT. 9,10)
4. A COMPREHENSIVE AND FULLY DOCUMENTED DESIGN PROCEDURE HAS BEEN PROPOSED TO ASSIST MINE DESIGNERS IN ACHIEVING AN OPTIMAL MINE LAYOUT (CAT. 9,10)
5. ANALYSIS OF IN-PIT CRUSHING AND CONVEYING IN OPEN PIT MINES AS AN ALTERNATIVE TO CONVENTIONAL TRUCK/SHOVEL SYSTEM (CAT. 4,5)

.../

**INDEX OF MINING
TECHNOLOGY DEVELOPMENT (1985)**

**INDEX SUR LE DÉVELOPPEMENT EN
TECHNOLOGIE MINIÈRE (1985)**

**UNIVERSITY OF BRITISH COLUMBIA
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PROJECT LISTING/LISTE DE PROJETS

6. INVESTIGATION OF THE IN SITU STRESS CONDITIONS AND THE DESIGNS AND ANALYSES BY NUMERICAL MODELLING METHODS OF PROPOSED CUT-AND-FILL STOPE (CAT. 9,10)
7. RECIRCULATION OF MINE VENTILATION IN ORDER TO DECREASE HEATING COSTS (CAT. 16)
8. DIFFERENT ASPECTS OF ROCK MECHANICS AT RUTTAN MINE, INCLUDING SONIC DEVICES (CAT. 3,5)
9. A LINKAGE ALGORITHM FOR FINITE ELEMENT/BOUNDARY INTEGRAL METHODS FOR SPECIFIC ROCK MECHANICS AND UNDERGROUND MINING APPLICATIONS TO REALISTICALLY MODEL THE ROCK MASS AND SUPPORT SYSTEMS (CAT. 3)
10. DESIGN AND MODELLING OF LAYOUTS IN SALT AND POTASH DEPOSITS (CAT. 10)

.../

**INDEX OF MINING
TECHNOLOGY DEVELOPMENT (1985)**

**INDEX SUR LE DÉVELOPPEMENT EN
TECHNOLOGIE MINIÈRE (1985)**

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PROJECT LISTING/LISTE DE PROJETS

11. APPLICATION OF GEOSTATISTICS TO ORE RESERVE ESTIMATION AT THE VENUS MINE, YUKON TERRITORY (CAT. 10)
12. USE OF DIESELS IN SURFACE AND UNDERGROUND MINING (CAT. 5)
13. STEEL FIBRE REINFORCED SILICA FUME SHOTCRETE RIBS IN SUBSTITUTION FOR STEEL RIBS FOR THE SUPPORT OF UNDERGROUND OPENINGS (CAT. 3,5)
14. STUDY OF THE BASIC MECHANISMS THAT RESULT IN VIOLENT ROCK FAILURE IN UNDERGROUND MINES (CAT. 3)
15. A COMPUTER PROGRAM TO ESTIMATE CAPITAL AND OPERATING COSTS IN THE MINING INDUSTRY (CAT. 15)

**INDEX OF MINING
TECHNOLOGY DEVELOPMENT (1985)**

**INDEX SUR LE DÉVELOPPEMENT EN
TECHNOLOGIE MINIÈRE (1985)**

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PROJECT LISTING/LISTE DE PROJETS

1. DESIGN CRITERIA FOR PILLARS IN COAL MINES (CAT. 10)

2. OUTBURSTS IN COAL MINES (CAT. 3)

**INDEX OF MINING
TECHNOLOGY DEVELOPMENT (1985)**

**INDEX SUR LE DÉVELOPPEMENT EN
TECHNOLOGIE MINIÈRE (1985)**

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PROJECT LISTING/LISTE DE PROJETS

1. ROCK SURFACE ROUGHNESS STUDY (CAT. 3)
2. SALT TAILINGS STUDY (REGARDING BACKFILL) (CAT. 7)
3. MICROCOMPUTER APPLICATIONS STUDY (CAT. 9)
4. EVOLUTION AND TESTING OF LARGE SAMPLE TESTING LABORATORY
(CAT. 17)

INDEX OF MINING
TECHNOLOGY DEVELOPMENT (1985)

INDEX SUR LE DÉVELOPPEMENT EN
TECHNOLOGIE MINIÈRE (1985)

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PROJECT LISTING/LISTE DE PROJETS

1. REMOVAL OF RADIUM FROM URANIUM ORES AND MILL TAILINGS (CAT. 17)

**INDEX OF MINING
TECHNOLOGY DEVELOPMENT (1985)**

**INDEX SUR LE DÉVELOPPEMENT EN
TECHNOLOGIE MINIÈRE (1985)**

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PROJECT LISTING/LISTE DE PROJETS

1. STUDY OF IN SITU STRESS MEASUREMENTS AT CAMPFLO MINES, INCLUDING
COMPUTER MODELLING OF STRESS PARAMETER DATA DETERMINED
UNDERGROUND (CAT. 3)

2. STUDY OF NON-DESTRUCTIVE ROCKBOLT LOAD CAPACITY MEASUREMENT
(CAT. 3,5)

3. "ON-GOING" RESEARCH IN MINIMIZATION OF BLAST VIBRATIONS AND
OPTIMIZATION OF ROCK MASS FRAGMENTATION (CAT. 2,9)

4. DEVELOPMENT OF A COMPUTERIZED OPEN PIT PACKAGE, (CAT. 17)
INCLUDING:
 - GEOSTATISTICAL ANALYSIS
 - PIT BOUNDARY ANALYSIS
 - COMPUTER ASSISTED MINE PLANNING
 - AUTOMATED MINE PLANNING USING LINEAR PROGRAMMING
 - HAULAGE ROAD LOCATION STUDIES
 - COMPUTER ASSISTED BLAST DESIGNS

5. DEVELOPMENT OF A COMPUTER AIDED SYSTEM FOR UNDERGROUND MINE
PLANNING AND DESIGN (CAT. 10)

.../

**INDEX OF MINING
TECHNOLOGY DEVELOPMENT (1985)**

**INDEX SUR LE DÉVELOPPEMENT EN
TECHNOLOGIE MINIÈRE (1985)**

QUEEN'S UNIVERSITY
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PROJECT LISTING/LISTE DE PROJETS

6. STUDY OF PROPERTIES OF BACKFILL MATERIALS FOR FROZEN BACKFILLS,
IN FROZEN ENVIRONMENTS (CAT. 7)
7. STUDY OF RADIOACTIVE PROPERTIES OF ORE AND BACKFILL MATERIALS IN
URANIUM MINES TO MORE ACCURATELY PREDICT RADIATION LEVELS
(CAT. 7,11)
8. TESTING OF SLAG PYRITE FOR UNDERGROUND BACKFILL (CAT. 7)
9. EXAMINATION OF UNDERGROUND HAULAGE SYSTEMS USING A COMPUTER
MODEL (CAT. 4,9)
10. LABORATORY STUDIES OF HIGH DENSITY TAILINGS FILL SLURRY
VISCOSITIES (CAT. 7)
11. STUDY OF THE STRUCTURE, METHODS AND REQUIREMENTS OF MAINTENANCE
SYSTEMS IN MINING OPERATIONS (CAT. 6)
12. DEVELOPMENT OF THE APPLICATION OF NUMERICAL TECHNIQUES IN ROCK
MECHANICS (CAT. 3)
13. FIELD EVALUATION OF A VIBRATING OVERBURDEN DRILL TO ASSESS
OPERATING CHARACTERISTICS (CAT. 1,5)
14. VENTILATION STUDIES AT DENISON MINES TO ESTABLISH A COMPUTER
MODEL OF THE MINE VENTILATION NETWORK (CAT. 16)

**INDEX OF MINING
TECHNOLOGY DEVELOPMENT (1985)**

**INDEX SUR LE DÉVELOPPEMENT EN
TECHNOLOGIE MINIÈRE (1985)**

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PROJECT LISTING/LISTE DE PROJETS

1. SIMULATION INFORMATISÉE DE L'AÉRAGE (CAT. 16)**
2. PERTE DE MINÉRAI ET DILUTION PAR DES STÉRILES (CAT. 17)*
3. DISPATCHING DE CAMIONS DANS UNE EXPLOITATION À CIEL OUVERT
(CAT. 4,9)***
4. LA PRODUCTIVITÉ MINIÈRE (CAT. 9)*
5. OPTIMISATIONS DES CONTOURS DES EXPLOITATIONS À CIEL OUVERT
(CAT. 9,10)*
6. MODÉLISATION D'EXPLOITATIONS MINIÈRES SOUTERRAINES
(CAT. 9,10)****
7. AMÉLIORATION DES MÉTHODES DE MINAGES EXISTANTES (CAT. 17)****

**INDEX OF MINING
TECHNOLOGY DEVELOPMENT (1985)**

**INDEX SUR LE DÉVELOPPEMENT EN
TECHNOLOGIE MINIÈRE (1985)**

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PROJECT LISTING/LISTE DE PROJETS

1. ENQUÊTE AUPRÈS DE L'INDUSTRIE MINIÈRE DU QUÉBEC SUR LES
UTILISATIONS DE L'INFORMATIQUE DANS LES MINES SOUTERRAINES
(CAT. 17)

**INDEX OF MINING
TECHNOLOGY DEVELOPMENT (1985)**

**INDEX SUR LE DÉVELOPPEMENT EN
TECHNOLOGIE MINIÈRE (1985)**

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PROJECT LISTING/LISTE DE PROJETS

1. CEMENTED HYDRAULIC BACKFILL MECHANICAL PROPERTIES (CAT. 7)*
2. PILLAR RECOVERY DESIGN AND CONTROL (CAT. 3,10)*
3. ROCKBURST PREDICTION AND CONTROL (CAT. 3)*
4. A GEOTECHNICAL STUDY OF LONGWALL FACE GATEROADS IN THE CAPE BRETON COALFIELD (CAT. 17)*
5. ANALYSIS OF ROCK-SUPPORT INTERACTION IN LONGWALL MINING (CAT. 17)**
6. AN INVESTIGATION INTO THE PHYSICAL AND MECHANICAL PROPERTIES OF SALT BACKFILL USED IN POTASH MINES (CAT. 7)**
7. AN INVESTIGATION INTO MONOLITHIC PACKING SYSTEMS (CAT. 17)**
8. ROCK STRUCTURE, AN IMPORTANT FACTOR IN FORECASTING BLAST FRAGMENTATION (CAT. 2)***
9. FIELD EVALUATION OF BLAST FRAGMENTATION (CAT. 2)***

.../

INDEX OF MINING
TECHNOLOGY DEVELOPMENT (1985)

INDEX SUR LE DÉVELOPPEMENT EN
TECHNOLOGIE MINIÈRE (1985)

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PROJECT LISTING/LISTE DE PROJETS

10. BLAST PATTERN INTENSITY AS A COMPONENT OF BENCH MINING
FRAGMENTATION (CAT. 2)***
11. BOREHOLE PATTERN AT BREAK-THROUGH (CAT. 1,9)***
12. INQUIRY INTO THE USE OF COMPUTING IN QUEBEC UNDERGROUND MINES
(CAT. 17)****
13. A MICRO-COMPUTER BASED MINE DESIGN/MINE PLANNING SYSTEM FOR SMALL
UNDERGROUND MINING OPERATIONS (CAT. 9,10)****
14. SOFTWARE FOR THE ECONOMIC EVALUATION OF MINERAL INVESTMENT
PROPOSALS (CAT. 15)*****
15. OPTIMIZATION OF MINE PROJECT SPECIFICATIONS (CAT. 15)*****
16. COMPUTERIZED SIMULATION OF MINING OPERATIONS (CAT. 15)*****
17. ECONOMIC CHARACTERISTICS OF GOLD DEPOSITS IN QUEBEC
(CAT. 15)*****
18. COMPARATIVE STUDY OF INTERNATIONAL MINERAL TAXATION SYSTEMS
(CAT. 15)*****

**INDEX OF MINING
TECHNOLOGY DEVELOPMENT (1985)**

**INDEX SUR LE DÉVELOPPEMENT EN
TECHNOLOGIE MINIÈRE (1985)**

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PROJECT LISTING/LISTE DE PROJETS

1. VENTILATION MINIÈRE: IMPACT DES NORMES DE SANTÉ AU TRAVAIL
(CAT. 11,16)
2. IMPLEMENTING A MONITORING SYSTEM FOR THE VENTILATION NETWORK AT
BRUNSWICK MINING AND SMELTING CORPORATION LIMITED (CAT. 16)
3. ÉVALUATION QUANTITATIVE INFORMATISÉE DE LA VENTILATION MINIÈRE
(CAT. 16)
4. DIMENSIONNEMENT DES PILIERS DE SURFACE D'EXPLOITATIONS MINIÈRES
(CAT. 10)
5. DIMENSIONNEMENT DES REVÊTEMENTS DE BÉTON DES GALERIES
SOUTERRAINES (CAT. 10)
6. ÉTUDE DU SOUTIRAGE DES BLOCS MINÉRALISÉS AUX NIVEAUX 16 et 18 DE
LA MINE MALARTIC POUR LES MINES CAMFLO LTÉE. (CAT. 4,9)
7. INFLUENCE DE LA PRIME AU RENDEMENT SUR LES ACCIDENTS DU TRAVAIL
DANS LES MINES SOUTERRAINES DU QUÉBEC (CAT. 11)
8. PRÉVISION DE L'IMMINENCE DE L'EFFONDREMENT DU REVÊTEMENT DE BÉTON
DES GALERIES MINIÈRES (CAT. 3)

.../

**INDEX OF MINING
TECHNOLOGY DEVELOPMENT (1985)**

**INDEX SUR LE DÉVELOPPEMENT EN
TECHNOLOGIE MINIÈRE (1985)**

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PROJECT LISTING/LISTE DE PROJETS

9. SIMULATION DE RÉSEAUX DE VENTILATION SOUTERRAIN (CAT. 16)
10. BACK-ANALYSIS OF A MAJOR UNDERGROUND GROUND FAILURE (CAT. 3)
11. MODE OF ACTION AND DESIGN OF CABLE-BOLT SUPPORT (CAT. 3,9)
12. GUIDELINES FOR THE USE OF ROCKBOLTING (CAT. 3)
13. ORE DRAW MODELLING AND OPTIMIZATION (CAT. 4,9)

**INDEX OF MINING
TECHNOLOGY DEVELOPMENT (1985)**

**INDEX SUR LE DÉVELOPPEMENT EN
TECHNOLOGIE MINIÈRE (1985)**

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PROJECT LISTING/LISTE DE PROJETS

1. LES ÉTUDES GÉOTECHNIQUES DE DIVERSE NATURES SUR LES SOLS, LES
ROCHES ET LES BÉTONS (CAT. 17)

2. LES ANALYSES PAR DIFFÉRENTES MÉTHODES POUR LE CONTRÔLE DES
TENEURS DES MINÉRAIS (CAT. 17)

3. LES EXPERTISES EN GÉOPHYSIQUE APPLIQUÉE ET ÉTUDES SÉISMiques
(CAT. 3)

**INDEX OF MINING
TECHNOLOGY DEVELOPMENT (1985)**

**INDEX SUR LE DÉVELOPPEMENT EN
TECHNOLOGIE MINIÈRE (1985)**

PRIVATE SECTOR RESEARCH AND ASSOCIATIONS/ASSOCIATIONS ET CENTRES PRIVÉS

	Page
BRITISH COLUMBIA and TERRITORIES/COLOMBIE BRITANNIQUE ET TERRITOIRES	
B.C. RESEARCH, DIVISION OF EXTRACTIVE METALLURGY	68
B.C. RESEARCH, ENVIRONMENTAL HEALTH	69
ONTARIO/ONTARIO	
HDRK MINING RESEARCH LTD.	71
MINES ACCIDENT ASSOCIATION OF ONTARIO (MAPAO)	72
THE MINING INDUSTRY RESEARCH ORGANIZATION OF CANADA (MIROC)	73
QUEBEC/QUÉBEC	
L'ASSOCIATION DES MINES DE MÉTAUX DU QUÉBEC INC.	74

**INDEX OF MINING
TECHNOLOGY DEVELOPMENT (1985)**

**INDEX SUR LE DÉVELOPPEMENT EN
TECHNOLOGIE MINIÈRE (1985)**

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PROJECT LISTING/LISTE DE PROJETS

1. DEVELOPMENT OF BACTERIAL LEACHING PRETREATMENT PROCESS FOR
REFRACTORY GOLD ORES AND CONCENTRATES (CAT. 8)

2. RECOVERY OF GOLD FROM PYRITIC AND ARSENOPYRITIC TAILINGS
(CAT. 17)

INDEX OF MINING
TECHNOLOGY DEVELOPMENT (1985)

INDEX SUR LE DÉVELOPPEMENT EN
TECHNOLOGIE MINIÈRE (1985)

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PROJECT LISTING/LISTE DE PROJETS

B.C. RESEARCH'S INDUSTRIAL HYGIENE AND TOXICOLOGY CAPABILITIES
OF USE TO THE MINING INDUSTRY

1. DETERMINATION OF CONCENTRATIONS AND SIZE - FRACTIONATE AIRBORNE
DUST PARTICLES USING AREA OR PERSONAL SAMPLING DEVICES
(CAT. 5,11)
2. DETERMINATION OF GAS CONCENTRATIONS ON-SITE, USING SENSITIVE
CONTINUOUS MONITORING TECHNIQUES (CAT. 5,11)
3. REVIEW AND INTERPRETATION OF THE CURRENT LITERATURE TO PROVIDE
COMPREHENSIVE TOXICOLOGICAL INFORMATION ON CHEMICALS AS AIR
CONTAMINANTS (CAT. 11)
4. RECOMMENDATION OF SAFE CHEMICAL HANDLING PRACTICES (CAT. 11)
5. PROVISION OF EDUCATION WORKSHOPS IN CHEMICAL HANDLING,
INDUSTRIAL HYGIENE AND TOXICOLOGY (CAT. 11)
6. SIZE FRACTIONATE COUNTING AND IDENTIFICATION OF BIOLOGICAL
CONTAMINANTS, SUCH AS MOULDS AND BACTERIA, IN THE WORKPLACE
ATMOSPHERE (CAT. 11)

.../

**INDEX OF MINING
TECHNOLOGY DEVELOPMENT (1985)**

**INDEX SUR LE DÉVELOPPEMENT EN
TECHNOLOGIE MINIÈRE (1985)**

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PROJECT LISTING/LISTE DE PROJETS

7. ADVICE ON CORRECT RESPIRATOR TYPES. ASSISTANCE IN RESPIRATORY PROJECTS ON PROGRAM SET-UP AND OPERATION (CAT. 11)

8. MEASUREMENT OF THE PERMEABILITY OF PROTECTIVE CLOTHING AND MAKING RECOMMENDATIONS FOR SPECIFIC CHEMICAL-HANDLING APPLICATIONS (CAT. 11)

INDEX OF MINING
TECHNOLOGY DEVELOPMENT (1985)

INDEX SUR LE DÉVELOPPEMENT EN
TECHNOLOGIE MINIÈRE (1985)

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PROJECT LISTING/LISTE DE PROJETS

1. DEVELOPMENT OF TECHNOLOGIES, TECHNIQUES AND EQUIPMENT FOR THE CUTTING OF HARDROCK, UTILIZING HIGH PRESSURE WATER JETS WITH OTHER RELEVANT DEVICES (CAT. 5,17)
2. STUDIES PERTAINING TO CONTINUOUS MINING, INCLUDING THE USE OF ORE SORTERS IN CONJUNCTION WITH CONTINUOUS BREAKAGE OF ROCK (CAT. 5,17)
3. STUDIES TO IMPROVE PRODUCTIVITY IN RAISE BORING (CAT. 9)

**INDEX OF MINING
TECHNOLOGY DEVELOPMENT (1985)**

**INDEX SUR LE DÉVELOPPEMENT EN
TECHNOLOGIE MINIÈRE (1985)**

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PROJECT LISTING/LISTE DE PROJETS

1. DEVELOPMENT AND CIRCULATION OF A UNIFORM ROCKBURST RECORDING FORM
DESIGNED TO SUBJECT DATA IN QUESTION TO COMPUTER ANALYSIS
(CAT. 3,11)
2. A MINE LIGHTING STUDY TO RECOMMEND TYPES AND SPACING OF LIGHTS
FOR VARIOUS UNDERGROUND MINE SITUATIONS (CAT. 5,11)
3. INTRODUCTION OF A UNIFORM ACCIDENT INVESTIGATION RECORDING FORM
FOR ONTARIO MINES IN ORDER TO SUBJECT ASSEMBLED DATA TO COMPUTER
ANALYSIS (CAT. 11)
4. MAINTENANCE OF A VENTILATION ADVISORY SERVICE TO ONTARIO MINES
(CAT. 16)

INDEX OF MINING
TECHNOLOGY DEVELOPMENT (1985)

INDEX SUR LE DÉVELOPPEMENT EN
TECHNOLOGIE MINIÈRE (1985)

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PROJECT LISTING/LISTE DE PROJETS

1. DEVELOPMENT OF A MINER'S AIR-FLOW HELMET, FEATURING DUST PROTECTION AND INCORPORATING A NEW LAMP (CAT. 11)
2. DEVELOPMENT AND FIELD TESTING OF A 12-VOLT MINI HALOGEN CAP LAMP (CAT. 11)
3. DEVELOPMENT OF A MINER'S WORKSUIT, WITH A COMFORTABLE WATER-RESISTANT FABRIC (CAT. 11)
4. DEVELOPMENT OF A LIGHTER AND MORE PROTECTIVE WORKBOOT THAN PREVIOUSLY AVAILABLE (CAT. 11)
5. DEVELOPMENT OF A SYSTEM FOR MONITORING MINE VENTILATION (CAT. 16)
6. DEVELOPMENT, AND ULTIMATELY FIELD TESTING, OF A NEW CONCEPT FOR UNDERGROUND RADIO COMMUNICATIONS (CAT. 5,12)
7. CONSIDERATION OF THE DEVELOPMENT AND TESTING OF A NEW CONCEPT FOR AIR-POWERED SPACE LIGHTING UNDERGROUND (CAT. 5,11)

**INDEX OF MINING
TECHNOLOGY DEVELOPMENT (1985)**

**INDEX SUR LE DÉVELOPPEMENT EN
TECHNOLOGIE MINIÈRE (1985)**

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PROJECT LISTING/LISTE DE PROJETS

1. DESIGN OF GROUND PILLARS (CAT. 10)
2. SUPERVISORY TRAINING (CAT. 14)
3. RELATIONS BETWEEN BONUS AND ACCIDENT FREQUENCY (CAT. 11)
4. CREATION OF AN ASSOCIATION RESEARCH COMMITTEE TO MAINTAIN CONTACTS WITH DIFFERENT RESEARCH CENTRES (CAT. 17)

