# CANMET

## REPORT 80-15

Canada Centre for Mineral and Energy Technology

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





# CATALOGUE OF CANMET PUBLICATIONS 1979/80

MINERALS AND ENERGY RESEARCH PROGRAMS
TECHNOLOGY INFORMATION DIVISION

Energy, Mines and Resources Canada

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NOVEMBER 1980

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# CATALOGUE OF CANMET PUBLICATIONS 1979/80

Publications and papers published or presented by
CANMET scientific and technical staff in 1979/80.

Compiled and edited by J.L. Metz
French translation by J. Collins-DeCotret

MINERALS AND ENERGY RESEARCH PROGRAMS
TECHNOLOGY INFORMATION DIVISION

CANMET REPORT 80-15 NOVEMBER 1980

## FOREWORD

A compilation is presented of publications and papers prepared by CANMET scientific and technical staff during 1979/80 as well as research reports prepared by outside agencies under contract. Information for obtaining publications precedes each section. An author/subject index is also provided.

Section 1 lists titles and abstracts of CANMET Reports for general distribution and sale.

Section 2 gives titles and abstracts of journal publications prepared for outside periodicals.

Section 3 covers oral presentations made to outside conferences.

Section 4 contains divisional and declassified reports which provide results of investigations initiated by CANMET or at the request of industry or government agencies.

Section 5 lists reports prepared by private research agencies under contract to CANMET with regard to studies on national mineral resources and energy supply and technology.

Section 6 covers reports describing research performed by outside agencies supported through financial grants by CANMET.

James E. Kanasy,
Chief,
Technology Information Division

CONTENTS

# SECTION 1

# CANMET REPORTS

The reports listed below are available at prices indicated from either Printing and Publishing, Supply and Services Canada, Ottawa, K1A 0S9 or CANMET Publication Sales and Distribution, Energy, Mines and Resources Canada, 555 Booth Street, Ottawa, K1A 0G1. Microfiche copies may be obtained from Micromedia Limited, Box 502, Station S, Toronto, Canada, M5M 4L8.

001
CANMET REPORT 78-1. Misener, D.C. "Summaries of CANMET research contracts 1975-1978"
A compilation of contract summary sheets is provided of the R & D performed by CANMET in accordance with government contracting-out policy.
Cat. No. M38-13/78-1 - 48 p
Canada $1.25; other countries $1.50

002
CANMET REPORT 78-7. Knight, G. "Mine dust sampling system - CAMPEDS"
A record is provided of experimental work at CANMET's Elliot Lake Laboratory in developing a method of dust sampling for mines using both gravimetric assessment and X-ray diffraction analysis for quartz.
Cat. No. M38-13/78-7 - 107 p
Canada $3.50; other countries $4.20

003
CANMET REPORT 78-12F. "Revue de CANMET 1977/78"
This review records progress achieved by CANMET staff during 1977/78 in implementing the department's Minerals Research Program and Energy Research Program.
Cat. No. M38-13/78-12F - 64 p
Canada $2.25; other countries $2.70

004
CANMET REPORT 78-17. Bartlett, G. and Coates, D.F. "Pit slope project - A case study of contracting-out"
A detailed analysis is given of research performance using the Pit Slope Project as a case study of multi-faceted R & D performed under contract.
This study led to the recommendation of a budgeting procedure which, together with Treasury Board guidelines would provide an optional division between in-house and contract performance.
Cat. No. M38-13/78-17 - 18 p
Canada $1.00; other countries $1.20

005
CANMET REPORT 78-18. "Catalogue of CANMET publications 1977/78" (English and French)
A compilation is presented of publications and papers prepared by CANMET scientific and technical staff in 1977/78 comprising CANMET Reports, journal publications, oral presentations, investigation, and declassified reports. Research reports prepared by outside agencies under contract are also included.
Cat. No. M38-13/78-18 - 71 p
Canada $6.00; other countries $7.20

006
CANMET REPORT 78-21. Bell, K.E., Brady, J.G. and Zemgals, L.K. "Ceramic clays and shales of the Atlantic Provinces"
Representative samples of typical clays and shales indigenous to the Atlantic region were examined to determine their composition and salient ceramic properties. The results and discussion along with those contained in earlier reports on B.C., Ontario and Quebec constitute a contribution to the knowledge base necessary to ensure the orderly and efficient development of the ceramic industry in Canada.
Cat. No. M38-13/78-21 - 89 p
Canada $3.00; other countries $3.60

007
CANMET REPORT 78-23. Petruk, W. "Image analysis study of mill products from batch tests on Brunswick Mining and Smelting tailings"
A study was performed to determine the behaviour of sphalerite during laboratory batch tests or recovering zinc from a sample of Brunswick Mining and Smelting mill tailings containing 1.8 wt % zinc. This report summarizes image analysis data, interprets the behaviour of sphalerite, and extrapolates results to predict the ultimate possible zinc recovery.
Cat. No. M38-13/78-23 - 12 p
Canada $1.25; other countries $1.50

008
CANMET REPORT 78-28. Hedley, D.G.F. "Canadian base metal mining in the 1970's"
An overview is presented of the Canadian base metal mining industry. Information is provided on source of production, mining methods, number and size of mines, employment figures, costs, and productivity.
Cat. No. M38-13/78-28 - 11 p
Canada $1.25; other countries $1.50

009
CANMET REPORT 78-30. Gransden, J.F., Price, J.T. and Ramey, N.J. "Reduction rates of iron ore-char briquets used in cupola smelting"
CANMET examined the potential of the Peace River deposit as a source of iron for the

steel industry in Western Canada. An unconventional ironmaking method was investigated - the smelting of iron ore-char briquets in a cupola. This report describes the reduction behaviour of the briquets as determined in laboratory experiments.
Cat. No. M38-13/78-30 - 15 p
Canada $1.25; other countries $1.50

010
CANMET REPORT 79-1. Raicevic, D. and Noblitt, H.L. "Tantalum and niobium ore dressing investigations at CANMET"

Tantalum and niobium are described in terms of properties, uses and resources, both domestic and global. Production and consumption statistics are given for both metals. Appendices provide brief reviews of ore dressing investigations related to the mineralogy and concentration of Canadian ores conducted at CANMET. It also covers research on foreign niobium ores considered of interest in treating domestic ores.
Cat. No. M38-13/79-1 - 66 p
Canada $3.85; other countries $4.65

011
CANMET REPORT 79-2. Wheat, T.A. "Synthesis and characterization of zirconia electrolytes for potential use in energy conversion systems"

As part of a program to develop ionically conducting materials for potential use in energy storage and conversion systems, a study was made to determine the stability of various compositions in the $CaO-ZrO_2$ system for fuel cell and MHD applications. This report covers the microstructural aspects of powder synthesis and the development of sintered materials.
Cat. No. M38-13/79-2 - 28 p
Canada $1.75; other countries $2.10

012
CANMET REPORT 79-3. Bowman, W.S., Faye, G.H., Sutarno, R., McKeague, J.A. and Kodama, H. "Soil samples SO-1, SO-2, SO-3 and SO-4 - Certified reference materials"

This report describes the preparation, characterization and certification of four soil samples for use as certified reference materials. The samples were certified for Al, Fe, Mn, K, Zn, Cu, Cr and Pb, and one or more were certified for Si, Na, Mg, Ca, P, Ti, Hg, Ni, Sr and V.
Cat. No. M38-13/79-3 - 32 p
Canada $1.75; other countries $2.10

013
CANMET REPORT 79-4. Faye, G.H., Bowman, W.S. and Sutarno, R. "Uranium ore BL-5 - A certified reference material"

A uranium ore BL-5 was prepared as a compositional reference material. In a "free-choice" program for certification, 27 laboratories provided analytical results; a statistical treatment of the data yielded a consensus value of 7.09 ± 0.03%. Information is also provided on the state of radioactive equilibrium of BL-5 and its content of Ra-226, Pb-210 and Th-230.
Cat. No. M38-13/79-4 - 11 p
Canada $1.25; other countries $1.50

014
CANMET REPORT 79-5. Kim, C., Wolff, S.F., Baafi, E.Y. and Cervantes, J.A. "Optimization of coal recovery from open pits"

The design techniques of the 25-volume Pit Slope Manual were successfully applied in the case study of a steeply dipping multiple seam deposit, being mined by the truck-shovel combination. A benefit-cost analysis is presented for three different pit designs having overall slopes of 45°, 28° and 35°.
Cat. No. M38-13/79-5 - 175 p
Canada $11.75; other countries $14.10

015
CANMET REPORT 79-6. White, D.W.G. and Winterton, K. (editors) "Heat-affected-zone toughness of welded joints in micro-alloy steels"

Work was done to evaluate the effects of chemical composition and cooling rate on the notch toughness of the heat-affected-zone of welded micro-alloy (HSLA) steel plate. The report provides in separate parts the results of instrumented impact tests, descriptions of continuous cooling transformation characteristics, metallographic analysis of HAZ microstructures and precipitation effects. An appendix contains the individual transition curves for the eight experimental steels welded with five levels of heat input are sixteen curves relating to the stress-relieved condition.
Cat. No. M38-13/79-6 - 107 p
Canada $5.75; other countries $6.90

016
CANMET REPORT 79-7. Tibbetts, T.E., Montgomery, W.J. and Faurschou, D.K. "Analysis directory of Canadian commercial coals - Supplement No. 3"

Chemical and physical analyses of thermal and metallurgical coals currently produced by mines in Nova Scotia, New Brunswick, Saskatchewan, Alberta and British Columbia are presented.
Cat. No. M38-13/79-7 - 81 p
Canada $4.00; other countries $4.80

017
CANMET REPORT 79-8. Stemerowicz, A.I. and Leigh, G.W. "Flotation techniques for producing high-recovery bulk Zn-Pb-Cu-Ag concentrate from a New Brunswick massive sulphide ore"

This report describes an investigation to develope a batch flotation technique for producing bulk zinc-lead-copper-silver concentrates at a target grade of 30% zinc with the highest possible recovery. Feed assaying 8.73% zinc, 3.95% lead, 0.24% copper and 87.8 g/t silver, produced a bulk concentrate grading 30.0% zinc, 10.75% lead, 0.68% copper and 246.9 g/t silver with recoveries of 95.3, 86.6, 76.7 and 84.6%, respectively.
Cat. No. M38-13/79-8 - 94 p
Canada $8.00; other countries $9.60

018
CANMET REPORT 79-9. Prud'homme, P. and Lucas, B.H. "Construction and operation of a continuous ion-exchange pilot plant using fluidized-bed columns"

The development of new simplified ion-exchange equipment for recovering metals from solution is described. It consists of a single-stage deep fluidized-bed extraction column coupled with moving-bed elution and wash columns for extracting different ions from mine water solutions and leach liquors. A procedure for achieving proper utilization and optimum operating conditions is given.
Cat. No. M38-13/79-9 - 10 p
Canada $1.25; other countries $1.50

019
CANMET REPORT 79-10. Wilson, H.S. "A comparative study of lightweight aggregates in structural concrete"

Results are given of a comparative study of the physical properties of five lightweight aggregates produced commercially in Canada from clays and shales, and of the properties of structural concretes incorporating these lightweight aggregates. The specimens were prepared, cured and tested in accordance with ASTM specifications.
Cat. No. M38-13/79-10 - 25 p
Canada $2.00; other countries $2.40

020
CANMET REPORT 79-11. Hedley, D.G.F., Herget, G., Miles, P. and Yu, Y.S. "CANMET's rock mechanics research at the Kidd Creek mine"

This report describes measuring techniques and their applications, compares measured and predicted deformations and stresses, and evaluates potential modes of failure at the Kidd Creek mine in northern Ontario. An appendix describes the mine's open pit monitoring system.
Cat. No. M38-13/79-11 - 52 p
Canada $3.50; other countries $4.20

021
CANMET REPORT 79-12. Hayden, A.C. and Brown ,T.D. "Energy cascades in Canada"

Three major applications where the cascade principle offered advantages in fuel conservation and costs over more conventional systems are shown by: (1) a combined cycle energy cascade; (2) total energy gas engine cascade; (3) cogeneration in a district heating scheme.
Cat. No. M38-13/79-12 - 22 p
Canada $1.75; other countries $2.10

022
CANMET REPORT 79-13. Taylor, G.W. "Liquid fuels from Canadian coals"

This report represents a consolidation of the knowledge and considered opinions of CANMET scientists on producing liquid fuels from coals in the Canadian context. Several priority areas for R & D are identified, particularly basic engineering, hydrogen supply, coal quality and environmental impact. The main considerations bearing on research and pilot plant strategies are discussed.
Cat. No. M38-13/79-13 - 43 p
Canada $3.10; other countries $3.75

023
CANMET REPORT 79-14. Faye, G.H., Bowman, W.S. and Sutarno, R. "Zinc concentrate CZN-1 - A certified reference material"

A zinc concentrate CZN-1 from Kimberley, B.C. was prepared as a compositional reference material. In a "free-choice" analytical program, 30 laboratories contributed results for one or more of 21 elements of CZN-1. Recommended values have been assigned for Ag, $Al_2O_3$, As, Cd, Cu, Fe, Hg, Mn, Pb, S, Sb and Zn. Also, non-certified values have been determined for: Au, Bi, CaO, In, MgO, Se, $SiO_2$ and Sn.
Cat. No. M38-13/79-14 - 39 p
Canada $2.00; other countries $2.40

024
CANMET REPORT 79-15. Faye, G.H., Bowman, W.S. and Sutarno, R. "Lead concentrate CPB-1 - A certified reference material"

