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UNDERGROUND EXCAVATION

An Annotated Bibliography

December 1976

Final Report

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OFFICE OF THE SECRETARY
WASHININGTON, D.C. 20590

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16. Abstract

The bibliography covers all aspects of science, technology, and engineering that relate directly to excavation of underground openings in both soil and rock. The volume lists 600 document citations which contain excavation techniques other than drill-and-blast method. Each document is characterized by its type, orignality of data, stage of project completion, excavation techniques, energy application methods, costs, ground conditions, materials handling systems and other operational or physical properties of the tunneling project. Cross-indexed listings provide access via the name of performing organization, funding organization, tunnel names, excavation techniques, authors, etc. Literature sources include journals,both national and international, books and monographs covering a period of 1960 to present. Approximately 60% of the document citations were published in the period 1972-1976.

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FOREWORD

Tunnels have the potential for improving our urban transportation systems by greatly reducing congestion, noise, exhaust pollution, and excessive use of real estate by surface transportation modes.

Unfortunately, outdated contracting and management practices and inefficient technologies make tunneling costly and, thus, unacceptable to many transportation planners and community leaders.

To bring about a reduction of these high cost, the U.S. Department of Transportation has established a Transportation Tunneling Research Program. Included in the objectives of the program are studies of advanced construction techniques, modernization of scheduling and management, exploration and testing of new excavation tools, analysis of safety practices. And, since the outputs of all R&D activities must finally be accepted and used by the industry if they are to be effective, DOT also seeks to familiarize companies with the newly developed techniques, and implement them at ongoing sites.

The bibliography of tunneling literature represents one of the DOT efforts to achieve the objectives. The listed abstracts have been made a part of the computer-accessible data base of the transportation literature that is searchable and available through the various components of the DOT-sponsored national Network of Transportation Research Information Services (TRISNET). Readers who wish to gain access to this data base are urged to contact TRISNET Secretariat, 2101 Constitution Avenue, N. W., Washington, D. C. 20418, or phone 202-389-6611 for details.

Russell K. McFarland
U. S. Department of Transportation
Washington, D. C. 20590

PREFACE

This work constitutes the first formal publication in documentation disseminated at large by the Underground Excavation and Rock Properties Information Center (UERPIC), a component of the Center for Information and Numerical Data Analysis and Synthesis (CINDAS). The world's literature and data relevant to UERPIC's mission has been brought under control for effective use by all segments of the technical community interested in underground excavation, rock properties, and geodynamic phenomena induced by high energy explosions. Of singular significance is that the data on all subject elements listed in the annotations to the bibliography are keyed to and retrievable from specialized data banks.

The utility of this compendium has manifold aspects. It can help identify gaps of information in underground excavation technology and, thus, can assist Federal agencies and other organizations engaged in research planning and proposal evaluation. In addition, redundant research activities on underground excavation methods can be inhibited because the file identifies relevant research projects in various stages of progress. Case histories can be located that will describe the applications of these methods in actual construction. Design professionals will have a readily accessible bibliographic source to assist in the design of underground openings and equipment. Contractors can use the file in their search for more efficient excavation techniques. By accessing this file, organizations preparing research proposals may save several man-months of effort required to produce necessary supporting bibliographies, often from literature which is highly diffused and not readily accessible.

In closing, I wish to express my personal thanks to Professor Gordon W. Prescott of the Department of Geosciences at Purdue University, for his many contributions while serving as a part-time member of the UERPIC Senior Staff. I also wish to acknowledge the programming and computer operations support provided by Mr. Peter C. Miller of the CINDAS staff. Beginning with 1976, UERPIC was privileged in having the benefit of the guidance and counsel provided by a visiting Advisory Board, consisting of distinguished geologists and engineers who meet at CINDAS twice a year. The members of the Board for 1976 have been: Dr. M. S. Agbabian, Chairman, Dr. H. Reginald Hardy, Jr., Mr. Lloyd B. Underwood, and Dr. George B. Wallace. Their individual and collective contributions already have been felt and I am sure will have a major effect in setting the future policies and direction of UERPIC.

Last, but not least, I wish to acknowledge with thanks the financial support received from the Office of the Secretary, Assistant Secretary for Systems Development and Technology, DOT and the understanding assistance and cooperation of Dr. Alex Hoshovsky who served as the technical monitor on this contract.

December 1976
West Lafayette, Indiana

Y. S. Touloukian
Director, CINDAS

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APPENDICES

INTRODUCTION

This volume is the first edition of a contemplated annual publication, sponsored by the U. S. Department of Transportation, which provides a readily accessible bibliography on all aspects of science, technology, and engineering that relate directly to the excavation of underground openings in both soil and rock. The present volume represents the first step in a program that eventually will include as comprehensive a coverage as possible of the published information for the following components of the ICET Activity Classification Categories in Excavation Technology*:

1. Interaction with Society
   - 1.2. Environmental Factors
   - 1.3. Health and Safety
   - 1.6. Legal Relations
     - 1.6.3. Contractual Relations
   - 1.7. Education and Evaluation
     - 1.7.1. Academic Education and Training
2. Site Investigation and Measurement of Earth Properties
   - 2.1. Geology
   - 2.2. Geophysics
   - 2.3. Hydrology
   - 2.4. Topography
   - 2.6. Rock Mechanics
   - 2.7. Soil Mechanics
3. Excavation Methods (soil and rock)
   - 3.1. Explosive
   - 3.2. Mechanical
   - 3.3. Thermal
   - 3.4. Chemical
4. Ground Control and Stabilization
   - 4.1. Excavation Design
   - 4.2. Supports in Open Cuts
   - 4.3. Tunnel Supports and Lining
5. Materials Handling
   - 5.1. Excavated Materials Handling

* "ICET" is the acronym for the Federal Government's Interagency Committee on Excavation Technology. The associated numerical designations are those given in the original ICET classification. Gaps in these numbers indicate categories not covered in this bibliography. See APPENDIX 1 for further details.

The current compilation of UNDERGROUND EXCAVATION lists 600 document citations which contain information primarily on excavation techniques other than the conventional drill-and-blast method. For each citation listed in Section II of this work, a computer generated abstract is included which accurately reflects the data content and subject matter of the document. These abstracts were generated from data tapes maintained by the Underground Excavation and Rock Properties Information Center (UERPIC). The content of each document is characterized according to the following elements which also are listed by order of appearance in the abstract:

1. Type of Report (IV)*
2. Originality of Data (V)
3. Stage of Project Completion (VI)
4. Tunnel-Underground Opening Name and Location (VII)
5. Utilization of Tunnel-Underground Opening (IX)
6. Excavation Technique (X)
7. Energy Application Method (XI)
8. Drilling Equipment Characteristics (XIII)
9. Tunneling Machine Characteristics (XIV)
10. Excavation Advancement Rate (XVI)
11. TBM Excavation Rate (XVII)
12. Excavation Cost (XIX)
13. Geostructural Characteristics (XXXVI)
14. Soil Characteristics (XXXVII)
15. Soil Mechanical Properties (XXXVIII)
16. Ground Conditions (XXVI)
17. Tunnel and Underground Opening Supports (XXVII)
18. Material Handling System(s) (XXIX)
19. Stratigraphic Formation Name(s) (XXXIX)
20. Rock Type(s) (XL)
21. Petrography (XLII)
22. Rock Mechanical Properties (XLIII)

These characterization elements will be expanded in future editions of this publication as the scope of literature coverage is broadened to incorporate more of the above listed components of the ICET Activity Classification Categories in Excavation Technology.

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* The Roman numerals reference the appropriate data elements given in APPENDIX 2.

APPENDIX 2 gives the full spectrum of available document characterization elements from which abstracts are currently generated.

The documents given in Section II are listed in increasing numerical order by a unique accession number which prefixes each citation. These accession numbers also are indexed by author in Section III to produce the author index.

Section I represents a series of bibliographies for which the document accession numbers have been cross-indexed according to "performing" and "funding" organizations, and to items 4, 6, 7, 10, 12, 17, 18, and 20 of the above-listed document-characterization elements. The cross-indexed bibliographies can be manipulated to produce more specialized bibliographies. For example, to obtain a bibliography on rates of excavation in granite simply isolate all accession numbers which are common to both the bibliography for granite (item 20, ROCK TYPE = GRANITE) and the bibliography for excavation rates (item 10). Or, for a bibliography on hard rock excavation, compile all the accession numbers found for the bibliographies of the rock types listed for granite, basalt, gneiss, quartzite, etc.