**INDEX OF MINING
TECHNOLOGY DEVELOPMENT (1985)**

**INDEX SUR LE DÉVELOPPEMENT EN
TECHNOLOGIE MINIÈRE (1985)**

PUBLIC SECTOR RESEARCH AND ENGINEERING/ORGANISMES DU SECTEUR PUBLIC

	Page
PRAIRIE PROVINCES/PRAIRIES	
SASKATCHEWAN RESEARCH COUNCIL, ROCK MECHANICS INSTRUMENT SHOP	76
MANITOBA DEPARTMENT OF ENERGY AND MINES, MINES BRANCH	77
ONTARIO/ONTARIO	
ONTARIO MINISTRY OF LABOUR, OCCUPATIONAL HEALTH AND SAFETY DIVISION, MINING HEALTH AND SAFETY BRANCH	78
NATURAL SCIENCES AND ENGINEERING RESEARCH COUNCIL OF CANADA (NSERC)	79
ENERGY, MINES AND RESOURCES CANADA, CANMET, MINING RESEARCH LABORATORIES ("IN-HOUSE" RESEARCH)	80
ENERGY, MINES AND RESOURCES CANADA CANMET, MINING RESEARCH LABORATORIES (CONTRACT RESEARCH)	85
ENERGY, MINES AND RESOURCES CANADA CANMET, MINING RESEARCH LABORATORIES (RESEARCH AGREEMENTS)	90
QUEBEC/QUÉBEC	
MINISTÈRE DE L'ÉNERGIE ET DES RESSOURCES, CENTRE DE RECHERCHES MINÉRALES	91

**INDEX OF MINING
TECHNOLOGY DEVELOPMENT (1985)**

**INDEX SUR LE DÉVELOPPEMENT EN
TECHNOLOGIE MINIÈRE (1985)**

**SASKATCHEWAN RESEARCH COUNCIL
ROCK MECHANICS INSTRUMENT SHOP**
Annex Building
30 Campus Drive
Saskatoon, Saskatchewan S7N 0X1

Joseph T. Jones
Project Supervisor
(306)933-5874
(306)933-5503

PROJECT LISTING/LISTE DE PROJETS

1. POTASH ROCK MECHANICS INSTRUMENTATION (CAT. 3)
2. LARGE SAMPLE TRIAXIAL TEST FACILITY (CAT. 3,17)

**INDEX OF MINING
TECHNOLOGY DEVELOPMENT (1985)**

**INDEX SUR LE DÉVELOPPEMENT EN
TECHNOLOGIE MINIÈRE (1985)**

**MANITOBA DEPARTMENT OF ENERGY AND MINES
MINES BRANCH**
555-330 Graham Avenue
Winnipeg, Manitoba R3C 4E3

D.C. Cook
Project Co-Ordinator
(204)945-0491

PROJECT LISTING/LISTE DE PROJETS

1. OVERBURDEN STABILIZATION (CAT. 3,13)
2. SECONDARY RECOVERY OF BASE METALS BY IN-PLACE BACTERIAL LEACHING
(CAT. 8)
3. MINE AIR/WATER WASTE HEAT RECOVERY (CAT. 16)
4. UNDERGROUND COMPUTER ASSISTED DESIGN (CAT. 10)
5. MINING RECORDING COMPUTERIZATION (CAT. 15)

**INDEX OF MINING
TECHNOLOGY DEVELOPMENT (1985)**

**INDEX SUR LE DÉVELOPPEMENT EN
TECHNOLOGIE MINIÈRE (1985)**

**ONTARIO MINISTRY OF LABOUR
OCCUPATIONAL HEALTH AND
SAFETY DIVISION
MINING HEALTH AND SAFETY BRANCH**
400 University Ave., 7th Floor
Toronto, Ontario M7A 1T7

V. Pakalnis,
Director
(416)965-1328

PROJECT LISTING/LISTE DE PROJETS

1. EVALUATION OF ULTRASONIC ROCKBOLT TESTER ((CAT. 3,5)
2. JOINT CANMET/MOL/INDUSTRY ROCKBURST RESEARCH PROGRAM (CAT. 3)
3. EVALUATION OF INSTALLED WIRE MESH SCREENING (CAT. 3,5)
4. ROCKBOLT TESTING AND AUDITS (CAT. 3,5)
5. DIESEL EMISSIONS IN UNDERGROUND MINES (CAT. 11,5)
6. WIRE ROPE TECHNOLOGY (CAT. 3,5)
7. MEN AND MATERIAL HOISTING (CAT. 4,5)

**INDEX OF MINING
TECHNOLOGY DEVELOPMENT (1985)**

**INDEX SUR LE DÉVELOPPEMENT EN
TECHNOLOGIE MINIÈRE (1985)**

NATURAL SCIENCES AND ENGINEERING RESEARCH COUNCIL OF CANADA (NSERC)	Denyse Ross
200 Kent Street	Grants Officer
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	(613) 996-6291

PROJECT LISTING/LISTE DE PROJETS

1. ADAPTIVE CONTROL OF ROBOTS.VISION FOR ROBOTS (CAT. 5)
2. SENSORS FOR UNMANNED MACHINING (CAT. 5)
3. ROTARY ENGINE DEVELOPMENTS (CAT. 5)

**INDEX OF MINING
TECHNOLOGY DEVELOPMENT (1985)**

**INDEX SUR LE DÉVELOPPEMENT EN
TECHNOLOGIE MINIÈRE (1985)**

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(613) 996-4570 (150)

PROJECT LISTING/LISTÉ DE PROJETS

IN-HOUSE RESEARCH

1. DEVELOPMENT OF TECHNOLOGY AND METHODS FOR THE MANAGEMENT OF MINE/MILL WASTE TO REDUCE ENVIRONMENTAL IMPACT (CAT. 13)
2. PARTICIPATION IN THE PREPARATION OF NATIONAL SAFETY STANDARDS PERTAINING TO EQUIPMENT OPERATION IN UNDERGROUND MINES, WHILE CONDUCTING RESEARCH IN THE FIELDS OF GAS AND DUST EXPLOSIONS AND FIRE RESISTANCE (CAT. 5,11)
3. DEVELOPMENT OF AN OPTIMAL AIR QUALITY INDEX, IN CONJUNCTION WITH FIELD TRIALS OF DIESEL EMISSION REDUCTION STRATEGIES (CAT. 11)
4. DEVELOPMENT AND TESTING OF RADIATION INSTRUMENTATION FOR MEASUREMENT AND CONTROL OF RADIATION (CAT. 11)
5. INVESTIGATION OF UNDERGROUND STABILITY RELATED TO GEOLOGICAL STRUCTURE AND GRAVITATIONAL FORCES AND DEVELOPMENT OF EMPIRICAL, STATISTICAL AND DETERMINISTIC MODELS TO PREDICT STRUCTURAL STABILITY (CAT. 3)
6. INVESTIGATION OF UNDERGROUND STABILITY RELATED TO HIGH STRESSES AND ASSOCIATED ROCKBURSTS AND, USING INSTRUMENTATION, STUDY OF EMPIRICAL AND COMPUTER MODELS, MINING LAYOUTS AND DESIGNS TO MINIMIZE FAILURES (CAT. 3,10)

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**INDEX OF MINING
TECHNOLOGY DEVELOPMENT (1985)**

**INDEX SUR LE DÉVELOPPEMENT EN
TECHNOLOGIE MINIÈRE (1985)**

ENERGY, MINES AND RESOURCES CANADA
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PROJECT LISTING/LISTE DE PROJETS

IN-HOUSE RESEARCH

7. CONTRACT RESEARCH FOR CANADIAN POTASH MINING PERTAINING TO GROUND CONTROL, ENVIRONMENT AND PRODUCTIVITY (CAT. 3,9)
8. PROMOTION OF MINING EQUIPMENT DEVELOPMENTS FOR MINE DEVELOPMENT, PRODUCTION AND TRANSPORTATION, AS WELL AS ASSESSMENT OF THE IMPACT OF SUCH EQUIPMENT ON MINE DESIGN, INCLUDING ASSOCIATED AUTOMATION, REMOTE CONTROL OR ROBOTICS (CAT. 5,10)
9. STUDIES DEVOTED TO THE DEVELOPMENT OF TECHNIQUES FOR REDUCING THE NOISE LEVELS OF DIAMOND DRILLING EQUIPMENT (CAT. 5,11)
10. EVALUATION OF THE LIMITATIONS AND EFFECTIVENESS OF EXISTING AND PROPOSED SUPPORT SYSTEMS FOR USE IN DEEP MINING UNDER HIGH STRESS CONDITIONS (CAT. 3)
11. LABORATORY TESTS ON ROCKS AND OTHER STRUCTURAL MATERIALS TO PROVIDE MATERIAL PROPERTIES DATA FOR PARALLEL FIELD AND MODEL STUDIES (CAT. 3)
12. MEASUREMENT OF THE CURRENT LEVELS OF RESPIRABLE DUST IN SELECTED CANADIAN MINES, AS WELL AS IDENTIFICATION AND ASSESSMENT OF DUST CONTROL MEASURES (CAT. 11)

.../

**INDEX OF MINING
TECHNOLOGY DEVELOPMENT (1985)**

**INDEX SUR LE DÉVELOPPEMENT EN
TECHNOLOGIE MINIÈRE (1985)**

ENERGY, MINES AND RESOURCES CANADA
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PROJECT LISTING/LISTE DE PROJETS

IN-HOUSE RESEARCH

13. QUANTIFICATION AND DOCUMENTATION OF THE MAJOR SOURCES OF VIBRATION IN HARDROCK MINES, COMBINED WITH DEVELOPMENT OF INDICATED INSTRUMENTATION (CAT. 5,11)
14. TESTING OF DESIGNATED EXPLOSIVES MANUFACTURED IN OR IMPORTED INTO CANADA FOR AUTHORIZATION UNDER THE ACT AND THE EXECUTION OF RELATED RESEARCH (CAT. 2)
15. DEVELOPMENT OF COMPUTERIZED MINING COST DATABASE, COST MODELS AND MINE EVALUATION PROCEDURES (1987) (CAT. 15)
16. REPORT ON MINING COSTS FOR PRINCIPAL CLASSIFICATIONS OF MINE OPERATIONS (UPDATED ANNUALLY) (CAT. 15)
- 17 SURVEY OF SHAFT SINKING TECHNOLOGY (1986) (CAT. 4,5)
- 18 CONCEPTUAL DEVELOPMENT OF A DEMONSTRATION PROJECT FOR A FULLY INSTRUMENTED MINE (1985), FOLLOWED BY A DEMONSTRATION (1986/87/88) (CAT. 15)
- 19 DEVELOPMENT OF MINE STATUS INDICATOR SYSTEM, INCLUDING SENSORS AND HARDWARE (1986/87) (CAT. 15,11)

.../

**INDEX OF MINING
TECHNOLOGY DEVELOPMENT (1985)**

**INDEX SUR LE DÉVELOPPEMENT EN
TECHNOLOGIE MINIÈRE (1985)**

ENERGY, MINES AND RESOURCES CANADA
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PROJECT LISTING/LISTE DE PROJETS

IN-HOUSE RESEARCH

20. STATE-OF-THE-ART REPORT ON ASPECTS OF MINE EQUIPMENT TECHNOLOGY
(CAT. 5)
21. CAD FOR SMALL UNDERGROUND MINE (3-DIMENSIONAL) (1987) (CAT. 10)
22. STATE-OF-THE-ART PUBLICATION OF SYSTEMS FOR COMPUTERIZED MINE
DESIGN AND OPERATIONS RESEARCH (1987) (CAT. 9,10)
23. HAULAGE SIMULATION FOR OPEN PIT IRON ORE MINE (1987) (CAT. 4,9)
24. MATHEMATICAL MODEL FOR HEAT BALANCE AND RECUPERATION FROM MINE
EXHAUST AIR AND WATER (1986) (CAT. 16)
25. REVIEW OF DESIGN GUIDELINES FOR SURFACE CROWN PILLARS (1987)
(CAT. 10)
26. EVALUATION OF SUPPORT SYSTEMS INCLUDING BACKFILL FOR WEAK ROCK
MASSES (1987) (CAT. 3,7)
27. REPORT ON NEW ROCK BOLTING GUIDELINES FOR HARD ROCK (1986) (CAT. 3,5)
28. DEVELOPMENT OF A NEW 3-D BOUNDARY ELEMENT PROGRAM FOR MINE
APPLICATIONS (1986) (CAT. 3)

.../

**INDEX OF MINING
TECHNOLOGY DEVELOPMENT (1985)**

**INDEX SUR LE DÉVELOPPEMENT EN
TECHNOLOGIE MINIÈRE (1985)**

ENERGY, MINES AND RESOURCES CANADA
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PROJECT LISTING/LISTE DE PROJETS

IN-HOUSE RESEARCH

29. DEVELOPMENT OF A GRAPHICS DISPLAY PACKAGE FOR MINE STRESS ANALYSIS APPLICATIONS (1987) (CAT. 3)
30. RUGGED, PORTABLE, SMALL SIDE-VIEWING BOREHOLE T.V. INSPECTION TOOL (1987) (CAT. 3,5)
31. FORCEMETER TO DETERMINE THE STABILITIY OF BULKHEADS IN BACKFILLED STOPES (1987) (CAT. 7,5)
32. REPORT ON STATE-OF-THE-ART REVIEW ON CURRENT UNDERGROUND COMMUNICATION SYSTEMS (1985) (CAT. 12)
33. COMPLETION OF A GEOTECHNICAL DATABASE AND A NUMERICAL MODELLING PACKAGE FOR THE DESIGN OF UNDERGROUND OPENINGS AT DEPTH (1987) (CAT. 3)
34. DEVELOPMENT OF AN IMPROVED MICROSEISMIC MONITORING SYSTEM, WITH SUBSTANTIAL CANADIAN CONTENT (1986) (CAT. 3)
35. INFRA-RED ANALYSIS OF DUST SAMPLES (1986) (CAT. 11)

.../

**INDEX OF MINING
TECHNOLOGY DEVELOPMENT (1985)**

**INDEX SUR LE DÉVELOPPEMENT EN
TECHNOLOGIE MINIÈRE (1985)**

ENERGY, MINES AND RESOURCES CANADA J.E. Udd, Director
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PROJECT LISTING/LISTE DE PROJETS

CONTRACT RESEARCH

1. DEVELOPMENT OF A STATE-OF-THE-ART MICROSEISMIC MONITORING SYSTEM
(#5-9110) (NORANDA INC., POINTE CLAIRE, QUEBEC) (CAT. 3)
2. MICROBIOLOGICAL CONTROL OF LEACHINGS FROM MINE TAILINGS
(#5-9156) (UNIVERSITY OF OTTAWA, OTTAWA, ONTARIO) (CAT. 8,13)
3. SAMPLING, FIELD TESTING AND MODELLING OF A SURFACE CROWN PILLAR
AT LES MINES SELBAIE, JOUTEL, QUEBEC (#5-9017) (C. MIRZA
ENGINEERING INC., NORTH YORK, ONTARIO) (CAT. 3,10)
4. INVESTIGATION OF THE LOW TEMPERATURE PERFORMANCE OF TRUCKS
OPERATING ON LOW CETANE DIESEL FUEL (#4-6270) (IMPERIAL OIL
LIMITED, SARNIA, ONTARIO) (CAT. 4,5)
5. PATHWAYS MOVEMENTS OF BRINE FROM POTASH TAILINGS AT THE POTASH
CORPORATION OF SASKATCHEWAN TAILINGS PILES IN SASKATCHEWAN
(#5-9164) (POTASH CORPORATION OF SASKATCHEWAN, SASKATOON,
SASKATCHEWAN) (CAT. 13)
6. COMPUTER BLAST DESIGN PROGRAM EVALUATION FOR LARGE DIAMETER BLASTHOLE
STOPE UNDERGROUND (#5-7085) (HYCARB ENGINEERING LIMITED, CALGARY,
ALBERTA) (CAT. 2)

.../

**INDEX OF MINING
TECHNOLOGY DEVELOPMENT (1985)**

**INDEX SUR LE DÉVELOPPEMENT EN
TECHNOLOGIE MINIÈRE (1985)**

ENERGY, MINES AND RESOURCES CANADA J.E. Udd, Director
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PROJECT LISTING/LISTE DE PROJETS

CONTRACT RESEARCH

7. STUDY OF THE CONSTRAINTS TO TECHNOLOGY DEVELOPMENT AND APPLICATION IN THE MINING SECTOR (#5-9170) (BEVELANDER AND COMPANY, TORONTO, ONTARIO) (CAT. 17)
8. DETERMINATION OF THE TECHNICAL VIABILITY OF A CAVITATING HYDRO IMPACTOR (#5-9001) (TELEDYNE CANADA LIMITED, THORNBURY, ONTARIO) (CAT. 5)
9. PROVISION OF A JARCO 500 LHD DIESEL MACHINE FOR UNDERGROUND ENVIRONMENTAL IMPACT TRIALS OF EMISSIONS REDUCTION DEVICES (#4-9326) (CIL INCORPORATED, BURLINGTON, ONTARIO) (CAT. 5,11)
10. COMPLETION OF SYSTEMS DEVELOPMENT AND ADAPTATION PHASE OF CANMET DIESEL EMISSIONS REDUCTION PROGRAM (#5-9019) (ONTARIO RESEARCH FOUNDATION, MISSISSAUGA, ONTARIO) (CAT. 11)
11. DEVELOPMENT, CONSTRUCTION AND TESTING OF PROTOTYPE ACCESSORIES FOR AUTOMATION OF A DOWN-THE-HOLE DRILL (#4-9339) (VADEKO INTERNATIONAL INC., MISSISSAUGA, ONTARIO) (CAT. 1,5)

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**INDEX OF MINING
TECHNOLOGY DEVELOPMENT (1985)**

**INDEX SUR LE DÉVELOPPEMENT EN
TECHNOLOGIE MINIÈRE (1985)**

ENERGY, MINES AND RESOURCES CANADA J.E. Udd, Director
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PROJECT LISTING/LISTE DE PROJETS

CONTRACT RESEARCH

12. IDENTIFICATION OF EQUIPMENT DEVELOPMENT POTENTIAL AND THE INFLUENCE ON MINE DESIGN (#4-9070) (BRAMPTON MINING CO. LTD., BRAMPTON, ONTARIO) (CAT. 5,10)
13. DEVELOPMENT OF VERTICAL BLOCK METHOD DESIGN GUIDELINES FOR A STEEPLY-DIPPING OREBODY AND DEVELOPMENT OF SCALING TECHNIQUES (#4-9147-4) (INCO LIMITED, THOMPSON, MANITOBA, CANADA-MANITOBA MINERAL DEVELOPMENT AGREEMENT) (CAT. 3,10)
14. GEOMECHANICAL DATABASE FOR GROUND CONTROL IN DEEP MINES (#4-9147-3) (INCO LIMITED, THOMPSON, MANITOBA, CANADA-MANITOBA MINERAL DEVELOPMENT AGREEMENT) (CAT. 3)
15. DEVELOPMENT OF A TAILINGS MANAGEMENT PROGRAM PLAN IN RELATION TO ACID-GENERATING MINE TAILINGS IN CANADA (4-9319) (MONENCO LIMITED, HALIFAX, NOVA SCOTIA) (CAT. 13)
16. COMMUNICATION SYSTEM FOR ISOLATED AREAS IN MINES (#4-9147-2) (SHERRITT GORDON MINES LTD., LEAF RAPIDS, MANITOBA, CANADA-MANITOBA MINERAL DEVELOPMENT AGREEMENT) (CAT. 12)

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**INDEX OF MINING
TECHNOLOGY DEVELOPMENT (1985)**

**INDEX SUR LE DÉVELOPPEMENT EN
TECHNOLOGIE MINIÈRE (1985)**

ENERGY, MINES AND RESOURCES CANADA
CANMET
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PROJECT LISTING/LISTE DE PROJETS

CONTRACT RESEARCH

17. GROUND STABILITY EVALUATION WITH PARTICULAR REFERENCE TO AN EN ECHELON LENSED OREBODY (#4-9147-1) (SHERRITT GORDON MINES LTD., LEAF RAPIDS, MANITOBA, CANADA-MANITOBA MINERAL DEVELOPMENT AGREEMENT) (CAT. 3)
18. EXPERIMENTAL VERIFICATION OF HIGH VELOCITY IMPACT MODEL FOR SLURRY EXPLOSIVES PROJECTILE IMPACT (#4-9151) (MINING RESOURCE ENGINEERING LIMITED, KINGSTON, ONTARIO) (CAT. 2)
19. APPLICATION OF CONVENTIONAL MINING TECHNIQUES TO UNDERGROUND OIL SANDS MINING (#4-9198) (COMINCO ENGINEERING SERVICES LTD., CALGARY, ALBERTA) (CAT. 17)
20. CANADIAN MINING INDUSTRY CAPITAL AND OPERATING INDICES (OPEN PIT AND UNDERGROUND) (#4-9136) (DYNATEC MINING LIMITED, RICHMOND HILL, ONTARIO) (CAT. 15)
21. USE OF BACKFILL IN NEW BRUNSWICK POTASH MINES (#5-9031) (DENISON-POTACAN POTASH CO., SUSSEX, CANADA-NEW BRUNSWICK MINERAL DEVELOPMENT AGREEMENT) (CAT. 7)
22. CONSOLIDATION OF URANIUM MILL TAILINGS (#5-1708) (GEOCON INCORPORATED, MISSISSAUGA) (CAT. 13,17)

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**INDEX OF MINING
TECHNOLOGY DEVELOPMENT (1985)**

**INDEX SUR LE DÉVELOPPEMENT EN
TECHNOLOGIE MINIÈRE (1985)**

**ENERGY, MINES AND RESOURCES CANADA
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PROJECT LISTING/LISTE DE PROJETS

CONTRACT RESEARCH

23. DEVELOP A METHODOLOGY FOR ESTIMATING PREPRODUCTION AND OPERATING COSTS OF MINING SMALL MINERAL DEPOSITS BY UNDERGROUND METHODS (#5-9128) (J.S. REDPATH LTD., NORTH BAY) (CAT. 15)

24. THE FATE OF RADIUM IN URANIUM LEACHING AND ITS CONSEQUENT DISSOLUTION MECHANISMS (#5-1710) (CHEMEX LABS LIMITED, NORTH VANCOUVER) (CAT. 13,17,8)

**INDEX OF MINING
TECHNOLOGY DEVELOPMENT (1985)**

**INDEX SUR LE DÉVELOPPEMENT EN
TECHNOLOGIE MINIÈRE (1985)**

ENERGY, MINES AND RESOURCES CANADA
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PROJECT LISTING/LISTE DE PROJETS

RESEARCH AGREEMENTS

1. NOVEL MINING METHODS FOR CONTINUOUS MINING MACHINES IN HARD ROCK FORMATIONS (CAT. 17)
2. FRAGMENTATION CONTROL THROUGH BLASTING (CAT. 2)
3. COMPUTER APPLICATIONS IN UNDERGROUND MINE DESIGN (CAT. 10)
4. NATURAL AND INDUCED SEISMICITY IN SASKATCHEWAN (CAT. 3)
5. OPTIMIZING THE EFFECTIVENESS OF MINE DEWATERING WELLS IN FRACTURED ROCKS (CAT. 13)
6. COMPUTERIZED MINE VENTILATION NETWORK SIMULATOR FOR LANIGAN POTASH MINE, SASKATCHEWAN (CAT. 16)
7. EVALUATION DE LA RÉSISTANCE DES BÉTONS GELÉS PRÉMATURÉMENT (CAT. 3)
8. CONTRÔLE EN TEMPS RÉEL DES CAMIONS D'UNE MINE EN MAXIMISANT LE TONNAGE ET EN ASSURANT L'UNIFORMITÉ DE LA TENEUR (CAT. 4,9)