A lead concentrate CPB-1 from Kimberley B.C. has been prepared as a compositional reference material. In a "free-choice" analytical program, 25 laboratories contributed results for one or more of 21 elements of CPB-1. Recommended values have been assigned for: Ag, $Al_2O_3$, As, Bi, Cd, Cu, Fe, Hg, Pb, S, Sb, $SiO_2$ and Zn. Also, non-certified values have been determined for: Au, CaO, In, MgO, Mn, Se, Sn, and Te.
Cat. No. M38-13/79-15 - 38 p
Canada $2.00; other countries $2.40

025
CANMET REPORT 79-16. Faye, G.H., Bowman, W.S. and Sutarno, R. "Copper concentrate CCU-1 - A certified reference material"

A copper concentrate CCU-1 from Lynn Lake, Manitoba has been prepared as a compositional reference material. In a "free-choice" analytical program, 33 laboratories contributed results for one or more of 18 elements of CCU-1. Recommended values have been assigned for: Ag, $Al_2O_3$, Au, Cu, Hg, Pb, $SiO_2$ and Zn. Also, non-certified values have been determined for: As, Bi, CaO, Cd, Fe, MgO, Mo, S, Se and Te.
Cat. No. M38-13/79-16 - 27 p
Canada $1.45; other countries $1.75

026
CANMET REPORT 79-17. George, A.E., Smiley, G.T. and Sawatzky, H. "Rapid chromatographic procedure for characterizing hydrocarbons in synthetic fuel naphtha"

This report describes a rapid chromatographic procedure for chemical characterization of the naphtha fraction of synthetic fuels. The procedure provides complete distillation information, sulphur content, hydrocarbon-type distribution analysis of saturates, olefins and aromatics as well as individual identification of major hydrocarbon constituents.
Cat. No. M38-13/79-17 - 12 p
Canada $2.75; other countries $3.30

027
CANMET REPORT 79-18. Gransden, J.F. and Leeder, W.R. "Influence of flue temperature and coal preparation on coke quality in 460-mm technical-scale coke oven"

The effect of oven flue temperature, coal moisture and pulverization level on oven operating characteristics and coke quality was determined for a typical industrial coal blend used for making blast furnace coke. The test program was car-

ried out in a 460-mm technical-scale coke oven and from the results the following standard operating conditions were selected: flue temperature - 1125°C; coal moisture - 6%; coal size - 80% minus 3.25 mm.
Cat. No. M38-13/79-18 - 11 p
Canada $1.50; other countries $1.80

028
CANMET REPORT 79-19. Hoey, G.R., Dingley, W. and Wiles, C.T. "Test installation for studying erosion-corrosion of metals for coal washing plants"
Erosion-corrosion tests of mild steel panels were conducted using slurries of alundum, quartz, washed coal and coal refuse. Results show that the successful application of corrosion control techniques would reduce metal wastage in coal washing plants.
Cat. No. M38-13/79-19 - 9 p
Canada $1.10; other countries $1.35

029
CANMET REPORT 79-20. Sawatzky, H. Beshai, J.E., Smiley, G.T. and George, A.E. "Effect of hydrocracking on the distribution of nitrogenous components in Athabasca bitumen"
The various fractions of nitrogenous and associated polar compounds were examined using infrared spectrometry and titration of the bases. Results showed that carbazoles, indoles and related compounds, particularly in the asphaltenes, increased substantially with hydrocracking severity. Basicity of the hydrocracked products is also discussed.
Cat. No. M38-13/79-20 - 10 p
Canada $1.25; other countries $1.50

030
CANMET REPORT 79-21. Itzkovitch, I.J. and Ritcey, G.M. "Removal of radionuclides from process streams - A review"
This report details the origin and control of radium 226, thorium 230 and lead 210 contamination of mill effluent streams from conventional and non-conventional milling of uranium ores, reviews the basic chemistry of the radionuclides as it relates to potential alternatives for control and presents these alternatives along with a summary of published cost data.
Cat. No. M38-13/79-21 - 171 p
Canada $8.00; other countries $9.60

031
CANMET REPORT 79-22. Collings, R.K. "Mineral waste resources of Canada Report No. 3 - Mining wastes in British Columbia"
Background information is provided on waste rock and mill tailings in British Columbia. Data on the occurrence, mineralogy, petrography, physical and chemical characteristics of wastes from 27 operating mines are given in tabular form for three principal types of mines - metal, nonmetallic or industrial minerals, and coal. Potential uses for certain wastes are noted along with relevant research.
Cat. No. M38-13/79-22 - 36 p
Canada $2.00: other countries $2.40

032
CANMET REPORT 79-24. Shnay, R.C. (ed. R.K. Buhr) "Assessment of the technological capabilities of the Canadian foundry industry"
A comprehensive survey was conducted of the Canadian foundry industry to obtain detailed information of technological capabilities. Results were summarized and are presented for the benefit of the industry and public at large.
Cat. No. M38-13/79-24 - 21 p
Canada $3.25; other countries $3.90

033
CANMET REPORT 79-24F. Shnay, R.C. (ed. R.K. Buhr) "Evaluation des ressources technologiques de l'industrie canadienne de la fonderie"
Abstract given in CANMET Report 79-24.
Cat. No. M38-13/79-24F - 25 p
Canada $3.25; other countries $3.90

034
CANMET REPORT 79-25. "CANMET Review 1978/79"
Assuring effective utilization of minerals and energy, developing new technology, and assuring the availability of energy from innovative as well as traditional sources are the prime functions of the Canada Centre for Mineral and Energy Technology (CANMET). This review presents highlights during 1978-79 of the various CANMET activities and projects.
Cat. No. M38-13/79-25 - 56 p
Canada $4.25; other countries $5.10

035
CANMET REPORT 79-27. Cabri, L.J. and Laflamme, J.H.G. "Mineralogy of samples from the Lac des Iles area, Ontario"
Samples from the Lac des Iles area, Ontario were investigated to determine the mineralogy and distribution of the platinum-group elements from different areas and rock types. Mineralogical determinations together with data on mineral associations and size variations are presented.
Cat. No. M38-13/79-27 - 20 p
Canada $1.00; other countries $1.20

036
CANMET REPORT 79-28. Malhotra, V.M. "Sulphur concrete and sulphur infiltrated concrete: Properties, applications and limitations"
This report consists of two parts: the first discusses the development of sulphur concrete, gives its mechanical properties, advantages and limitations; the second describes sulphur-infiltrated concrete and discusses its mechanical properties, durability, applications and limitations.
Cat. No. M38-13/79-28 - 26 p
Canada $2.25; other countries $2.70

037
CANMET REPORT 79-29. Coates, D.F., Larocque, G. and Geller, L. "Geological disposal of high-level radioactive wastes"
Wastes from nuclear generating stations are highly radioactive and involve serious human and environmental problems which remain to be solved. Disposal problems are explained and the suggestion is made that deep underground burial in mined-out facilities in igneous rocks would be acceptable.

Cat. No. M38-13/79-29 - 21 p
Canada $1.50; other countries $1.80

038
CANMET REPORT 79-30. Malhotra, V.M. and Carette, G.G. "In situ testing for concrete strength"

This report describes methods for estimating in situ strength of concrete, i.e., surface hardness tests; rebound and penetration techniques, pullout and breakoff methods; pulse velocity techniques, combined methods approach and maturity concept.
Cat. No. M38-13/79-30E - 20 p
Canada $1.75; other countries $2.10

039
CANMET REPORT 79-31. Malhotra, V.M. "Superplasticizers: Their effect on fresh and hardened concrete"

This report briefly describes the main types of superplasticizers available in North America, discusses their mode of action, and describes their effect on the properties of fresh and hardened concrete. Although satisfactory for present concrete, problems associated with slump loss has remain to be solved for use in ready-mixed concrete.
Cat. No. M38-13/79-31 - 23 p
Canada $2.00; other countries $2.40

040
CANMET REPORT 79-32. Berry, E.E. "Concrete made with supplementary cementing materials"

Slag, fly ash and pozzolan are produced by less energy intensive procedures than the portland cement they replace, hence their use in making concrete reduces total energy consumption are construction costs. This report provides a state-of-the-art review of supplementary cementing materials and urges further research to improve quality control, develop specification tests and assess long-term performance.
Cat. No. M38-13/79-32 - 17 p
Canada $2.25; other countries $2.70

041
CANMET REPORT 79-33. Wilson, H.S. "Lightweight aggregates: Properties, applications and outlook"

This report describes the various properties and applications of lightweight aggregates produced from clay, shale, slate, fly ash and blast furnace slag, and discusses production methods. Their main advantages in concrete masonry units are decreasing the weight of structures by 20 to 30% and doubling the thermal resistance. Escalating fuel costs for producing such aggregates require process improvements to remain economically competitive with conventional aggregates.
Cat. No. M38-13/79-33 - 23 p
Canada $2.25; other countries $2.70

042
CANMET REPORT 79-34. Adams, C.J. "Recycling of steel plant waste oxides - A review"

Large quantities of ferruginous waste material are produced at steel plants as a byproduct of iron and steelmaking processes. This review outlines the sources and types of waste material generated and documents the processes developed to recycle them.
Cat. No. M38-13/79-34 - 13 p
Canada $1.50; other countries $1.80

043
CANMET REPORT 79-38. Malhotra, V.M. "Strength and freeze-thaw characteristics of concrete incorporating granulated blast furnace slag"

Portland cement is a highly energy intensive material. Attempts are thus being made to find substitutes which are less energy intensive to partially replace cement in concrete. This report gives results of laboratory investigations to determine the strength and freeze-thaw durability characteristics of concrete incorporating granulated iron blast furnace slag. Although slag has shown considerable potential as a partial replacement for portland cement, it generally reduces the compressive strength and further research is recommended.
Cat. No. M38-13/79-38 - 26 p
Canada $2.25; other countries $2.70

044
CANMET REPORT 80-4E. Gransden, J.F., Price, J.T. and Leeder, W.R. "Cokemaking with Canadian medium- and high-volatile commercial coking coals"

Questions about future availability of imported premium quality coking coal for Canadian steel mills has prompted an investigation of domestic coal. Blends of low ash, high sulphur Eastern coals with high ash low sulphur Western coals produced coke with suitable chemical and physical properties - all blends had low coking pressure and could be coked in industrial ovens. The various tests are described.
Cat. No. M38-13/80-4E - 29 p
Canada $2.25; other countries $2.70

# SECTION 2

# JOURNAL PUBLICATIONS

Papers are available only from the journal or proceedings cited, or by direct request to the author.

## MINERAL SCIENCES LABORATORIES

045
Barkley, D.J. "The nonaqueous potentiometric determination of commercial benzophenone oxime (L1X) extractants"; Anal Chim Acta 105:83-89; 1979.

A nonaqueous potentiometric method for determining substituted benzophenone oxime reagents (L1X) used as extractants in copper extraction processes is described.

046
Bowman, W.S., Faye, G.H., Sutarno, R., McKeague, J.A. and Kodama, H. "New CCRMP reference soils SO-1 to SO-4"; Geostandards Newsletter 3:2:109-113; 1979.

Information is given on the preparation, characterization, and certification of soil samples SO-1 to SO-4 for use as certified reference materials.

047
Cabri, L.J., Rowland, J.F., Gilles, J.H.G. and Stewart, J.M. "Keithconnite, telluropalladinite and other Pd-Pt tellurides from the Stillwater complex, Montana"; Can Mineral 17:589-594; 1979.

Mineralogical studies of rock samples and heavy mineral concentrates from the Banded and Upper zones of the Stillwater complex, Montana, have revealed rich and diverse assemblages of platinum-group minerals (PGM). This paper describes the new minerals keithconnite and telluropalladinite, as well as three other PG-tellurides.

048
Donaldson, Elsie M. "Determination of antimony in concentrates, ores and non-ferrous materials by atomic-absorption spectrophotometry after iron-lanthanum collection, or by the iodide method after further xanthate extraction"; Talanta 26: 999-1010; 1979.

Methods for determining trace and moderate amounts of antimony in copper, nickel, molybdenum, lead and zinc concentrates and in ores are described.

049
Donaldson, Elsie M. "Determination of bismuth in ores, concentrates and non-ferrous alloys by atomic-absorption spectrophotometry after separation by diethyldithiocarbamate extraction or iron collection"; Talanta 26:1119-1123; 1979.

Two simple, reliable and moderately rapid atomic-absorption methods for determining trace and minor amounts of bismuth in copper, nickel, molybdenum, lead and zinc concentrates and ores, and in non-ferrous alloys, are described. Results obtained by both methods are compared with those obtained spectrophotometrically by the iodide method after the separation of bismuth by DDTC and xanthate extractions.

050
Haque, K.E. "Carbonate rock - A resource for energy"; Energy Sources 4:1; 1978

A brief account of various research reports available in the literature on the catalytic hydrogenation of carbon dioxide is presented. Carbonate rock is advanced as a potential source of products that might serve either as feedstocks for petrochemical industries or for production of energy.

051
Hitchen, A. "The differential pulse polarographic determination of trace amounts of tin and its application to zinc-aluminum alloys"; Talanta 26:369-372; 1979.

A differential pulse polarographic procedure for determining 0.001-0.02% Sn in zinc-aluminum alloys is described.

052
Jambor, J.L. "Mineralogical evaluation of proximal-distal features in New Brunswick massive-sulphide deposits"; Can Mineral 17:649-664; 1979.

A tentative classification of most of the Bathurst-area deposits in New Brunswick is made with reference to their established or assumed displacement from feeder conduits (proximal versus distal) and position of sulphide crystallization (autochthonous versus allochthonous).