These two examples illustrate how more specialized bibliographies may be generated from the cross-indexed bibliographies listed in Section I. This search method is readily tractable by manual effort especially when bibliographic requirements are well defined. The search effort also may be reduced to a machine operation: merely take the uniquely assigned document accession numbers directly from Section I as input for a simple computerized sorting program*. Thus, the 10 cross-indexed bibliographies listed in Section I provide a tool that facilitates isolation of those bibliographies which help satisfy the user's requirements for documentation.

The document citations presented here are from books, proceedings of symposia and congresses, and numerous national and international journals on rock mechanics and underground excavation technology. Recently an effort has been initiated to search a number of these journals from the year 1960 to the present for appropriate citations. Upon completion of this task the effort will be maintained on a current basis and pertinent articles will be extracted for inclusion into subsequent editions of this compendium. The published journals which currently are undergoing processing in this systematic fashion are given in APPENDIX 3. Also listed in APPENDIX 3 are the abstracting services which are used currently to supplement direct journal searches and to identify additional relevant documents.

* Such programs are readily available in computer libraries.

The document citations presented in this edition of UNDERGROUND EXCAVATION were obtained from 103 reference sources. The bibliographic statistics for the 600 reported citations are given in Table 1. An analysis of these statistics indicates that 83% of the listed documents were obtained from journals. Reports (13%) and conference proceedings (4%) constitute the remaining two major literature categories from which the listed citations are derived. Table 1 also characterizes in detail the reported documentation for the past 30 years and indicates that a little more than 34% of the bibliographies cited were published within the last two and a half years. Approximately 60% of the document citations presented here were published in the period 1972-1976. There remains undoubtedly a considerable volume of additional literature for this 30-year period which is still to be identified and captured in subsequent editions of UNDERGROUND EXCAVATION.

TABLE 1

Distribution and Frequency of References on Tunneling Technology Reported in this Bibliography

Year	Journal	Report	Book	Thesis	Total
1976	38	4	0	0	42
1975	64	13	0	0	77
1974	76	10	0	0	86
1973	46	16	1	0	63
1972	69	9	15	0	93
1971	27	5	2	0	34
1970	63	9	0	0	72
1969	19	3	0	0	22
1968	18	4	0	1	23
1967	11	1	0	0	12
1966	4	1	0	0	5
1965	16	1	0	0	17
1964	16	0	0	1	17
1963	4	0	0	0	4
1962	3	0	0	0	3
1961	4	0	0	0	4
1960	1	1	0	0	2
1959	3	0	1	0	4
1958	0	0	0	0	0
1957	2	0	0	0	2
1956	3	0	0	0	3
1955	2	0	0	0	2
1954	2	0	0	0	2
1953	1	0	0	0	1
1952	1	0	0	0	1
1951	2	0	0	0	2
1950	0	1	0	0	1
1949	0	0	0	0	0
1948	0	0	0	0	0
1947	0	0	0	0	0
<1947	1	5	0	0	6
Total	496	83	19	2	600

SECTION I

CROSS-INDEXED BIBLIOGRAPHIES

A. Bibliography

on

PERFORMING ORGANIZATIONS

A. BIBLIOGRAPHY ON PERFORMING ORGANIZATIONS

ALL UNION SCIENTIFIC RESEARCH AND PLANNING, TECHNOLOGICAL INSTITUTE
OF COAL,MINING MACHINE CONSTRUCTION (VNIIPTU GLEMASH),MOSCOW,USSR.
R001734

ALPINE EQUIPMENT CORP!USA.
R001909 R001922

AMAX INC!USA
R002965

AMERICAN GILSONITE CO.
R000794

AMERICAN PIPE AND CONSTRUCTION CO!CENTRILINE DIVISION OF
R002797

ANGLO-AMERICAN CORP.OF SOUTH AFRICA
R001262 R001263 R001890

ANGLO-ROUYN MINES LTD.
R001047

AOKI KENSETSU!JAPAN
R003148

ARGE HOCHTIEF AG/KUMZ AND CO.
R000409 R002835

ASTRUP AND AUBERT A/S,OSLO,NORWAY
R000456 R002403

ATKINSON,GUY.F.
R000258

ATLAS COPCO A.B!STOCKHOLM,SWEDEN
R000860 R003966

ATLAS COPCO MASCHINEN AG!SWITZERLAND
R001914

ATLAS,WILSON AND JANIN,CANADA
R000213

AZOTEA CONSTRUCTION
R000258

BARTIE,SHAW AND MORTON,CONSULTING ENGINEERS, GLASGOW,SCOTLAND,U.K.
R001777

BATTELLE MEMORIAL INSTITUTE,COLUMBUS,OH!USA.
R001527

BEATTY,BALFOUR AND CO.LTD!U.K.
R000831 R002817

BECHTEL ASSOCIATES,PROFESSIONAL CORP!WASHINGTON,D.C!USA.
R001900 R001917

BECHTEL INC!SO,BEALE ST!SAN FRANSISCO,CA!94119
R000571 R002908 R003148

BENDIX RESEARCH LABORATORIES,SOUTHFIELD,MI!USA.
R000328

BETON-UND MONIERBAU (DUSSLEDORF,W.GERMANY)
R003620

BINNIE AND PARTNERS,LONDON,U.K.
R000824

BLES,M.J. (,,U.S.A.)
R000256

BOVIS CIVIL ENGINEERING LTD!U.K.
R003122

BOYLES BROTHERS DRILLING CO!CO!USA.
R000232 R000233 R001297 R003524

BRAND,CHARLES AND SON LTD!LONDON,U.K.
R001036 R001530 R002088

BRITISH TUNNELING SOCIETY
R001775

BUDAPEST,TECHNICAL UNIVERSITY OF,HUNGARY
R000434

BUNKER HILL CO.
R001050

CALIFORNIA,UNIVERSITY OF,LOS ANGELES,CA!USA
R001086 R001975

CALIFORNIA,UNIVERSITY OF,SCHOOL OF ENGINEERING AND APPLIED
SCIENCE,LOS ANGELES,CA.
R001050 R002083

CALIFORNIA,UNIVERSITY OF,USA!HAGCONSULT AB, STOCKHOLM AND ROYAL
INSTITUTE OF TECHNOLOGY,STOCKHOLM,SWEDEN
R002798

CALIFORNIA INSTITUTE OF TECHNOLOGY,JET PROPULSION LABORATORY,
4800,OAK GROVE DRIVE,PASADENA,CA!91103,USA
R003146

CAMAY DRILLING CO.
R001050

CAMBRIDGE UNIVERSITY!ENGINEERING DEPT.
R001531

CAMPBELL LIMESTONE CO!SC!USA
R001718

CEMENTATION SPECIALIST HOLDING CO.LTD.
R000845

CEMENTATIONS PROJECTS LTD!U.K.
R001050 R002819

CEMENTATION (AFRICAN CONTRACTS PTY) LTD.
R003621

CHANNEL (ENGLISH) TUNNEL CO!CEPT.OF ENVIRONMENT,U.K.GOVT.
R003117

CHICAGO,CITY OF,METROPOLITAN SANITARY DISTRICT, CHICAGO,IL!USA.
R000851

CHRISTIANI AND NIELSEN A/S,COPENHAGEN,DENMARK
R000217

CHRISTIANI NIELSEN
R003670

CLIMAX MOLYBDENUM CO!CLIMAX,CO!USA.
R001688

CLYDE AND CO.
R000232 R001297 R003524

COALBROOK COLLIERIES,CLYDESDALE COLLIERIES LTD! TRANSVAL,AFRICA
R001046

CODELFA-COGEFAR (M.Z.)LTD!
1.CODELFA CONSTRUCTION DEL FARERO SP A,SUBSIDIARY OF
2.CONSTRUZIONI GENERALI FARSURA SP A,MILAN
R000829 R003660

CODELFA CONSTRUCTIONS PVT.LTD!AUSTRALIA
R000995

LOWARI TUNNEL ORGANIZATION,PAKISTAN
R002843

MAEDA CONSTRUCTION CO.;JAPAN
R003506

MAEDA KENSETSU,JAPAN
R003148

MAJES CONSORTIUM
1.AB SKANSKA CEMENTJUTERIET,SWEDEN

2.CONCORD CONSTRUCTION LTD;SOUTH AFRICA

3.ENTRECANALES Y TRAVERA SA,SPAIN

4.MACON

6.TARMAC CONSTRUCTION LTD;U.K.