.../

**INDEX OF MINING
TECHNOLOGY DEVELOPMENT (1985)**

**INDEX SUR LE DÉVELOPPEMENT EN
TECHNOLOGIE MINIÈRE (1985)**

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PROJECT LISTING/LISTE DE PROJETS

1. STABILITY OF BACKFILL: LES MINES BELMORAL LTÉE (CAT. 7)
2. GEOTECHNICAL STUDY OF OVERBURDEN: LES MINES BELMORAL LTÉE
(CAT. 3,13)
3. ENGINEERING OF CROWN PILLARS: ROCHE MINES ASSOCIÉS LTÉE
(CAT. 3,10)
4. ANALYSIS OF INCLINOMETRIC DATA: J.M. ASBESTOS INC. (CAT. 3)
5. PILLAR STABILITY IN INCLINED RAMPS: LES MINES GOLDSEARCH LTÉE
(CAT. 3)
6. UNDERGROUND COMMUNICATIONS STUDY: PHASE 1 (CAT. 12)
7. UNDERGROUND COMMUNICATIONS STUDY: PHASE 2 (CAT. 12)
8. A FEASIBILITY ANALYSIS CONCERNING USED OIL RECLAMATION ON SITE
(CAT. 6)
9. ON-GOING ROCK MECHANICS/GEOTECHNICAL STUDY AT THE BELMORAL MINE
(CAT. 3)

.../

**INDEX OF MINING
TECHNOLOGY DEVELOPMENT (1985)**

**INDEX SUR LE DÉVELOPPEMENT EN
TECHNOLOGIE MINIÈRE (1985)**

**MINISTÈRE DE L'ÉNERGIE ET
DES RESSOURCES DE QUÉBEC
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PROJECT LISTING/LISTE DE PROJETS

10. ON-GOING STUDY OF ROCK BOLTING NEEDS AT LES MINES SELEINE INC.
(CAT. 3)
11. UNIVERSITY RESEARCH CONTRACT: SURVEY OF MINE NEEDS FOR
COMPUTING DEVICES AND SOFTWARE (CAT. 5,17)
- Prof. René Dufour, École Polytechnique
12. TECHNICAL SERVICES ON HOISTING PLANT OPERATIONS OFFERED TO THE
QUEBEC MINING INDUSTRY (CAT. 4,5)
13. LONG-TERM PROJECTS TO INCREASE EXPERTISE IN ROCK MECHANICS AND
GROUND CONTROL (CAT. 3)
14. LONG-TERM PROJECTS TO DEVELOP COMPUTER SOFTWARE FOR MINE USAGE
(CAT. 9)
15. LONG-TERM PROJECTS TO DEVELOP AND IMPLEMENT AUTOMATION DEVICES IN
MINES (CAT. 9,17)
16. LONG-TERM PROJECTS TO DEVELOP EXPERTISE CONCERNING MINING
EQUIPMENT (CAT. 5)

.../

**INDEX OF MINING
TECHNOLOGY DEVELOPMENT (1985)**

**INDEX SUR LE DÉVELOPPEMENT EN
TECHNOLOGIE MINIÈRE (1985)**

**MINISTÈRE DE L'ÉNERGIE ET
DES RESSOURCES DE QUÉBEC
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PROJECT LISTING/LISTE DE PROJETS

17. CONCEPTION DES PILIERS DE SURFACE À LA MINE CHIMO (CAT. 3,10)
18. COLLABORATION DU CANMET DANS LA SOLUTION DE PROBLÈMES EN CONTRÔLE DES TERRAINS À LA MINE NIOBEC (CAT. 3)
19. LES EXTENSOMÈTRES: CE QUE L'ON DOIT SAVOIR À PROPOS DE CES APPAREILS DE MESURES DE DÉFORMATION (MINES SELEINE) (CAT. 3)
20. REVUE DE L'INFORMATION DISPONIBLE SUR LA STABILITÉ DU MUR NORD DE LA MINE JEFFREY (CAT. 3)
21. LE SUPPORT PAR CÂBLES CIMENTÉS (CAT. 3)
22. LE REMBLAI ROCHEUX CIMENTÉ (CAT. 3)
23. INSTABILITÉS DE TALUS DANS LES MINIÈRES (CAT. 3)
24. RÈGLES D'UTILISATION DU BOULONNAGE (CAT. 3)
(Professeur Pierre Choquet, Université Laval)

.../

**INDEX OF MINING
TECHNOLOGY DEVELOPMENT (1985)**

**INDEX SUR LE DÉVELOPPEMENT EN
TECHNOLOGIE MINIÈRE (1985)**

**MINISTÈRE DE L'ÉNERGIE ET
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PROJECT LISTING/LISTE DE PROJETS

25. LES PROPRIÉTÉS PHYSIQUES ET MÉCANIQUES DES REMBLAIS SOUTERRAINS ET LEUR INFLUENCE SUR LA CONCEPTION DES CHANTIERS SOUTERRAINS (CAT. 3,7) (M.J. Scoble, McGill)
26. GUIDE PRATIQUE DE CONCEPTION DES PILIERS DE SURFACE (CAT. 10)
27. SERVICES TECHNIQUES ET ÉTUDES DES MACHINES D'EXTRACTION DANS LES MINES SOUTERRAINES DU QUÉBEC (AMMQ) (CAT. 5)
28. PROGRAMME D'ESSAIS ET DE SURVEILLANCE EN CHANTIER DE LA FOREUSE ROGER (CAT. 1,5)
29. ACCROISSEMENT DE LA PRODUCTIVITÉ PAR L'AMÉLIORATION DU FONCTIONNEMENT DES ÉQUIPEMENTS DE HISSAGE DANS LES MINES SOUTERRAINES (CAT. 4,5)
30. LE BAZOOKA LÉGER UTILISÉ COMME ÉQUIPEMENT DE DÉCROCHAGE DANS LES CHEMINÉES À MINÉRAI OU À STÉRILE (CAT. 4,5)

.../

**INDEX OF MINING
TECHNOLOGY DEVELOPMENT (1985)**

**INDEX SUR LE DÉVELOPPEMENT EN
TECHNOLOGIE MINIÈRE (1985)**

**MINISTÈRE DE L'ÉNERGIE ET
DES RESSOURCES DE QUÉBEC
CENTRE DE RECHERCHES MINÉRALES**
Complexe Scientifique
2700 Rue Einstein
Sainte Foy, Québec G1P 3W8

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(418)643-4504
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PROJECT LISTING/LISTE DE PROJETS

31. ÉVALUATION ÉCONOMIQUE PRÉLIMINAIRE D'UN SYSTÈME À TROLLEY ADAPTÉ AUX CHARGEUSES - NAVETTES ET CAMIONS (CAT. 4,9)
32. AÉRAGE MINIER: RELEVÉ DES FACTEURS DE FRICTION DANS LES EXCAVATIONS SOUTERRAINES (CAT. 16)
33. NOUVELLE TECHNOLOGIE POUR LE CASSAGE SECONDAIRE DE ROCHES (CAT. 2,17)
34. LES ÉCONOMIES D'ÉNERGIE DANS LES EXPLOITATIONS MINIÈRES SOUTERRAINES (CAT. 15)
35. ÉTUDE DE LA RELATION DE CAUSE À EFFET DE LA PRIME AU RENDEMENT SUR LA PRODUCTIVITÉ, LA RENTABILITÉ ET LA SECURITÉ (CAT. 9,11)
(Professeur Jean-Luc Collins, Université Laval)
36. PROJET DE RECHERCHE EN PLANIFICATION MINIÈRE AVEC LES MINES SELBAIE (CAT. 10)
37. ÉTUDE DE FAISABILITÉ DU TRANSFERT DU LOGICIEL "DISCODAT" SUR LE SYSTÈME INFORMATIQUE DE J.M. Asbestos (CAT. 17)

.../

**INDEX OF MINING
TECHNOLOGY DEVELOPMENT (1985)**

**INDEX SUR LE DÉVELOPPEMENT EN
TECHNOLOGIE MINIÈRE (1985)**

**MINISTÈRE DE L'ÉNERGIE ET
DES RESSOURCES DE QUÉBEC
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(418)643-3536

PROJECT LISTING/LISTE DE PROJETS

- 38. GÉOSTATISTIQUE APPLIQUÉE AUX MINES DU QUÉBEC (CAT. 17)
- 39. IMPLANTATION D'UN SYSTÈME D'ACQUISITION AUTOMATIQUE PAR TÉLÉPHONE (SACATEL) À LA J.M. Asbestos (CAT. 12)
- 40. APPROCHE THERMODYNAMIQUE POUR LA MODÉLISATION DE L'AÉRAGE DES MINES (CAT. 16)
- 41. DÉVELOPPEMENT D'UN LOGICIEL DE RÉPARTITION DES CAMIONS DANS UNE MINE À CIEL OUVERT, AVEC CONTRÔLE DE LA TENEUR (CAT. 4,9)

INDEX OF MINING
TECHNOLOGY DEVELOPMENT (1985)

INDEX SUR LE DÉVELOPPEMENT EN
TECHNOLOGIE MINIÈRE (1985)

SECTION II

SECTION II

PROJECT TITLES BY
SUBJECT CATEGORIES

TITRE DES PROJETS
PAR CATÉGORIE



INDEX OF MINING
TECHNOLOGY DEVELOPMENT (1985)

INDEX SUR LE DÉVELOPPEMENT EN
TECHNOLOGIE MINIÈRE (1985)

DRILLING CATEGORY/CATÉGORIE FORAGE (1)

1. FIELD TESTING 4 1/2 INCH AND 3 1/2 INCH IN-THE-HOLE UP-HOLE DRILLING SYSTEM (SULLIVAN MINE, COMINCO, KIMBERLEY)
2. SOUND AND VIBRATION SUPPRESSION ON COMPRESSED AIR EQUIPMENT (JACKLEGS, STOPERS) (MANITOBA DIVISION, INCO, THOMPSON)
3. TESTING OF TWO DRILL JUMBOS WHICH HAVE BEEN CONVERTED FOR UP-HOLE DRILLING (DENISON MINE, ELLIOT LAKE)
4. PLANS TO DEVELOP AUTOMATED DOWN-THE-HOLE DRILLING (FALCONBRIDGE, FALCONBRIDGE)
5. OVERSEEING A HDRK PROJECT TO AUTOMATE DRILL ROD HANDLING (FALCONBRIDGE, FALCONBRIDGE)
6. SURVEYING DEVIATIONS IN LONG LARGE DIAMETER (6 1/2 IN.) DRILL HOLES (ONTARIO DIVISION, INCO, COPPER CLIFF)
7. DEVELOPMENT OF AN ITH MACHINE WITH COMPONENT BREAKDOWN TO A 24" x 24" SIZE (ONTARIO DIVISION, INCO, COPPER CLIFF)
8. TIME STUDY REGARDING LONG HOLE DRILL (BOUSQUET DIVISION, LAC MINERALS, MALARTIC)
9. FIELD EVALUATION OF A VIBRATING OVERBURDEN DRILL TO ASSESS OPERATING CHARACTERISTICS (QUEEN'S UNIVERSITY, KINGSTON)
10. DEVELOPMENT, CONSTRUCTION AND TESTING OF PROTOTYPE ACCESSORIES FOR AUTOMATION OF A DOWN-THE-HOLE DRILL (CANMET CONTRACT TO VADEKO INTERNATIONAL, MISSISSAUGA)

.../

INDEX OF MINING
TECHNOLOGY DEVELOPMENT (1985)

INDEX SUR LE DÉVELOPPEMENT EN
TECHNOLOGIE MINIÈRE (1985)

DRILLING CATEGORY/CATÉGORIE FORAGE (1)

11. PROGRAMME D'ESSAIS ET DE SURVEILLANCE EN CHANTIER DE LA FOREUSE
ROGER (CENTRE DE RECHERCHES MINÉRALES, SAINTE-FOY)
12. BOREHOLE PATTERN AT BREAK-THROUGH (MCGILL UNIVERSITY, MONTREAL)
13. AN EVALUATION STUDY OF A MINING MACHINE BIT (POTASH CORPORATION
OF SASKATCHEWAN, SASKATOON)
14. COMPUTERIZED DRILL AND BLAST OPTIMIZATION (DETOUR LAKE MINE,
CAMPBELL RED LAKE, TIMMINS)

**INDEX OF MINING
TECHNOLOGY DEVELOPMENT (1985)**

**INDEX SUR LE DÉVELOPPEMENT EN
TECHNOLOGIE MINIÈRE (1985)**

BLASTING CATEGORY/CATÉGORIE SAUTAGE (2)

1. CONTINUING RESEARCH ON EXPLOSIVES AND EXPLOSIVES TECHNOLOGY
(SULLIVAN MINE, COMINCO, KIMBERLEY)
2. BALLISTIC "HANG-UP" CLEARANCE SYSTEM FOR ORE PASSES AND
DRAWPOINTS (KIDD CREEK, TIMMINS)
3. NON-ELECTRIC SEQUENTIAL BLASTING (ALGOMA ORE DIVISION, WAWA)
4. PROGRAM IN PLACE TO OPTIMIZE BIG-HOLE BLASTING BY MONITORING
VIBRATION AND BY MINE WIDE MICROSEISMIC MONITORING OF GROUND
MOVEMENTS (FALCONBRIDGE, FALCONBRIDGE)
5. EVALUATION OF SMOOTH WALL BLASTING TECHNIQUES (ONTARIO DIVISION,
INCO, COPPER CLIFF)
6. FIELD TESTING OF BLASTING CHARGES (ONTARIO DIVISION, INCO,
COPPER CLIFF)
7. BLAST VIBRATION MONITORING (ONTARIO DIVISION, INCO, COPPER CLIFF)
8. BLAST SIMULATION BY COMPUTER MODEL (ONTARIO DIVISION, INCO,
COPPER CLIFF)
9. TESTING OF "DOUBLE-DECKED" CRATER BLASTING (ONTARIO DIVISION,
INCO, COPPER CLIFF)
10. EVALUATION OF WATER EMULSION EXPLOSIVES (ONTARIO DIVISION, INCO,
COPPER CLIFF)

.../

BLASTING CATEGORY/CATÉGORIE SAUTAGE (2)

11. EXPLOSIVE CONSUMPTION AT THE KING MINE (KING-BEAVER MINE, ASBESTOS CORPORATION, THETFORD MINES)
12. ELIMINATION OF SLURRY EXPLOSIVE (EAST KEMPTVILLE MINE, RIO ALGOM, EAST KEMPTVILLE)
13. "HANG-UP" CHARGES (BRUNSWICK, BATHURST)
14. CABLE BOLT CUTTING WITH EXPLOSIVES (BRUNSWICK, BATHURST)
15. "ON-GOING" RESEARCH IN MINIMIZATION OF BLAST VIBRATIONS AND OPTIMIZATION OF ROCK MASS FRAGMENTATION (QUEEN'S UNIVERSITY, KINGSTON)
16. ROCK STRUCTURE, AN IMPORTANT FACTOR IN FORECASTING BLAST FRAGMENTATION (MCGILL UNIVERSITY, MONTREAL)
17. FIELD EVALUATION OF BLAST FRAGMENTATION (MCGILL UNIVERSITY, MONTREAL)
18. BLAST PATTERN INTENSITY AS A COMPONENT OF BENCH MINING FRAGMENTATION (MCGILL UNIVERSITY, MONTREAL)
19. OPTIMIZATION OF UNDERGROUND STOPE BLASTS (NORANDA RESEARCH CENTRE, POINTE CLAIRE)
20. COMPUTER BLAST DESIGN PROGRAM EVALUATION FOR LARGE DIAMETER BLASTHOLE STOPES UNDERGROUND (HYCARB ENGINEERING, CALGARY)

.../

INDEX OF MINING
TECHNOLOGY DEVELOPMENT (1985)

INDEX SUR LE DÉVELOPPEMENT EN
TECHNOLOGIE MINIÈRE (1985)

BLASTING CATEGORY/CATÉGORIE SAUTAGE (2)

21. EXPERIMENTAL VERIFICATION OF HIGH VELOCITY IMPACT MODEL FOR SLURRY EXPLOSIVES PROJECTILE IMPACT (MINING RESOURCE ENGINEERING, KINGSTON)
22. FRAGMENTATION CONTROL THROUGH BLASTING (RESEARCH AGREEMENTS PROGRAM, CANMET, EMR)
23. "ON-GOING" DEVELOPMENT OF TECHNOLOGY RELATED TO THE MANUFACTURE, STORAGE, TRANSPORTATION AND USE OF EXPLOSIVES (CANMET, EMR, OTTAWA)
24. NOUVELLE TECHNOLOGIE POUR LE CASSAGE SECONDAIRE DE ROCHES (CENTRE DE RECHERCHES MINÉRALES, SAINTE-FOY)
25. TESTING OF DESIGNATED EXPLOSIVES MANUFACTURED IN OR IMPORTED INTO CANADA FOR AUTHORIZATION UNDER THE ACT AND THE EXECUTION OF RELATED RESEARCH (CERL, MRL, CANMET, EMR, OTTAWA)
26. COMPUTERIZED DRILL AND BLAST OPTIMIZATION (DETOUR LAKE MINE, CAMPBELL RED LAKE, TIMMINS)
27. PRESHEAR BLASTING WITH LARGE DIAMETER HOLES (DETOUR LAKE MINE, CAMPBELL RED LAKE, TIMMINS)
28. MINING SEQUENCES AND BLASTING FOR GRADE CONTROL PURPOSES (DETOUR LAKE MINE, CAMPBELL RED LAKE, TIMMINS)

INDEX OF MINING
TECHNOLOGY DEVELOPMENT (1985)

INDEX SUR LE DÉVELOPPEMENT EN
TECHNOLOGIE MINIÈRE (1985)

GROUND CONTROL CATEGORY/CATÉGORIE SOUTÈNEMENT (3)

1. METHODS TO STABILIZE PERMAFROST (SULLIVAN MINE, COMINCO, KIMBERLEY, BC)
2. DEVELOPMENT OF A GEOMECHANICAL DATABASE AND NUMERICAL MODEL FOR PREDICTING GROUND BEHAVIOUR AT DEPTH (MANITOBA DIVISION, INCO, THOMPSON)
3. VBM DESIGN GUIDELINES FOR STEEPLY DIPPING OREBODIES AND SCALING TECHNIQUES (MANITOBA DIVISION, INCO, THOMPSON)
4. OVERBURDEN STABILIZATION (MANITOBA DIVISION, INCO, THOMPSON)
5. MODIFICATION OF ROCKBOLT SHELLS FOR IMPROVED ANCHORING IN SOFTER ROCK AND ORE FORMATIONS (MANITOBA DIVISION, INCO, THOMPSON)
6. SILL PILLAR DESTRESSING (CAMPBELL RED LAKE, BALMERTOWN)
7. MICROSEISMIC MONITORING (CAMPBELL RED LAKE, BALMERTOWN)
8. GROUND CONTROL RESEARCH AND TESTING (SIFTO SALT DIVISION, DOMTAR, GODERICH)
9. MECHANICAL SCALING (SIFTO SALT DIVISION, DOMTAR, GODERICH)
10. LOOSE ROCK SENSING SYSTEM FOR MECHANIZED SCALING (KIDD CREEK, TIMMINS)
11. DEVELOP CONCEPTS AND PROCURE A MOBILE SCALER/ROCKBOLTER/BLOCKHOLER UNIT (ALGOMA ORE DIVISION, WAWA)

.../

INDEX OF MINING
TECHNOLOGY DEVELOPMENT (1985)

INDEX SUR LE DÉVELOPPEMENT EN
TECHNOLOGIE MINIÈRE (1985)

GROUND CONTROL CATEGORY/CATÉGORIE SOUTÈNEMENT (3)

12. STUDY OF MICROSEISMIC GROUND MONITORING (RIO ALGOM, ELLIOT LAKE)
13. PROGRAM IN PLACE TO OPTIMIZE BIG HOLE BLASTING BY MONITORING VIBRATION AND BY MINE WIDE MICROSEISMIC MONITORING OF GROUND MOVEMENTS (FALCONBRIDGE, FALCONBRIDGE)
14. DEVELOPMENT OF A "SPRAY ON" COATING FOR GROUND SUPPORT (ONTARIO DIVISION, INCO, COPPER CLIFF)
15. BLAST VIBRATION MONITORING (ONTARIO DIVISION, INCO, COPPER CLIFF)
16. MICROSEISMIC MONITORING (ONTARIO DIVISION, INCO, COPPER CLIFF)
17. DEVELOPMENT OF A 3-D NUMERICAL MODELLING SYSTEM FOR ROCK MECHANICS (ONTARIO DIVISION, INCO, COPPER CLIFF)
18. SCALER MACHINE IN UNDERGROUND MINE (KIENA MINES, VAL D'OR)
19. ROCK MECHANICS COMPUTER SIMULATION MODEL (LES MINES SELEINE, ÎLES-DE-LA-MADELEINE)
20. SWELLEX BOLTS (BOUSQUET DIVISION, LAC MINERALS, MALARTIC)
21. IN SITU STRESS MEASUREMENT IN 1305-W DRIFT (SIGMA MINES, VAL D'OR)
22. INSTALLATION AND EVALUATION OF 20 FEET STRESSED CABLE BOLTS IN PRE-SHEARED PIT WALLS (JEFFREY MINE, JOHNS MANVILLE, ASBESTOS)

.../

INDEX OF MINING
TECHNOLOGY DEVELOPMENT (1985)

INDEX SUR LE DÉVELOPPEMENT EN
TECHNOLOGIE MINIÈRE (1985)

GROUND CONTROL CATEGORY/CATÉGORIE SOUTÈNEMENT (3)

23. ROCKBOLTING OPEN PIT WALL (JEFFREY MINE, J.M. ASBESTOS)
24. ROCK MECHANICS INSTRUMENTATION FOR AN UNDERGROUND POTASH MINE
UTILIZING BACKFILLING OPERATIONS (DENISON-POTACAN POTASH, SUSSEX)
25. RECESSING ATTACHMENT/CABLE BOLTING (BRUNSWICK, BATHURST)
26. CABLE BOLT CUTTING WITH EXPLOSIVES (BRUNSWICK, BATHURST)
27. MODIFIED ROCK BOLT DOLLY WRENCH (BRUNSWICK, BATHURST)
28. FRICTION WASHERS FOR SCREEN SUPPORT (BRUNSWICK, BATHURST)
29. INVESTIGATION OF THE IN-SITU STRESS CONDITIONS AND THE DESIGN
AND ANALYSIS BY NUMERICAL MODELLING METHODS OF PROPOSED
CUT-AND-FILL STOPES (UBC, VANCOUVER)
30. DIFFERENT ASPECTS OF ROCK MECHANICS AT RUTTAN MINE, INCLUDING
SONIC DEVICES (UBC, VANCOUVER)
31. A LINKAGE ALGORITHM FOR FINITE ELEMENT BOUNDARY INTEGRAL METHODS
FOR SPECIFIC ROCK MECHANICS AND UNDERGROUND MINING APPLICATIONS
TO REALISTICALLY MODEL THE ROCK MASS AND SUPPORT SYSTEMS (UBC,
VANCOUVER)
32. STEEL FIBRE REINFORCED SILICA FUME SHOTCRETE RIBS IN
SUBSTITUTION FOR STEEL RIBS FOR THE SUPPORT OF UNDERGROUND
OPENINGS (UBC, VANCOUVER)