053
Kodama, H. and Dean, R.S. "Illite from Eldorado, Saskatchewan"; Can Mineral 18:109-118; 1980.

Chemical composition, X-ray diffraction and electron microscopy revealed that the 0.07 to 2 μm fraction of a sample of mudstone from Eldorado was exceptionally pure illite. It was characterized and its mineralogical details are given.

054
Leclerc, A. and Townsend, M.G. "Quadrupole splitting and ground state in FeS and NiS ($^{57}Fe$)"; J

Phys Chem Solids 40:1069-1072; 1979.

From a Mössbauer study of an oriented single crystal of $Ni_{0.996}S$ (2% $Fe^{57}$) at 298 K (above the metal-insulator transition at ~230K) the sign of the quadrupole splitting in $Fe^{57}$ is determined to be positive; this contrasts with a negative sign found for FeS and $Fe_{0.93}S$. A tentative model is presented that is consistent with these results and with magnetic anisotropy data.

055
MacKinnon, D.J., Brannen, J.M. and Kerby, R.C. "The effect of cadmium on zinc deposit structures obtained from high purity industrial acid sulphate electrolyte"; J Appl Electrochem 9:603-613; 1979.

The effect of cadmium on cathodic zinc crystal growth was studied in high purity industrial electrolyte, with and without additives, in an attempt to establish a correlation between morphology, polarization and the extent of cadmium contamination. Results are given.

056
MacKinnon, D.J., Brannen, J.M. and Kerby, R.C. "The effect of lead on zinc deposit structures obtained from high purity synthetic and industrial acid sulphate electrolytes"; J Appl Electrochem 9:55-70; 1979.

Results are described of a study undertaken in zinc electrolysis to determine the effect of Pb contamination on the morphology and orientation of zinc deposits obtained from acid sulphate electrolytes and to determine the effect of Pb on the polarization behaviour and current efficiency of zinc deposition in relation to any significance it may have with respect to controlling the process using polarization techniques.

057
Makhija, R. and Hitchen, A. "The titrimetric determination of sulphate, thiosulphate and polythionates in mining effluents"; Anal Chim Acta 105:375-382; 1979.

A titrimetric procedure is proposed for determining various forms of sulphur in mining effluents. Results obtained are in good agreement with those obtained by lengthy gravimetric procedures.

058
Petruk, W. "Correlation between grain sizes in a polished section with sieving data and an investigation of mineral liberation measurements from polished sections"; Inst Min Metall Sec C 87:C271-277; 1978.

Samples of known material were analyzed with a Quantimet 720 image analyser to (1) correlate size distributions as obtained by screening with size distributions for grains as observed in polished sections and (2) to investigate mineral liberation measurements from polished sections.

059
Ritcey, G.M. "Crud in solvent extraction processing - A review of causes and treatment"; Hydrometallurgy 5:97-107; 1980.

An overview is presented on the various aspects of affecting solvent loss through crud formation encountered in many hydrometallurgical plants that employ solvent extraction processing.

060
Smith, C.W. and Dalton, J.L. "Application of EDXRF analysis to the determination of metallic elements in airborne mineralogical dusts"; Can J Spectrosc 24:6:163-171; Nov.-Dec. 1979.

Objective was to examine the potential of EDXRF to measure other elements than silica in particulate matter collected from the CAMPEDS system. The equipment was known to have sensitivity and took a reasonable time.

Calibration techniques are described and optional modifications are suggested to increase sensitivities for particular elements and to expand the scope to other elements.

061
Steger, H.F., Faye, G.H., Bowman, W.S. and Sutarno, R. "New CCRMP reference uranium ore BL-5 and sulphide concentrates CCU-1, CPB-1 and CZN-1"; Geostandards Newsletter 3:2:173-175; 1979.

Information is presented on the preparation, characterization, and certification of uranium ore BL-5 and a suite of chalcopyrite, galena and sphalerite concentrates, CCU-1, CPB-1 and CZN-1, respectively.

062
Stewart, J.M. and Szymanski, J.T. "A redetermination of the crystal structure of potassium trithionate, $K_2S_3O_6$"; Acta Crystallogr B35:1967-1970; 1979.

The trithionate ion is one of the constituents of thiosalt waste of the flotation circuit process. This paper reports the re-examination of the crystal structure of potassium trithionate as part of an overall program to decrease industrial pollution.

063
Stewart, J.M. and Szymanski, J.T. "The crystal structure of potassium tetrathionate, $K_2S_4O_6$"; Acta Crystallogr B35:1971-1974; 1979.

The crystal structure of potassium tetrathionate was determined in a study of waste effluents from sulphide mining operations.

064
Szymanski, J.T. "The crystal structure of platarsite, $Pt(As,S)_2$, and a comparison with sperrylite, $PtAs_2$"; Can Mineral 17:117-123; 1979.

The structures of platarsite and sperrylite were examined to accurately determine their relationship.

065
Szymanski, J.T. "The crystal structure of tetraaqua-cis-dichloroiron (III) tetrachloroferrate (III) monohydrate (ferric chloride 2 1/2-hydrate)"; Acta Crystallogr B35:1958-1963; 1979.

This paper reports the results of the first of three crystal structure determinations of the three lower ferric chloride hydrates. This work was a first step in the study of reaction mechanisms of sulphide leaching reactions.

066
Townsend, M.G., Webster, A.H. and Horwood, J.L. "Ferrimagnetic transition in $Fe_{0.9}S$: magnetic, thermodynamic and kinetic aspects"; J Phys Chem Solids 40:183-189; 1979.

This paper provides results of a study made on single crystals by specific heat, Mossbauer spectroscopy and magnetic susceptibility of the magnetic structure and kinetics and thermodynamics of formation of the ferrimagnetic component of antiferromagnetic $Fe_{0.9}S$.

## ENERGY RESEARCH LABORATORIES

067
Bancroft, G.M., Gupta, R.P., Hardin, A.H. and Ternan, M. "Quantitative electron spectroscopy for chemical analyses of bitumen processing catalysts"; Anal Chem 51:2102; 1979.

An investigation is described and results given from a study using X-ray photoelectron spectroscopy to analyze a large number of $Mo/Al_2O_3$ hydrodesulphurization catalysts containing nickel and cobalt as promoters.

068
Hayden, A.C.S. "How does ambient temperature affect economy and emissions?"; J Soc Auto Eng 87:1; 1979.

Results are presented from a recent study by the Canadian Combustion Research Laboratory of CANMET on the effects of ambient temperature on economy and emissions of diesel, stratified charge, lean burn, and turbo-charged knock-limit engines and comparing these with conventionally-carburated catalyst-equipped automobiles.

069
Hayden, A.C.S. and Braaten, R.W. "Efficient residential oil-heating systems - A manual for servicemen, designers and builders"; Report EL79-8; (This report is available on request from Conservation and Renewable Energy Branch, 580 Booth Street, Ottawa, Ont. K1A 0E4).

This manual is intended as a guide to improve the efficiency of domestic oil-fired systems, both by changing or expanding the emphasis of periodic maintenance and by actual physical modifications to the heating system.

070
Kelly, J.F. and Ternan, M. "Hydrocracking Athabasca bitumen with alkali metal promoted $CoO-MoO_3-Al_2O_3$ catalysts"; Can J Chem Eng 57:726-733.

Alkali metal promoters (lithium, sodium and potassium) were added to catalysts used to hydrocrack Athabasca bitumen to decrease the coke deposition which causes catalyst deactivation. Results are explained in terms of changes in catalyst electronic properties caused by adding the promoters.

071
Ranganathan, R., Pruden, B.B., Ternan, M. and Denis, J.M. "Evaluation of a two-stage thermal and catalytic hydrocracking process for Athabasca bitumen"; Am Chem Soc Advances in Chem, No. 179: 54-66.

A two-stage thermal and catalytic hydrocracking process for upgrading Athabasca bitumen is described. Three catalysts - cobalt-molybdenum on alumina, nickel-molybdenum on alumina, and nickel-tungsten on alumina - are evaluated in the catalytic hydrocracking stage and their selectivities are compared.

072
Sekhar, M.V.C. and Ternan, M. "Thermogravimetric studies on catalytic and noncatalytic pyrolysis of pitch derived from hydrocracked Athabasca bitumen"; Am Chem Soc 15:183:259.

Results are given from a study to determine the pyrolytic behaviour of a hydrocracked vacuum residuum in an inert atmosphere in the presence and absence of an alumina catalyst using thermogravimetric techniques.

073
Ternan, M. and Fuller, O.M. "A comparison of methods used to measure pore size in solids"; Can J Chem Eng 57:750-757; 1979.

A comparison is presented of measuring the size of pores in a number of solid samples by nitrogen adsorption, oxygen adsorption, mercury porosimetry, scanning electron microscopy, and optical microscopy.

PHYSICAL METALLURGY RESEARCH LABORATORIES

074
Couture, A. "Effect of iron, antimony, aluminum and silicon contamination on the mechanical properties of four tin bronzes"; Am Fdy Soc Trans 79: 50:439-451; 1979.

The effect on copper alloys of antimony, Sb and iron, Fe, added singly and combined was determined. Also determined was the influence of aluminum, Al and silicon, Si, added singly. The result of varying the concentration of these four elements was evaluated in terms of the effect on mechanical and other properties.

075
Lagowski, B. "Reacted sand inclusions and their effect on the tensile properties of magnesium alloys"; Am Fdy Soc Trans 87:387-390; 1979.

This paper describes an investigation to determine the effects of reacted sand inclusions on the tensile properties of magnesium alloys.

076
McDonald, R.D. "Automotive under-body corrosion testing"; Proc Nat Assoc Corr Eng Ann Meet; Chicago; March 3-7, 1980.

Corrosion characteristics of potential automotive candidate material have been evaluated and compared with commonly used automotive steels. The first of a series of corrosion tests of these materials is described.

077
Milliken, K.S. and Mitchell, C.M. "Comparison of strain gauge and X-ray diffraction measurements of residual stresses in a weldment of HY130 steel"; Proc 5th Bolton Landing Conf Weldments: Physical Metallurgy and Failure Phenomena, General Electric Co. Technology and Marketing Operation; Schenectady, New York; 1979.

The residual stress distribution over the HAZ and the weld in a circular patch test plate of HY130 steel was determined by a strain gauge method using a rim mounted strain gauge and trepanning from the plate centre. The connection between the residual stresses and stress corrosion cracking in such plates is demonstrated.

078
Packwood, R.H., Kriz, J. and Patmore, D.J.F. "EPMA-SEM as tools in the investigation of hydrocracking processes"; Proc 14th Ann Conf Microbeam Anal Soc; San Antonio, Texas; Aug. 12-17, 1979.

Two investigations are described which touch on problems in catalytic and thermal hydrocracking using the microprobe and SEM coupled with Energy Dispensive X-ray Spectroscopy (EDXS) techniques.

079
Sahoo, M., Edwards, J.O. and Thomson, R. "Influence of corrosion-inhibiting heat treatment on the microstructure and mechanical properties of nickel-aluminum bronze alloy C 95800"; Am Fdy Soc Trans 87:495-502; 1979.

The differences in microstructure and properties of a nickel-aluminum bronze alloy after corrosion-inhibiting heat treatment are interpreted in terms of composition and prior cooling rate.

080
Sahoo, M., Wang, K.C. and Edwards, J.O. "Foundry characteristics of both Nb-modified and Cr-modified high strength 70/30 Cu-Ni alloys"; Am Fdy Soc Trans 53:529-536; 1979.

A summary is presented of studies on foundry and welding characteristics of high-strength 70/30 cupro-nickel casting alloys because of anticipated demand for such materials in future shipboard piping systems.

081
Sahoo, M. and Edwards, J.O. "Gating and risering of medium-size commercial castings of high-strength cupro-nickel (IN 768)"; Am Fdy Soc Trans 87:519; 1979.

Results are given from a study conducted on the foundry characteristics, mechanical properties, and weldability of a chromium-modified 70/30 cupro-nickel alloy.

082
Shmay, R.C. and Buhr, R.K. "Assessment of the technological capabilities of the Canadian foundry industry"; Modern Castings; March 1980.

Abstract given under CANMET Report 79-24 (entry 032) Section 1.

083
Skelly, H.M. "Some mechanical properties of powder-forged iron/alloy mixtures"; Powder Metall 22: 2:41-44; 1979.

This paper describes an investigation to determine the feasibility of producing alloy forgings from a powder prepared by mixing the alloying additions with iron powder. Results show that useful tensile properties can be obtained from a preform forging made from a powder mixture of nominal composition: 0.5% C - 0.6% Mn - balance iron.

084
Thomson, R. and Sahoo, M. "The structure and mechanical properties of continuously cast Ni-Al bronze bar stock"; Am Fdy Soc Trans 87:485-490; 1979.

The properties of continuously cast nickel-aluminum bronze alloy products are examined and data are given on the increases in strength attainable by precipitation hardening heat treatment.

085
Tyson, W.R. "Hydrogen in metals"; Can Metall Q 18:1-11; 1979.

A brief summary is presented of the known effects of hydrogen on metals, especially degradation and embrittlement. Practical problems involving hydrogen are surveyed.

TECHNOLOGY INFORMATION DIVISION

086
Sutterlin, P.G. "Review of 'Geomathematics': Past, present, and prospects"; Int Union Geol Sci; Episodes 1979:2.

A brief review is presented of papers published in "Geomathematics: Past, present, and prospects" of the International Association for Mathematical Geology. Contributors are: J.C. Griffiths, W. Schwarzacher, F.P. Agterberg, R.A. Rayment, W.C. Krumbein, and Felix Chayes.