7.THE FOUNDATION CO. OF CANADA LTD;CANADA

R002784 R002813

MANGLA DAM CONTRACTORS
1.ATKINSON,GUY F., COMPANY

2.CHICAGO BRIDGE AND IRON CO.,

3.GROVES,S.J.,AND SONS

4.HARNEY,CHARLES J., COMPANY

5.LANGENFELDER,C.J.,AND SON

6.OSTRANDER CONSTRUCTION COMPANY

7.TRIPPFER,R.A.,COMPANY

8.WALSH CONSTRUCTION COMPANY

R002631

MANNIX LTD;CALGARY,ALBERTA,CANADA
R002814 R003615

MARINE INDUSTRIES LTD;CANADA
R000223

MARPLES RIDGWAY LTD;LONDON,U.K.
R000438 R000445

MARTIN MARIETTA LAB;BALTIMORE,MD;USA
R001091

MARTI AG,BERN,SWITZERLAND
R002821

MASON,SILAS CO.
R000221

MASSACHUSETTS INSTITUTE OF TECHNOLOGY,MA;USA.
R000331 R000383 R001489

MATHEWS,A.A;INC.
R003378

MAUNSELL GEOTECHNICAL SERVICES.MELBOURNE,AUSTRALIA
R002852

MAVOR AND COULSON,LTD;SHEFFIELD,U.K.
R000236

MCALPINES,SIR ROBERTS SONS LTD.
R000495 R000826 R001868 R002826

MCNALLY AND SONS,HAMILTON
R000850 R001033

MEADOWBANK ROCK SALT MINE,U.K.
R001463 R001464

MEGIN,W.J;INC;NAUGATUCK,CT;USA
R003634

MELBOURNE AND METROPOLITAN BOARD OF WORKS
R000258 R001344

METROPOLITAN SAO PAULO CO.;SAO PAULO,BRAZIL
R003503

MILE HIGH DRILLING CO.,INC. (DENVER,CO,USA)
R003650

MILLER,FOSTER ASSOCIATES,INC;135 SECOND AVE;
WALTHAM,MA;02154
R001093 R001265 R001470 R001909 R002920

MILWAUKEE BOILER MANUFACTURING CO;MILWAUKEE,WI;USA
R001241

MINISTRY OF PUBLIC WORKS,DEPT.OF RAIL CONSTRUCTION,
MADRID,SPAIN
R000511

MISSOURI,UNIVERSITY OF,ROLLA,MO;USA
R000489 R001051 R001087 R001486 R001989
R003376

MITCHELL BROTHERS,SONS AND CO.LTD.
R000499

MITCHELL CONSTRUCTION KINNEAR MOODIE GROUP LTD;
PETERBOROUGH
R000493

MITTRY CONSTRUCTION CO;LOS ANGELES,CA;USA.
R000221 R000258 R003491 R003494 R003495

MOLESMITH TUNNELS,U.K.
R002816

MOLE CONSTRUCTION COMPANY,INC.;ROMULUS,MI,U.S.A.
R003515

MOODIE,KINNEAR AND CO.LTD;U.K.
R000970 R001980 R001983

MOODIE,KINNEAR (1973) LTD;U.K.
R002846

MORRISON-KNUDSON CO.OF CANADA LTD.
R000258 R002208 R002211

MORRISON-KNUDSEN COMPANY;BOISE,ID;U.S.A.
R003521

MOTT,HAY AND ANDERSON,CONSULTING ENGINEERS,LONDON,
U.K.
R000416 R000451

MOWLEM (SCOTLAND) LTD;U.K.
R002781

MOWLEM,JOHN AND CO.LTD.
R000412 R002838 R003121 R003666

MOWLEN,JOHN AND CO.LTD;SCOTLAND,U.K.
R001980

MT.ISA MINES,AUSTRALIA
R001314

MULLEN,S.S.INC;SEATTLE,WA,USA
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MURER,B;AG;ERSTFELD,SWITZERLAND
R001524

NATIONAL COAL BOARD,U.K.
R000408 R000409 R000796 R000797 R001517
R001993

NATIONAL RESEARCH INSTITUTE OF POLLUTION AND
RESOURCES,SAITAMA,
JAPAN

R000410

NATIONAL RESEARCH COUNCIL OF CANADA,OTTAWA,CANADA
R002049 R002050 R002073

NAVAL CIVIL ENGINEERING LAB;PORT HUENEME,CA;93043
R001484

NEWCASTLE-UPON-TYNE,UNIVERSITY OF
R000841

NEW JERSEY DRILLING CO.
R001475

NEW YORK CITY TRANSIT AUTHORITY
R000531

NICE,CITY OF AND FSIR,NICE,FRANCE
R002779

NISHIMATSU CONSTRUCTION CO:TOKYO,JAPAN
R000212

NISHIMATSU KENSETSU:JAPAN
R003148

NORAO MINES LTD.(GECO DIVISION),MANITOUWADGE,
ONTARIO,CANADA
R001891

NORCONSTRUCTION,NORWAY
R000829

NORTHERN CONSTRUCTION CO.(J.W.STEWART LTD.)
R000420 R001775

NORWEGIAN STATE RAILWAYS,GEOTECHNICAL DEPT:OSLO,
NORWAY
R001282 R001375

NORWEGIAN INSTITUTE OF TECHNOLOGY (N.H.T.)
R001458

NUTTALL,ATKINSON AND CO.
R000445 R001018

NUTTAL,EDMUND LTD:U.K.
R001389 R001979 R002022 R003646

NUTTAL,ED.LTD:LONDON,U.K.
R000218 R000624 R001167 R002216

OAHE CONSTRUCTORS
R000258 R003491 R003493

OAK RIDGE NATIONAL LABORATORY,USA.
R000241 R000377

OBERRANZMAYER-SORAVIA-ISOLA,LARCHBAUMER,AUSTRIA
R001266

OBERPRANZMEYER,R.CO:AUSTRIA
R001779

OCLSA (,,SPAIN)
R000258

ONTARIO SAND CO:ONTARIO,IL:USA
R000241

OSO CONSTRUCTORS
R000258

OY TIEFUNDAMENTTI AB:HELSINKI,FINLAND
R002934

OY YLEINEN INSINOORITOIMISTO,FINLAND
R001121 R001346

PARSONS,BRINCKERHOFF,QUADE AND DOUGLAS,ENGINEERS,
NEW YORK AND
SAN FRANCISCO:USA.

R000529 R001895

PEARSON BRIDGE (NSW) PRIVATE LTD:AUSTRALIA
R002785

PERMALL AND ASSOCIATES,MONTREAL,CANADA
R000248

PERINI CORP.
R000258 R001469 R001915

PERRY AND FAUST DRILLING CO.
R001050

PETERS,C.M.F:CONSULTANTS,SAN FRANSISCO,CA:USA.
R000527

PHYSICS INTERNATIONAL CO.
R000836 R001920

POIRIER AND MCLAINE CORP.
R000329

PORR-UNION-UNIVERSALE-HINTEREGGER-MOUYREDER KRAUS-
RELLA,AUSTRIA
R001266

PRADER-LOSINGER AND OTHERS
R001339

PRADER AG.
R000258 R003644

PRAIRIE CONSTRUCTORS
R003491

PRECISION BLASTING LTD:U.K.
R002933

RAISE CONTRACTING LTD:CANADA
R001892 R002579

RAND MINES LTD:S.AFRICA
R001476

RAPIDEX INC.
R001918

REES/HUGH LTD:U.K.
R001268

REGIE AUTONOME DES TRANSPORTS PARISIENS,FRANCE
R000442

REGIE AUTONOME DES TRANSPORT PARISIENS (R.A.T.P.),
PARIS,FRANCE
R001898 R002832

RHOKANA CORP.LTD.
R001341

RICHMOND CONSTRUCTORS:
1.CATAPANO,ANDREW CO.INC.