.../

INDEX OF MINING
TECHNOLOGY DEVELOPMENT (1985)

INDEX SUR LE DÉVELOPPEMENT EN
TECHNOLOGIE MINIÈRE (1985)

GROUND CONTROL CATEGORY/CATÉGORIE SOUTÈNEMENT (3)

33. STUDY OF THE BASIC MECHANISMS THAT RESULT IN VIOLENT ROCK FAILURE IN UNDERGROUND MINES (UBC, VANCOUVER)
34. OUTBURSTS IN COAL MINES (UNIVERSITY OF ALBERTA, EDMONTON)
35. ROCK SURFACE ROUGHNESS STUDY (UNIVERSITY OF SASKATCHEWAN, SASKATOON)
36. STUDY OF IN-SITU STRESS MEASUREMENTS AT CAMFLO MINES, INCLUDING COMPUTER MODELLING OF STRESS PARAMETER DATA DETERMINED UNDERGROUND (QUEEN'S UNIVERSITY, KINGSTON)
37. STUDY OF NON-DESTRUCTIVE ROCKBOLT LOAD CAPACITY MEASUREMENT (QUEEN'S UNIVERSITY, KINGSTON)
38. DEVELOPMENT OF THE APPLICATION OF NUMERICAL TECHNIQUES IN ROCK MECHANICS (QUEEN'S UNIVERSITY, KINGSTON)
39. LES EXPERTISES EN GÉOPHYSIQUE APPLIQUÉE ET ÉTUDES SÉISMQUES (UNIVERSITÉ DU QUÉBEC, CHICOUTIMI)
40. ROCKBURST PREDICTION AND CONTROL (MCGILL UNIVERSITY, MONTREAL)
41. PRÉVISION DE L'IMMINENCE DE L'EFFONDREMENT DU REVÊTEMENT DE BÉTON DES GALERIES MINIÈRES (UNIVERSITÉ LAVAL, SAINTE-FOY)
42. SYNTHÈSE DE L'UTILISATION DES BOULONS D'ANCRAGE DANS LES MINES DU QUÉBEC; ÉTABLISSEMENT D'UNE UTILISATION STANDARD DES BOULONS D'ANCRAGE POUVANT ÊTRE APPLIQUÉE (UNIVERSITÉ LAVAL, SAINTE-FOY)

.../

INDEX OF MINING
TECHNOLOGY DEVELOPMENT (1985)

INDEX SUR LE DÉVELOPPEMENT EN
TECHNOLOGIE MINIÈRE (1985)

GROUND CONTROL CATEGORY/CATÉGORIE SOUTÈNEMENT (3)

43. BACK ANALYSIS OF A MAJOR UNDERGROUND GROUND FAILURE (UNIVERSITÉ LAVAL, SAINTE-FOY)
44. MODE OF ACTION AND DESIGN OF CABLE-BOLT SUPPORT (UNIVERSITÉ LAVAL, SAINTE-FOY)
45. GUIDELINES FOR THE USE OF ROCKBOLTING (UNIVERSITÉ LAVAL, SAINTE-FOY)
46. "ON-GOING" SEISMICITY STUDY ENCOMPASSING SURFACE AND UNDERGROUND MONITORING TO DETECT MINING INDUCED EARTH MOVEMENT (POTASH CORPORATION OF SASKATCHEWAN MINING, SASKATCHEWAN)
47. DEVELOPMENT AND CIRCULATION OF A UNIFORM ROCKBURST RECORDING FORM DESIGNED TO SUBJECT DATA IN QUESTION TO COMPUTER ANALYSIS (MINES ACCIDENT PREVENTION ASSOCIATION ONTARIO, NORTH BAY)
48. CONSIDERATION OF THE DEVELOPMENT OF NOVEL GROUND MONITORING INSTRUMENTATION TO OVERCOME DEFICIENCIES OF EXISTING INSTRUMENTATION, SUCH AS AWKWARDNESS, NON-REUSABILITY, EXPENSE AND A LOW SUCCESS RATIO (NORANDA RESEARCH CENTRE, POINTE CLAIRE)
49. MICROSEISMIC MONITORING TECHNOLOGY (NORANDA RESEARCH CENTRE, POINTE CLAIRE)
50. ROCK MECHANICS FIELD DATA ACQUISITION (NORANDA RESEARCH CENTRE, POINTE CLAIRE)

.../

INDEX OF MINING
TECHNOLOGY DEVELOPMENT (1985)

INDEX SUR LE DÉVELOPPEMENT EN
TECHNOLOGIE MINIÈRE (1985)

GROUND CONTROL CATEGORY/CATÉGORIE SOUTÈNEMENT (3)

51. DEVELOPMENT OF NOVEL GROUND CONTROL INSTRUMENTATION (NORANDA RESEARCH CENTRE, POINTE CLAIRE)
52. ULTRASONIC MINE SURVEY PROBE (NORANDA RESEARCH CENTRE, POINTE CLAIRE)
53. POTASH ROCK MECHANICS INSTRUMENTATION (SASKATCHEWAN RESEARCH COUNCIL, SASKATOON)
54. LARGE SAMPLE TRIAXIAL TEST FACILITY (SASKATCHEWAN RESEARCH COUNCIL, SASKATOON)
55. OVERBURDEN STABILIZATION (MINES BRANCH, WINNIPEG)
56. DEVELOPMENT OF A STATE-OF-THE-ART MICROSEISMIC MONITORING SYSTEM (CANMET CONTRACT TO NORANDA INC., POINTE CLAIRE)
57. SAMPLING, FIELD TESTING AND MODELLING OF A SURFACE CROWN PILLAR AT LES MINES SELBAIE, JOUTEL, QUEBEC (CANMET CONTRACT TO C. MIRZA ENGINEERING INC., NORTH YORK)
58. DEVELOPMENT OF VERTICAL BLOCK METHOD DESIGN GUIDELINES FOR A STEEPLY DIPPING OREBODY, AS WELL AS SCALING TECHNIQUES (CANMET CONTRACT TO INCO LIMITED, THOMPSON, MANITOBA, CANADA-MANITOBA MINERAL DEVELOPMENT AGREEMENT)
59. GEOMECHANICAL DATABASE FOR GROUND CONTROL IN DEEP MINES (CANMET CONTRACT TO INCO LIMITED, THOMPSON, MANITOBA, CANADA-MANITOBA MINERAL DEVELOPMENT AGREEMENT)

.../

INDEX OF MINING
TECHNOLOGY DEVELOPMENT (1985)

INDEX SUR LE DÉVELOPPEMENT EN
TECHNOLOGIE MINIÈRE (1985)

GROUND CONTROL CATEGORY/CATÉGORIE SOUTÈNEMENT (3)

60. GROUND STABILITY EVALUATION WITH PARTICULAR REFERENCE TO AN EN ECHELON LENSED OREBODY (CANMET CONTRACT TO SHERRITT GORDON MINES LIMITED, LEAF RAPIDS, MANITOBA, CANADA-MANITOBA MINERAL DEVELOPMENT AGREEMENT)
61. NATURAL AND INDUCED SEISMICITY IN SASKATCHEWAN (RESEARCH AGREEMENT, CANMET, OTTAWA)
62. ÉVALUATION DE LA RÉSISTANCE DES BÉTONS GÉLÉS PRÉMATURÉMENT (RESEARCH AGREEMENT, CANMET, OTTAWA)
63. INVESTIGATION OF UNDERGROUND STABILITY RELATED TO GEOLOGICAL STRUCTURE AND GRAVITATIONAL FORCES AND DEVELOPMENT OF EMPIRICAL, STATISTICAL AND DETERMINISTIC MODELS TO PREDICT STRUCTURAL STABILITY (CANMET, EMR, OTTAWA)
64. INVESTIGATION OF UNDERGROUND STABILITY RELATED TO HIGH STRESSES AND ASSOCIATED ROCK BURSTS AND, USING INSTRUMENTATION, STUDY OF EMPIRICAL AND COMPUTER MODELS, MINING LAYOUTS AND DESIGNS TO MINIMIZE FAILURES (CANMET, EMR, OTTAWA)
65. DEVELOPMENT OF NEW COMPUTER MODELS FOR EVALUATING STABILITY OF UNDERGROUND OPENINGS AND RELATED STRUCTURES (CANMET, EMR, OTTAWA)
66. CONTRACT RESEARCH FOR CANADIAN POTASH MINING PERTAINING TO GROUND CONTROL, ENVIRONMENT AND PRODUCTIVITY (CANMET, EMR, OTTAWA)

.../

INDEX OF MINING
TECHNOLOGY DEVELOPMENT (1985)

INDEX SUR LE DÉVELOPPEMENT EN
TECHNOLOGIE MINIÈRE (1985)

GROUND CONTROL CATEGORY/CATÉGORIE SOUTÈNEMENT (3)

67. EVALUATION OF THE LIMITATIONS AND EFFECTIVENESS OF EXISTING AND PROPOSED SUPPORT SYSTEMS FOR USE IN DEEP MINING UNDER HIGH STRESS CONDITIONS (CANMET, EMR, OTTAWA)
68. LABORATORY TESTS ON ROCKS AND OTHER STRUCTURAL MATERIALS TO PROVIDE MATERIAL PROPERTIES DATA FOR PARALLEL FIELD AND MODEL STUDIES (CANMET, EMR, OTTAWA)
69. EVALUATION OF SUPPORT SYSTEMS INCLUDING BACKFILL FOR WEAK ROCK MASSES (1987) (CANMET, EMR, OTTAWA)
70. REPORT ON NEW ROCK BOLTING GUIDELINES FOR HARD ROCK (1986) (CANMET, EMR, OTTAWA)
71. DEVELOPMENT OF A NEW 3-D BOUNDARY ELEMENT PROGRAM FOR MINE APPLICATIONS (1986) (CANMET, EMR, OTTAWA)
72. DEVELOPMENT OF A GRAPHICS DISPLAY PACKAGE FOR MINE STRESS ANALYSIS APPLICATIONS (1987) (CANMET, EMR, OTTAWA)
73. RUGGED, PORTABLE SMALL SIDE-VIEWING BOREHOLE T.V. INSPECTION TOOL (1987) (CANMET, EMR, OTTAWA)
74. COMPLETION OF A GEOTECHNICAL DATABASE AND A NUMERICAL MODELLING PACKAGE FOR THE DESIGN OF UNDERGROUND OPENINGS AT DEPTH (1987) (CANMET, EMR, OTTAWA)
75. DEVELOPMENT OF AN IMPROVED MICROSEISMIC MONITORING SYSTEM WITH SUBSTANTIAL CANADIAN CONTENT (1986) (CANMET, EMR, OTTAWA)

.../

**INDEX OF MINING
TECHNOLOGY DEVELOPMENT (1985)**

**INDEX SUR LE DÉVELOPPEMENT EN
TECHNOLOGIE MINIÈRE (1985)**

GROUND CONTROL CATEGORY/CATÉGORIE SOUTÈNEMENT (3)

76. GEOTECHNICAL STUDY OF OVERBURDEN: LES MINES BELMORAL LTÉE (CENTRE DE RECHERCHES MINÉRALES, SAINTE-FOY)
77. ENGINEERING OF CROWN PILLARS: ROCHE MINES ASSOCIES LTÉE (CENTRE DE RECHERCHES MINÉRALES, SAINTE-FOY)
78. ANALYSIS OF INCLINOMETRIC DATA: J.M. ASBESTOS INC. (CENTRE DE RECHERCHES MINÉRALES, SAINTE-FOY)
79. PILLAR STABILITY IN INCLINED RAMPS: LES MINES GOLDSEARCH LTÉE (CENTRE DE RECHERCHES MINÉRALES, SAINTE-FOY)
80. ON-GOING ROCK MECHANICS/GEOTECHNICAL STUDY AT THE BELMORAL MINE (CENTRE DE RECHERCHES MINÉRALES, SAINTE-FOY)
81. ON-GOING STUDY OF ROCK BOLTING NEEDS AT LES MINES SELEINE INC. (CENTRE DE RECHERCHES MINÉRALES, SAINTE-FOY)
82. RULES FOR USE IN ROCK BOLTING (PROFESSOR PIERRE CHOQUET (LAVAL) FOR CENTRE DE RECHERCHES MINÉRALES, SAINTE-FOY)
83. LONG TERM PROJECTS TO INCREASE EXPERTISE IN ROCK MECHANICS AND GROUND CONTROL (CENTRE DE RECHERCHES MINÉRALES, SAINTE-FOY)
84. CONCEPTION DES PILIERS DE SURFACE À LA MINE CHIMO (CENTRE DE RECHERCHES MINÉRALES, SAINTE-FOY)
85. COLLABORATION DU CANMET DANS LA SOLUTION DE PROBLÈMES EN CONTRÔLE DES TERRAINS À LA MINE NIOBEC (CENTRE DE RECHERCHES MINÉRALES, SAINTE-FOY)

.../

INDEX OF MINING
TECHNOLOGY DEVELOPMENT (1985)

INDEX SUR LE DÉVELOPPEMENT EN
TECHNOLOGIE MINIÈRE (1985)

GROUND CONTROL CATEGORY/CATÉGORIE SOUTÈNEMENT (3)

86. LES EXTENSOMÈTRES: CE QUE L'ON DOIT SAVOIR À PROPOS DE CES APPAREILS DE MESURES DE DÉFORMATION (MINES SELEINE) (CENTRE DE RECHERCHES MINÉRALES, SAINTE-FOY)
87. REVUE DE L'INFORMATION DISPONIBLE SUR LA STABILITÉ DU MUR NORD DE LA MINE JEFFREY (CENTRE DE RECHERCHES MINÉRALES, SAINTE-FOY)
88. LE SUPPORT PAR CÂBLES CIMENTÉS (CENTRE DE RECHERCHE MINÉRALES, SAINTE-FOY)
89. LE REMBLAI ROCHEUX CIMENTÉ (CENTRE DE RECHERCHES MINÉRALES, SAINTE-FOY)
90. INSTABILITÉS DE TALUS DANS LES MINIÈRES (CENTRE DE RECHERCHES MINÉRALES, SAINTE-FOY)
91. RÈGLES D'UTILISATION DU BOULONNAGE (CENTRE DE RECHERCHES MINÉRALES, SAINTE-FOY)
92. LES PROPRIÉTÉS PHYSIQUES ET MÉCANIQUES DES REMBLAIS SOUTERRAINS ET LEUR INFLUENCE SUR LA CONCEPTION DES CHANTIERS SOUTERRAINS (M.J. SCOBLE, MCGILL, FOR CENTRE DE RECHERCHES MINÉRALES, SAINTE-FOY)
93. STUDY OF OVERBURDEN MOVEMENT AND PILLAR BEHAVIOUR IN EXTRACTED AREAS (INTERNATIONAL MINERALS AND CHEMICAL CORP., ESTERHAZY, SASKATCHEWAN)

.../

INDEX OF MINING
TECHNOLOGY DEVELOPMENT (1985)

INDEX SUR LE DÉVELOPPEMENT EN
TECHNOLOGIE MINIÈRE (1985)

GROUND CONTROL CATEGORY/CATÉGORIE SOUTÈNEMENT (3)

94. SEISMIC MONITORING (INTERNATIONAL MINERALS AND CHEMICAL CORP.,
ESTERHAZY, SASKATCHEWAN)
95. TERTIARY RECOVERY ADJACENT TO UNCONSOLIDATED BACKFILL (HUDSON BAY
MINING AND SMELTING, FLIN FLON)
96. EVALUATION OF ULTRASONIC ROCKBOLT TESTER (MINING HEALTH AND
SAFETY BRANCH, OHSD, TORONTO)
97. JOINT CANMET/MOL/INDUSTRY ROCKBURST RESEARCH PROGRAM (MINING
HEALTH AND SAFETY BRANCH, OHSD, TORONTO)
98. EVALUATION OF INSTALLED WIRE MESH SCREENING (MINING HEALTH AND
SAFETY BRANCH, OHSD, TORONTO)
99. ROCKBOLT TESTING AND AUDITS (MINING HEALTH AND SAFETY BRANCH,
OHSD, TORONTO)
100. WIRE ROPE TECHNOLOGY (MINING HEALTH AND SAFETY BRANCH, OHSD,
TORONTO)
101. PILLAR RECOVERY DESIGN AND CONTROL (MCGILL UNIVERSITY, MONTREAL)

INDEX OF MINING
TECHNOLOGY DEVELOPMENT (1985)

INDEX SUR LE DÉVELOPPEMENT EN
TECHNOLOGIE MINIÈRE (1985)

MATERIALS HANDLING CATEGORY/CATÉGORIE MANUTENTION DES MATÉRIAUX (4)

1. RUBBER TRUCK BOX (VALLEY COPPER, COMINCO, KAMLOOPS)
2. TROLLEY ASSIST TRUCK HAULAGE (LORNEX, RIO ALGOM, LOGAN LAKE)
3. SCALPING/SCREENING OF MILL FEED (LORNEX, RIO ALGOM, LOGAN LAKE)
4. HAULAGE TRUCK FUEL EFFICIENCY STUDY (LORNEX, RIO ALGOM, LOGAN LAKE)
5. COMPUTER ASSISTED TRUCK DISPATCH (LORNEX, RIO ALGOM, LOGAN LAKE)
6. SHOVEL PAYLOAD WEIGHING SYSTEM (LORNEX, RIO ALGOM, LOGAN LAKE)
7. REMOTE SCOOP RETRIEVAL SYSTEM (LYON LAKE DIVISION, NORANDA, IGNACE)
8. UNDERGROUND MINE DRAINAGE SYSTEM - SLIMES HANDLING METHODS EVALUATION (KIDD CREEK, TIMMINS)
9. TRACK HAULAGE REMOTE CONTROL (KIDD CREEK, TIMMINS)
10. BALLISTIC "HANG-UP" CLEARANCE SYSTEM FOR ORE PASSES AND DRAWPOINTS (KIDD CREEK, TIMMINS)
11. INSTALLATION OF A NEW RAIL HAULAGE SYSTEM (RIO ALGOM, ELLIOT LAKE)
12. STUDY OF LOW PROFILE HAULAGE EQUIPMENT (RIO ALGOM, ELLIOT LAKE)

.../

INDEX OF MINING
TECHNOLOGY DEVELOPMENT (1985)

INDEX SUR LE DÉVELOPPEMENT EN
TECHNOLOGIE MINIÈRE (1985)

MATERIALS HANDLING CATEGORY/CATÉGORIE MANUTENTION DES MATÉRIAUX (4)

13. COLLABORATION WITH QUEBEC HYDRO AND GENERAL ELECTRIC TO EVOLVE A TROLLEY-TRUCK HAULAGE OPERATION (J.M. ASBESTOS, ASBESTOS)
14. ANALYSIS OF AUTOMATIC SKIP LOADING, NOT CURRENTLY ECONOMIC (J.M. ASBESTOS, ASBESTOS)
15. REMOTE CONTROL OF PRIMARY CRUSHER OPERATION (J.M. ASBESTOS, ASBESTOS)
16. PROGRAMMABLE CONTROLLER FOR PACKAGING OPERATION (J.M. ASBESTOS, ASBESTOS)
17. COMPUTERIZED SYSTEM TO IMPROVE CONCENTRATE FEED BLENDING (DEVELOPED AT MCMASTER UNIVERSITY) (QUEBEC CARTIER MINING, PORT CARTIER)
18. "HANG-UP" CHARGES (BRUNSWICK MINING, BATHURST)
19. LOAD MONITORING SYSTEM (BRUNSWICK MINING, BATHURST)
20. MUCK PILE WATER SPRAYS (BRUNSWICK MINING, BATHURST)
21. ANALYSIS OF IN-PIT CRUSHING AND CONVEYING IN OPEN PIT MINES AS ALTERNATIVE TO CONVENTIONAL TRUCK/SHOVEL SYSTEM (UBC, VANCOUVER)
22. EXAMINATION OF UNDERGROUND HAULAGE SYSTEMS USING A COMPUTER MODEL (QUEEN'S UNIVERSITY, KINGSTON)
23. DISPATCHING DE CAMIONS DANS UNE EXPLOITATION À CIEL OUVERT (ÉCOLE POLYTECHNIQUE, MONTREAL)

.../

INDEX OF MINING
TECHNOLOGY DEVELOPMENT (1985)

INDEX SUR LE DÉVELOPPEMENT EN
TECHNOLOGIE MINIÈRE (1985)

MATERIALS HANDLING CATEGORY/CATÉGORIE MANUTENTION DES MATÉRIAUX (4)

24. ÉTUDE DU SOUTIRAGE DES BLOCS MINÉRALISÉS AUX NIVEAUX 16 ET 18 DE LA MINE MALARTIC POUR LES MINES CAMFLO LTÉE (UNIVERSITÉ LAVAL, SAINTE-FOY)
25. ORE DRAW MODELLING AND OPTIMIZATION (UNIVERSITÉ LAVAL, SAINTE-FOY)
26. INVESTIGATION OF THE LOW TEMPERATURE PERFORMANCE OF TRUCKS OPERATING ON LOW CETANE DIESEL FUEL (CANMET CONTRACT TO IMPERIAL OIL, SARNIA)
27. CONTRÔLE EN TEMPS RÉEL DES CAMIONS D'UNE MINE EN MAXIMISANT LE TONNAGE ET EN ASSURANT L'UNIFORMITÉ DE LA TENEUR (EMR RESEARCH AGREEMENT, CANMET, OTTAWA)
28. SURVEY OF SHAFT SINKING TECHNOLOGY (1986) (CANMET, EMR, OTTAWA)
29. HAULAGE SIMULATION FOR OPEN PIT IRON ORE MINE (1987) (CANMET, EMR, OTTAWA)
30. TECHNICAL SERVICES ON HOISTING PLANT OPERATIONS OFFERED TO THE QUEBEC MINING INDUSTRY (CENTRE DE RECHERCHES MINÉRALES, SAINTE-FOY)
31. ACCROISSEMENT DE LA PRODUCTIVITÉ PAR L'AMÉLIORATION DU FONCTIONNEMENT DES ÉQUIPEMENTS DE HISSAGE DANS LES MINES SOUTERRAINES (CENTRE DE RECHERCHES MINÉRALES, SAINTE-FOY)