087
Weidmark, P.E. "Fifteenth supplement to bibliography of Canadian contributions in the field of rock mechanics" CIM Bull 72:807:145-147; July 1979.

Prepared for the Canadian National Committee on Rock Mechanics.

# SECTION 3

# ORAL PRESENTATIONS

The following papers were presented at various meetings, conferences, and symposia. As indicated some have been published in the appropriate conference proceedings or as journal articles. They are available only from the journal or proceedings cited, or by direct request to the author.

## MINERAL SCIENCES LABORATORIES

088
Ahmed, S.M. "Redox reactions and photoelectrochemical studies on the 11-C surfaces of $MoS_2$"; ERP/MSL 79-57(OP); presented 156th Meet Electrochem Soc, Los Angeles; Oct. 14-19, 1979.
Extended abstract.

089
Ahmed, S.M. "Surface chemistry of asbestos fibre"; MRP/MSL 79-132(OP); presented Am chem Soc Meet; Houston, Texas; March 24-28.
Wet processing, an alternative method to dry processing, was examined by measuring the electrophoretic mobility and the zero point of charge of chrysotile samples. The effect of different reagents on the settling of chrysotile fibre was also examined. Surface chemistry of asbestos is briefly reviewed.

090
Ahmed, S.M. "Use of semiconductor oxides in photoelectrochemical cells for solar energy conversion: Principles and problems"; ERP/MSL 79-166 (OP); presented Can Ceram Soc Meet; Feb. 27-29, 1980.
A review is presented of attempts to overcome problems encountered in using $TiO_2$ and certain titanates for solar energy conversion.

091
CANMET Staff "Submission to Province of British Columbia Royal Commission of Enquiry Health and Environmental Protection - Uranium Mining"; ERP/MSL 79-136(OP); Oct. 1979.
Technology for economic processing of uranium ores is described and specific aspects that have an impact on environment and public health are identified: production and control of dust in crushing; product drying and packaging; control of radioactivity levels in the mill; and containment of radionuclides, heavy metals, and process chemicals.

092
Carson, D.W. "CANALPH-3 - A portable alpha spectrometer for radiation dosimetry in mines and homes"; MRP/MSL 80-38(OP); presented at workshop on radon and radon daughters in urban communities associated with uranium mining and processing; Port Hope, Ont.; March 12-14, 1980.
CANALPH-3 is a portable alpha spectrometer for measuring daughter products of radon and thoron to determine the health risk to personnel both underground in a mine environment and in homes. This instrument is described and a discussion on counting procedures for determining the working levels of radon and thoron is presented.

093
Green, D.J. "Solution spray-dried and freeze-dried sodium beta-alumina powders: Preparation and hot pressing"; ERP/MSL 79-42(OPJ); presented 4th Int Conf Mod Ceram Tech, St. Vincent, Italy; May 30, 1979. (Will be published in Conf Proc)
Results on powders produced from solution by spray freezing-freeze drying and spray drying techniques are presented. The two types of powder are compared with respect to their behaviour during calcination and ease of fabrication. Both techniques have been successful in producing high quality ceramic powders.

094
Green, D.J. "Hot pressing of sodium beta alumina"; ERP/MSL 79-151(OP); presented Ann Con Can Ceram Soc; Montreal; Feb. 25-27, 1979.
Sodium beta-alumina powders were prepared by spray-drying and freeze-drying of solutions. After characterizing the dried powders and their calcination products the calcined powders were hot-pressed into dense ceramic discs. A comparison was made of the relative densification rates for the two types. The discs were characterized by microstructural and phase analyses.

095
Haque, K.E. "Hydrochloric acid leaching on Elliot Lake uranium ore"; ERP/MSL 79-59(OP); presented 18th Ann Conf Metall, Sudbury; Aug. 19-23, 1979.
Laboratory-scale studies of hydrochloric acid and chlorine-assisted leaching of a typical Elliot Lake uranium ore are described. Results indicated that irrespective of temperature and retention time chlorine-assisted leaches favoured uranium and thorium extraction and the maximum extractions, U = 98% and Th = 92%, appeared at 75°C with six hours retention.

095a
Joe, E.G. "Capital and operating costs for uranium milling in Canada"; ERP/MSL 78-203(OP); pre-

sented Ann Gen Meet CIM; Montreal; April 24, 1979.

Methods for determining capital and operating costs of a 3000 t/d acid leach uranium mill are presented. Factored systems based on capital cost of major pieces of equipment using the Lang and Chilton factors are described.

096
Laguitton, D. and Wilson, J.M.D. "Matbal II - A Fortran program for balancing mineral processing circuits"; MRP/MSL 79-109(OPJ); presented 18th Ann Conf Metall, Sudbury; Aug. 19-23, 1979. (Will be published in Conf Proc)

A new FORTRAN package has been developed which permits routine and in-depth investigation of steady state flow conditions in a mineral processing circuit. This new prgram is referred to as MATBAL II. This report outlines the method and provides details of the error calculation. An example from published data is used to demonstrate the application of the program.

097
Laguitton, D., Pilgrim, R., Hodouin, D. and Everell, M.D. "Computer simulators, building blocks for the mineral processor"; MRP/MSL 80-6(OPJ); presented Can Min Proc Ann Meet, Ottawa; Jan. 1980. (Will be published in Proc)

This is a case history of applying computer modelling and simulation to improve grinding in an operating concentrator.

098
MacKinnon, D.J. and Brannen, J.M. "Zinc electrowinning from chloride electrolyte"; MRP/MSL 79-83 (OP); presented 109th AIME Ann Meet, Las Vegas, Nevada; Feb. 24-28, 1980.

An electrowinning process is described whereby compact metallic zinc is electrowon directly from purified aqueous zinc chloride electrolyte containing 15 g/L Zn, 0.12 M HCl and 15 mg/L tetrabutylammonium chloride as the smoothing agent.

099
Mathieu, G.I. "Desulphurization and de-ashing of an Eastern coal by high-gradient magnetic separation"; ERP/MSL 79-80(OP); presented 1979 Eng Found Conf Adv Coal Cleaning, Rindge, New Hampshire, U.S.A.; Aug. 5-10, 1979.

Tests were performed on a raw coal from the Prince mine of Cape Breton Development Corporation using the high-gradient magnetic separation (HGMS) process. The sample contained 9.26% ash and 2.56% pyritic sulphur of which up to 57.4% and 65.4%, respectively, were removed by HGMS. Tests are described along with the characteristics of the coal sample and features of the magnetic separator.

100
Mikhail, S.A. "DTA investigations of the chlorination of some sulphide minerals"; MRP/MSL 79-95 (OP); presented CIM Conf Metall; Aug. 1979.

A study is described on chlorination of individual sulphide minerals using differential thermal analysis (DTA). The minerals studied were: galena, sphalerite, pyrite and chalcopyrite.

101
Mirkovich, V.V. "Thermal diffusivity of Ba-mica and Ba-mica/yttria-stabilized zirconia composites"; ERP/MSL 79-145(OPJ); presented 16th Int Therm Conduct Conf; Nov. 7-9, 1979. (Will be published in Conf Proc)

A specimen of solid Ba-mica and a Ba-mica/yttria-stabilized zirconia composite were prepared and their thermal diffusivities determined in the range of 25 to 700°C. Measurements on an oxygen deficient Ba-mica/zirconia composite indicate that oxygen vacancy formation appreciably depresses the thermal transport properties.

102
Pint, P. "Electrochemistry of molten salts"; MRP/MSL 79-163(OP); presented Dept. Chem, Carleton Univ, Ottawa; Nov. 30, 1979.

Various properties of molten salts are described and compared with aqueous electrolytes. The advantages of fused salt systems for electrorefining and electrowinning of metals are discussed and examples from industrial processes are given.

103
Quon, D.H.H and Malhotra, V.M. "Effect of superplasticizers on workability, strength and degree of conversion of high-alumina cement concrete"; MRP/MSL 80-55(OPJ); presented Ann Meet Am Ceram Soc; Chicago; April 27-30. (Will be published in J Am Concr Inst)

Results are provided of an investigation to determine the effect of superplasticizers on the workability, compressive strength and degree of conversion of high-alumina cement concrete.

104
Quon, D.H.H., Wheat, T.A. and Nesbitt, W. "Synthesis, characterization and fabrication of $Na_{Hx}Zr_2Si_xP_{3-x}O_{12}$ powders"; ERP/MSL 80-9(OP); presented Can Ceram Soc; Feb. 24-26, 1980.

A wet chemical technique was used to prepare $Na_{Hx}Zr_2Si_xP_{3-x}O_{12}$. The effects of sintering conditions and atmosphere on density and phase formation in the system were examined.

105
Steger, H.F. and Faye, G.H. "The 'State-of-the-Art' in the analysis of reference materials of the CCRMP"; MRP/MSL 79-106(OP); presented Int Symp Prod and Use Ref Mater, Berlin, West Germany; Nov. 13-16, 1979.

A compilation of methodological information is presented from data available to the Canadian Certified Reference Materials Project, which up to then had performed 90 certifications for 27 constituents in 26 reference ores, concentrates and metallurgical products. This information should serve as a vehicle for comparing the accuracy, absolute and relative, of various analytical methods.

106
Stemerowicz, A.I. and Petruk, W. "Laboratory investigations and image analysis studies on samples from the base metal deposit of Brunswick Mining and Smelting Corp. Ltd."; MRP/MSL 79-2(OPJ);

presented Can Miner Proc Meet; Ottawa; Jan. 23, 1979 and in Proc 76-97.

Flotation techniques are described for recovering zinc from mill tailings and for producing bulk concentrates with high metal recoveries from ores. Results show the recoveries of metals, free sphalerite, slimed sphalerite and unliberated sphalerite.

107
Sutarno, R. "Application of statistical methods for inventory verification"; ERP/MSL 80-28(OP); presented CAC/ISO/TC 69 Meet; April 18, 1980.

A simplified formula for calculating sample size for both attribute and variable inspection for nuclear material inventory is derived from the hypergeometric frequency distribution function. Applications of this method within the field of nuclear material safeguard are given.

108
Wheat, T.A. "Synthesis of beta-aluminas from gibbsite"; ERP/MSL 80-27(OP); presented Elect Basic Sci Div, Can Ceram Soc; Ottawa; Feb. 24-26, 1980.

This report describes a process that exploits adsorption from a liquid phase whereby binary and ternary (MgO- and $Li_2O$-stabilized) 1:6 sodium beta- and beta"-alumina can be produced in a reactive form.

109
Yoon, R. and Stemerowicz, A.I. "Collectorless flotation of chalcopyrite and sphalerite"; MRP/MSL 79-53(OPJ); presented Can Miner Proc; Ottawa; Jan. 24, 1979 and in Proc 186-204.

An investigation is described in which the flotation of chalcopyrite and sphalerite from copper and copper-zinc ores was achieved without using thiol-type collectors.

## ENERGY RESEARCH LABORATORIES

110
Belinko, K., Kriz, J.F. and Nandi, B.N. "Behaviour of different macerals during liquefaction of a high volatile bituminous coal with zinc and tin catalysts"; presented 6th Can Symp Catal; Ottawa; Aug. 1979.

The catalytic activity of tin and zinc in the hydrogenolysis process is compared with that of other tin compounds in terms of conversion, hydrogen consumption and product distribution.

111
Brown, T.D. "Coal gasification and liquefaction"; ERP/ERL 80-10(OP); presented CIM First Technical Meet on Western Coals; Vancouver, Feb. 14-15, 1980.

A review is presented of current gasification technologies for use in the gasification of Canadian coal. Four coal liquefaction processes are also described.

112
Fung, D.P.C., Graham, R. "The role of catalysis in wood gasification"; ERP/ERL 79-36(OP); presented Am Chem Soc Meet, Wash., D.C., Sept. 10-14, 1979.

A literature survey and laboratory studies on gasification of biomass in the presence of potassium carbonate and calcium oxide catalysts are presented. The catalysts significantly increased hydrogen composition of the product gas and promoted a greater net gas yield at the expense of the solid char product.

113
George, A.E. "Research projects of oil and gas resource and reserve assessment"; ERP/ERL 79-49 (OP); presented NACMMR Sub-Committee Meet for Energy Proc; Sept. 1979.

A summary is presented of the objectives and recent accomplishments of the Resource and Reserve Assessment group of Energy Research Laboratories, CANMET.

114
Hayden, A.C.S. "Efficiency of wood-fired appliances"; ERP/ERL 78-82(TR)(OP); presented to Can Wood Energy Institute and published in Manual on Installation, Operation and Maintenance of Wood-burning Appliances; 1979.

This paper discusses four techniques used to measure the efficiency of wood-fired appliances and suggests that efficient air-tight wood stoves can be effective in conserving energy.

115
Hayden, A.C.S. "Performance of compressed wood briquettes in wood stoves"; ERP/ERL 79-16(OP); presented 1979 Ann Conf of Can Wood Energy Inst and in Proc.

This paper discusses preliminary test results on the relative performance of a representative dry maple, and compressed wood briquettes in three wood stove types - two airtight and one non-airtight stoves. Results show that the briquettes should not be used in a non-airtight stove.

116
Lee, G.K., Friedrich, F.D., Whaley, H. and Ogle, I.C. "Coal combustion activities of the Canadian Combustion Research Laboratory"; ERP/ERL 80-25(OP); presented 82nd Ann Gen Meet CIM; Toronto, April 20-23, 1980. (Will be published in CIM Bull)

Brief descriptions are given of projects of the Canadian Combustion Research Laboratory (CCRL) of CANMET related to improved utilization of coal in conventional pulverized-fired boilers and kilns, the use of coal-oil mixtures as a substitute fuel in equipment designed for oil firing and efforts to accelerate the application of fluidized-bed combustion systems for low-grade coal.