2.GROVE,MACLEAN AND CO.INC.

3.GROW TUNNELING CORP.

4.MORRISON-KNUDSEN CO.INC.

R001906

RIO DE JANEIRO TRAMWAY,LIGHT AND POWER CO., BRAZIL
R002409

RIVER LAR PROJECT-LAR(UPPER)DIVERSION WORKS
CONTRACT
1.HEITKAMP GMBH:WEST GERMANY

2.HUTA-HEGERFELD AG:WEST GERMANY

3.STOHR,KARL,KG:WEST GERMANY

R002799

RIVER LAR PROJECT-DAM AND ASSOCIATED WORKS CONTRACT
1.IMPREDILO SPA,ITALY

2.TESSA CO,IRAN

P002799

ROBBINS RAISE BORING CO:SEATTLE,WA:USA.
R001264 R001344

ROCK FALL CO.LTD:GLASGOW,U.K.
P000825

ROCK MECHANICS AND EXPLOSIVES RESEARCH CENTER
(UNIV. OF MISSOURI
AT ROLLA,MO:USA)

R000241 R000373 R001214

ROYAL ADRIAAN VOKER GROUP (ROTTERDAM,NETHERLANDS)
1.DREDGING AND CONSTRUCTION CO.LTD. (U.K.)

2.VISSER EN SMIT (NETHERLANDS)

R003619

SAFETY IN MINES RESEARCH ESTABLISHMENT,U.K.
R000380

SAPPERS,BRITISH ARMY,U.K.
R002795

SATO KOHGYO,JAPAN
R002848 R003148

SCHINDLER
R000258

SCHWENGER CONSTRUCTION CO:OTTAWA,CANADA
R001981

SCIENTIFIC ASSOCIATES INC:CA:USA.
R001213

SCOTT WILSON KIRKPATRICK AND PARTNERS,CONSULTING ENGINEERS.
LONDON,U.K.

R000415

SHAFT DRILLERS INC.
R000822 R001030 R001090

SHAFT SINKERS LTD:JOHANNESBURG,REPUBLIC OF S.AFRICA
R000252

SHANNON AND WILSON INC:SEATTLE,WA:USA.
R000526

SHEA-KAISER-MACCO,REDDING,CALIFORNIA
R003488

SHEA,J.F:CO.INC:CA:USA.
R000208 R001056

SHEFFIELD,UNIVERSITY OF,POST GRADUATE SCHOOL IN MINING,U.K.
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R000207 R000232 R001053 R001912

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R000251 R001132

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2.LOCKHEED

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R000258 R003491

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3.RAYMOND

4.WALSH

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ELEKTRIZITATSWERK D.STADT BERN,SWITZERLAND
R000409

EL PASO NATURAL GAS CO:EL PASO,TX:USA.
R000844 R001297 R001346

ENEL,ITALY
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R002817

EUGENE WATER AND ELECTRIC BOARD,EUGENE,OR:USA.
R000521

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R003117

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R000804

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R002780

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R000331 R001151 R001481 R001901 R001919
R001977

FEDERAL REPUBLIC OF W.GERMANY
R001270

FERROVIE DELLO STATO-SERVIZIO LAVORI E COSTRUZIONI,ROME,ITALY
ROME ITALY

R001142

FLOW RESEARCH INC:KENT,WA:98031,USA.
R001188

FLUIDONICS RESEARCH LAB:SALT LAKE CITY,UT:USA
R001465

GAS AND WATER DEPT:BASEL,SWITZERLAND
R001508 R002850

GEMEINDE FLAWIL,SWITZERLAND
R000409

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R001986

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R002784

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CHICAGO, IL. USA

R000256 R001244 R001511 R003507

GREATER VANCOUVER SEWERAGE AND DRAINAGE DISTRICT
R000420

GREATER VICTORIA WATER DIST:BRITISH COLUMBIA,CANADA
R000420

HANNA MINING CO.
R001050

HEBEGGER LTD:THUN,SWITZERLAND
R000249

HELSINKI METROPOLITAN AREA WATER CO.
R002934

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R003118

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R001050

HONG KONG GOVT.
R000827

HONG KONG CROSS-HARBOUR TUNNEL CO:LTD.
R000415

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R002845

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R001030

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R001516 R003499

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R001463 R001464

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ITALIAN NATIONAL RAILROAD ADMINISTRATION
R001904

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R002794

JAPAN RAILWAY CONSTRUCTION CORP:JAPAN
R003148

JARVA TUNNELING MACHINES AND CUTTERS,OH:USA.
R001240

JEFFREY MINING MACHINERY CO:USA.
R001265 R001470 R001923

JOINT VENTURE:
1.MID-NORTHAMPTONSHIRE WATER BOARD,U.K.

2.WELLAND AND NENE RIVER AUTHORITY

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KAISER STEEL CORP:USA.
R001500

KERR-MCGEE DRILLING CO.
R001050

KRAFTWERKE OBERHASLI,SWITZERLAND
R002850

KUPFERBERGBAU MITTERBERG,GMBH,AUSTRIA
R000409

LITANI RIVER AUTHORITY,LEBANON
R001775

LONDON TRANSPORT SYSTEM,LONDON,U.K.
R000218

LONDON TRANSPORT EXECUTIVE AND NATIONAL RESEARCH DEVELOPMENT
CORP:LONDON,U.K.

R002216

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R000252

MAGMA COPPER CORPORATION,SUPERIOR,AZ:USA.
R001048

MASSACHUSETTS TURNPIKE AUTHORITY
R001469

MELBOURNE UNDERGROUND RAIL LOOP AUTHORITY (MURLA),
MELBOURNE,
AUSTRALIA

R002840

MERSEY TUNNEL JOINT COMMITTEE,U.K.
R000416 R000451 R001119 R003505

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R003503

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R000425

MILWAUKEE SEWER COMMISSION,MILWAUKEE,WI:USA.
R000814

MILWAUKEE BOILER MANUFACTURING CO:MILWAUKEE,WI:USA.
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MT.ISA MINES,AUSTRALIA
R001314

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NATIONAL COAL BOARD,MINING RESEARCH ESTABLISHMENT, U.K.
BOARD, U.K.

R000797

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R000410

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R000828

NATIONAL RESEARCH AND DEVELOPMENT CORP.,U.K.
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R000242 R000296 R000297 R000298 R000300
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NATIONAL SCIENCE FOUNDATION AND U.S.BUREAU OF MINES
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NESTE OY PORVOO REFINERY,PORVOO,FINLAND
R001121

NEW ENGLAND ELECTRIC POWER CO.
R001899

NEW SOUTH WALES,DEPT.OF MAIN ROADS,AUSTRALIA
R002785

NEW YORK CITY TRANSIT AUTHORITY
R000531

NEW YORK CITY,BOARD OF WATER SUPPLY,NY:USA.
R003489

NEW YORK CITY,DEPT.OF WATER RESOURCES,NY:USA.
R001906

NEW YORK,CITY OF,NY:USA.
R001230

NEW ZEALAND GOVT:MINISTRY OF MINES
R002844

NICE,CITY OF,NICE,FRANCE
R002779

NORTHERN IRELAND ELECTRICITY SERVICE:N.IRELAND,U.K.
R003670

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NORWEGIAN STATE RAILWAYS,OSLO,NORWAY
R001375

OREGON STATE HIGHWAY DEPT:OR:USA.
R000521

U.S.AIR FORCE WEAPONS LAB:AIRFORCE SYSTEMS COMMAND
KIRTLAND AFB, NM., USA.

R000426

U.S.ARMY CORPS OF ENGINEERS
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U.S.ARMY COLD REGIONS RESEARCH AND ENGINEERING LAB.
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U.S.ARMY MOBILITY EQUIPMENT RESEARCH AND
DEVELOPMENT CENTER, FORT BELVOIR,VA:USA.