.../

**INDEX OF MINING
TECHNOLOGY DEVELOPMENT (1985)**

**INDEX SUR LE DÉVELOPPEMENT EN
TECHNOLOGIE MINIÈRE (1985)**

MATERIALS HANDLING CATEGORY/CATÉGORIE MANUTENTION DES MATÉRIAUX (4)

32. LE BAZOOKA LÉGER UTILISÉ COMME ÉQUIPEMENT DE DÉCROCHAGE DANS LES CHEMINÉES À MINÉRAI OU À STÉRILE (CENTRE DE RECHERCHES MINÉRALES, SAINTE-FOY)
33. ÉVALUATION ÉCONOMIQUE PRÉLIMINAIRE D'UN SYSTÈME À TROLLEY ADAPTÉ AUX CHARGEUSES NAVETTES ET CAMIONS (CENTRE DE RECHERCHES MINÉRALES, SAINTE-FOY)
34. DÉVELOPPEMENT D'UN LOGICIEL DE RÉPARTITION DES CAMIONS DANS UNE MINE À CIEL OUVERT, AVEC CONTRÔLE DE LA TENEUR (CENTRE DE RECHERCHES MINÉRALES, SAINTE-FOY)
35. REMOTE CONTROLLED SCOOPTRAM (MAC PUBLICATION, ONTARIO DIVISION, INCO, COPPER CLIFF)
36. AUTOMATIC TRUCK DISPATCH SYSTEM (MAC PUBLICATION, QUEBEC CARTIER MINING, PORT CARTIER)
37. EVALUATION OF ROLLER COMPACTED CONCRETE FOR UNDERGROUND ROADWAY PAVING (ONTARIO DIVISION, INCO, COPPER CLIFF)
38. BOAT LOADING FACILITIES STUDY (OJIBWAY MINE, CANADIAN SALT CO., WINDSOR)
39. LHD FLEET REPLACEMENT (OJIBWAY MINE, CANADIAN SALT CO., WINDSOR)
40. INSTALLATION OF TWO 100 TON TRUCK SCALES (OJIBWAY MINE, CANADIAN SALT CO., WINDSOR)
41. MEN AND MATERIAL HOISTING (MINING HEALTH AND SAFETY BRANCH, OHSD, TORONTO)

INDEX OF MINING
TECHNOLOGY DEVELOPMENT (1985)

INDEX SUR LE DÉVELOPPEMENT EN
TECHNOLOGIE MINIÈRE (1985)

EQUIPMENT CATEGORY/ÉQUIPEMENT GÉNÉRAL (5)

1. RUBBER TRUCK BOX (VALLEY COPPER, COMINCO, KAMLOOPS)
2. TROLLEY ASSIST TRUCK HAULAGE (LORNEX, RIO ALGOM, LOGAN LAKE)
3. SCALPING/SCREENING OF MILL FEED (LORNEX, RIO ALGOM, LOGAN LAKE)
4. HAULAGE TRUCK FUEL EFFICIENCY STUDY (LORNEX, RIO ALGOM, LOGAN LAKE)
5. COMPUTER ASSISTED TRUCK DISPATCH (LORNEX, RIO ALGOM, LOGAN LAKE)
6. SHOVEL PAYLOAD WEIGHING SYSTEM (LORNEX, RIO ALGOM, LOGAN LAKE)
7. MINING 30° DIP OREBODIES WITH TRACKLESS EQUIPMENT (MYRA FALLS, WESTMIN, CAMPBELL RIVER)
8. FIELD TESTING 4 1/2 INCH AND 3 1/2 INCH IN-THE-HOLE UP-HOLE DRILLING SYSTEM (SULLIVAN, COMINCO, KIMBERLEY)
9. CONTROL OF DIESEL EMISSIONS (SULLIVAN, COMINCO, KIMBERLEY)
10. MECHANICAL MINING MACHINES: SHAFTS, RAISES, DRIFTS (SULLIVAN, COMINCO, KIMBERLEY)
11. SOUND AND VIBRATION SUPPRESSION ON COMPRESSED AIR EQUIPMENT (JACKLEGS, STOPERS) (MANITOBA DIVISION, INCO, THOMPSON)
12. ROCK BREAKING WITHOUT THE CONVENTIONAL USE OF EXPLOSIVES (MANITOBA DIVISION, INCO, THOMPSON)

.../

**INDEX OF MINING
TECHNOLOGY DEVELOPMENT (1985)**

**INDEX SUR LE DÉVELOPPEMENT EN
TECHNOLOGIE MINIÈRE (1985)**

EQUIPMENT CATEGORY/ÉQUIPEMENT GÉNÉRAL (5)

13. REMOTE SCOOP RETRIEVAL SYSTEM (LYON LAKE DIVISION, NORANDA, IGNACE)
14. MECHANICAL SCALING (SIFTO SALT DIVISION, DOMTAR, GODERICH)
15. MECHANICAL NARROW VEIN MINING (DOME MINES, SOUTH PORCUPINE)
16. THE USE OF WATER UNDER PRESSURE FOR ROCK WORK (FOR MINING APPLICATIONS IN COMMON HARD ROCK) (KIDD CREEK, TIMMINS)
17. LOOSE ROCK SENSING SYSTEM FOR MECHANIZED SCALING (KIDD CREEK, TIMMINS)
18. TRACK HAULAGE REMOTE CONTROL (KIDD CREEK, TIMMINS)
19. SELF-CONTAINED SCOOPTRAM DUST SUPPRESSION SYSTEM (ALGOMA ORE DIVISION, WAWA)
20. DEVELOP CONCEPTS AND PROCURE A MOBILE SCALER/ROCKBOLTER/BLOCKHOLER UNIT (ALGOMA ORE DIVISION, WAWA)
21. CONTINUING SEARCH AND EVALUATION OF LOW PROFILE MINING EQUIPMENT (DENISON, ELLIOT LAKE)
22. INSTALLATION OF A NEW RAIL HAULAGE SYSTEM (RIO ALGOM, ELLIOT LAKE)
23. STUDY OF LOW PROFILE HAULAGE EQUIPMENT (RIO ALGOM, ELLIOT LAKE)

.../

INDEX OF MINING
TECHNOLOGY DEVELOPMENT (1985)

INDEX SUR LE DÉVELOPPEMENT EN
TECHNOLOGIE MINIÈRE (1985)

EQUIPMENT CATEGORY/ÉQUIPEMENT GÉNÉRAL (5)

24. OVERSEEING A HDRK PROJECT TO AUTOMATE DRILL ROD HANDLING
(FALCONBRIDGE, FALCONBRIDGE)
25. PLANS TO DEVELOP AUTOMATED DOWN-THE-HOLE DRILLING (FALCONBRIDGE,
FALCONBRIDGE)
26. DEVELOPMENT OF AN ITH MACHINE WITH COMPONENT BREAKDOWN TO A
24" x 24" SIZE (ONTARIO DIVISION, INCO, COPPER CLIFF)
27. TUNNEL BORING MACHINE (KIENA GOLD MINES, VAL D'OR)
28. SCALER MACHINE IN UNDERGROUND MINE (KIENA GOLD MINES, VAL D'OR)
29. TIME STUDY REGARDING LONG HOLE DRILL (BOUSQUET DIVISION, LAC
MINERALS, MALARTIC)
30. SWELLEX BOLTS (BOUSQUET DIVISION, LAC MINERALS, MALARTIC)
31. PURCHASE OF COMPUTER EQUIPMENT AS WELL AS APPROPRIATE SOFTWARE IN
MINING (SIGMA MINES, VAL D'OR)
32. COLLABORATION WITH QUEBEC HYDRO AND GENERAL ELECTRIC TO EVOLVE A
TROLLEY-TRUCK HAULAGE OPERATION (J.M. ASBESTOS, ASBESTOS)
33. INSTALLATION AND EVALUATION OF 20 FEET STRESSED CABLE BOLTS IN
PRE-SHEARED PIT WALLS (JOHNS MANVILLE ASBESTOS, ASBESTOS)

.../

**INDEX OF MINING
TECHNOLOGY DEVELOPMENT (1985)**

**INDEX SUR LE DÉVELOPPEMENT EN
TECHNOLOGIE MINIÈRE (1985)**

EQUIPMENT CATEGORY/ÉQUIPEMENT GÉNÉRAL (5)

34. ANALYSIS OF AUTOMATIC SKIP LOADING, NOT CURRENTLY ECONOMIC (JOHNS-MANVILLE ASBESTOS, ASBESTOS)
35. REMOTE CONTROL OF PRIMARY CRUSHER OPERATION (JOHNS-MANVILLE ASBESTOS, ASBESTOS)
36. ROCK BOLTING-OPEN PIT WALL (JOHNS-MANVILLE ASBESTOS, ASBESTOS)
37. PROGRAMMABLE CONTROLLER FOR PACKAGING OPERATION (JOHNS-MANVILLE ASBESTOS, ASBESTOS)
38. AUTOMATIC FAN CONTROL (BRUNSWICK MINING, BATHURST)
39. LOAD MONITORING SYSTEM (BRUNSWICK MINING, BATHURST)
40. RECESSING ATTACHMENT/CABLE BOLTING (BRUNSWICK MINING, BATHURST)
41. MODIFIED ROCK BOLT DOLLY WRENCH (BRUNSWICK MINING, BATHURST)
42. MUCK PILE WATER SPRAYS (BRUNSWICK MINING, BATHURST)
43. FRICTION WASHERS FOR SCREEN SUPPORT (BRUNSWICK MINING, BATHURST)
44. ANALYSIS OF IN PIT CRUSHING AND CONVEYING IN OPEN PIT MINES AS ALTERNATIVE TO CONVENTIONAL TRUCK/SHOVEL SYSTEM (UBC, VANCOUVER)
45. DIFFERENT ASPECTS OF ROCK MECHANICS AT RUTTAN MINE, INCLUDING SONIC DEVICES (UBC, VANCOUVER)

.../

INDEX OF MINING
TECHNOLOGY DEVELOPMENT (1985)

INDEX SUR LE DÉVELOPPEMENT EN
TECHNOLOGIE MINIÈRE (1985)

EQUIPMENT CATEGORY/ÉQUIPEMENT GÉNÉRAL (5)

46. USE OF DIESELS IN SURFACE AND UNDERGROUND MINING (UBC, VANCOUVER)
47. STEEL FIBRE REINFORCED SILICA FUME SHOTCRETE RIBS IN
SUBSTITUTION FOR STEEL RIBS FOR THE SUPPORT OF UNDERGROUND
OPENINGS (UBC, VANCOUVER)
48. STUDY OF NON-DESTRUCTIVE ROCKBOLT LOAD CAPACITY MEASUREMENT
(QUEEN'S UNIVERSITY, KINGSTON)
49. FIELD EVALUATION OF A VIBRATING OVERBURDEN DRILL TO ASSESS
OPERATING CHARACTERISTICS (QUEEN'S UNIVERSITY, KINGSTON)
50. SYNTHÈSE DE L'UTILISATION DES BOULONS D'ANCRAGE DANS LES MINES
DU QUÉBEC; ÉTABLISSEMENT D'UNE UTILISATION STANDARD DES BOULONS
D'ANCRAGE POUVANT ÊTRE APPLIQUÉE (UNIVERSITÉ LAVAL, SAINTE-FOY)
51. DETERMINATION OF CONCENTRATIONS AND SIZE-FRACTIONATE AIRBORNE
DUST PARTICLES USING AREA OR PERSONAL SAMPLING DEVICES (B.C.
RESEARCH, VANCOUVER)
52. DETERMINATION OF GAS CONCENTRATIONS ON-SITE USING SENSITIVE
CONTINUOUS MONITORING TECHNIQUES (B.C. RESEARCH, VANCOUVER)
53. AN EVALUATION STUDY OF A MINING MACHINE BIT (POTASH CORPORATION
SASKATCHEWAN, SASKATOON)
54. FIELD TESTS OF A DEVICE FOR ON-BOARD MONITORING K40, AS A
PROJECTED MACHINE MOUNTED ORE ANALYZER (POTASH CORPORATION
SASKATCHEWAN, SASKATOON)

.../

**INDEX OF MINING
TECHNOLOGY DEVELOPMENT (1985)**

**INDEX SUR LE DÉVELOPPEMENT EN
TECHNOLOGIE MINIÈRE (1985)**

EQUIPMENT CATEGORY/ÉQUIPEMENT GÉNÉRAL (5)

55. A MINE LIGHTING STUDY TO RECOMMEND TYPES AND SPACING OF LIGHTS FOR VARIOUS UNDERGROUND MINE SITUATIONS (MINE ACCIDENT PREVENTION ASSOCIATION ONTARIO, NORTH BAY)
56. DEVELOPMENT AND ULTIMATELY FIELD TESTING OF A NEW CONCEPT FOR UNDERGROUND RADIO COMMUNICATIONS (MINING INDUSTRY RESEARCH ORGANIZATION, TORONTO)
57. CONSIDERATION OF THE DEVELOPMENT AND TESTING OF A NEW CONCEPT FOR AIR-POWERED SPACE LIGHTING UNDERGROUND (MINING INDUSTRY RESEARCH ORGANIZATION, TORONTO)
58. DEVELOPMENT OF TECHNOLOGIES, TECHNIQUES AND EQUIPMENT FOR THE CUTTING OF HARDROCK UTILIZING HIGH PRESSURE WATER JETS WITH OTHER RELEVANT DEVICES (HDRK MINING RESEARCH, COPPER CLIFF)
59. STUDIES PERTAINING TO CONTINUOUS MINING INCLUDING THE USE OF ORE SORTERS IN CONJUNCTION WITH THE CONTINUOUS BREAKAGE OF ROCK (HDRK MINING RESEARCH, COPPER CLIFF)
60. PREPARATION FOR FIELD TESTING OF AN ULTRA SONIC SURVEY PROBE FOR DETERMINING THE CONTOURS OF INACCESSIBLE OPEN STOPES (NORANDA RESEARCH CENTRE, POINTE CLAIRE)
61. CONSIDERATION OF THE DEVELOPMENT OF NOVEL GROUND MONITORING INSTRUMENTATION TO OVERCOME DEFICIENCIES OF EXISTING INSTRUMENTATION, SUCH AS AWKWARDNESS, NON RE-USABILITY, EXPENSE AND A LOW SUCCESS RATIO (NORANDA RESEARCH CENTRE, POINTE CLAIRE)

.../

INDEX OF MINING
TECHNOLOGY DEVELOPMENT (1985)

INDEX SUR LE DÉVELOPPEMENT EN
TECHNOLOGIE MINIÈRE (1985)

EQUIPMENT CATEGORY/ÉQUIPEMENT GÉNÉRAL (5)

62. DEVELOPMENT OF NOVEL GROUND CONTROL INSTRUMENTATION (NORANDA RESEARCH CENTRE, POINTE CLAIRE)
63. ULTRASONIC MINE SURVEY PROBE (NORANDA RESEARCH CENTRE, POINTE CLAIRE)
64. INVESTIGATION OF THE LOW TEMPERATURE PERFORMANCE OF TRUCKS OPERATING ON LOW CETANE DIESEL FUEL (CANMET CONTRACT TO IMPERIAL OIL LIMITED, SARNIA)
65. DETERMINATION OF THE TECHNICAL VIABILITY OF A CAVITATING HYDRO IMPACTOR (CANMET CONTRACT TO TELEDYNE CANADA LTD., THORNBURY, ONTARIO)
66. PROVISION OF A JARCO 500 LHD DIESEL MACHINE FOR UNDERGROUND ENVIRONMENTAL IMPACT TRIALS OF EMISSIONS REDUCTION DEVICES (CANMET CONTRACT TO CIL INCORPORATED, BURLINGTON, ONTARIO)
67. DEVELOPMENT, CONSTRUCTION AND TESTING OF PROTOTYPE ACCESSORIES FOR AUTOMATION OF A DOWN-THE-HOLE DRILL (CANMET CONTRACT TO VADEKO INTERNATIONAL INC., MISSISSAUGA, ONTARIO)
68. IDENTIFICATION OF EQUIPMENT DEVELOPMENT POTENTIAL AND THE INFLUENCE ON MINE DESIGN (CANMET CONTRACT TO BRAMPTON MINING CO. LTD., BRAMPTON, ONTARIO)
69. ADAPTIVE CONTROL OF ROBOTS. VISION FOR ROBOTS (NATIONAL SCIENCE AND ENGINEERING RESEARCH COUNCIL OF CANADA (NSERC), OTTAWA, ONTARIO)

.../

**INDEX OF MINING
TECHNOLOGY DEVELOPMENT (1985)**

**INDEX SUR LE DÉVELOPPEMENT EN
TECHNOLOGIE MINIÈRE (1985)**

EQUIPMENT CATEGORY/ÉQUIPEMENT GÉNÉRAL (5)

70. SENSORS FOR UNMANNED MACHINING (NSERC, OTTAWA, ONTARIO)
71. ROTARY ENGINE DEVELOPMENTS (NSERC, OTTAWA, ONTARIO)
72. PARTICIPATION IN THE PREPARATION OF NATIONAL SAFETY STANDARDS PERTAINING TO EQUIPMENT OPERATION IN UNDERGROUND MINES, WHILE CONDUCTING RESEARCH IN THE FIELDS OF GAS AND DUST EXPLOSIONS AND FIRE RESISTANCE (CANMET, OTTAWA)
73. PROMOTION OF MINING EQUIPMENT DEVELOPMENTS FOR MINE DEVELOPMENT, PRODUCTION AND TRANSPORTATION AS WELL AS ASSESSMENT OF THE IMPACT OF SUCH EQUIPMENT ON MINE DESIGN, INCLUDING ASSOCIATED AUTOMATION, REMOTE CONTROL OR ROBOTICS (CANMET, OTTAWA)
74. STUDIES DEVOTED TO THE DEVELOPMENT OF TECHNIQUES FOR REDUCING THE NOISE LEVELS OF DIAMOND DRILLING EQUIPMENT (CANMET, OTTAWA)
75. QUANTIFICATION AND DOCUMENTATION OF THE MAJOR SOURCES OF VIBRATION IN HARDROCK MINES, COMBINED WITH DEVELOPMENT OF INDICATED INSTRUMENTATION (CANMET, OTTAWA)
76. SURVEY OF SHAFT SINKING TECHNOLOGY (1986) (CANMET, OTTAWA)
77. STATE-OF-THE-ART REPORT ON ASPECTS OF MINE EQUIPMENT TECHNOLOGY (CANMET, OTTAWA)
78. REPORT ON NEW ROCK BOLTING GUIDELINES FOR HARD ROCK (CANMET, OTTAWA)

.../

INDEX OF MINING
TECHNOLOGY DEVELOPMENT (1985)

INDEX SUR LE DÉVELOPPEMENT EN
TECHNOLOGIE MINIÈRE (1985)

EQUIPMENT CATEGORY/ÉQUIPEMENT GÉNÉRAL (5)

79. FORCEMETER TO DETERMINE THE STABILITY OF BULKHEADS IN BACKFILLED STOPES (1987) (CANMET, OTTAWA)
80. UNIVERSITY RESEARCH CONTRACT: "SURVEY OF MINE NEEDS FOR COMPUTING DEVICES AND SOFTWARE" BY PROFESSOR RENÉ DUFOUR, ÉCOLE POLYTECHNIQUE (CENTRE DE RECHERCHES MINÉRALES, SAINTE-FOY)
81. TECHNICAL SERVICES ON HOISTING PLANT OPERATIONS OFFERED TO THE QUEBEC MINING INDUSTRY (CENTRE DE RECHERCHES MINÉRALES, SAINTE-FOY)
82. LONG TERM PROJECTS TO DEVELOP EXPERTISE CONCERNING MINING EQUIPMENT (CENTRE DE RECHERCHES MINÉRALES, SAINTE-FOY)
83. SERVICES TECHNIQUES ET ÉTUDES DES MACHINES D'EXTRACTION DANS LES MINES SOUTERRAINES DU QUÉBEC (AMMQ) (CENTRE DE RECHERCHES MINÉRALES, SAINTE-FOY)
84. PROGRAMME D'ESSAIS ET DE SURVEILLANCE EN CHANTIER DE LA FOREUSE ROGER (CENTRE DE RECHERCHES MINÉRALES, SAINTE-FOY)
85. ACCROISSEMENT DE LA PRODUCTIVITÉ PAR L'AMÉLIORATION DU FONCTIONNEMENT DES ÉQUIPEMENTS DE HISSAGE DANS LES MINES SOUTERRAINES (CENTRE DE RECHERCHES MINÉRALES, SAINTE-FOY)
86. LE BAZOOKA LÉGER UTILISÉ COMME ÉQUIPEMENT DE DÉCROCHAGE DANS LES CHEMINÉES À MINÉRAI OU À STÉRILE (CENTRE DE RECHERCHES MINÉRALES, SAINTE-FOY)

.../

**INDEX OF MINING
TECHNOLOGY DEVELOPMENT (1985)**

**INDEX SUR LE DÉVELOPPEMENT EN
TECHNOLOGIE MINIÈRE (1985)**

EQUIPMENT CATEGORY/ÉQUIPEMENT GÉNÉRAL (5)

87. INFORMATISER LES RAPPORTS D'ESSAIS EFFECTUÉS SUR LES MACHINES D'EXTRACTION (CENTRE DE RECHERCHES MINÉRALES, SAINTE-FOY)
88. INTRODUCTION OF FIRE RESISTANT HYDRAULIC FLUIDS (SULLIVAN MINE, COMINCO, KIMBERLEY)
89. CONTINUOUS MINER (BOUSQUET DIVISION, LAC MINERALS, MALARTIC)
90. REMOTE CONTROLLED SCOOPTRAM (MAC PUBLICATION: ONTARIO DIVISION, INCO, COPPER CLIFF)
91. AUTOMATIC TRUCK DISPATCH SYSTEM (MAC PUBLICATION: QUEBEC CARTIER MINING, PORT CARTIER)
92. RUGGED PORTABLE SMALL SIDE-VIEWING BOREHOLE T.V. INSPECTION TOOL (1987) (CANMET, OTTAWA)
93. TESTING OF TWO DRILL JUMBOS WHICH HAVE BEEN CONVERTED FOR UP-HOLE DRILLING (DENISON MINES, ELLIOT LAKE)
94. LHD FLEET REPLACEMENT (OJIBWAY MINE, CANADIAN SALT CO., WINDSOR)
95. INSTALLATION OF TWO 100 TON TRUCK SCALES (OJIBWAY MINE, CANADIAN SALT CO., WINDSOR)
96. A COMPREHENSIVE STUDY ON ENERGY ECONOMICS, INCLUDING THE DEVELOPMENT OF A HEAT PUMP (CENTRE DE RECHERCHES MINÉRALES, SAINTE-FOY)

.../

INDEX OF MINING
TECHNOLOGY DEVELOPMENT (1985)

INDEX SUR LE DÉVELOPPEMENT EN
TECHNOLOGIE MINIÈRE (1985)

EQUIPMENT CATEGORY/ÉQUIPEMENT GÉNÉRAL (5)