MINING RESEARCH LABORATORIES

117
Bigu, J. "Statistical planning of radiation surveys"; MRP/MRL 79-106(OP); presented UMITC, Elliot Lake, Ont.; Oct. 1979.

Useful notions and concepts are given for planning radiation surveys. The topic of this report is described in four sections: methodology of radiation measurements; planning of radiation surveys; fundamentals of statistical analysis; and statistical planning of radiation surveys.

118
Bigu, J. "Some elementary concepts of radiation health and safety in underground uranium mines"; MRP/MRL 80-9(OP); presented Workshop on Health and Safety, Sault College of Applied Arts and Technology, Sault Ste. Marie, Ont.; Feb. 26-27, 1980.

This report reviews main radiation sources, discusses biological effects of ionizing radiation and introduces presently accepted radiation indexes for radiation hazard and exposure. A review is made of available techniques for radiation control and monitoring and of various methods of personnel radiation protection including the use of respirators, job rotation, personnel dosimetry and medical surveillance.

119
Chakravorty, R.N. and Woolf, R.L. "Evaluation of systems for early detection of spontaneous combustion in coal mines"; ERP/MRL 79-9(OP); presented 2nd Inst Mine Vent Congr; Reno, Nevada; Nov. 4-8, 1979.

This paper briefly reviews the state-of-the-art knowledge of the methods developed and used for the early detection of spontaneous combustion. CANMET work to date on carbon monoxide monitoring and infrared detection systems is discussed. Field and laboratory studies indicate that both systems can be used successfully.

120
Chiang, C.S.W., Bannerman, W. and Fisekci, M.Y. "Strata control instrumentation at hydraulic operation mining of a thick and steep coal seam in Western Canada"; ERP/MRL 79-81(OPJ); presented 3rd Can Symp Mining, Surveying and Rock Deformation Measurements, Laurentian Univ., Sudbury, Ont.; Oct. 10-12, 1979.

This paper outlines the current status of a joint study by CANMET and Kaiser Resources Ltd. on strata control instrumentation. It deals with the present state of instrumentation required for fast moving faces in an hydraulic mine where a 16-m thick and >30° coal seam is being extracted at Sparwood, B.C. The results at this stage are for a depth of about 300 m.

121
Dainty, E.D. "A review of the 'underground environment' contributions to the 1978/79 CANMET Minerals Program outputs"; MRP/MRL 79-46(OP); presented Joint Panel on Occup and Envir Res for Uran Prod in Canada, Sudbury; June 5, 1979.

This report describes achievements during 1978/79 by CANMET staff contributing to the improvement of the underground environment in Canadian non-coal mines in ventilation network R/D; dust source identification, measurement and control; diesel emission measurement and control; radiation source identification measurement and control; noise vibration evaluation and control.

122
Dainty, E.D. "Progress during 1979 in the underground environment and tailings treatment aspects of the CANMET Minerals Program"; MRP/MRL 79-96 (OP); presented Joint Panel Occup Envir Res Uran Prod Canada, Ottawa; Dec. 5-6, 1979.

Brief descriptions are presented of the work undertaken by CANMET scientists in the underground environment and tailings treatment aspect of the Minerals Program and indicate progress during 1979 as of November 30, 1979.

123
Dainty, E.D., Lawson, A. and Mogan, J.P. "Impact on underground ventilation of the reduction of diesel emissions toxicity by water-in-oil fuel emulsification"; MRP/MRL 80-11(OP); presented CIM Ann Gen Meet; Toronto; April 20-24, 1980.

The reduction in toxicity of emissions from two diesel engines by the emulsification of water in fuel oil was investigated to determine the applicability of such systems for underground use.

124
DeKorompay, V. "Proposed procedure for using a 'Hydraulic Pot' for measuring the effect of the revegetation on the hydraulic and radiation conditions of uranium tailings ponds; MRP/MRL 79-65 (OPJ); presented Can Soc Civil Eng Conf; Montreal, Que.; June 7-8, 1979. (Will be published in Minerals and Environ J; London, U.K.)

A procedure is described for using an "Hydraulic Pot" developed to measure the effect of revegetation on the hydraulic and radiation properties of uranium mill tailings stored in surface ponds. This Hydraulic Pot is basically the combination of a seeding pot, a multifunctional hydraulic tester and an open radon collector hood and permits the measurement of the physical properties of the tailings during growth of the vegetation planted in the pot.

125
Gangal, M. "Standard procedures for the use of barometers, pressure gauges and the measurement of friction factors"; MRP/MRL 79-64(OP); presented Subcommittee on Ventilation, Elliot Lake/Sudbury Ventilation Group Meeting held at Rio Algom Mines Ltd., Elliot Lake, Ont.; Jan. 24, 1979.

A brief description of aneroid barometers and pressure gauges is given followed by standard procedures for their use. Also, a method for calculating the friction factor of airways is discussed.

126
Knight, G. "Personal dust sampling for asbestos: A position paper"; MRP/MRL 79-88(OP); presented CAN/EEC Experts Asbestos Sub-Group; Montreal; Feb. 21, 1980.

Various factors affecting dust sampling procedures in asbestos mills are given. It is suggested that respirable size selection for personal sampling should be developed as it gives a better and more consistent estimate of exposure than current sampling techniques.

127
Knight, G. "Novel methods for measuring asbestos: A position paper"; MRP/MRL 79-89(OP); presented CAN/EEC Experts Asbestos Sub-Group; Montreal; Feb. 21, 1980.

A number of possibilities are outlined for improving existing standard techniques for measuring airborne asbestos fibre in workplaces. These depend on aligning the fibre in magnetic or electric fields and include image analysis, diffraction optical methods, light-scattering techniques, X-ray diffraction, and infrared techniques.

128
Knight, G., Kirk, B., Sutarno, R. and Stefanich, W. "Personal dust sampling in mines: Statistical analysis"; MRP/MRL 79-14(OPJ); presented Int Vent Congr; Reno, Nevada; Nov. 1979. (Will be published in Conf Proc.)

It is shown that the dust exposure of all underground workers varies greatly from day to day even with each man doing the same job in the same working place. Variability followed a logarithmic normal distribution with a geometric standard deviation of about 1.6 for total respirable dust, respirable combustible dust, are respirable quartz dust. Variability was homogeneous for all men and most jobs. The difference between men doing the same job was not significant. It is suggested that dust sampling determine the average for each job and use this as the best estimate of individual exposure.

129
Mogan, J.P. and Dainty, E.D. "Assessment of diesel exhaust treatment options by a new diesel ventilation criterion"; MRP/MRL 79-13(OP); presented 2nd Int Mine Vent Congr; Reno, Nevada; Nov. 4-8, 1979.

An additive health effects index "V" of major noxious constituents in diesel exhaust based on physiological response to a mixture of pollutants was developed by the research contractor. Because more of the interacting exhaust constituents are taken into account, the index represents a significant and workable improvement over existing diesel exhaust dilution criteria.

130
Mogan, J.P., Ferguson, S., Sarin, N. and Stewart, D.B. "Factors affecting explosion pressures in flameproof diesel exhaust systems"; ERP/MRL 79-36 (IR&OP); presented XVIII Int Safety Mines Res Conf, Yugoslavia; Oct. 1979 and in Proc.

Work was done at the Canadian Explosive Atmospheres Laboratory of CANMET to reduce the internal explosion pressure of flameproof diesel exhaust systems in effort to make exhaust treatment systems safer and more economical. Test results and design guidelines are given from a study made of an adjustable mock-up water scrubbing unit. Results show that minimum pressure design requires a modest series of prototype explosion tests.

131
Savich, M. "Development of a noise monitor hat"; MRP/MRL 79-40(OP); presented 18th Int Conf Sci Res Work Safety, Yugoslavia; Oct. 1979.

Initial Laboratory and mine tests of the Noise Monitor Hat ability are presented. Its accuracy of measuring noise exposure was better than standard requirements.

## PHYSICAL METALLURGY RESEARCH LABORATORIES

132
Buhr, R.K. "Foundry research at CANMET"; MRP/PMRL 79-67(OPJ); presented Am Fdy Soc Conf; Toronto; Sept. 28, 1979.

A brief outline is presented of several of PMRL's current foundry-related research projects: foundry technological capability survey; a survey of the melting efficiencies of cupolas; a technique for applying an abrasion-resistant coating directly to castings; the inter-critical heat treatment of cast steels.

133
McGrath, J.T., Godden, M.J., Gordine, J. and Boyd, J.D. "Fracture resistance of pipeline weldments"; ERP/MRP/PMRL 79-48(OPJ); Can Metall Q 19:1; 1980.

The fracture properties of both seams and girth weldments in three line-pipe steels are presented. Comparisons are made of the different steels and welding consumables investigated and results are compared with existing line-pipe specifications.

134
Sahoo, M. and Edwards, J.D. "Gating and risering of medium-size commercial castings of high-strength cupro-nickel (IN 768)"; presented Am Fdy Soc Cast Congr; Birmingham, Alabama; April 30-May 4, 1979.

Of the various factors affecting the soundness of any casting, the gating and risering systems play a most important role. This report deals with the changes in risering as being the main features of the gating system for production-type IN 768 alloy castings.

135
Tyson, W.R. and Trudeau, L.P. "Fracture mechanics concepts" presented CIM Conf of Metall; Sudbury, Ont.; Aug. 1979.

A brief survey is presented of the more important characteristics of the fracture mechanics concepts. Emphasis is placed on describing the state at the tips of cracks in stressed bodies.

136
Vosikovsky, O. "Effects of mechanical and environmental variables on fatique crack growth rates in steels - A summary of work at CANMET"; presented 18th Conf Metall; Sudbury, Ont.; Aug. 19-23, 1979.

The effects of stress ratio and frequency are examined in air and in liquid environments (represented by 3.5% NaCl water solution, distilled water and sour crude oil) on X65 and X70 line-pipe steels, and on HY130 marine steel.

## TECHNOLOGY INFORMATION DIVISION

137
Taylor, G. "Energy research and development at the Canada Centre for Mineral and Energy Technology (CANMET)"; ERP/TID 79-11(OPJ); presented 14th Intersoc Energy Conver Eng Conf; Boston, Mass., Aug. 5-10, 1979.

This paper outlines CANMET's energy research program. Selected highlights are described in coal mining, preparation and conversion; cokemaking; combustion technology; oil sands; renewable and nuclear energy; energy storage and transportation; and technical information.

138
Taylor, G. "Energy technology information trends in Canada"; ERP/TID 79-19(OPJ); presented 29th Can Chem Eng Conf, Sarnia, Ont., Sept. 30-Oct. 3, 1979 and in Proc.

Current practices and future trends in data base development and information retrievals are outlined and principal Canadian energy documentation efforts and technical advisory services are described.

# SECTION 4

# DIVISIONAL AND DECLASSIFIED REPORTS

The reports listed below are available for purchase in microfiche or paper copy from Micromedia Limited, Box 502, Station S, Toronto, Canada, M5M 4L8.

## MINERAL SCIENCES LABORATORIES

139
MRP/MSL 78-34(TR). Prud'homme, P. "Investigation of new selective ion exchange resins for copper and nickel"

140
MRP/MSL 78-223(IR). McNamara, V.M. "Acidification volatilization reneutralization treatment process for decontamination of Canadian gold mill effluents"

141
MRP/MSL 78-230(IR). Ripley, L.G. "Extraction of alumina from fly ash and furnace deposits from Hat Creek coal by the modified lime-sinter process"

142
MRP/MSL 78-231(IR). Ripley, L.G. "Extraction of alumina from fluidized bed ash from Hat Creek coaly waste by the modified lime-sinter process"

143
MRP/MSL 79-23(IR). Jongejan, A. "Compost production from municipal wastes of Elliot Lake"

144
MRP/MSL 79-24(IR). Jongejan, A. and Wilkins, A.L. "Compost quality in connection with the effects of microbial concentrates on the degradation of wood waste"

145
MRP/MSL 79-31(IR). Klymowsky, I.B. and Wilson, J.M. "A survey of research demands in iron ore"

146
MRP/MSL 79-32(TR). Laflamme, J.H.G., Beaulne, J.M. and Bourgoin, Y. "Current polishing procedure for ore minerals, mill products, and synthetic materials in the Mineralogy Section, Physical Sciences Laboratories, CANMET"

147
MRP/MSL 79-34(IR). Jongejan, A. "Methods used for the identification of metabolites from cellulose and wood degrading organisms"

148
MRP/MSL 79-35(IR). Ripley, L.G. "Analyses of the leach residues from the modified lime-sinter process and the possible utilization of the residues in the cement industry"

149
MRP/MSL 79-38(TR). MacKinnon, D.J., Brannen, J.M. and Kilpatrick, M.W. "The effect of glue and chloride ion on copper electrowinning"

150
MRP/MSL 79-52(IR). Bell, K.E. "Canadian clay resources for alumina: Summary report"

151
MRP/MSL 79-55(TR). MacKinnon, D.J., Kilpatrick, M.W. and Brannen, J.M. "Evaluation of organic additives for use in copper electrowinning"

152
ERP/MSL 79-58(IR). Pritzker, M.D., "Beneficiation of secondary heavy-media cyclone middlings from Fording Coal Limited"