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U.S.BUREAU OF RECLAMATION
R000207 R000230 R000231 R000232 R000233
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U.S.GOVT:DEPT.OF DEFENSE
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U.S.GOVT:OFFICE OF NAVAL RESEARCH,EARTH SCIENCE
DIVISION
R001484

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ALPINE MONTAN AG., AUSTRIA

R001935 R001936

WARRINGTON,COUNTY BOROUGH OF,U.K.
R000499

WASHINGTON METRO,WASHINGTON,D.C:USA.
R000530

WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY (
WAMATA),
WASHINGTON,D.C:USA.

R001896 R001900 R002848

WESSEX WATER AUTHORITY,BRISTOL,U.K.
R003122

WESTERN NUCLEAR CORPORATION
R001050

WEST SUSSEX DRAINAGE DIVISION,SOUTHERN WATER
AUTHORITY,U.K.
R002846

WHITE PINE COPPER CO:WHITE PINE,MI:USA.
R001019 R001903

WILLIAMS,HUGHS B.MANUFACTURING CO.
R001514

WIRTH,ALFRED AND CO:KG:GERMANY
R001133

WOOKEY HOLE CAVES LTD:U.K.
R001532

YALE UNIVERSITY
R003634

YOKOHAMA,CITY OF
R003148

1.BARNET,LONDON BOROUGH OF,U.K.
2.HAMMERSON GROUP,U.K.

R002819

1.BUILDING RESEARCH ESTABLISHMENT,U.K.
2.NORTHUMBRIA WATER AUTHORITY,U.K.

3.WATER RESEARCH COUNCIL,U.K.

R002827

1.COLORADO SCHOOL OF MINES
2.FLOW RESEARCH INC.

3.NATIONAL SCIENCE FOUNDATION

4.ROBBINS COMPANY

5.U.S.BUREAU OF MINES

R001265 R003377

1.SERVICES TECHNIQUES DE LA VILLE DE MARSEILLE (
DIRECTION DE
L'URBANISME) FRANCE

2.GREATER LONDON COUNCIL

3.BRITISH GOVT.

R000412

1.SWISS FEDERAL RAILWAYS,SWITZERLAND
2.SWITZERLAND,GOVERNMENT OF.

3.ZURICH,MUNICIPALITY OF,ZURICH,SWITZERLAND

R003635

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R002852

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R002846

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ACCESS TUNNEL,UNDERGROUND POWER HOUSE,KEMANO SCHEME (KEMANO, BRITISH COLUMBIA,CANADA)
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ACCESS TUNNEL,DINORWIC PROJECT (SNOWDONIA,WALES,U.K.)
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ACCESS TUNNEL FOR SEELISBERG MOTORWAY TUNNEL (SEELISBERG) SWITZERLAND)
R002821

AIR SHAFT,NORTHERN TUNNEL,KIELDER WATER SCHEME (SHERBERRY, ENGLAND,U.K.)
R002783

ALBERG TUNNEL (EASTERN SECTION) (,,AUSTRIA)
R002786

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ALBERG TUNNEL (,,AUSTRIA)
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ALBONA SHAFT OF ALBERG TUNNEL (,,AUSTRIA)
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ALLEGHENY PORTAGE TUNNEL (,PA:USA)
R001227

ALTAMIRA TUNNEL (MADRID,,SPAIN)
R001077

ALVA B. ADAMS TUNNEL
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AMELIE POTASH MINE (,,N.FRANCE)
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AMERICAN GILSONITE MINE (,CO:USA)
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APPALACHIA PROJECT (,TN:USA)
R001227

ARLBERG TUNNEL (,,AUSTRIA)
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AUBURN (CANAL) TUNNEL (,PA:USA)
R001227

AWALI TUNNEL (,,LEBANON)
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AZOTEA TUNNEL (JUAN-CHAMA PROJECT) (,N.CEN.NM:USA)
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R003517

BALTIMORE AND OHIO RAILROAD TUNNEL (,MV:USA)
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BALTIMORE CHANNEL TUNNEL (CHESAPEAKE BAY,VA:USA)
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BARBARINE TUNNEL (GRAND EMOSSON HYDRO-ELECTRIC POWER STATION) (GRAND EMOSSON,,SWITZERLAND)
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BASEL UTILITY TUNNEL (BASEL,,SWITZERLAND)
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BAYTOWN TUNNEL (,TX:USA)
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BAY AREA RAPID TRANSIT PROJECT (BART) (SECTION UNSPECIFIED) (SAN FRANCISCO,CA:USA)
R000254 R000505 R000514 R000814 R001025
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BAY OF HAVANA TUNNEL (,,CUBA)
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BEAR SWAMP PROJECT (,NEW ENGLAND:USA)
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BEAUMONT ABBOTSCLIFF TUNNEL (ABBOTSCLIFF,KENT,U.K.)
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BEAUMONT ENGLISH CHANNEL TUNNEL (,KENT,U.K.)
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BERGEN TUNNEL (,NJ:USA)
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BERKLEY HILLS TUNNEL (SAN FRANCISCO,CA,USA)
R003516

BIG CREEK NO.3 TUNNEL (,CA:USA)
R001227

MOSS POINT DRAINAGE PROJECT (EUCERO,OH:USA)
R000855

MOUNTAIN DIVISION TUNNEL (,CA:USA)
R001227

MOUNT CENIS (FREJUS) TUNNEL (,,FRANCE-ITALY)
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MUNICH RAPID TRANSIT LINE (,,GERMANY)
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MURRAY 1 PRESSURE TUNNEL (SNOWY MTN. PROJECT) (,,AUSTRALIA)
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MURRUMBIDGEE-EUCUMBENE TUNNEL (SNOWY MTN. PROJECT) (,,AUSTRALIA)
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MUSCONETCONG TUNNEL (,NJ:USA)
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NAGATA-CHO II TUNNEL,EIDAN NO.8 LINE (TOKYO,,JAPAN)
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NAST TUNNEL (,CO:USA)
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NAVAHO INDIAN IRRIGATION PROJECT:TUNNEL NO.3 (,NM,USA)
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NAVAJO INDIAN IRRIGATION PROJECT,TUNNEL NO.3A (,NM:USA)
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NAVAJO INDIAN IRRIGATION PROJECT:TUNNEL NO.1 (NEW MEXICO,U.S.A)
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NAVAJO IRRIGATION PROJECT (,NM:USA)
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NEWHALL TUNNEL (,,USA)
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NEW CASCADE (,WA:USA)
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NEW CROSS TUNNEL (,,U.K.)
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NEW ELKHORN TUNNEL (,WV:USA)
R001227

NEW SANYO SUPER EXPRESS RAIL LINE TUNNEL (,,JAPAN)
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R003148

NIGADOO RIVER MINES
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NORAD UNDERGROUND COMPLEX (COLORADO SPRINGS,CO:USA)
R002054

NORANO MINE (,ONTARIO,CANADA)
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NORTHERN TUNNEL,KIELDER WATER SCHEME (,,U.K.)
R002783

NORTH BRANCH INTERCEPTING SEWER TUNNEL (NEW YORK CITY,NY:USA)
R001117 R001915

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R001168

NORWEGIAN RAILWAY TUNNELS (,,NORWAY)
R001375

NO.1 SOUTH FACE-STAIRHEAD SEAM,MONKTONHALL COLLIERY (,SCOTLAND,U.K.)
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NO.5 SHAFT,VAN DYK (,WITWATERSRAND,S.AFRICA)
R002078

OAHE DAM DIVERSION TUNNEL (,SD:USA)
R000245 R001489 R001513

OAHE DAM DOWNSTREAM OUTLET TUNNELS (,SD:USA)
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R003493

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R000221 R003491 R003494 R003495

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OAHE TUNNEL (UNSPECIFIED) (,SD:USA)
R000236 R000245 R000258 R003492

OAK PARK MINE (CADIZ,OH:USA)
R000814

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R001343 R003518 R003672 R003730

ORANGE FISH INLET TUNNEL (,,S.AFRICA)
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R001981

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OVERTON PARK TUNNEL (MEMPHIS,TN:USA)
R003149

OWENS RIVER TUNNEL (,CA:USA)
R001227

OWYHEE TUNNEL (,OR.-ID:USA)
R001227

PAIJANNE TUNNEL-SECTION 1 (ASIKKALANSELKA,,FINLAND)
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R000421

POST OFFICE COMMUNICATIONS TUNNELS (MANCHESTER,U.K.
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POWER TUNNEL,KEMANO SCHEME (KEMANO,BRITISH
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PYRAMID DAM,VALVE CHAMBER (TEHACHAPI MOUNTAINS,
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R003644