97. EVALUATION OF ULTRASONIC ROCKBOLT TESTER (MINING HEALTH AND SAFETY BRANCH, OHSD, TORONTO)
98. EVALUATION OF INSTALLED WIRE MESH SCREENING (MINING HEALTH AND SAFETY BRANCH, OHSD, TORONTO)
99. ROCKBOLT TESTING AND AUDITS (MINING HEALTH AND SAFETY BRANCH, OHSD, TORONTO)
100. DIESEL EMISSIONS IN UNDERGROUND MINES (MINING HEALTH AND SAFETY BRANCH, OHSD, TORONTO)
101. WIRE ROPE TECHNOLOGY (MINING HEALTH AND SAFETY BRANCH, OHSD, TORONTO)
102. MEN AND MATERIAL HOISTING (MINING HEALTH AND SAFETY BRANCH, OHSD, TORONTO)

**INDEX OF MINING
TECHNOLOGY DEVELOPMENT (1985)**

**INDEX SUR LE DÉVELOPPEMENT EN
TECHNOLOGIE MINIÈRE (1985)**

MAINTENANCE CATEGORY/CATÉGORIE ENTRETIEN (6)

1. COMPUTERIZED MINE MAINTENANCE (LORNEX, RIO ALGOM, LOGAN LAKE)
2. DEVELOPMENT OF COMPUTERIZED WAREHOUSE AND MAINTENANCE SYSTEMS
(RIO ALGOM, ELLIOT LAKE)
3. STUDY OF THE STRUCTURE, METHODS AND REQUIREMENTS OF MAINTENANCE
SYSTEMS IN MINING OPERATIONS (QUEEN'S UNIVERSITY, KINGSTON)
4. A FEASIBILITY ANALYSIS CONCERNING USED OIL RECLAMATION ON SITE
(CENTRE DE RECHERCHES MINÉRALES, SAINTE-FOY)
5. INTEGRATED MAINTENANCE SYSTEM (MAC PUBLICATION: KIDD CREEK,
TIMMINS)

INDEX OF MINING
TECHNOLOGY DEVELOPMENT (1985)

INDEX SUR LE DÉVELOPPEMENT EN
TECHNOLOGIE MINIÈRE (1985)

BACKFILLING CATEGORY/CATÉGORIE REMBLAYAGE (7)

1. SUB-LEVEL RETREAT MINING WITH WASTE FILL (MYRA FALLS OPERATIONS, WESTMIN RESOURCES, CAMPBELL RIVER)
2. A FIELD TEST PROGRAM TO EVALUATE THE USE OF WASTE SALT BACKFILL IN SASKATCHEWAN POTASH MINES (CENTRAL CANADA POTASH, NORANDA, COLONSAY)
3. CONCEPTUAL STUDIES ON USING GRANULATED SLAG AS BACKFILL IN BULK MINING STOPEs (MANITOBA DIVISION, INCO, THOMPSON)
4. HYDRAULIC BACKFILL (LYON LAKE DIVISION, NORANDA, IGNACE)
5. TAILSPINNER BACKFILL PROJECT (DOME MINES, SOUTH PORCUPINE)
6. PARTIAL REPLACEMENT OF PORTLAND CEMENT IN CONSOLIDATED BACKFILL (KIDD CREEK MINES, TIMMINS)
7. BACKFILL MINING PROGRAM, INVOLVING TESTING OF OPEN AND FREE DRAINAGE FILL FENCES, FILTER MEDIA AND VARIOUS TYPES OF DRAINAGE PIPES (DENISON MINES, ELLIOT LAKE)
8. TEST WORK UNDERWAY TO REDUCE THE CEMENT CONTENT OF BACKFILL AND INCREASE THE SLAG CONTENT (FALCONBRIDGE, FALCONBRIDGE)
9. INVESTIGATION OF NICKEL SLAG AS A BINDING AGENT FOR FILLS (ONTARIO DIVISION, INCO, COPPER CLIFF)
10. INVESTIGATION OF STRENGTHS OF CONSOLIDATED FILLS (ONTARIO DIVISION, INCO, COPPER CLIFF)

.../

**INDEX OF MINING
TECHNOLOGY DEVELOPMENT (1985)**

**INDEX SUR LE DÉVELOPPEMENT EN
TECHNOLOGIE MINIÈRE (1985)**

BACKFILLING CATEGORY/CATÉGORIE REMBLAYAGE (7)

11. HIGH DENSITY FILL (ONTARIO DIVISION, INCO, COPPER CLIFF)
12. DEVELOPMENT OF A "TIMBERLESS" UNDERCUT AND FILL MINING METHOD
(ONTARIO DIVISION, INCO, COPPER CLIFF)
13. INVESTIGATION OF GROUTS TO CONSOLIDATE IN SITU FILL MATERIALS
(ONTARIO DIVISION, INCO, COPPER CLIFF)
14. INVESTIGATION OF IRON ORE BLAST FURNACE SLAG AS A BINDING AGENT
FOR FILLS (ONTARIO DIVISION, INCO, COPPER CLIFF)
15. ADHESION OF FLOCCULANT IN MINING BACKFILL (KIENA GOLD MINES, VAL
D'OR)
16. ROCK MECHANICS INSTRUMENTATION FOR AN UNDERGROUND POTASH MINE
UTILIZING BACKFILLING OPERATIONS (DENISON-POTACAN POTASH, SUSSEX)
17. USE OF BACKFILL IN POTASH MINING (MODELLING) (DENISON-POTACAN
POTASH, SUSSEX)
18. USE OF BACKFILL IN POTASH MINING (LABORATORY AND IN SITU
TESTING) (DENISON-POTACAN POTASH, SUSSEX)
19. SALT TAILINGS STUDY (RE BACKFILL) (UNIVERSITY OF SASKATCHEWAN,
SASKATOON)
20. STUDY OF PROPERTIES OF BACKFILL MATERIALS FOR FROZEN BACKFILLS,
IN FROZEN ENVIRONMENTS (QUEEN'S UNIVERSITY, KINGSTON)

.../

INDEX OF MINING
TECHNOLOGY DEVELOPMENT (1985)

INDEX SUR LE DÉVELOPPEMENT EN
TECHNOLOGIE MINIÈRE (1985)

BACKFILLING CATEGORY/CATÉGORIE REMBLAYAGE (7)

21. STUDY OF RADIOACTIVE PROPERTIES OF ORE AND BACKFILL MATERIALS IN URANIUM MINES TO MORE ACCURATELY PREDICT RADIATION LEVELS (QUEEN'S UNIVERSITY, KINGSTON)
22. TESTING OF SLAG PYRITE FOR UNDERGROUND BACKFILL (QUEEN'S UNIVERSITY, KINGSTON)
23. LABORATORY STUDIES OF HIGH DENSITY TAILINGS FILL SLURRY VISCOSITIES (QUEEN'S UNIVERSITY, KINGSTON)
24. CEMENTED HYDRAULIC BACKFILL MECHANICAL PROPERTIES (MCGILL UNIVERSITY, MONTREAL)
25. AN INVESTIGATION INTO THE PHYSICAL AND MECHANICAL PROPERTIES OF SALT BACKFILL USED IN POTASH MINES (MCGILL UNIVERSITY, MONTREAL)
26. BACKFILL PROJECT INVESTIGATING UNDERGROUND FILL TRANSPORT, FILL PLACEMENT, DROP PIPES AND BACKFILL COMPACTION (POTASH CORPORATION OF SASKATCHEWAN, SASKATOON)
27. STUDY OF THE IN SITU CONSOLIDATION OF BACKFILL BY FREEZING, INJECTIONS, ETC. TO REDUCE CEMENT COSTS AND THE DILUTION OF PILLAR ORE (NORANDA RESEARCH CENTRE, POINTE CLAIRE)
28. REVIEW OF THE USE OF ICE AS A TEMPORARY FILL MATERIAL WHILE MINING PILLARS (NORANDA RESEARCH CENTRE, POINTE CLAIRE)

.../

**INDEX OF MINING
TECHNOLOGY DEVELOPMENT (1985)**

**INDEX SUR LE DÉVELOPPEMENT EN
TECHNOLOGIE MINIÈRE (1985)**

BACKFILLING CATEGORY/CATÉGORIE REMBLAYAGE (7)

29. ICE AS A BACKFILL IN UNDERGROUND MINES (NORANDA RESEARCH CENTRE, POINTE CLAIRE)
30. EVALUATION OF SUPPORT SYSTEMS INCLUDING BACKFILL FOR WEAK ROCK MASSES (CANMET, OTTAWA)
31. FORCEMETER TO DETERMINE THE STABILITY OF BULKHEADS IN BACKFILLED STOPES (CANMET, OTTAWA)
32. STABILITY OF BACKFILL: LES MINES BELMORAL LTÉE (CENTRE DE RECHERCHES MINÉRALES, SAINTE-FOY)
33. LES PROPRIÉTÉS PHYSIQUES ET MÉCANIQUES DES REMBLAIS SOUTERRAINS ET LEUR INFLUENCE SUR LA CONCEPTION DES CHANTIERS SOUTERRAINS (CENTRE DE RECHERCHES MINÉRALES, SAINTE-FOY BY M.J. SCOBLE, MCGILL UNIVERSITY)
34. USE OF BACKFILL IN NEW BRUNSWICK POTASH MINES (#5-9031) (CANMET CONTRACT TO DENISON POTACAN POTASH CO., SUSSEX)
35. TAILINGS BACKFILL DE-WATERING (CANADA TUNGSTEN, TUNGSTEN, N.W.T.)

INDEX OF MINING
TECHNOLOGY DEVELOPMENT (1985)

INDEX SUR LE DÉVELOPPEMENT EN
TECHNOLOGIE MINIÈRE (1985)

MINE LEACHING CATEGORY/CATÉGORIE LIXIVIATION (8)

1. HEAP LEACHING - SOLVENT EXTRACTION (VALLEY COPPER MINE, COMINCO, KAMLOOPS)
2. PROGRAM OF LARGE-SCALE UNDERGROUND TESTING OF HEAP LEACHING (DENISON MINES, ELLIOT LAKE)
3. DEVELOPMENT OF BACTERIAL LEACHING PRETREATMENT PROCESS FOR REFRACTORY GOLD ORES AND CONCENTRATES (B.C. RESEARCH, VANCOUVER)
4. STUDY OF THE IN SITU MINING OF COPPER OXIDE BY LEACHING (NORANDA RESEARCH CENTRE, POINTE CLAIRE)
5. BACTERIALLY-ASSISTED UNDERGROUND LEACHING OF COPPER SULPHIDES (NORANDA RESEARCH CENTRE, POINTE CLAIRE)
6. SECONDARY RECOVERY OF BASE METALS BY IN-PLACE BACTERIAL LEACHING (MINES BRANCH, ENERGY AND MINES, WINNIPEG)
7. MICROBIOLOGICAL CONTROL OF LEACHINGS FROM MINE TAILINGS (CANMET CONTRACT TO UNIVERSITY OF OTTAWA, OTTAWA)
8. BACTERIAL-LEACH ASSISTED MINING (HUDSON BAY MINING AND SMELTING, FLIN FLON)
9. THE FATE OF RADIUM IN URANIUM LEACHING AND ITS CONSEQUENT DISSOLUTION MECHANISMS (CANMET CONTRACT TO CHEMEX LABS, NORTH VANCOUVER)

**INDEX OF MINING
TECHNOLOGY DEVELOPMENT (1985)**

**INDEX SUR LE DÉVELOPPEMENT EN
TECHNOLOGIE MINIÈRE (1985)**

INDUSTRIAL ENGINEERING CATEGORY/CATÉGORIE GÉNIE INDUSTRIEL (9)

1. OREBODY EVALUATION - PIT OPTIMIZATION (AFTON OPERATING CORPORATION, KAMLOOPS)
2. POLYURETHANE APPLICATION IN THE UNDERGROUND ENVIRONMENT (MANITOBA DIVISION, INCO, THOMPSON)
3. MODIFICATION OF ROCKBOLT SHELLS FOR IMPROVED ANCHORING IN SOFTER ROCK AND ORE FORMATIONS (MANITOBA DIVISION, INCO, THOMPSON)
4. MINING METHODS OPTIMIZATION (MANITOBA DIVISION, INCO, THOMPSON)
5. METHODS BEING STUDIED TO IMPROVE ORE RECOVERY FROM PILLARS BETWEEN FILLED STOPEs (FALCONBRIDGE, FALCONBRIDGE)
6. BLAST SIMULATION BY COMPUTER MODEL (ONTARIO DIVISION, INCO, COPPER CLIFF)
7. INVESTIGATION OF GROUTS TO CONSOLIDATE IN SITU FILL MATERIALS (ONTARIO DIVISION, INCO, COPPER CLIFF)
8. DEVELOPMENT OF A 3-D NUMERICAL MODELLING SYSTEM FOR ROCK MECHANICS (ONTARIO DIVISION, INCO, COPPER CLIFF)
9. ROCK MECHANICS COMPUTER SIMULATION MODEL (LES MINES SELEINE, ÎLES-DE-LA-MADELEINE)
10. PURCHASE OF COMPUTER EQUIPMENT AS WELL AS APPROPRIATE SOFTWARE IN MINING (SIGMA MINES, VAL D'OR)

.../

INDEX OF MINING
TECHNOLOGY DEVELOPMENT (1985)

INDEX SUR LE DÉVELOPPEMENT EN
TECHNOLOGIE MINIÈRE (1985)

INDUSTRIAL ENGINEERING CATEGORY/CATÉGORIE GÉNIE INDUSTRIEL (9)

11. COMPUTERIZED SYSTEM TO IMPROVE CONCENTRATE FEED BLENDING
(DEVELOPED AT MCMASTER UNIVERSITY FOR QUEBEC CARTIER MINING, PORT
CARTIER)
12. MEANS OF RELATING DRILL HOLE CUTTINGS FROM EACH ORE BLOCK TO ORE
REACTIONS IN THE MILL, TO IMPROVE THE PREDICTABILITY OF
CONCENTRATE GRADES (QUEBEC CARTIER MINING, PORT CARTIER)
13. A COMPUTER PROGRAM HAS BEEN DEVELOPED BY USE OF THE MONTE CARLO
TECHNIQUE TO ESTIMATE OPERATIONAL TIMES OF A DRILL-BLAST-MUCK
SUPPORT TUNNELLING SYSTEM (UBC, VANCOUVER)
14. ESTIMATION OF OPTIMUM STOPE SPAN DIMENSIONS GIVEN ITS ROCK
QUALITY AND STRESS CONDITIONS, AS WELL AS EXCAVATION METHOD AND
RATE (UBC, VANCOUVER)
15. A COMPREHENSIVE AND FULLY DOCUMENTED DESIGN PROCEDURE HAS BEEN
PROPOSED TO ASSIST MINE DESIGNERS IN ACHIEVING AN OPTIMAL MINE
LAYOUT (UBC, VANCOUVER)
16. MICROCOMPUTER APPLICATIONS STUDY (UNIVERSITY OF SASKATCHEWAN,
SASKATOON)
17. "ON-GOING" RESEARCH IN MINIMIZATION OF BLAST VIBRATIONS AND
OPTIMIZATION OF ROCK MASS FRAGMENTATION (QUEEN'S UNIVERSITY,
KINGSTON)
18. EXAMINATION OF UNDERGROUND HAULAGE SYSTEMS USING A COMPUTER MODEL
(QUEEN'S UNIVERSITY, KINGSTON)

.../

**INDEX OF MINING
TECHNOLOGY DEVELOPMENT (1985)**

**INDEX SUR LE DÉVELOPPEMENT EN
TECHNOLOGIE MINIÈRE (1985)**

INDUSTRIAL ENGINEERING CATEGORY/CATÉGORIE GÉNIE INDUSTRIEL (9)

19. DISPATCHING DE CAMIONS DANS UNE EXPLOITATION À CIEL OUVERT (ÉCOLE POLYTECHNIQUE, MONTRÉAL)
20. LA PRODUCTIVITÉ MINIÈRE (ÉCOLE POLYTECHNIQUE, MONTRÉAL)
21. OPTIMISATIONS DES CONTOURS DES EXPLOITATIONS À CIEL OUVERT (ÉCOLE POLYTECHNIQUE, MONTRÉAL)
22. MODÉLISATION D'EXPLOITATIONS MINIÈRES SOUTERRAINES (ÉCOLE POLYTECHNIQUE, MONTRÉAL)
23. BOREHOLE PATTERN AT BREAK-THROUGH (MCGILL UNIVERSITY, MONTREAL)
24. A MICRO-COMPUTER BASED MINE DESIGN/MINE PLANNING SYSTEM FOR SMALL UNDERGROUND MINING OPERATIONS (MCGILL UNIVERSITY, MONTREAL)
25. ÉTUDE DU SOUTIRAGE DES BLOCS MINERALISÉS AUX NIVEAUX 16 ET 18 DE LA MINE MALARTIC POUR LES MINES CAMFLO LTÉE (UNIVERSITÉ LAVAL, SAINTE-FOY)
26. MODE OF ACTION AND DESIGN OF CABLE BOLT SUPPORT (UNIVERSITÉ LAVAL, SAINTE-FOY)
27. ORE DRAW MODELLING AND OPTIMIZATION (UNIVERSITÉ LAVAL, SAINTE-FOY)
28. STUDIES PERTAINING TO THE SONAR GUIDANCE OF MINING MACHINES (POTASH CORPORATION OF SASKATCHEWAN, SASKATOON)

.../

INDEX OF MINING
TECHNOLOGY DEVELOPMENT (1985)

INDEX SUR LE DÉVELOPPEMENT EN
TECHNOLOGIE MINIÈRE (1985)

INDUSTRIAL ENGINEERING CATEGORY/CATÉGORIE GÉNIE INDUSTRIEL (9)

29. A STRATEGY FOR MINE COMPUTERIZATION (MAC PUBLICATION: TECK CORPORATION, VANCOUVER)
30. STUDIES TO IMPROVE PRODUCTIVITY IN RAISE BORING (HDRK MINING RESEARCH, COPPER CLIFF)
31. DEVELOPMENT OF A COMPUTERIZED RAMP DESIGN PROGRAM (NORANDA RESEARCH CENTRE, POINTE CLAIRE)
32. CONTRÔLE EN TEMPS RÉEL DES CAMIONS D'UNE MINE EN MAXIMISANT LE TONNAGE ET EN ASSURANT L'UNIFORMITÉ DE LA TENEUR (RESEARCH AGREEMENT, CANMET, OTTAWA)
33. CONTRACT RESEARCH FOR CANADIAN POTASH MINING PERTAINING TO GROUND CONTROL, ENVIRONMENT AND PRODUCTIVITY (CANMET, OTTAWA)
34. STATE-OF-THE-ART PUBLICATION OF SYSTEMS FOR COMPUTERIZED MINE DESIGN AND OPERATIONS RESEARCH (1987) (CANMET, OTTAWA)
35. HAULAGE SIMULATION FOR OPEN PIT IRON ORE MINE (1987) (CANMET, OTTAWA)
36. A COMPREHENSIVE STUDY ON ENERGY ECONOMICS, INCLUDING THE DEVELOPMENT OF A HEAT PUMP (CENTRE DE RECHERCHE MINÉRALES, SAINTE-FOY)
37. ANALYSIS OF RELATION BETWEEN BONUS AND PRODUCTIVITY, PROFITABILITY AND SAFETY (N. BILLETTE (CANMET) FOR CENTRE DE RECHERCHES MINÉRALES, SAINTE-FOY)

.../

INDEX OF MINING
TECHNOLOGY DEVELOPMENT (1985)

INDEX SUR LE DÉVELOPPEMENT EN
TECHNOLOGIE MINIÈRE (1985)

INDUSTRIAL ENGINEERING CATEGORY/CATÉGORIE GÉNIE INDUSTRIEL (9)

38. LONG TERM PROJECTS TO DEVELOP COMPUTER SOFTWARE FOR MINE USAGE
(CENTRE DE RECHERCHES MINÉRALES, SAINTE-FOY)
39. LONG TERM PROJECTS TO DEVELOP AND IMPLEMENT AUTOMATION DEVICES
IN MINES (CENTRE DE RECHERCHES MINÉRALES, SAINTE-FOY)
40. ÉVALUATION ÉCONOMIQUE PRÉLIMINAIRE D'UNE SYSTÈME À TROLLEY
ADAPTÉ AUX CHARGEUSES-NAVETTES ET CAMIONS (CENTRE DE RECHERCHES
MINÉRALES, SAINTE-FOY)
41. ÉTUDE DE LA RELATION DE CAUSE À EFFET DE LA PRIME AU RENDEMENT
SUR LA PRODUCTIVITÉ, LA RENTABILITÉ ET LA SÉCURITÉ (CENTRE DE
RECHERCHES MINÉRALES, SAINTE-FOY)
42. DÉVELOPPEMENT D'UN LOGICIEL DE RÉPARTITION DES CAMIONS DANS UNE
MINE À CIEL OUVERT, AVEC CONTRÔLE DE LA TENEUR (CENTRE DE
RECHERCHES MINÉRALES, SAINTE-FOY)
43. MINING SEQUENCES AND BLASTING FOR GRADE CONTROL PURPOSES (DETOUR
LAKE MINE, CAMPBELL RED LAKE, TIMMINS)

INDEX OF MINING
TECHNOLOGY DEVELOPMENT (1985)

INDEX SUR LE DÉVELOPPEMENT EN
TECHNOLOGIE MINIÈRE (1985)

MINE DESIGN CATEGORY/CATÉGORIE CONCEPTION (10)

1. LAKE DEWATERING (VALLEY COPPER, COMINCO, KAMLOOPS)
2. OVERBURDEN DEWATERING (VALLEY COPPER, COMINCO, KAMLOOPS)
3. TAILINGS DAMS CONSTRUCTION (VALLEY COPPER, COMINCO, KAMLOOPS)
4. VACUUM ENHANCED DRAINAGE (AFTON OPERATING CORPORATION, KAMLOOPS)
5. OREBODY EVALUATION - PIT OPTIMIZATION (AFTON OPERATING CORPORATION, KAMLOOPS)
6. LOG NORMAL ORE RESERVE CALCULATIONS (MYRA FALLS OPERATION, WESTMIN RESOURCES, CAMPBELL RIVER)
7. MINING 30° DIP OREBODIES WITH TRACKLESS EQUIPMENT (MYRA FALLS OPERATION, WESTMIN RESOURCES, CAMPBELL RIVER)
8. SUB-LEVEL RETREAT MINING WITH WASTE FILL (MYRA FALLS OPERATION, WESTMIN RESOURCES, CAMPBELL RIVER)
9. METHODS TO STABILIZE PERMAFROST (SULLIVAN MINE, COMINCO, KIMBERLEY)
10. DEVELOPMENT OF A GEOMECHANICAL DATABASE AND NUMERICAL MODEL FOR PREDICTING GROUND BEHAVIOUR AT DEPTH (CANMET CONTRACT TO MANITOBA DIVISION, INCO, THOMPSON, UNDER CANADA-MANITOBA MINERAL DEVELOPMENT AGREEMENT)