153
ERP/MSL 79-60(IR). Dean, R.S. "Mineralogical analysis of the Herrin No. 6 coal, Illinois, U.S.A."

154
MRP/MSL 79-61(IR). Berry, E.E. "Acidic northern waters project - Progress report No. 2"

155
MRP/MSL 79-62(IR). Ripley, L.G. "Extraction and recovery of alumina from fly ash by hydrochloric acid-hydrofluoric acid leaching"

156
MRP/MSL 79-64(IR). Wilson, H.S. "Investigation into sintering coal-mine shales for lightweight aggregate Part I"

157
MRP/MSL 79-68(TR). Gilmore, A.J. "The removal of metals from chloride raffinates by iron exchange - Interim report No. 5"

158
MRP/MSL 79-69(TR). MacKinnon, D.J. "Zinc dust cementation of cobalt from chloride solutions"

159
MRP/MSL 79-71(TR). MacKinnon, D.J. and Brannen,

J.M. "Copper electrowinning using small pilot-scale electrolysis cells"

160
MRP/MSL 79-74(TR). Rolia, E. and Barbeau, F. "Thiosalt generation during the production of bulk concentrate from Brunswick Mining and Smelting Corporation ore"

161
MRP/MSL 79-77(IR). Mikhail, S.A. and Webster, A.H. "Chlorination of sulphide minerals III. Pyrite and chalcopyrite"

162
MRP/MSL 79-79(IR). Laguitton, D. "Development of a computer simulator to investigate the grinding of a complex fine-grained sulphide ore"

163
MRP/MSL 79-84(IR). Leung, J. "The feasibility of calibrating an X-ray fluorescence on-stream analyzer with solid standards"

164
MRP/MSL 79-85(TR). Rolia, E. and Barbeau, F. "Oxidation of thiosalts by: $SO_2$ plus air, charcoal plus air, and chlorine"

165
MRP/MSL 79-89(TR). Jongejan, A. "Progress report on the degradation of wood waste in connection with the compositing process"

166
MRP/MSL 79-92(IR). Mirkovich, V.V. "Thermal conductivity of drill core specimens from the Darlington site"

167
MRP/MSL 79-93(IR). Sutarno, R. and Bowman, W.S. "Personal dust sampling in mines - Statistical analysis of analytical results"

168
MRP/MSL 79-97(IR). Hitchen, A. and MacPherson, D.R. "The determination of $Fe^{3+}$, $Fe^{2+}$, $Cu^{2+}$, $Cu^{1+}$ in concentrated salt solutions related to the hydrometallurgical lead process"

169
MRP/MSL 79-99(IR). Winer, A.A., Wang, S.B. and Sirianni, G.V. "Commissioning of a special electric smelting furnace for production of mineral thermal insulation"

170
MRP/MSL 79-101(IR). Ripley, L.G. "Extraction of alumina from Hat Creek coaly waste by the modified lime-sinter process"

171
MRP/MSL 79-104(TR). Bartels, K. and Copeland, C. "A Cary Model 118C spectrophotometer/microprocessor data acquisition interface: (III) A computer program for calculating from UV-visible spectral data, the wavelength positions and ordinate values of spectral maxima and minima"

172
MRP/MSL 79-107(IR). Parsons, H.W., Saleh, V., Kearns, J.B., Ritcey, G.M. and Lucas, B.H. "Low temperature chlorination of Zn/Pb/Cu sulphide ores continuous testing Progress Report No. 1"

173
MRP/MSL 79-108(TR). Carson, D.W. "CANALPH-3 - A portable three-channel alpha spectrometer for measuring the daughter products of radon and thoron"

174
MRP/MSL 79-112(IR). Mirkovich, V.V. "Thermal diffusivity and thermal expansion of drill core specimens from the Darlington site"

175
MRP/MSL 79-114(IR). Wilson, J. and Klymowsky, I.B. "Material balances of the Brunswick Mining and Smelting flotation circuit and the Health-Steele grinding circuit using the Matbal Program"

176
MRP/MSL 79-116(IR). Raicevic, D., Raicevic, M. and McCarthy, D.R. "Preconcentration of low-grade uranium ores with environmentally acceptable tailings"

177
ERP/MSL 79-117(TR). Laflamme, J.H.G. "Operation of a low-temperature plasma asher"

178
MRP/MSL 79-119(IR). Stemerowicz, A.I. and Leigh, G.W. "Production of a zinc concentrate from Brunswick Mining and Smelting Corporation mill tailings"

179
MRP/MSL 79-120(IR). Laguitton, D. "Household Fortran computer programs for the Ore Processing Laboratory: I - METCAL, metallurgical calculations from laboratory and pilot plant investigation results"

180
MRP/MSL 79-121(TR). Kelly, F.J. "Radium removal processes capital and operating cost estimates"

181
MRP/MSL 79-125(IR). Jongejan, A. "Progress report on the degradation of garbage in connection with the composting process"

182
MRP/MSL 79-126(TR). Bartels, K. "An evaluation of the destruction of thiosalts by electro-oxidation"

183
MRP/MSL 79-134(IR). Petruk, W. "Mineralogical and image analysis investigation of iron ore samples from the Scully Mine, Southwestern Labrador"

184
ERP/MSL 79-135(TR). Saiddington, J.C. "Abrasive wear of selected line-pipe and abrasive resistant

steels in quartz slurries"

185
MRP/MSL 79-137(IR). Ripley, L.G. "Extraction of alumina from five Ontario anorthosites by the modified lime-sinter process"

186
MRP/MSL 79-138(IR). Dean, R.S. "Evaluation of the Hat Creek, British Columbia coal deposits as potential sources of non-bauxitic alumina: A preliminary mineralogical investigation"

187
MRP/MSL 79-139(TR). Kelly, F.J. and Wong, W.S. "Material and heat balances for the Sherrit Gordon pressure leach process for treating complex zinc-lead-copper ores of New Brunswick"

188
MRP/MSL 79-144(IR). Hamer, C. "Alumina from fluidized-bed combustion ash of Hat Creek, B.C. coaly waste - Part II. Alumina recovery and purification by an HCl process"

189
MRP/MSL 79-146(IR). Ripley, L.G. "Extraction of alumina from French River (Ontario) nepheline syenite by the lime-sinter process"

190
ERP/MSL 79-148(LS). Gilmore, A.J. "Rejuvenation processes applied to poisoned anion exchangers in uranium processing - A review"

191
MRP/MSL 79-154(TR). Gilmore, A.J. "The removal of radioactive radium ($Ra^{226}$) from chloride leach liquors by ion exchange - Progress report"

192
MRP/MSL 79-156(IR). Hughson, M.R. "An image analysis study of exsolution chalcopyrite in sphalerite from the south sulphide orebody of the Caribou Deposit"

193
MRP/MSL 79-159(IR). Mikhail, S.A. and Webster, A.H. "The effect of $Fe_2O_3$ additions on the chlorination of some sulphide minerals"

194
MRP/MSL 79-160(TR). Pilgrim, R.F. "Preliminary users' guide for 'ANS' - A computer program to implement a computer print-out system for sample handling and reporting for the chemical laboratory"

195
MRP/MSL 79-167(IR). Jongejan, A. "Microbial cellulose-degradation in connection with the abatement of water acidity"

196
MRP/MSL 79-169(IR). Dean, R.S. "Cursory mineralogical examination of ceramic clays and shales of the Prairie Provinces"

197
MRP/MSL 79-174(TR). Bell K.E. "Effect of heating rate on the thermal dilatometry of rocks"

198
MRP/MSL 80-4(LT). Chen, T.T. "An English translation of the Chinese paper: Mineralogy and occurrence of the platinum-group elements in a chromium deposit in Northwestern China"

199
MRP/MSL 80-5(TR). Hoey, G.R. and Bednar, J.S. "Corrosion of metals and alloys in ferric-ferrous chloride leach solutions at 22° to 106°C"

200
MRP/MSL 80-7(TR). Skeaff, J.M. and Campbell, H.W. "Physical, chemical and dewatering characteristics of Ba/$RaSo_4$ sludges from uranium milling"

201
MRP/MSL 80-11(TR). Pinard, R.G. "Mineralogical and image analysis investigations of a bulk concentrate prepared in the Ore Processing Laboratory from the ore of Brunswick Mining and Smelting Corporation Limited, Bathurst, New Brunswick"

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MRP/MSL 80-13(IR). Lucas, B.H. "Desilication of sodium aluminate solutions"

203
ERP/MSL 80-14(TR). McCreedy, H.H. and Smith, H.W. "Proceedings of the $^{226}$Radium workshop October 17, 1977"

204
ERP/MSL 80-15(TR). Wheat, T.A. "Recent developments in ceramics"

205
MRP/MSL 80-18(TR). MacKinnon, D.J. and Brannen, J.M. "Copper electrowinning from sulphate electrolytes produced by solvent extraction"

206
MRP/MSL 80-23(TR). Rolia, E. "A study of the comparative rates of thiosalt generation from cleaned sulphide mineral concentrates and BMS ore during agitation in a flotation cell"

207
MRP/MSL 80-47(TR). Dutrizac, J.E. "Synthesis of $2Sb_2O_3 \cdot V_2O_3$"

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ERP/ERL 79-17(TR). Andersen, N.E. "A critical review of size distributions of flocculated particles: Application of electronic particle counters"

209
ERP/ERL 79-18(TR). Mikhail, M. "Size degradation -1 of bituminous coal"

210
ERP/ERL 79-19(TR). Andersen, N., Hamza, H.A. and Hashmi, K. "An evaluation of the applicability of the Coulter counter for the characterization of bituminous dispersions in aqueous phases"

211
ERP/ERL 79-24(TR). Whalley, B.J.P. and Lau, I.T. "Instrumental anticipation of defluidization of heated beds of caking coal (Part II)"

212
ERP/ERL 79-29(TR). Braaten, R.W. and Brown, T.D. "Evaluation of a modified Carswell 300-C warm air furnace"

213
ERP/ERL 79-33(TR). Tibbetts, T.E. "Assessment of rank and quality of Canadian coals"

214
ERP/ERL 79-37(TR). Nandi, B.N. "Petrographic studies of lignite and its residual product from liquefaction process"

215
ERP/ERL 79-38(TR). Janke, L., Montgomery, W.J., Hickman, C.M. and Dureau, R. "Determination of major and minor elements in fused coal-ash samples with energy-dispersive X-ray spectrometry using a fundamental parameter approach"

216
ERP/ERL 79-40(TR). Combustion Sub-committee of the Ferrous Energy Research Assoc. "The effect of atomization variables on heat transfer from liquid fuel flames"

217
ERP/ERL 79-41(TR). Montgomery, W.J. "Assessment of Mont Joli coal"

218
ERP/ERL 79-43(TR). Janke, L.J. and Montgomery, W.J. "A comparison of three analytical procedures for the determination of moisture in the analytical sample of brown coals and lignites"

219
ERP/ERL 79-47(TR). Marwaha, V.R., Cameron, D.D. and Botham, J.C. "Engineering modifications to CANMET test ovens and related pilot plant facilities: Part I: Repair of Ottawa test ovens"

220
ERP/ERL 79-52(TR). Brown, T.D. "Canadian research, development and demonstration activities in coal gasification, coal liquefaction and coal oil mixture combustion"

221
ERP/ERL 79-62(TR). Chmielowiec, J., Beshai, J. and George, A.E. "Synthetic studies of high performance liquid chromatographic bonded phase sorbents for preparative scale fossil fuel separation"

222
ERP/ERL 80-2(TR). Montgomery, W.J. "A test to determine the physical stability of a compressed wood fire-log as it relates to the absorbtion of atmospheric moisture"

223
ERP/ERL 80-28(TR). Price, J.T., Gransden, J. and Brown, T.D. "Chinese-Canadian metallurgical coal blends: Prediction of coke characteristics"

224
ERP/ERL 80-33(TR). Galbraith, L.E. "An XPS examination of oxidized coals submitted by Dr. B.N. Nandi"

MINING RESEARCH LABORATORIES

225
ERP/MRL 79-24(TR). Sabourin, R. "Definitions des reserves"

226
MRP/MRL 79-25(TR). de Korompay, V. "Determination of the relative discharge rate from a uranium mine tailings pond by water level measurements"

227
MRP/MRL 79-26(TR). Rowlandson, M. "Mass collection efficiency tests on cyclones"

228
ERP/MRL 79-30(R). Grant, F. "Support of mine strata with roof bolts"

229
ERP/MRL 79-32(TR). Bossert, J.A. "Report of the meeting of International Electrotechnical Commission 31 in Budapest, Hungary"

230
ERP/MRL 79-35(TR). Lobay, G. "A proposed short test program for combustible gas detection instrument to supplement CSA standard C22.2 No. 152-1976"

231
ERP/MRL 79-39(TR). Srajer, V. "Air injection test in oil sands"

232
MRP/MRL 79-42(TR). Bigu, J. "A technical evaluation of the EDA radon gas continuous monitoring system"

233
ERP/MRL 79-43(TR). Grant, F. "Sukunka main roof bolt tests, March 5,6,7,/79"

234
ERP/MRL 79-45(TR). Zahary, G. "Joint panel - Uranium production"

235
MRP/MRL 79-51(TR). Hedley, D.G.F. "Minutes of the 24th Annual Meeting of the Canadian National Committee on Rock Mechanics"