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R000227 R000745

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UNDERGROUND POWER HOUSE
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TRANSFORMER VAULT
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R000509

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CHAMBER (RACCOON
MTN:TN:USA)

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ACCESS TUNNEL
(RACCOON MTN., TN., USA)

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VENTILATION AND EMERGENCY
EXIT TUNNEL (RACCOON MTN:TN:USA)

R000509

RACCOON MOUNTAIN PUMPED STORAGE PROJECT,CABLE AND
VISITOR ACCESS
SHAFT (RACCOON MTN:TN:USA)

R000509

RACCOON MOUNTAIN PUMPED STORAGE PROJECT,INTAKE
SHAFT AND POWER
PLANT CONNECTING TUNNEL (RACCOON MTN:TN:USA)

R000509

RACCOON MOUNTAIN PUMPED STORAGE PROJECT,SURGE
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R000509

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TUNNEL (RACCOON
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REGIONAL EXPRESS TRANSPORT SYSTEM (R.E.R.),TUNNELS-
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RELIEF SEWER TUNNEL (WASHINGTON,D.C:USA)
R001941

RENDSBURG TUNNEL (,,W.GERMANY)
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RENFREW MOTORWAY SEWER (,,U.K.)
R002815

REPUBLIC STEEL CORP. (MINEVILLE,NY:USA)
R001050

RESERVOIR CONNECTION (FORT PECK,MT:USA)
R000866

REUNION UMLAZI TUNNEL (,,S.AFRICA)
R001130

RHEINPREUSSEN AND PATTBERG COAL MINES (RHEINLAND,
GERMANY)
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RHEIN TUNNEL (DUSSELDORF,,W.GERMANY)
R003148

RICHMOND WATER TUNNEL (NEW YORK,NY:USA)
R000969 R001941

RITSEM POWER STATION TUNNEL (RITSEM,,SWEDEN)
R001985

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RIVER LAR PROJECT:SPILLWAY INTAKE SHAFT (LAR RIVER
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R002799

RIVER LAR PROJECT:SPILLWAY TUNNEL (LAR RIVER
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SUPER HIGHWAY TWIN TUNNEL (,,VENEZUELA)
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SURGE CHAMBER,GRIMSEL II EAST PUMPED STORAGE POWER PROJECT
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R002850

SURGE SHAFT,DINORWIC PROJECT (SNOWDONIA,WALES,U.K.)
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SUSAKI TUNNEL,EIDAN NO.5 LINE (TOKYO,,JAPAN)
R003148

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R003519

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P000995

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R001990

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R001118

TAILRACE TUNNEL,UNDERGROUND POWER HOUSE,KEMANO SCHEME (KEMANO,
BRITISH COLUMBIA,CANADA)
R002211

TAILRACE TUNNELS,DINORWIC PROJECT (SNOWDONIA,WALES, U.K.)
R002781

TAILRACE TUNNEL,SNOQUALMIE FALLS U/G POWER HOUSE (, WA!USA)
R002646

TAKATSUKAYAMA TUNNEL (,KOBE,JAPAN)
R001234

TAMAGAWA TUNNEL (,,JAPAN)
R001383

TARBELA DAM TUNNELS (,,PAKISTAN)
R001897

TARBELA DAM PROJECT,POWER TUNNELS (,,PAKISTAN)
R002800

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R002800

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R003499

TAVERN TUNNEL (,,AUSTRIA)
R001266

TECHACHAPI TUNNEL NO.3 (,CA!USA)
R000527

TEES TUNNEL (ALSO CALLED KIELDER TUNNELS) (,,U.K.)
R002788 R002847 R002986

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R003148

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EXCAVATION COSTS

G. BIBLIOGRAPHY ON EXCAVATION COSTS

R000218 R000221 R000232 R000246 R000257
R000297 R000303 R000801 R000828 R000856
R001022 R001056 R001130 R001227 R001263
R001298 R001468 R001469 R001481 R001500
R001516 R001716 R001890 R001903 R001911
R001914 R001950 R001974 R002788 R002798
R002920 R003122 R003149

H. Bibliography

on

TUNNEL-UNDERGROUND OPENING SUPPORTS

H. BIBLIOGRAPHY ON TUNNEL-UNDERGROUND OPENING SUPPORTS

CONVENTIONAL

R000207 R000208 R000209 R000221 R000225
R000226 R000227 R000228 R000232 R000233
R000245 R000246 R000251 R000329 R000412
R000421 R000426 R000431 R000435 R000436
R000438 R000445 R000490 R000491 R000495
R000496 R000499 R000509 R000521 R000527
R000530 R000531 R000794 R000802 R000814
R000823 R000825 R000827 R000829 R000844
R000846 R000849 R000851 R000853 R000854
R000856 R000969 R000971 R000996 R001026
R001053 R001054 R001055 R001056 R001068
R001118 R001122 R001142 R001230 R001234
R001267 R001269 R001270 R001297 R001298
R001339 R001343 R001375 R001383 R001467
R001469 R001477 R001483 R001489 R001505
R001506 R001509 R001511 R001533 R001775
R001779 R001894 R001895 R001896 R001897
R001898 R001899 R001900 R001901 R001906
R001916 R001922 R001935 R001936 R001941
R001979 R001981 R001986 R001987 R002188
R002208 R002211 R002414 R002649 R002780
R002782 R002783 R002787 R002797 R002799
R002817 R002821 R002825 R002826 R002827
R002831 R002832 R002838 R002848 R002850
R002853 R002965 R002986 R002988 R003142
R003146 R003381 R003483 R003485 R003490
R003491 R003494 R003495 R003497 R003506
R003511 R003513 R003516 R003518 R003519
R003521 R003522 R003524 R003612 R003613
R003614 R003631 R003634 R003644 R003650
R003669 R003679 R003730

REINFORCED ROCK

R000221 R000232 R000233 R000246 R000247
R000251 R000436 R000442 R000496 R000499
R000521 R000527 R000794 R000844 R000850
R000853 R000856 R000859 R000969 R000971
R000996 R001053 R001054 R001118 R001122
R001142 R001230 R001266 R001267 R001270
R001297 R001298 R001339 R001348 R001375
R001434 R001455 R001467 R001477 R001489
R001505 R001506 R001509 R001532 R001776
R001779 R001888 R001889 R001894 R001897
R001898 R001899 R001900 R001905 R001922
R001935 R001936 R001941 R001974 R001981
R002414 R002781 R002782 R002783 R002814
R002820 R002821 R002827 R002832 R002835
R002836 R002838 R002842 R002847 R002850
R002853 R002913 R002965 R002986 R003485
R003486 R003491 R003508 R003517 R003522
R003523 R003524 R003613 R003620 R003679

UNSUPPORTED

R000232 R000233 R000426 R000833 R000969
R001297 R001298 R001343 R001468 R001489
R001910 R001935 R001936 R001957 R002831
R002853 R002934 R003520

I. Bibliography

on

MATERIALS HANDLING SYSTEMS

I. BIBLIOGRAPHY ON MATERIALS HANDLING SYSTEMS

BACKHOE,CONVEYOR BELT AND MUCK TRAIN
R001025 R003497 R003509

CACTUS GRAB
R000252 R000490 R000503 R000842 R001227

CHAIN BAR SCRAPPER CONVEYOR
R001984 R002784

CLAMSHELL BUCKET
R003518

COMBINATION OF CONVEYOR BELT,MINE CARS AND TRUCKS
R000207 R000215 R000226 R000412 R000431
R000802 R001297 R001298 R001389 R001935
R001936 R001941

COMBINATION OF PNEUMATIC AND HYDRAULIC PIPELINES
R002911 R003145

CONVEYOR AND SHUTTLE CARS
R003641

CONVEYOR BELT
R000412 R000491 R000499 R000814 R000849
R000850 R000851 R000854 R000856 R000859
R000995 R001030 R001046 R001068 R001071
R001073 R001074 R001075 R001076 R001077
R001078 R001240 R001339 R001345 R001348
R001477 R001511 R001774 R001775 R001914
R001917 R001922 R001935 R001936 R001941
R002188 R002477 R002831 R002834 R003484
R003489 R003491 R003494 R003495 R003503
R003505 R003506 R003517 R003670