.../

**INDEX OF MINING
TECHNOLOGY DEVELOPMENT (1985)**

**INDEX SUR LE DÉVELOPPEMENT EN
TECHNOLOGIE MINIÈRE (1985)**

MINE DESIGN CATEGORY/CATÉGORIE CONCEPTION (10)

11. V.B.M. DESIGN GUIDELINES FOR STEEPLY DIPPING OREBODIES AND SCALING TECHNIQUES (CANMET CONTRACT TO MANITOBA DIVISION, INCO, THOMPSON, UNDER CANADA-MANITOBA MINERAL DEVELOPMENT AGREEMENT)
12. MINING METHODS OPTIMIZATION (MANITOBA DIVISION, INCO, THOMPSON)
13. LONG HOLE CUT AND FILL (LYON LAKE DIVISION, NORANDA, IGNACE)
14. METHODS BEING STUDIED TO IMPROVE ORE RECOVERY FROM PILLARS BETWEEN FILLED STOPE (FALCONBRIDGE, FALCONBRIDGE)
15. DEVELOPMENT OF A "TIMBERLESS" UNDERCUT AND FILL MINING METHOD (ONTARIO DIVISION, INCO, COPPER CLIFF)
16. ESTIMATION OF OPTIMUM STOPE SPAN DIMENSIONS GIVEN ITS ROCK QUALITY, STRESS CONDITIONS, AS WELL AS EXCAVATION METHOD AND RATE (UBC, VANCOUVER)
17. A COMPREHENSIVE AND FULLY DOCUMENTED DESIGN PROCEDURE HAS BEEN PROPOSED TO ASSIST MINE DESIGNERS IN ACHIEVING AN OPTIMAL MINE LAYOUT (UBC, VANCOUVER)
18. INVESTIGATION OF THE IN SITU STRESS CONDITIONS AND THE DESIGNS AND ANALYSIS BY NUMERICAL MODELLING METHODS OF PROPOSED CUT-AND-FILL STOPE (UBC, VANCOUVER)
19. DESIGN AND MODELLING OF LAYOUTS IN SALT AND POTASH DEPOSITS (UBC, VANCOUVER)

.../

INDEX OF MINING
TECHNOLOGY DEVELOPMENT (1985)

INDEX SUR LE DÉVELOPPEMENT EN
TECHNOLOGIE MINIÈRE (1985)

MINE DESIGN CATEGORY/CATÉGORIE CONCEPTION (10)

20. APPLICATION OF GEOSTATISTICS TO ORE RESERVE ESTIMATION AT THE VENUS MINE, YUKON TERRITORY (UBC, VANCOUVER)
21. DESIGN CRITERIA FOR PILLARS IN COAL MINES (UNIVERSITY OF ALBERTA, EDMONTON)
22. DEVELOPMENT OF A COMPUTER AIDED SYSTEM FOR UNDERGROUND MINE PLANNING AND DESIGN (QUEEN'S UNIVERSITY, KINGSTON)
23. OPTIMISATIONS DES CONTOURS DES EXPLOITATIONS À CIEL OUVERT (ÉCOLE POLYTECHNIQUE, MONTREAL)
24. MODÉLISATION D'EXPLOITATIONS MINIÈRES SOUTERRAINES (ÉCOLE POLYTECHNIQUE, MONTREAL)
25. PILLAR RECOVERY DESIGN AND CONTROL (MCGILL UNIVERSITY, MONTREAL)
26. A MICRO-COMPUTER BASED MINE DESIGN/MINE PLANNING SYSTEM FOR SMALL UNDERGROUND MINING OPERATIONS (MCGILL UNIVERSITY, MONTREAL)
27. DIMENSIONNEMENT DES PILLIERS DE SURFACE D'EXPLOITATIONS MINIÈRES (UNIVERSITÉ LAVAL, SAINTE-FOY)
28. DIMENSIONNEMENT DES REVÊTEMENTS DE BÉTON DES GALERIES SOUTERRAINES (UNIVERSITÉ LAVAL, SAINTE-FOY)
29. A STRATEGY FOR MINE COMPUTERIZATION (MAC PUBLICATION: TECK CORPORATION, VANCOUVER)

.../

**INDEX OF MINING
TECHNOLOGY DEVELOPMENT (1985)**

**INDEX SUR LE DÉVELOPPEMENT EN
TECHNOLOGIE MINIÈRE (1985)**

MINE DESIGN CATEGORY/CATÉGORIE CONCEPTION (10)

30. DESIGN OF GROUND PILLARS (QUEBEC METAL MINING ASSOCIATION, QUEBEC)
31. PREPARATION OF A PROPOSAL TO DEVELOP A NEW MINING METHOD WITH ONE OF THE MAIN OBJECTIVES BEING TO REDUCE OR ELIMINATE THE CYCLE ELEMENTS OF MINING (NORANDA RESEARCH CENTRE, POINTE CLAIRE)
32. DEVELOPMENT OF A CAD SYSTEM FOR MINE DESIGN, UTILIZING PERSONAL COMPUTERS RATHER THAN COSTLY MAIN FRAME EQUIPMENT (NORANDA RESEARCH CENTRE, POINTE CLAIRE)
33. NUMERICAL MODELLING FOR MINE DESIGN (NORANDA RESEARCH CENTRE, POINTE CLAIRE)
34. DEVELOPMENT OF A COMPUTERIZED RAMP DESIGN PROGRAM (NORANDA RESEARCH CENTRE, POINTE CLAIRE)
35. UNDERGROUND COMPUTER ASSISTED DESIGN (MINES BRANCH, ENERGY AND MINES, WINNIPEG)
36. SAMPLING, FIELD TESTING AND MODELLING OF A SURFACE CROWN PILLAR AT LES MINES SELBAIE, JOUTEL, QUEBEC (CANMET CONTRACT TO C. MIRZA ENGINEERING INC., NORTH YORK)
37. IDENTIFICATION OF EQUIPMENT DEVELOPMENT POTENTIAL AND THE INFLUENCE ON MINE DESIGN (CANMET CONTRACT TO BRAMPTON MINING, BRAMPTON)

.../

**INDEX OF MINING
TECHNOLOGY DEVELOPMENT (1985)**

**INDEX SUR LE DÉVELOPPEMENT EN
TECHNOLOGIE MINIÈRE (1985)**

MINE DESIGN CATEGORY/CATÉGORIE CONCEPTION (10)

38. DEVELOPMENT OF VERTICAL BLOCK METHOD DESIGN GUIDELINES FOR A STEEPLY DIPPING OREBODY, AS WELL AS SCALING TECHNIQUES (CANMET CONTRACT TO INCO LIMITED, THOMPSON, MANITOBA, CANADA-MANITOBA MINERAL DEVELOPMENT AGREEMENT)
39. COMPUTER APPLICATIONS IN UNDERGROUND MINE DESIGN (RESEARCH AGREEMENT, CANMET, OTTAWA)
40. INVESTIGATION OF UNDERGROUND STABILITY RELATED TO HIGH STRESSES AND ASSOCIATED ROCK BURSTS AND, USING INSTRUMENTATION, STUDY OF EMPIRICAL AND COMPUTER MODELS, MINING LAYOUTS AND DESIGNS TO MINIMIZE FAILURES (CANMET, OTTAWA)
41. PROMOTION OF MINING EQUIPMENT DEVELOPMENTS FOR MINE DEVELOPMENT, PRODUCTION AND TRANSPORTATION, AS WELL AS ASSESSMENT OF THE IMPACT OF SUCH EQUIPMENT ON MINE DESIGN, INCLUDING ASSOCIATED AUTOMATION, REMOTE CONTROL OR ROBOTICS (CANMET, OTTAWA)
42. CAD FOR SMALL UNDERGROUND MINE (3-DIMENSIONAL) (1987) (CANMET, OTTAWA)
43. STATE-OF-THE-ART PUBLICATION OF SYSTEMS FOR COMPUTERIZED MINE DESIGN AND OPERATIONS RESEARCH (1987) (CANMET, OTTAWA)
44. REVIEW OF DESIGN GUIDELINES FOR SURFACE CROWN PILLARS (1987) (CANMET, OTTAWA)
45. ENGINEERING OF CROWN PILLARS: ROCHE MINES ASSOCIÉES LTÉE (CENTRE DE RECHERCHES MINÉRALES, SAINTE-FOY)

.../

**INDEX OF MINING
TECHNOLOGY DEVELOPMENT (1985)**

**INDEX SUR LE DÉVELOPPEMENT EN
TECHNOLOGIE MINIÈRE (1985)**

MINE DESIGN CATEGORY/CATÉGORIE CONCEPTION (10)

46. CONCEPTION DES PILIERS DE SURFACE À LA MINE CHIMO (CENTRE DE RECHERCHES MINÉRALES, SAINTE-FOY)
47. GUIDE PRATIQUE DE CONCEPTION DES PILIERS DE SURFACE (CENTRE DE RECHERCHES MINÉRALES, SAINTE-FOY)
48. PROJET DE RECHERCHE EN PLANIFICATION MINIÈRE AVEC LES MINES SELBAIE (CENTRE DE RECHERCHES MINÉRALES, SAINTE-FOY)
49. MINING METHOD SELECTION, BLAST, DESIGN AND LAYOUT FOR FLAT DIPPING OREBODY (HUDSON BAY MINING AND SMELTING, FLIN FLON)
50. TERTIARY RECOVERY ADJACENT TO UNCONSOLIDATED BACKFILL (HUDSON BAY MINING AND SMELTING, FLIN FLON)
51. MINE DESIGN CADD SYSTEM (HUDSON BAY MINING AND SMELTING, FLIN FLON)
52. VCR ORE EXTRACTION (CANADA TUNGSTEN, TUNGSTEN, N.W.T.)

INDEX OF MINING
TECHNOLOGY DEVELOPMENT (1985)

INDEX SUR LE DÉVELOPPEMENT EN
TECHNOLOGIE MINIÈRE (1985)

HEALTH AND SAFETY CATEGORY/SANTÉ ET SÉCURITÉ (11)

1. INTRODUCTION OF FIRE RESISTANT HYDRAULIC FLUIDS (SULLIVAN MINE, COMINCO, KIMBERLEY)
2. CONTROL OF DIESEL EMISSIONS (SULLIVAN MINE, COMINCO, KIMBERLEY)
3. SELF-CONTAINED SCOOPTRAM DUST SUPPRESSION SYSTEM (ALGOMA ORE DIVISION, WAWA)
4. INTRODUCTION OF A SAFETY SYSTEM (RIO ALGOM, ELLIOT LAKE)
5. DEDUSTING OF ASBESTOS FIBRE (KING BEAVER MINE, ASBESTOS CORPORATION, THETFORD MINES)
6. HYDRAULIC LEVELLING AND ALARM SYSTEM ON A BENCH IN THE OPEN PIT MINE (JOHNS MANVILLE ASBESTOS, ASBESTOS)
7. STUDY OF RADIOACTIVE PROPERTIES OF ORE AND BACKFILL MATERIALS IN URANIUM MINES TO MORE ACCURATELY PREDICT RADIATION LEVELS (QUEEN'S UNIVERSITY, KINGSTON)
8. VENTILATION MINIÈRE: IMPACT DES NORMES DE SANTÉ AU TRAVAIL (UNIVERSITÉ LAVAL, SAINTE-FOY)
9. INFLUENCE DE LA PRIME AU RENDEMENT SUR LES ACCIDENTS DU TRAVAIL DANS LES MINES SOUTERRAINES DU QUÉBEC (UNIVERSITÉ LAVAL, SAINTE-FOY)

.../

**INDEX OF MINING
TECHNOLOGY DEVELOPMENT (1985)**

**INDEX SUR LE DÉVELOPPEMENT EN
TECHNOLOGIE MINIÈRE (1985)**

HEALTH AND SAFETY CATEGORY/SANTÉ ET SÉCURITÉ (11)

10. DETERMINATION OF CONCENTRATIONS AND SIZE-FRACTIONATE AIRBORNE DUST PARTICLES USING AREA OR PERSONAL SAMPLING DEVICES (B.C. RESEARCH, VANCOUVER)
11. DETERMINATION OF GAS CONCENTRATIONS ON-SITE, USING SENSITIVE CONTINUOUS MONITORING TECHNIQUES (B.C. RESEARCH, VANCOUVER)
12. REVIEW AND INTERPRETATION OF THE CURRENT LITERATURE TO PROVIDE COMPREHENSIVE TOXICOLOGICAL INFORMATION ON CHEMICALS AS AIR CONTAMINANTS (B.C. RESEARCH, VANCOUVER)
13. RECOMMENDATIONS OF SAFE CHEMICAL HANDLING PRACTICES (B.C. RESEARCH, VANCOUVER)
14. PROVISION OF EDUCATION WORKSHOPS IN CHEMICAL HANDLING, INDUSTRIAL HYGIENE AND TOXICOLOGY (B.C. RESEARCH, VANCOUVER)
15. SIZE-FRACTIONATE COUNTING AND IDENTIFICATION OF BIOLOGICAL CONTAMINANTS, SUCH AS MOULD AND BACTERIA, IN THE WORKPLACE ATMOSPHERE (B.C. RESEARCH, VANCOUVER)
16. ADVICE ON CORRECT RESPIRATOR TYPES, ASSISTANCE IN RESPIRATORY PROJECTS ON PROGRAM SET-UP AND OPERATION (B.C. RESEARCH, VANCOUVER)
17. MEASUREMENT OF THE PERMEABILITY OF PROTECTIVE CLOTHING AND MAKING RECOMMENDATIONS FOR SPECIFIC CHEMICAL-HANDLING APPLICATIONS (B.C. RESEARCH, VANCOUVER)

.../

**INDEX OF MINING
TECHNOLOGY DEVELOPMENT (1985)**

**INDEX SUR LE DÉVELOPPEMENT EN
TECHNOLOGIE MINIÈRE (1985)**

HEALTH AND SAFETY CATEGORY/SANTÉ ET SÉCURITÉ (11)

18. INTRODUCTION OF A UNIFORM ACCIDENT INVESTIGATION RECORDING FORM FOR ONTARIO MINES IN ORDER TO SUBJECT ASSEMBLED DATA TO COMPUTER ANALYSIS (MINES ACCIDENT PREVENTION ASSOCIATION ONTARIO, NORTH BAY)
19. DEVELOPMENT AND CIRCULATION OF A UNIFORM ROCKBURST RECORDING FORM DESIGNED TO SUBJECT DATA IN QUESTION TO COMPUTER ANALYSIS (MINES ACCIDENT PREVENTION ONTARIO, NORTH BAY)
20. A MINE LIGHTING STUDY TO RECOMMEND TYPES AND SPACING OF LIGHTS FOR VARIOUS UNDERGROUND MINE SITUATIONS (MINES ACCIDENT PREVENTION ASSOCIATION ONTARIO, NORTH BAY)
21. DEVELOPMENT OF A MINER'S AIR-FLOW HELMET, FEATURING DUST PROTECTION AND INCORPORATING A NEW LAMP (MIROC, TORONTO)
22. DEVELOPMENT AND FIELD TESTING OF A 12-VOLT MINI HALOGEN CAP LAMP (MIROC, TORONTO)
23. DEVELOPMENT OF A MINER'S WORKSUIT, WITH A COMFORTABLE WATER-RESISTANT FABRIC (MIROC, TORONTO)
24. DEVELOPMENT OF A LIGHTER AND MORE PROTECTIVE WORKBOOT THAN PREVIOUSLY AVAILABLE (MIROC, TORONTO)
25. CONSIDERATION OF THE DEVELOPMENT AND TESTING OF A NEW CONCEPT FOR AIR-POWERED SPACE LIGHTING UNDERGROUND (MIROC, TORONTO)
26. RELATIONS BETWEEN BONUS AND ACCIDENT FREQUENCY (QUEBEC METAL MINING ASSOCIATION, QUEBEC)

.../

**INDEX OF MINING
TECHNOLOGY DEVELOPMENT (1985)**

**INDEX SUR LE DÉVELOPPEMENT EN
TECHNOLOGIE MINIÈRE (1985)**

HEALTH AND SAFETY CATEGORY/SANTÉ ET SÉCURITÉ (11)

27. PREPARATION FOR FIELD TESTING OF AN ULTRA SONIC SURVEY PROBE FOR DETERMINING THE CONTOURS OF INACCESSIBLE OPEN STOPES (NORANDA RESEARCH CENTRE, POINTE CLAIRE)
28. PROVISION OF A JARCO 500 LHD DIESEL MACHINE FOR UNDERGROUND ENVIRONMENTAL IMPACT TRIALS OF EMISSIONS REDUCTION DEVICES (CANMET CONTRACT TO CIL INC., BURLINGTON)
29. COMPLETION OF SYSTEMS DEVELOPMENT AND ADAPTATION PHASE OF CANMET DIESEL EMISSIONS REDUCTION PROGRAM (CANMET CONTRACT TO ONTARIO RESEARCH FOUNDATION, MISSISSAUGA)
30. PARTICIPATION IN THE PREPARATION OF NATIONAL SAFETY STANDARDS PERTAINING TO EQUIPMENT OPERATION IN UNDERGROUND MINES, WHILE CONDUCTING RESEARCH IN THE FIELDS OF GAS AND DUST EXPLOSIONS AND FIRE RESISTANCE (CANMET, OTTAWA)
31. EVALUATION OF ENVIRONMENTAL CONTAMINANT AND VENTILATION PARAMETER SENSORS AND SYSTEMS FOR UNDERGROUND ENVIRONMENTAL ASSESSMENTS (CANMET, OTTAWA)
32. DEVELOPMENT OF AN OPTIMAL AIR QUALITY INDEX, IN CONJUNCTION WITH FIELD TRIALS OF DIESEL EMISSION REDUCTION STRATEGIES (CANMET, OTTAWA)
33. DEVELOPMENT AND TESTING OF RADIATION INSTRUMENTATION FOR MEASUREMENT AND CONTROL OF RADIATION (CANMET, OTTAWA)

.../

INDEX OF MINING
TECHNOLOGY DEVELOPMENT (1985)

INDEX SUR LE DÉVELOPPEMENT EN
TECHNOLOGIE MINIÈRE (1985)

HEALTH AND SAFETY CATEGORY/SANTÉ ET SÉCURITÉ (11)

34. STUDIES DEVOTED TO THE DEVELOPMENT OF TECHNIQUES FOR REDUCING THE NOISE LEVELS OF DIAMOND DRILLING EQUIPMENT (CANMET, OTTAWA)
35. MEASUREMENT OF THE CURRENT LEVELS OF RESPIRABLE DUST IN SELECTED CANADIAN MINES, AS WELL AS IDENTIFICATION AND ASSESSMENT OF DUST CONTROL MEASURES (CANMET, OTTAWA)
36. QUANTIFICATION AND DOCUMENTATION OF THE MAJOR SOURCES OF VIBRATION IN HARDROCK MINES, COMBINED WITH DEVELOPMENT OF INDICATED INSTRUMENTATION (CANMET, OTTAWA)
37. DEVELOPMENT OF MINE STATUS INDICATOR SYSTEM, INCLUDING SENSOR AND HARDWARE (1986/87) (CANMET, OTTAWA)
38. INFRA-RED ANALYSIS OF DUST SAMPLES (1986) (CANMET, OTTAWA)
39. ANALYSIS OF RELATION BETWEEN BONUS AND PRODUCTIVITY, PROFITABILITY AND SAFETY (N. BILLETTE (CANMET) FOR CENTRE DE RECHERCHES MINÉRALES, SAINTE-FOY)
40. ÉTUDE DE LA RELATION DE CAUSE À EFFET DE LA PRIME AU RENDEMENT SUR LA PRODUCTIVITÉ, LA RENTABILITÉ ET LA SÉCURITÉ (CENTRE DE RECHERCHES MINÉRALES, SAINTE-FOY)
41. DIESEL EMISSIONS IN UNDERGROUND MINES (MINING HEALTH AND SAFETY BRANCH, OHSD, TORONTO)

INDEX OF MINING
TECHNOLOGY DEVELOPMENT (1985)

INDEX SUR LE DÉVELOPPEMENT EN
TECHNOLOGIE MINIÈRE (1985)

COMMUNICATIONS CATEGORY/CATÉGORIE COMMUNICATIONS (12)

1. LEAKY CABLE UNDERGROUND COMMUNICATION SYSTEM (SULLIVAN MINE, COMINCO, KIMBERLEY)
2. UNDERGROUND RADIO COMMUNICATIONS (SIFTO SALT DIVISION, DOMTAR, GODERICH)
3. UNDERGROUND COMMUNICATION IMPROVEMENT (KIDD CREEK, TIMMINS)
4. COMMUNICATION SYSTEMS FOR UNDERGROUND WORKERS (KIENA GOLD MINES, VAL D'OR)
5. EVALUATION OF COMMUNICATIONS SYSTEMS, ESPECIALLY THOSE WITH FREQUENCIES WHICH PASS THROUGH SALT (POTASH CORPORATION OF SASKATCHEWAN MINING, SASKATOON)
6. DEVELOPMENT, AND ULTIMATELY FIELD TESTING OF A NEW CONCEPT FOR UNDERGROUND RADIO COMMUNICATIONS (MIROC, TORONTO)
7. COMMUNICATION SYSTEM FOR ISOLATED AREAS IN MINES (CANMET CONTRACT TO SHERRITT GORDON MINES, LEAF RAPIDS, UNDER CANADA-MANITOBA MINERAL DEVELOPMENT AGREEMENT)
8. REPORT ON STATE-OF-THE-ART REVIEW ON CURRENT UNDERGROUND COMMUNICATION SYSTEMS (1985) (CANMET, OTTAWA)
9. UNDERGROUND COMMUNICATIONS STUDY: PHASE I AND II (CENTRE DE RECHERCHES MINÉRALES, SAINTE-FOY)

.../

INDEX OF MINING
TECHNOLOGY DEVELOPMENT (1985)

INDEX SUR LE DÉVELOPPEMENT EN
TECHNOLOGIE MINIÈRE (1985)

COMMUNICATIONS CATEGORY/CATÉGORIE COMMUNICATIONS (12)

10. COMITÉ AVISEUR - PROJET D'ÉTUDE SUR LES COMMUNICATIONS
SOUTERRAINES (CENTRE DE RECHERCHES MINÉRALES, SAINTE-FOY)

11. IMPLANTATION D'UN SYSTÈME D'ACQUISITION AUTOMATIQUE PAR
TÉLÉPHONE (SACATEL) À LA J.M. ASBESTOS (CENTRE DE RECHERCHES
MINÉRALES, SAINTE-FOY)

**INDEX OF MINING
TECHNOLOGY DEVELOPMENT (1985)**

**INDEX SUR LE DÉVELOPPEMENT EN
TECHNOLOGIE MINIÈRE (1985)**

SURFACE ENVIRONMENT AND TAILINGS CATEGORY/CATÉGORIE ENVIRONNEMENT MINIER (13)