236
ERP/MRL 79-52(TR). Romaniuk, A.S. "Saskatchewan coal quality factors"

237
ERP/MRL 79-53(TR). Sabourin, R. "Standard procedure for the documentation of computer programs"

238
MRP/MRL 79-54(TR). Annor, A. "Proposed survey and computer programs"

239
ERP/MRL 79-56(TR). Sarin, N. "Investigation of the modified exhaust system on Rhino diesel powered transporter"

240
MRP/MRL 79-57(TR). Muir, B. Ambient temperature calibration of 24 IRAD stressmeters"

241
MRP/MRL 79-58(TR). Carr, P., et al. "Progress report on in situ heater experiment"

242
ERP/MRP/MRL 79-59(TR). Scott, Joan P. "MRL project control computer program"

243
MRP/MRL 79-60(TR). Annor, A., Larocque, G. and Chernis, P. "Uniaxial compression tests, Brazilian tensile tests and dilatational velocity measurements on rock specimens from Pinawa and Chalk River"

244
MRP/MRL 79-63(TR). Bigu, J. and Carson, D.W. "A preliminary report on the combined radon daughter/dust sampler (TLD/CAMPED) dosimeter"

245
MRP/MRL 79-66(TR). Miles, P. and Herget, G. "Ground stress determinations at Thompson and Birchtree Mines, Thompson, Manitoba"

246
ERP/MRL 79-67(TR). Das, B.M. "Development of preliminary underground coal mining methods matrix"

247
ERP/MRL 79-68(TR). Dainty, E.D. and Mogan, J.P. "Preliminary draft (Iteration No. 2): The certification of flameproof diesel-powered, rubber-tired, trackless, self-propelled vehicles for use in underground coal mines in Canada"

248
MRP/MRL 79-69(TR). Yu, Y.S. "Some clarification for pillar strength formulae developed for the Elliot Lake mines"

249
MRP/MRL 79-71(TR). Hedley, D.G.F., Hambley, D.F. and Morgan, G. "Regional stability in the Elliot Lake mines Part 1: The Denison-Quirke Boundary"

250
MRP/MRL 79-72(TR). Feng, K.K. and Hanasaki, K. "A numerical study of the behaviour of liquid and slurry explosives under projectile impact"

251
MRL/MRL 79-73(TR). Carr, P. "Laboratory test of in situ heater segment"

252
MRP/MRL 79-74(TR). Darling, J.A. "Smokeless powder burning trial at Hinchinbrook, May 1979"

253
ERP/MRL 79-75(TR). Geller, L.B. "Report on IEA/MTCH hydrotransport meeting, Pittsburgh, August 6-9, 1979"

254
MRP/MRL 79-76(TR). Herget, G. and Miles, P. "Shear strength of geological discontinuities with material bridges"

255
MRP/MRL 79-78(TR). Lim, T. "Dilution gouging method using chloride and iodide selectrode for tailing effluent discharge measurement"

256
MRP/MRL 79-79(TR). Kirk, B. "The feasibility of measuring chrysotile fibres by X-ray diffraction"

257
MRP/MRL 79-80(TR). Carr, P., Annor, A. and Kapeller, F. "Calibration report for the digitilt inclinometer used in the in situ heater project"

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MRP/MRL 79-82(TR). Toews, N., Wong, A.S., Rebstock, J. and Yu, Y.S. "PRSPLT documentation"

259
MRP/MRL 79-83(TR). Sangster, R. "The analysis of Radium-226 by alpha spectrometry"

260
ERP/MRL 79-85(TR). Dainty, D. "A review of the 'Environment and Safety' contributions to the 1978/79 Energy Program outputs of the CANMET Mining Sub-Sub/Activity"

261
MRP/MRL 79-86(TR). Piche, R. "Analysis of oxisymmetric pillar structure"

262
MRP/MRL 79-87(TR). Knight, G. "A comparison between two mine dust sampling systems"

263
ERP/MRL 79-92(TR). Ralph, M.S. "Proposed quality control programme for EMR certification service"

264
MRP/MRL 79-93(TR). Morgan, G., Hedley, D.G.F. and Hambley, D.F. "Regional stability in the Elliot Lake mines Part 2: The Denison-Panel Boundary"

265
MRP/MRL 79-94(TR). Hedley, D.G.F., Morgan, G. and Hambley, D.F. "Regional stability in the Elliot Lake Mines Part 3: Pillar recovery at Denison Mine"

266
ERP/MRL 79-95(TR). Bossert, J.A. "Report of the meeting of Technical Committee No. 31 of the International Electrotechnical Commission held in Ottawa, Canada, Sept. 14 to 21, 1979"

267
ERP/MRL 79-97(TR). Bossert, J.A. and Ralph, M.S. "Modification to the No. 1 control console for automated explosion testing of electrical apparatus"

268
ERP/MRL 79-100(TR). Srajer, V. "Potential of bucketwheel technology for Mining Plains Coal"

269
ERP/MRL 79-101(TR). Fisecki, M.Y., Chiang, C. and Bannerman, W. "Progress Report of the strata control Project 77-78 at Kaiser Hydraulic Mines, Sparwood, B.C."

270
MRP/MRL 79-102(TR). Yu, Y.S. and Toews, N.A. "Three-dimensional stress distribution in a pillar for a typical room-and-pillar system of mining"

271
MRP/MRL 79-103(TR). Yu, Y.S. and Toews, N. "MINSIM - A mining simulator for determining the elastic response of strata, surrounding tabular mining excavations (User's Guide)"

272
ERP/MRL 79-104(TR). Feng, K.K. and Augsten, R. "Minimum ignition temperature of coal dust closed from Canadian coal mines"

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MRP/MRL 80-1(TR). Knight, G. "Program for dust in coal mines"

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MRP/MRL 80-2(TR). Knight, G. "Radiation sampling pumps: Airflow calibration"

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MRP/MRL 80-3(TR). Bigu, J. "Summary of a meeting on personal dosimetry and personal exposure estimation sponsored by AECB (Ottawa, Oct. 5, 1978)"

276
MRP/MRL 80-4(TR). Hedley, D.G.F., Muir, W.B. and Yu, Y.S. "Regional stability in the Elliot Lake mines - Part 4 pillar removal at the Nordic mine"

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ERP/MRL 80-6(TR). Bossert, J.A. "A proposal for continuous monitoring of certified equipment and materials for underground mines"

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MRP/MRL 80-7(TR). Bossert, J.A. "The Canadian Explosive Atmospheres Laboratory"

279
MRP/MRL 80-8(TR). Herget, G. "Regional stress in the Canadian Shield"

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MRP/MRL 80-9(TR). Bigu, J. "Some elementary concepts of radiation health and safety in underground uranium mines"

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ERP/MRL 80-10(TR). Sarin, N. "Interim certification requirements for fire-resistant hydraulic fluids"

282
MRP/MRL 80-12(TR). Murray, D.R. "Surface stabilization: Waste management demonstration study - Progress report 1978/79"

283
MRP/MRL 80-14(TR). Larocque, G. "A proposal to investigate thermal fracturing of igneous rocks"

284
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286
MRP/MRL 80-20(TR). Contestabile, E., Craig, T. and Larsen, P. "Sound velocity in slurry explosives"

287
ERP/MRL 80-21(TR). Bossert, J.A. "Certification service for underground mining equipment and materials offered by Energy, Mines and Resources Canada"

288
ERP/MRL 80-22(TR). Sarin, N. and Bossert, J.A. "Research and development plan for hydraulic fluids 1978-83"

289
MRP/MRL 80-26(TR). Savich, N. "Noise measurements in Quirke No. 2 mine, Rio Algom in Elliot Lake"

290
ERP/MRL 80-29(TR). Sarin, N., Ebersole, J. and Ferguson, S. "Development of Canadian facility for testing fire resistant hydraulic fluids"

291
MRP/MRL 80-30(TR). Bigu, J. "Design of an experimental system of the Flow-Through type for laboratory measurements of radon gas emanation from uranium ores - A progress report"

292
ERP/MRL 80-31(TR). Silver, S. "Another look at the comparative safety between explosion-proof and intrinsically safe electrical equipment"

293
ERP/MRL 80-32(TR). Silver, S. and Staff, Technical Services Division "Design and operation of a motorized binary gas mixture apparatus"

294
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295
MRP/MRL 80-34(TR). Knight, G. and Stefanich, W. "The use of impastors for dust size distribution analysis in mines"

296
MRP/MRL 80-36(TR). Yu, Y.S. "Preliminary assessment of three bulk mining sequences of mining at depth - An elastic stress analysis"

## PHYSICAL METALLURGY RESEARCH LABORATORIES

297
MRP/PMRL 78-9(IR). McDonald, R.D. "Under-car corrosion tests, Dec. 1977 to May 1978"

298
MRP/PMRL 78-23(TR). Sahoo, M. and Edwards, J.O. "Summary of high-strength cupro-nickel casting alloys part IV: The gating and risering of production-type sand casting of chromium-modified 70/30 cupro-nickel"

299
MRP/PMRL 79-3(IR). St. John, D. and Davis, K.G. "Computer modelling of metal flow in gating systems. Stage 1, flow in a horizontal runner"

300
MRP/PMRL 79-6(TR). Skelly, H.M. "A gear produced by preform forging iron powder"

301
MRP/PMRL 79-9(TR). Sahoo, M. "High-strength copper-base alloy for shipboard systems. Nickel-aluminum bronze, alloys progress report No. NAB-3, Oct.-Dec. 31, 1978"

302
MRP/PMRL 79-10(IR). Fegredo, D.M. and Kiff, D.R. "A comparison of microstructures and mechanical properties of forged and rolled laboratory plates and rails of similar composition"

303
MPR/PMRL 79-11(TR). Sahoo, M. "Metallographic examination of nickel-aluminum bronze (NAB) submarine hull valve casting"

304
ERP/PMRL 79-13(TR). Godden, M. "Microstructure aspects of the heat-affected zone of the seam weld of linepipe AB"

305
MRP/PMRL 79-15(TR). Skelly, H.M. "Conversion of machine turning into semi-fabricated products without remelting"

306
MRP/PMRL 79-23(TR). McGrath, J.T. "Evaluation of notch toughness gleeble simulated HAZ of direct-quench line-pipe steel"

307
MRP/PMRL 79-24(TR). Campbell, W.P. and Sahoo, M. "Summary of high-strength cupro-nickel casting alloys. Part III: Weldability of niobium modified 70/30 cupro-nickel"

308
MRP/PMRL 79-26(TR). Godden, M. "Instrumented charpy tests of base plate and weld HAZ of a direct quenched steel"

309
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310
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311
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312
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314
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315
MRP/PMRL 79-44(IR). Townsend, P.G., Kenny, W.D., Buhr, R.K. and Boyd, J.D. "Low temperature properties of cast steels"

316
MRP/PMRL 79-45(TR). Charest, M. "La préparation de lames minces de divers aciers étudiés par microscopie électronique"

317
MRP/PMRL 79-52(TR). McDonald, R.D. and Biefer, G.J. "Examination of two stainless steel shackle and bolt assemblies"

318
ERP/PMRL 79-54(IR). McGrath, J. "Evaluation of notch toughness of the HAZ of pipe seam weld by the instrumented charpy test"

319
MRP/PMRL 79-61(IR). McDonald, R.D. "Corrosion by intermittent immersion as a means of laboratory simulation of under-car tests on automotive steels"

320
ERP/PMRL 79-65(IR). Bell, D.R. "Interim summary report on line-pipe evaluation and development"

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322
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325
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330
63-3(IR). Sebisty, J.J. "Metallurgical examination of galvanized transmission tower samples"

331
63-4(IR). Parsons, D.E. "Examination of pipe samples - Heating tunnel Parliament Buildings"

332
63-10(IR). Knight, R.F. "Examination of exhibits from the scene of a natural gas explosion at 687 Albert Street, Ottawa, Ont. January 10, 1963"

333
63-11(IR). Mazzei, P.J. "Tensile properties of new Fourdrinier wire, 63/56 flat warp and 68/56 round warp, from Capital Wire Cloth and Manufacturing Co. Ltd"

334
63-16(IR). Levert, H.L. and Perry, J.A. "Model investigation of seamless steel tube making"

335
63-22(IR). Sebisty, J.J. "Metallurgical examination of samples relating to research on the resistance welding of galvanized coatings"

336
63-30(IR). Webster, C.M. and Parsons, D.E. "Examination of four samples of fire tube from the National Film Board, Montreal, P.Q."

337
63-42(IR). Campbell, W.P. "Examination of failed section from a Bailey Bridge panel"

338
63-54(IR). Buhr, R.K. "Metallurgical examination of mitre gate lifting devices forged sockets"

339
63-57(IR). Webster, C.M. and Parsons, D.E. "Examination of two samples of fire tube from a Scotch dry back boiler installed at Beach Foundry Limited, Ottawa, Ontario"

340
63-65(IR). Webster, C.M. and Parsons, D.E. "Examination of boiler tube from Camp Gagetown, N.B."

341
63-68(IR). Couture, A. "Failure of a window cleaner's anchor bolt"

342
63-71(IR). Eeles, E.G. and Thurston, R.C.A. "The failure of a wing eyebolt from Norseman V Aircraft Cf-BHW"

343
63-75(IR). Kinsey, H.V. "The production of high-purity iron-16% chromium alloy"

344
63-77(IR). Pollard, W.A. "Examination of cast-on aluminum alloy flanges of wave-guide sections"

345
63-79(IR). Parsons, D.E. "Examination of two lengths of 4-6% chromium steel tubing"

346
63-91(IR). Hutchings, W.G. and Skelly, H.M. "Evaluation of 'Berkatekt' coatings for protection of zirconium and uranium during heat treatment"

347
63-105(IR). Sebisty, J.J. "Metallurgical examination of galvanized refrigeration unit samples"

348
63-107(TR). Parsons, D.E. "Examination of two broken icebreaker stub propeller blades"

349
63-114(IR). Marsh, F.W. and Rocque, K.A. "Investigation of the stresses and deflections induced in the arm support of a medical therapy unit"

350
63-116(IR). Knight, R.F. "Assessment of properties of Algoma plate samples"

351
64-6(IR). Parsons, D.E. "Fatigue failure of water pump shaft"

352
64-22(IR). Buhr, R.K. "Use of fluid coke for recarburizing molten iron"

353
64-23(IR). Faurschou, D.K. "Examination of Top-Hat mineshaft guide submitted by GECO Mines Ltd."