CONVEYOR BELT AND HOIST BUCKETS
R000331

CONVEYOR BELT,MINE CARS AND SKIP HOIST
R000846 R001230 R003507 R003519

CONVEYOR BELT,MINE CAR AND HOIST CRANE
R000329

CONVEYOR BELT AND MUCKERS
R003487 R003499 R003511 R003513 R003518
R003519 R003524 R003645 R003648

HAND LASHING
R000252 R001227 R002078

HAND LASHING,MINE CARS AND TRUCKS
R001941

HEAD WINDING GEAR
R002825

HOIST BUCKET
R001047 R001468 R001524 R002632

HYDRAULIC SYSTEM (UNSPECIFIED)
R002834

LOADER-HAULER-DUMPER (LHD MACHINE)
R002853 R003650

LOADER AND TRUCKS
R001121 R001505 R002786 R002850 R002934

LOADER AND TRAINS
R000208 R000216 R000221 R001025 R002780
R002786 R002850 R003522

LOADER AND DUMPER
R002781 R002821 R003673

LOADER AND SKIP HOIST
R002782

LOADER,CONCEYOR BELT AND MINING CARS
R002534 R002783 R003501

LOADER,MINE CARS AND SKIP HOIST
R000211

LOADER,MINE CARS AND LOCOMOTIVES
R002850 R003488

MINE CARS AND TRUCKS
R000220 R000221 R000236 R000246 R000251
R000260 R000426 R000490 R000499 R000509
R000814 R000820 R000821 R000829 R000830
R000844 R000850 R000851 R000853 R001121
R001132 R001227 R001244 R001343 R001346
R001348 R001467 R001469 R001476 R001477
R001483 R001484 R001895 R001902 R001905
R001915 R001916 R001917 R001923 R001979
R001981 R002211 R002834

MUCKER AND SKIP HOIST
R000255 R001230 R003523

MUCKER,BUCKET CARS AND DUMP TRUCKS
R003612 R003615

ORANGE PEEL GRAPPLE AND CRANE
R000329

PIPELINES AND WATER
R000490 R000794 R000830 R001167 R001514
R002216 R003142

PIPELINES AND AIR
R000490 R000508 R000828 R000968 R001475
R001476 R001917 R003147

RAILWAY SKIPS
R002837

SELF PROPELLED SHUTTLE CARS
R003666

SKIP AND LOCOMOTIVE
R002834

SKIP HOIST AND MULTIPLE BUCKET TRANSPORTER
R002850

SKIP
R002414

SLURRY
R000994 R002910 R003145

TIPPER ON RAILS
R003672

TRAILING CONVEYORS AND TRAINS
R000232 R000233 R000249 R000251 R000436
R002783 R002832 R003486 R003488 R003508
R003520 R003521

TRUCK MOUNTED LOADERS
R000252 R000438 R000449 R000456 R000509
R000531 R000535 R001054 R001055 R001269
R001270 R001468 R001483 R001906 R001917
R001922 R001923 R001935 R002848

UNSPECIFIED
R000247 R000530 R000827 R000833 R000971
R000996 R001022 R001056 R001142 R001532
R001912 R002850 R002986 R003485

J. Bibliography

on

ROCK TYPES

J. BIBLIOGRAPHY ON ROCK TYPES

AGGLOMERATE
R000232

ALBITE
R000300 R000301

ALLUVIUM
R000300 R000301 R000304 R000442 R001910
R002844 R003506

AMPHIBOLITE
R001468 R001505

ANDESITE
R000247 R000249 R000370 R000374 R000410
R000506 R001056 R001227 R001481 R002477

ANHYDRITE (ROCK)
R000241 R001936

ANORTHITE
R000300

ANORTHOSITE
R002060

ARGILLITE
R000220 R000236 R000505 R000969 R001481

BASALT
R000241 R000242 R000247 R000298 R000300
R000301 R000328 R000370 R000426 R000489
R000521 R000822 R000865 R001049 R001118
R001473 R001481 R001910 R001949 R002060
R002064 R002069 R002840

BENTONITE (ROCK)
R001481

BOJITE
R000438

BRECCIA
R000821 R001481 R001779

BROWN STONE
R000241

CHALK (MINERAL)
R000831 R000[illegible] R001934 R001987

CHALK (ROCK)
R000221 R000254 R000408 R000409 R000490
R001339 R001774 R001921 R002789 R002826
R002831 R002837 R002842 R002846 R002851

CHERT (MINERAL)
R001481

CHERT (ROCK)
R000241 R001227 R001434

CLASTICS
R001915

CLAYSHALE
R000221 R000841

CLAYSTONE
R000369 R000799 R001054 R001389 R001458
R001483 R001489 R001935 R002822

CLAY
R000254 R000511 R001119 R001481 R003524
R003618

COAL
R000210 R000227 R000241 R000245 R000378
R000379 R000490 R000804 R001030 R001046
R001483 R001509 R001527 R001889 R001935
R001936 R001950 R002783 R002834 R003145

CONGLOMERATE
R000232 R000241 R000258 R000409 R000506

(CONTINUED)

R000817 R000829 R000969 R001108 R001130
R001234 R001235 R001297 R001298 R001339
R001481 R001483 R001904 R001914 R001935
R002799 R002813 R003487 R003517

COPPER ORE
R000222

CORUNDUM
R000301

DACITE
R003520

DIABASE
R000490 R001130 R001135 R001977 R002666

DIOPSIDE
R000301

DIORITE
R000246 R000370 R000371 R000527 R000969
R001056 R001227 R001304 R002211 R002799

DOLERITE
R001130 R001227 R003730

DOLOMITE (ROCK)
R000241 R000303 R000376 R000421 R000490
R000832 R000969 R001108 R001142 R001392
R001439 R001481 R002060 R002066 R003376

FAULT GOUGE
R000527

FELDSPAR
R000300 R000301

FROZEN SOIL
R000503

FULGURITES
R002814

GABBRO
R000370 R000371 R000376 R000438 R000842
R001108 R001213 R001439 R002060

GILSONITE
R000794

GLASS (ROCK)
R002063

GNEISS
R000236 R000331 R000490 R000507 R000527
R000531 R000534 R000969 R001050 R001056
R001118 R001151 R001227 R001230 R001298
R001375 R001458 R001468 R001481 R001489
R001505 R001716 R001776 R001900 R001919
R002060 R002414 R002780 R002829 R002934
R003672

GRAHAMITE
R000510

GRANITE
R000208 R000216 R000222 R000236 R000241
R000242 R000246 R000259 R000260 R000298
R000300 R000301 R000303 R000328 R000329
R000331 R000368 R000369 R000370 R000371
R000372 R000374 R000375 R000376 R000377
R000379 R000380 R000382 R000383 R000410
R000421 R000490 R000514 R000527 R000535
R000842 R000856 R000865 R000975 R000996
R001049 R001054 R001056 R001058 R001091
R001108 R001118 R001121 R001130 R001151
R001168 R001214 R001227 R001298 R001304
R001339 R001383 R001439 R001458 R001465
R001468 R001475 R001481 R001484 R001486
R001489 R001508 R001514 R001524 R001720
R001734 R001905 R001908 R001916 R001919
R001921 R001942 R001949 R001977 R001988
R001989 R001991 R002049 R002054 R002060

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POTASH
R001030 R001923 R002782

QUARTZITE
R000230 R000328 R000421 R000449 R000490
R000506 R000817 R000847 R000865 R000969
R001058 R001135 R001227 R001458 R001468
R001473 R001481 R001495 R001500 R001890
R001977 R002060 R002064 R002069 R002078

QUARTZ
R000300 R000301 R002077 R003524

RHYODACITE
R000232 R000233 R000821 R000969 R001058
R001297 R001481 R003508 R003521

RHYOLITE
R000232 R000233 R000300 R000371 R000506
R000821 R000862 R000969 R001227 R001297
R001481 R001486 R001513 R002852 R002965
R003508 R003520 R003521