1. LAKE DEWATERING (VALLEY COPPER MINE, COMINCO, KAMLOOPS)
2. OVERBURDEN DEWATERING (VALLEY COPPER MINE, COMINCO, KAMLOOPS)
3. TAILINGS DAM CONSTRUCTION (VALLEY COPPER MINE, COMINCO, KAMLOOPS)
4. VACUUM ENHANCED DRAINAGE (AFTON OPERATING CORPORATION, KAMLOOPS)
5. OVERBURDEN STABILIZATION (MANITOBA DIVISION, INCO, THOMPSON)
6. ACTIVATED CARBON TOWERS TREATING TAILINGS DAM EFFLUENTS FOR GOLD RECOVERY (DOVE MINES, SOUTH PORCUPINE)
7. OVERBURDEN STABILIZATION (MINES BRANCH, ENERGY AND MINES, WINNIPEG)
8. MICROBIOLOGICAL CONTROL OF LEACHINGS FROM MINE TAILINGS (CANMET CONTRACT TO UNIVERSITY OF OTTAWA, OTTAWA)
9. PATHWAY MOVEMENTS OF BRINE FROM POTASH TAILINGS AT THE POTASH CORPORATION OF SASKATCHEWAN TAILINGS PILES IN SASKATCHEWAN (POTASH CORPORATION OF SASKATCHEWAN, SASKATOON)
10. DEVELOP A TAILINGS MANAGEMENT PROGRAM PLAN IN RELATION TO ACID-GENERATING MINE TAILINGS IN CANADA (CANMET CONTRACT TO MONENCO LIMITED, HALIFAX)
11. OPTIMIZING THE EFFECTIVENESS OF MINE DEWATERING WELLS IN FRACTURED ROCKS (RESEARCH AGREEMENT, CANMET, OTTAWA)

.../

INDEX OF MINING
TECHNOLOGY DEVELOPMENT (1985)

INDEX SUR LE DÉVELOPPEMENT EN
TECHNOLOGIE MINIÈRE (1985)

SURFACE ENVIRONMENT AND TAILINGS CATEGORY/CATÉGORIE ENVIRONNEMENT MINIER (13)

12. DEVELOPMENT OF TECHNOLOGY AND METHODS FOR THE MANAGEMENT OF MINE/MILL WASTE TO REDUCE ENVIRONMENTAL IMPACT (CANMET, OTTAWA)
13. GEOTECHNICAL STUDY OF OVERBURDEN: LES MINES BELMORAL LTÉE (CENTRE DE RECHERCHES MINÉRALES, SAINTE-FOY)
14. CONSOLIDATION OF URANIUM MILL TAILINGS (CANMET CONTRACT TO GEOCON INC., MISSISSAUGA)
15. THE FATE OF RADIUM IN URANIUM LEACHING AND ITS CONSEQUENT DISSOLUTION MECHANISMS (CANMET CONTRACT TO CHEMEX LABS LTD., NORTH VANCOUVER)

**INDEX OF MINING
TECHNOLOGY DEVELOPMENT (1985)**

**INDEX SUR LE DÉVELOPPEMENT EN
TECHNOLOGIE MINIÈRE (1985)**

PERSONNEL DEVELOPMENT CATEGORY/CATÉGORIE ENCADREMENT DU PERSONNEL (14)

1. JOB ROTATION (EAST KEMPTVILLE MINE, RIO ALGOM, EAST KEMPTVILLE)
2. SUPERVISORY TRAINING (QUEBEC METAL MINING ASSOCIATION, QUEBEC)

INDEX OF MINING
TECHNOLOGY DEVELOPMENT (1985)

INDEX SUR LE DÉVELOPPEMENT EN
TECHNOLOGIE MINIÈRE (1985)

MANAGEMENT TECHNIQUES CATEGORY/CATÉGORIE ADMINISTRATION (15)

1. UNDERGROUND COMPUTER TERMINALS FOR SHIFT BOSS REPORTING (SULLIVAN MINE, COMINCO, KIMBERLEY)
2. DEVELOPMENT OF COMPUTERIZED WAREHOUSING AND MAINTENANCE SYSTEMS (RIO ALGOM, ELLIOT LAKE)
3. REMOTE SURVEILLANCE OF PLANT ENTRANCES (JEFFREY MINE, JOHNS MANVILLE ASBESTOS, ASBESTOS)
4. REMOTE SURVEILLANCE OF THE CENTRAL AIR AND STEAM PLANT OPERATION (JEFFREY MINE, JOHNS MANVILLE ASBESTOS, ASBESTOS)
5. PROGRAM TO ELIMINATE PRODUCT CONTAMINATION BY IMPROVED HOUSEKEEPING PRACTICES (JEFFREY MINE, JOHNS MANVILLE ASBESTOS, ASBESTOS)
6. A COMPUTER PROGRAM TO ESTIMATE CAPITAL AND OPERATING COSTS IN THE MINING INDUSTRY (UBC, VANCOUVER)
7. SOFTWARE FOR THE ECONOMIC EVALUATION OF MINERAL INVESTMENT PROPOSALS (MCGILL UNIVERSITY, MONTREAL)
8. OPTIMIZATION OF MINE PROJECT SPECIFICATIONS (MCGILL UNIVERSITY, MONTREAL)
9. ECONOMIC CHARACTERISTICS OF GOLD DEPOSITS IN QUEBEC (MCGILL UNIVERSITY, MONTREAL)

.../

**INDEX OF MINING
TECHNOLOGY DEVELOPMENT (1985)**

**INDEX SUR LE DÉVELOPPEMENT EN
TECHNOLOGIE MINIÈRE (1985)**

MANAGEMENT TECHNIQUES CATEGORY/CATÉGORIE ADMINISTRATION (15)

10. COMPUTERIZED SIMULATION OF MINING OPERATIONS (MCGILL UNIVERSITY, MONTREAL)
11. COMPARATIVE STUDY OF INTERNATIONAL MINERAL TAXATION SYSTEMS (MCGILL UNIVERSITY, MONTREAL)
12. MINING RECORDING COMPUTERIZATION (MINES BRANCH, ENERGY AND MINES, WINNIPEG)
13. CANADIAN MINING INDUSTRY CAPITAL AND OPERATING INDICES (OPEN PIT AND UNDERGROUND) (CANMET CONTRACT TO DYNATEC MINING LTD., RICHMOND HILL)
14. REPORT ON MINING COSTS FOR PRINCIPAL CLASSIFICATIONS OF MINE OPERATIONS (UPDATED ANNUALLY) (CANMET, OTTAWA)
15. CONCEPTUAL DEVELOPMENT OF A DEMONSTRATION PROJECT FOR A FULLY INSTRUMENTED MINE (1985), FOLLOWED BY A DEMONSTRATION 1986/87/88 (CANMET, OTTAWA)
16. DEVELOPMENT OF MINE STATUS INDICATOR SYSTEM, INCLUDING SENSORS AND HARDWARE (1986/87) (CANMET, OTTAWA)
17. LES ÉCONOMIES D'ÉNERGIE DANS LES EXPLOITATIONS MINIÈRES SOUTERRAINES (CENTRE DE RECHERCHES MINÉRALES, SAINTE-FOY)

.../

INDEX OF MINING
TECHNOLOGY DEVELOPMENT (1985)

INDEX SUR LE DÉVELOPPEMENT EN
TECHNOLOGIE MINIÈRE (1985)

MANAGEMENT TECHNIQUES CATEGORY/CATÉGORIE ADMINISTRATION (15)

18. EXPERIENCES WITH A REMOTE FLY-IN MINING OPERATION (DETOUR LAKE MINE, CAMPBELL RED LAKE, TIMMINS)
19. DEVELOPMENT OF A MINING COST COMPUTER DATABASE, COST MODELS AND MINE EVALUATION PROCEDURES (CANMET, OTTAWA)
20. DEVELOP A METHODOLOGY FOR ESTIMATING PREPRODUCTION AND OPERATING COSTS OF MINING SMALL MINERAL DEPOSITS BY UNDERGROUND METHODS (CANMET CONTRACT TO J.S. REDPATH LTD., NORTH BAY)

INDEX OF MINING
TECHNOLOGY DEVELOPMENT (1985)

INDEX SUR LE DÉVELOPPEMENT EN
TECHNOLOGIE MINIÈRE (1985)

VENTILATION CATEGORY/CATÉGORIE VENTILATION (16)

1. MINE AIR/WATER WASTE HEAT RECOVERY (MANITOBA DIVISION, INCO, THOMPSON)
2. VACUUM-BLOWER UNIT (SIFTO SALT DIVISION, DOMTAR, GODERICH)
3. AUTOMATIC FAN CONTROL (BRUNSWICK MINING, BATHURST)
4. RECIRCULATION OF MINE VENTILATION IN ORDER TO DECREASE HEATING COSTS (UBC, VANCOUVER)
5. VENTILATION STUDIES AT DENISON MINES TO ESTABLISH A COMPUTER MODEL OF THE MINE VENTILATION NETWORK (QUEEN'S UNIVERSITY, KINGSTON)
6. SIMULATION INFORMATISÉE DE L'AÉRAGE (ÉCOLE POLYTECHNIQUE, MONTRÉAL)
7. VENTILATION MINIÈRE: IMPACT DES NORMES DE SANTÉ AU TRAVAIL (UNIVERSITÉ LAVAL, SAINTE-FOY)
8. IMPLEMENTING A MONITORING SYSTEM FOR THE VENTILATION NETWORK AT BRUNSWICK MINING AND SMELTING CORPORATION LIMITED (UNIVERSITÉ LAVAL, SAINTE-FOY)
9. ÉVALUATION QUANTITATIVE INFORMATISÉE DE LA VENTILATION MINIÈRE (UNIVERSITÉ LAVAL, SAINTE-FOY)
10. SIMULATION DES RESEAUX DE VENTILATION SOUTERRAIN (UNIVERSITÉ LAVAL, SAINTE-FOY)

.../

INDEX OF MINING
TECHNOLOGY DEVELOPMENT (1985)

INDEX SUR LE DÉVELOPPEMENT EN
TECHNOLOGIE MINIÈRE (1985)

VENTILATION CATEGORY/CATÉGORIE VENTILATION (16)

11. MAINTENANCE OF A VENTILATION ADVISORY SERVICE TO ONTARIO MINES (MINES ACCIDENT PREVENTION ASSOCIATION ONTARIO, NORTH BAY)
12. DEVELOPMENT OF A SYSTEM FOR MONITORING MINE VENTILATION (MIROC, TORONTO)
13. MINE AIR/WATER WASTE HEAT RECOVERY (MINES BRANCH, ENERGY AND MINES, WINNIPEG)
14. COMPUTERIZED MINE VENTILATION NETWORK SIMULATOR FOR LANIGAN POTASH MINE, SASKATCHEWAN (RESEARCH AGREEMENT, CANMET, OTTAWA)
15. EVALUATION OF ENVIRONMENTAL CONTAMINANT AND VENTILATION PARAMETER SENSORS AND SYSTEMS FOR UNDERGROUND ENVIRONMENTAL ASSESSMENTS (CANMET, OTTAWA)
16. MATHEMATICAL MODEL FOR HEAT BALANCE AND RECUPERATION FROM MINE EXHAUST AIR AND WATER (1986) (CANMET, OTTAWA)
17. UNIVERSITY RESEARCH CONTRACT: MINE VENTILATION SIMULATION AND OPTIMIZATION (CENTRE DE RECHERCHES MINÉRALES, SAINTE-FOY)
18. AÉRAGE MINIER: RELEVÉ DES FACTEURS DE FRICTION DANS LES EXCAVATIONS SOUTERRAINES (CENTRE DE RECHERCHES MINÉRALES, SAINTE-FOY)
19. APPROCHE THERMODYNAMIQUE POUR LA MODÉLISATION DE L'AÉRAGE DES MINES (CENTRE DE RECHERCHES MINÉRALES, SAINTE-FOY)

INDEX OF MINING
TECHNOLOGY DEVELOPMENT (1985)

INDEX SUR LE DÉVELOPPEMENT EN
TECHNOLOGIE MINIÈRE (1985)

OTHERS CATEGORY/CATÉGORIE AUTRES (17)

1. ROCK GRINDING INDEX (LORNEX MINING CORP., LOGAN LAKE)
2. MECHANICAL MINING MACHINES: SHAFTS, RAISES, DRIFTS (SULLIVAN MINE, COMINCO, KIMBERLEY)
3. ROCK BREAKING WITHOUT THE CONVENTIONAL USE OF EXPLOSIVES (MANITOBA DIVISION, INCO, THOMPSON)
4. DEVELOPMENT OF SULPHUR REDUCING MINERAL BENEFICIATION TECHNIQUES (MANITOBA DIVISION, INCO, THOMPSON)
5. DEVELOPMENT OF AN UNDERGROUND MINING APPROACH FOR A VERY HIGH GRADE URANIUM DEPOSIT (CIGAR LAKE MINING CORPORATION, SASKATOON)
6. MACASSA NO. 3 SHAFT PROJECT (MACASSA DIVISION, LAC MINERALS, KIRKLAND LAKE)
7. MECHANICAL NARROW VEIN MINING (DOME MINES, SOUTH PORCUPINE)
8. ACTIVATED CARBON TOWERS TREATING TAILINGS DAM EFFLUENTS FOR GOLD RECOVERY (DOME MINES, SOUTH PORCUPINE)
9. THE USE OF WATER UNDER PRESSURE FOR ROCK WORK (FOR MINING APPLICATIONS IN COMMON HARD ROCK)
 - STUDY AREA #1: CUTTING AND SLOTTING
 - STUDY AREA #2: SECONDARY BREAKAGE(KIDD CREEK, TIMMINS)

.../

INDEX OF MINING
TECHNOLOGY DEVELOPMENT (1985)

INDEX SUR LE DÉVELOPPEMENT EN
TECHNOLOGIE MINIÈRE (1985)

OTHERS CATEGORY/CATÉGORIE AUTRES (17)

10. UNDERGROUND MINE DRAINAGE SYSTEM - SLIMES HANDLING METHODS
EVALUATION (KIDD CREEK, TIMMINS)
11. EVALUATION OF ROLLER COMPACTED CONCRETE FOR UNDERGROUND ROADWAY
PAVING (ONTARIO DIVISION, INCO, COPPER CLIFF)
12. TUNNEL BORING MACHINE (KIENA GOLD MINES, VAL D'OR)
13. CONTINUOUS MINER (BOUSQUET DIVISION, LAC MINERALS, MALARTIC)
14. RECOVERY OF HIGH GRADE FINES FROM MINE SUMPS (DENISON, ELLIOT
LAKE)
15. MEANS OF RELATING DRILL HOLE CUTTINGS FROM EACH ORE BLOCK TO ORE
REACTIONS IN THE MILL, TO IMPROVE THE PREDICTABILITY OF
CONCENTRATE GRADES (QUEBEC CARTIER, PORT CARTIER)
16. LASER SURVEYING (BRUNSWICK MINING, BATHURST)
17. COMPUTER MODELLING AND SIMULATION OF THE INTERACTION OF
TECHNOLOGICAL AND ECONOMIC PARAMETERS INFLUENCING SUCCESSFUL
MINING IN B.C. (UBC, VANCOUVER)
18. A COMPUTER PROGRAM HAS BEEN DEVELOPED BY USE OF THE MONTE CARLO
TECHNIQUE TO ESTIMATE OPERATIONAL TIMES OF A DRILL-BLAST-MUCK
SUPPORT TUNNELLING SYSTEM (UBC, VANCOUVER)
19. EVALUATION AND TESTING OF LARGE SAMPLE TESTING LABORATORY
(UNIVERSITY OF SASKATCHEWAN, SASKATOON)

.../

**INDEX OF MINING
TECHNOLOGY DEVELOPMENT (1985)**

**INDEX SUR LE DÉVELOPPEMENT EN
TECHNOLOGIE MINIÈRE (1985)**

OTHERS CATEGORY/CATÉGORIE AUTRES (17)

20. DEVELOPMENT OF A COMPUTERIZED OPEN PIT PACKAGE, INCLUDING:
 - GEOSTATISTICAL ANALYSIS
 - PIT BOUNDARY ANALYSIS
 - COMPUTER ASSISTED MINE PLANNING
 - AUTOMATED MINE PLANNING USING LINEAR PROGRAMMING
 - HAULAGE ROAD LOCATION STUDIES
 - COMPUTER ASSISTED BLAST DESIGNS (QUEEN'S UNIVERSITY, KINGSTON)

21. LES ÉTUDES GÉOTECHNIQUES DE DIVERSE NATURES SUR LES SOLS, LES
ROCHES ET LES BÉTONS (UNIVERSITÉ DU QUÉBEC, CHICOUTIMI)

22. LES ANALYSES PAR DIFFÉRENTES MÉTHODES POUR LE CONTRÔLE DES
TENEURS DES MINÉRAIS (UNIVERSITÉ DU QUÉBEC, CHICOUTIMI)

23. PERTE DE MINÉRAI ET DILUTION PAR DES STÉRILES (ÉCOLE
POLYTECHNIQUE, MONTRÉAL)

24. AMÉLIORATION DES MÉTHODES DE MINAGES EXISTANTES (ÉCOLE
POLYTECHNIQUE, MONTRÉAL)

25. ENQUÊTE AUPRÈS DE L'INDUSTRIE MINIÈRE DU QUÉBEC SUR LES
UTILISATIONS DE L'INFORMATIQUE DANS LES MINES SOUTERRAINES (ÉCOLE
POLYTECHNIQUE, MONTRÉAL)

26. A GEOTECHNICAL STUDY OF LONGWALL FACE GATEROADS IN THE CAPE
BRETON COALFIELD (MCGILL UNIVERSITY, MONTRÉAL)

27. ANALYSIS OF ROCK-SUPPORT INTERACTION IN LONGWALL MINING (MCGILL
UNIVERSITY, MONTRÉAL)

.../

INDEX OF MINING
TECHNOLOGY DEVELOPMENT (1985)

INDEX SUR LE DÉVELOPPEMENT EN
TECHNOLOGIE MINIÈRE (1985)

OTHERS CATEGORY/CATÉGORIE AUTRES (17)

28. AN INVESTIGATION INTO MONOLITHIC PACKING SYSTEMS (MCGILL UNIVERSITY, MONTREAL)
29. INQUIRY INTO THE USE OF COMPUTING IN QUEBEC UNDERGROUND MINES (MCGILL UNIVERSITY, MONTREAL)
30. RECOVERY OF GOLD FROM PYRITIC AND ARSENOPYRITIC TAILINGS (B.C. RESEARCH, VANCOUVER)
31. STUDIES PERTAINING TO THE SONAR GUIDANCE OF MINING MACHINES (POTASH CORPORATION OF SASKATCHEWAN, SASKATOON)
32. DEVELOPMENT OF TECHNOLOGIES, TECHNIQUES AND EQUIPMENT FOR THE CUTTING OF HARDROCK, UTILIZING HIGH PRESSURE WATER JETS WITH OTHER RELEVANT DEVICES (HDRK MINING RESEARCH, COPPER CLIFF)
33. STUDIES PERTAINING TO CONTINUOUS MINING, INCLUDING THE USE OF ORE SORTERS IN CONJUNCTION WITH CONTINUOUS BREAKAGE OF ROCK (HDRK MINING RESEARCH, COPPER CLIFF)
34. CREATION OF AN ASSOCIATION RESEARCH COMMITTEE TO MAINTAIN CONTACTS WITH DIFFERENT RESEARCH CENTRES (QUEBEC METAL MINING ASSOCIATION, QUEBEC)
35. PREPARATION OF A PROPOSAL TO DEVELOP A NEW MINING METHOD WITH ONE OF THE MAIN OBJECTIVES BEING TO REDUCE OR ELIMINATE THE CYCLIC ELEMENTS OF MINING (NORANDA RESEARCH CENTRE, POINTE CLAIRE)

.../

**INDEX OF MINING
TECHNOLOGY DEVELOPMENT (1985)**

**INDEX SUR LE DÉVELOPPEMENT EN
TECHNOLOGIE MINIÈRE (1985)**

OTHERS CATEGORY/CATÉGORIE AUTRES (17)

36. STUDY OF THE CONSTRAINTS TO TECHNOLOGY DEVELOPMENT AND APPLICATION IN THE MINING SECTOR (CANMET CONTRACT TO BEVELANDER AND CO., TORONTO)
37. APPLICATION OF CONVENTIONAL MINING TECHNIQUES TO UNDERGROUND OIL SANDS MINING (CANMET CONTRACT TO COMINCO ENGINEERING SERVICES LTD., CALGARY)
38. NOVEL MINING METHODS FOR CONTINUOUS MINING MACHINES IN HARD ROCK FORMATIONS (RESEARCH AGREEMENT, CANMET, OTTAWA)
39. UNIVERSITY RESEARCH CONTRACT: SURVEY OF MINE NEEDS FOR COMPUTING DEVICES AND SOFTWARE (CENTRE DE RECHERCHES MINÉRALES, SAINTE-FOY)
40. LONG TERM PROJECTS TO DEVELOP AND IMPLEMENT AUTOMATION DEVICES IN MINES (CENTRE DE RECHERCHES MINÉRALES, SAINTE-FOY)
41. PROGRAMME DE TRAVAIL CONCERNANT LE LABORATOIRE DE MÉCANIQUE DES ROCHES DU STM (SERVICE DE TECHNOLOGIE MINIÈRE) (CENTRE DE RECHERCHES MINÉRALES, SAINTE-FOY)
42. NOUVELLE TECHNOLOGIE POUR LE CASSAGE SECONDAIRE DE ROCHES (CENTRE DE RECHERCHES MINÉRALES, SAINTE-FOY)
43. ÉTUDE DE FAISABILITÉ DU TRANSFERT DU LOGICIEL "DISCODAT" SUR LE SYSTÈME INFORMATIQUE DE J.M. ASBESTOS (CENTRE DE RECHERCHES MINÉRALES, SAINTE-FOY)

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INDEX OF MINING
TECHNOLOGY DEVELOPMENT (1985)

INDEX SUR LE DÉVELOPPEMENT EN
TECHNOLOGIE MINIÈRE (1985)

OTHERS CATEGORY/CATÉGORIE AUTRES (17)

44. GÉOSTATISTIQUE APPLIQUÉE AUX MINES DU QUÉBEC (CENTRE DE RECHERCHES MINÉRALES, SAINTE-FOY)
45. REMOVAL OF RADIUM FROM URANIUM ORES AND MILL TAILINGS (LAKEHEAD UNIVERSITY, THUNDER BAY)
46. LARGE SAMPLE TRIAXIAL TEST FACILITY (SASKATCHEWAN RESEARCH COUNCIL, SASKATOON)
47. BOAT LOADING FACILITIES STUDY (OJIBWAY MINE, CANADIAN SALT CO., WINDSOR)
48. CONSOLIDATION OF URANIUM MILL TAILINGS (CANMET CONTRACT TO GEOCON INC., MISSISSAUGA)
49. THE FATE OF RADIUM IN URANIUM LEACHING AND ITS CONSEQUENT DISSOLUTION MECHANISMS (CANMET CONTRACT TO CHEMEX LABS LTD., NORTH VANCOUVER)