354
64-28(IR). Parsons, D.E. "Failure of low pressure boiler tube"

355
64-30(IR). Campbell, W.P. "Welding tests on Algoma plate samples"

356
64-33(IR). Murton, A.E. "Test of peat moss from Rem Mill, P.Q. as a foundry sand conditioner"

357
64-34(IR). Campbell, W.P. "Examination of failed end piece from a Bailey Bridge panel"

358
64-36(IR). Knight, R.K. "Examination of failed roller bearing"

359
64-39(IR). Webster, C.M. and McDonald, R.D.

"Examination of a failed bolt from the connecting rod of a diesel engine used for power generation"

360
64-41(IR). Webster, C.M. and McDonald, R.D. "Metallurgical examination of worn snubbing caster support shaft"

361
64-47(IR). Crawford, W.M. "Examination of sulphide inclusions in steel castings"

362
64-51(IR). Pollard, W.A. "Assessment of the sand-casting properties of zinc-base alloy AZ-430 (AC121)"

363
64-56(IR). Hamilton, R.I. "Polishing nickel-rich alloys of the 80 Ni-20 Cr type"

364
64-61(IR). Murton, A.E. "Foundry tests of two samples of Alberta bentonite submitted by Magnet Cove Barium Corp. Ltd."

365
64-65(IR). Bell, D.R. "Examination of a failed crossarm bolt"

366
64-74(IR). Murton, A.E. "Test of Alberta lignite as sea coal substitute"

367
64-84(IR). Bell, D.R. "Examination of metal piece from the bottom of the St. Lawrence Seaway"

368
64-88(IR). Winkler, E. and Perry, J.A. "Extrusion defects on 90/10 and 70/30 copper-nickel tubes"

369
65-6(IR). Parsons, D.E. "Examination of three rock drill pistons for use in the Ingersoll-Rand Jr 300A Rock Drill (T.I.S. 58,733)"

370
65-20(IR). Faurschou, D.K. "Evaluation of failed suction-roll head from the drive end of the No. 3 press of the No. 5 paper machine at Port Alberni, B.C."

371
65-24(IR). Munro, D.A. and Parsons, D.E. "Metallurgical examination of three broken leaf springs"

372
65-25(IR). Garrison, J.G. and Biefer, G.J. "Examination of a failed underground fan from Denison Mines Ltd., Elliot Lake, Ont."

373
65-26(IR). Bell, D.R. "Metallurgical examination of failed mantle heat nut"

374
65-29(IR). Parsons, D.E. and Munro, D.E. "Examination of Nova Scotia Pulp Ltd. recovery boiler tube sample"

375
65-35(IR). Pollard, W.A. "Examination of failed aluminum alloy aircraft component"

376
65-41(IR). Crawford, W.M. "Examination of fractured reinforcing rods from Matsqui Institution Drug Centre, B.C."

377
65-53(IR). Munro, D.A. and Knight, R.F. "Metallurgical examination of coining dies"

378
65-59(IR). Pollard, W.A. "Fractured aluminum alloy pressure cooker cover"

379
65-60(IR). Parsons, D.E. and Munro, D.A. "Metallurgical examination of burst boiler tube from Electric Reduction Co. of Can. Ltd."

380
65-63(IR). Thomson, R. "Examination of superston 70 propeller material"

381
65-71(IR). Buhr, R.K. "Cupola operation at Stittsville Foundry Limited"

382
65-78(IR). Murton, A.E. "Impure chromite - Cause of pinhole porosity"

383
65-83(IR). Parsons, D.E. "Examination of Quebec North Shore and Labrador Rail Steel Service and test rail sections"

384
65-84(IR). Pollard, W.A. "Examination of 33S aluminum alloy extrusion billet samples"

385
65-93(IR). McDonald, R.D. and Ayers, D.E. "Identification of a soil sampling steel tube"

386
65-98(IR). Edwards, J.O. and Couture, A. "Fracture of heat exchanger copper tubes"

387
65-106(IR). Parsons, D.E. and Munro, D.A. "Examination of rivets from S.S. Midland Prince boiler"

388
65-107(IR). Crawford, W.W. "Examination of a fractured grey cast iron support ring"

389
66-1(IR). Bell, D.R. and Munro, D.A. "Examination of samples from dipper stick of a Bucyrus-Erie 280-D shovel"

390
66-4(IR). Sebisty, J.J. "Metallurgical examination of galvanized tubing"

391
66-5(IR). Bell, D.R. "Metallurgical examination of failed Mantle heat nut No. 2"

392
66-6(IR). Marsh, F.W. and Rocque, K.A. "Investigation of the stresses and deflections induced in the sub-base and bearing support of a medical therapy unit"

393
66-10(IR). Perry, J.A. and Winkler, E. "Extrusion of uranium alloys"

394
66-15(IR). Bell, D.R. and Munro, D.A. "Investigation into the failure of a PTO drive shaft of an RCAF alvis crash truck"

395
66-18(IR). Pollard, W.A. "Metallurgical examination of 2L73 and 24S clad sheet - (file No. 5002-2492(AIGT)"

396
66-21(IR). Ayers, G.D. and McDonald, R.D. "Examination of crust breaking tools"

397
66-23(IR). Couture, A. "Failure of brass fittings in cobalt 60 irradiator"

398
66-32(IR). Marsh, F.W. "Second report on measurement of residual stresses in lacing wires of Y-100 experimental stage 8 main rotor disc for RCN destroyer escort vessels"

399
66-33(IR). Perry, J.A. "Extrusion of uranium alloys at high reductions"

400
66-36(IR). Lagowski, B. "Evaluation of a Canadian produced magnesium-neodymium master alloy for the preparation of QE22 casting alloy"

401
66-39(IR). Ayers, G.D. and McDonald, R.D. "Examination of a cold punch for horseshoes (T.I.S. 60864)"

402
66-41(IR). Pollard, W.A. "Surface oxidation of aluminum pipe and sheet exposed to air and gamma radiation"

403
66-47(IR). Harbec, J. "Room temperature tensile tests of 15CDV6 (VASCO JET 90) steel sheet material"

404
66-48(IR). Parsons, D.E. and Munro, D.A. "Examination of broken Davit screw from C.C.G.S. Sir Humphrey Gilbert"

405
66-49(IR). Parsons, D.E. and Munro, D.A. "Examination of two C.S.F. icebreaker propeller castings"

406
66-52(IR). Faurschou, D.K. "Examination of cracked area of a type 416 suction roll"

407
66-54(IR). Winterton, K. "Cause of failure in Kiskatinaw River pipeline"

408
66-55(IR). Parsons, D.E. and Munro, D.A. "Examination of cast stainless (Mn-Cr) steel propeller - C.C.G.S. 'Narwhal'"

409
66-56(IR). Munro, D.A. and Parsons, D.E. "Comparison of two quenched steel bar samples"

410
66-57(IR). Crawford, W.M. and Nolan, M.J. "Failure of flat steel springs used in vibrating tables"

411
66-61(IR). Munro, D.A. and Parsons, D.E. "Metallurgical examination of steel computer parts"

412
66-65(IR). Nolan, M.J. "Failure of fuel tank, M113A1 armoured personnel carrier"

413
66-66(IR). McGoey, J. and Skelly, H.M. "An examination of alloy medallion blanks manufactured by powder metallurgy techniques"

414
66-69(IR). Crawford, W.M. and Munro, D.A. "Edge chipping of rotary slicer steel knoves"

415
66-78(IR). Lagowski, B. "Machining and simulated service testing of three forged aluminum alloy 81-μ Mortar base plates"

416
66-84(IR). Faurschou, D.K. "Examination of pneumatic capsules for containing cobalt 60"

417
66-86(IR). Bell, D.R. and Munro, D.A. "Metallurgical examination of Welland Canal lock gate anchor pin"

418
66-87(IR). Buhr, R.K. "Metallurgical examination of austenitic manganese steel crusher concaves"

419
66-90(IR). Parsons, D.E. "Examination of A/S-S.V. propeller casting coupons Nos. 29158, 29159 and 29160"

420
66-91(IR). Pollard, W.A. "Heat treatment of Alcan 65S billet for DRTE"

421
66-95(IR). Parsons, D.E. and Munro, D.A. "Metallographic examination and heat treatment of castings for flexible radiography cables"

422
66-101(IR). Sebisty, J.J. "Surface defects on anodized aluminum alloy extrusion"

423
66-104(IR). Parsons, D.E. and Munro, D.A. "Investigation of poor transverse properties of an SAE 1040 steel shaft"

424
66-105(IR). Edwards, J.O. and Couture, A. "Examination of failed copper alloy flexible metal steam hose assemblies"

# SECTION 5

# CONTRACT RESEARCH REPORTS

The reports listed below are available for purchase in microfiche or paper copy from Micromedia Limited, Box 502, Station S, Toronto, Canada, M5M 4L8

425
"Bitumen content analysis for Mining Research Laboratories, EMR"; Jha, Kamal N. and Strausz, Otto P.; University of Alberta
Contract OST78-00047 - 3 p

426
"Computer model for stress-strain analysis of oilsand"; Thurber Consultants Ltd.
Contract OSQ78-00139 - 227 p

427
"Development of a bench scale fluidized bed coal gasifier and gas burner system"; Plett, E.G., Hosny, N.M. and Khalil, M.B.
Contract OSU77-00413 - 79 p

428
"Development of an industrial burner for using gases of low calorific value"; Canadian Gas Research Institute
Contract OSQ78-00003 - 82 p

429
"Drying and briquetting of Estevan and Onakawana lignite"; Manalta Coal Limited
Contract OSQ76-00161 - 58 p

430
"Emission control of a Detroit diesel, 8V 71N engine derated for underground use"; Ontario Research Foundation
Contracts OSQ-77-00183, ISQ77-00123 - 187 p

431
"Feasibility study for the inorganic no-bake closed sand moulding system for steel casting"; Valvoline Oil and Chemicals Ltd. (Ashland chemical Division)
Contract OSQ78-00171 - 101 p

432
"Geophysical techniques applicable to Canadian coal/To adopt and develop"; D. Masszi Consulting Services Ltd.
Contract OSQ78-00121 - 233 p

433
"Investigations of waterways formation limestones"; Golder Associates
Contract OSQ78-00106 - 305 p

434
"Kinetic studies relating to gasification of coal characterization and reactivity of thin carbon films"; Chen, C.-J. and Back, M.H., University of Ottawa
Contract OSU77-00412 - 41 p

435
"Lab Nos. 79 7043 SC; 79 7043 DA3; 79 7043 WA3; 79 7043 WA5; 79 7043 WA10; 79 7043 DA10"; Warnock Hersey Professional Services
Contract OSQ78-00026 - 26 p

436
"Molybdenum and niobium on the hot working of line-pipe steels/effect of"; Jonas, J.J., McGill University
Contract OSU77-00419 - 11 p

437
"Solubility of cuprous chloride in chloride media"; Itzkovitch, I.J., Ontario Research Foundation
Contract OSQ78-00221 - 100 p

438
"Thermal dewatering of lignite"; Saskatchewan Power Research and Development Centre
Contract OSQ78-00017 - 129 p

439
"Technical and economic assessment of horizontal continuous casting of steel"; Ferrco Eng. Ltd.
Contract OSQ78-00197 - 118 p

# SECTION 6

# RESEARCH AGREEMENT PROGRAM REPORTS

The reports listed below are NOT available from CANMET. Copies should be requested from the authors at their respective institutional addresses.

440
Kouame, D., Hodouin, D. and Everell, M.D. Rapport d'avancement, Annexe I: "Etude du comportement de deux arrangements de l'unité de deschlammage expérimental de Niobec Services TMG, Inc." , Québec, Université Laval, Département de Mines et Métallurgie, août 1979
Agreement 65-2-78, 209-2-79 - 66 p

441
Amany, G., Rapport d'avancement, Annexe II: "Etude et simulation de broyeurs à barres industriels", Septembre 1979
Agreement 65-2-78, 209-2-79 - 168 p

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Groupe de recherche en automatisation appliquée à l'industrie minérale, Projet: "Dimensionnement de circuits industriels de comminution", octobre 1979
Agreement 65-2-78, 209-2-79 - 15 p

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Bland, C.J. and Gonzales, D.E. "A study to investigate the use of manganese impregnated fibre for the removal of dissolved radionuclides from mine discharges" Calgary, University of Calgary, Physics Department, May 1979
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444
Postlethwaite, J. and Santo, W. "Progress report No. 2, Inhibition of erosion-corrosion in slurry pipelines", Saskatoon, University of Saskatchewan, Department of Chemistry and Chemical Engineering, November 1977
Agreement 44-2-77, 153-2-78 - 7 p

445
Kai Kwok Cheng "Digital simulation of a flotation circuit", Vancouver, University of British Columbia, June 1979
Agreement 236-2-78 - 57 p

# BACKGROUND

## PROJECTED INCREASE IN TRAFFIC IN MONTREAL

# INDEX

# (AUTHOR/SUBJECT)

Refer to bracketed number at end of each entry to find publication details which are listed numerically in Sections 1 through 6 of Catalogue.