ROCKSALT
R001463 R001464

ROCK (UNSPECIFIED)
R000247 R000508 R000514 R002646 R003145
R003618

SALT
R000490 R003626

SANDSTONE
R000208 R000211 R000222 R000227 R000232
R000233 R000236 R000241 R000245 R000247
R000254 R000258 R000300 R000301 R000303
R000328 R000331 R000369 R000370 R000372
R000373 R000375 R000376 R000377 R000380
R000409 R000416 R000426 R000431 R000442
R000445 R000489 R000490 R000491 R000505
R000506 R000529 R000796 R000799 R000802
R000804 R000817 R000822 R000826 R000829
R000845 R000860 R000865 R000866 R000966
R000969 R001018 R001030 R001050 R001058
R001068 R001071 R001077 R001086 R001108
R001119 R001130 R001151 R001213 R001227
R001234 R001235 R001269 R001297 R001298
R001304 R001339 R001345 R001348 R001439
R001458 R001477 R001481 R001483 R001489
R001505 R001509 R001513 R001514 R001517
R001903 R001914 R001917 R001922 R001935
R001936 R001950 R001986 R002049 R002050
R002060 R002064 R002066 R002083 R002782
R002783 R002799 R002813 R002827 R002829
R002834 R002835 R002847 R002910 R003142
R003376 R003486 R003488 R003497 R003499
R003505 R003509 R003517 R003518 R003522
R003523 R003524 R003613 R003645

SAND
R000241 R000254 R000511 R003501 R003645

SCHIST
R000236 R000241 R000258 R000331 R000420
R000490 R000496 R000507 R000527 R000531
R000969 R000996 R001056 R001071 R001117
R001122 R001227 R001230 R001481 R001489
R001506 R001513 R001897 R001915 R001941
R001985 R002056 R002814 R002933 R003379
R003489 R003512

SERPENTINE
R000241 R000505 R001481 R001942

SERPENTINITE
R000529

SHALE
R000207 R000214 R000221 R000222 R000227
R000230 R000232 R000233 R000236 R000241
R000245 R000249 R000251 R000258 R000259
R000300 R000303 R000304 R000420 R000421
R000490 R000506 R000528 R000799 R000802
R000804 R000814 R000827 R000847 R000850
R000855 R000866 R000966 R000975 R001056
R001077 R001132 R001135 R001227 R001235
R001297 R001298 R001339 R001385 R001467
R001477 R001481 R001483 R001489 R001509

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R001513 R001514 R001889 R001903 R001922
R001942 R001950 R001981 R002782 R002799
R002813 R002829 R003376 R003486 R003491
R003493 R003494 R003495 R003504 R003522
R003523 R003524

SILEXITE
R000862

SILICA (AMORPHOUS)
R000301

SILTSTONE
R000232 R000247 R000260 R000506 R000817
R001130 R001297 R001298 R001348 R001477
R001481 R002834 R002840 R003517 R003523
R003524

SILT
R000254

SLATE
R000369 R000490 R001058 R001227 R001434
R001455 R001458 R001505 R001941 R001949
R002781 R002820 R002825 R002836 R002838
R003639

SYENITE
R002799

TACONITE
R000800 R001339 R001484 R002060 R002064

TACTITE
R000844

TERRACE DEPOSIT
R001056

TILLITE
R000209 R001130

TILL
R000245 R000254 R001230 R002988 R003623

TRAP
R001481 R001720 R002060

TRAVERTINE (ROCK)
R001921

TUFA (ROCK)
R000969 R001227

TUFF
R000222 R000236 R000241 R000247 R000249
R000296 R000297 R000298 R000300 R000302
R000303 R000304 R000305 R000371 R000821
R000823 R000861 R000973 R001234 R001481
R001778 R001935 R002060 R003520 R003521

VOLCANICS
R000247 R000814 R000969 R001056 R001297
R002477 R002852

SECTION II

DOCUMENT ABSTRACTS

II. DOCUMENT ABSTRACTS

R000207 MOLE INVADES NEW MEXICO.
AUTHOR ANON.
WESTERN CONSTRUCTION
40 (2), 50-4, 1965.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
1.BOYLES BROTHERS DRILLING CO.
2.DUGAN GRAHAM CO.INC:SALT LAKE CITY,UT:USA.

FUNDING ORGANIZATION(S)
U.S.BUREAU OF RECLAMATION

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE ON GOING EXCAVATION OF THE AZOTEA TUNNEL (JUAN-CHAMA PROJECT) (N.CEN.NM., USA) . THE PROJECT INVESTIGATED IS UTILIZED FOR COMBINATION (IRRIGATION-WATER SUPPLY) TUNNEL PURPOSES. THE TBM METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY AND DRAG) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON UNDERGROUND OPENING SUPPORTS AND MATERIALS HANDLING SYSTEM IS ALSO PRESENTED. THE EXCAVATION CHARACTERISTICS FOR MANCOS FORMATION ARE TREATED. ROCK TYPES REVIEWED INCLUDE SHALE .

R000208 SLUSHER TRAIN ADAPTS TO GROUND.
RUSSELL, J. K.
WESTERN CONSTRUCTION
40 (3), 88-92, 1965.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
SHEA,J.F:CO.INC:CA:USA.

FUNDING ORGANIZATION(S)
CALIFORNIA, STATE OF,DEPT. OF WATER RESOURCES,CA:USA.

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE COMPLETED EXCAVATION OF THE WILKET CREEK TUNNEL (STORM DRAINAGE) (TORONTO, CON.) . THE PROJECT INVESTIGATED IS UTILIZED FOR EXPLORATORY TUNNEL PURPOSES. THE DRILL AND BLAST (FULL FACE) METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES CONVENTIONAL EXPLOSIVE (UNSPECIFIED) . EXCAVATION ADVANCEMENT RATE IS ALSO DISCUSSED. GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON GROUND CONDITIONS AND UNDERGROUND OPENING SUPPORTS AND MATERIALS HANDLING SYSTEM IS ALSO PRESENTED. ROCK TYPES REVIEWED INCLUDE GRANITE, OCHER AND SANDSTONE .

R000209 TUNNELLING IN SOFT GROUND.
NOSKIEWICZ, T. M. RAMSAY, J. A.
CONSULTING ENGR. (LONDON)
30 (3), 34-6, 39, 1966)
LANGUAGE: ENGLISH

THIS IN-SITU REPORT CONTAINS REVIEW DATA. THE UNDERGROUND OPENINGS DISCUSSED INCLUDE THE COMPLETED EXCAVATION OF THE DARTFORD VEHICULAR TUNNEL (DARTFORD, ENGLAND, U.K.), THE COMPLETED EXCAVATION OF THE KENSINGTON TUBE, LONDON UNDERGROUND (LONDON, ENGLAND, U.K.), THE COMPLETED EXCAVATION OF THE LT.WILLIAM F.CALLAHAN JR. TUNNEL (BOSTON, MA., USA), THE COMPLETED EXCAVATION OF THE POTTERS BAR RAILWAY TUNNELS (U.K.), THE COMPLETED EXCAVATION OF THE THAMES-LEE WATER MAIN TUNNEL (LONDON, ENGLAND, U.K.), THE COMPLETED EXCAVATION OF THE TORONTO SUBWAY TUNNELS (TORONTO, ONTARIO, CANADA) AND THE COMPLETED EXCAVATION OF THE VICTORIA LINE TUNNEL (LONDON, ENGLAND, U.K.) . THE PROJECTS INVESTIGATED ARE UTILIZED FOR EXPLORATORY TUNNEL, METRO, RAILWAY, VEHICULAR TUNNEL (UNSPECIFIED) AND WATER SUPPLY TUNNEL PURPOSES. THE SHIELD METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED

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FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. TBM EXCAVATION AND EXCAVATION ADVANCEMENT RATES ARE ALSO DISCUSSED. GEOSTRUCTURAL AND SOIL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON GROUND CONDITIONS AND UNDERGROUND OPENING SUPPORTS IS ALSO PRESENTED. ROCK TYPES REVIEWED INCLUDE TILLITE .

R000210 TECHNIQUES FOR TUNNELING.
BRAUN, M. M.
CONSULTING ENGR. (LONDON)
35 (3), 59, 61, 65, 69, 73, 1971.
LANGUAGE: ENGLISH

THIS IN-SITU REPORT CONTAINS REVIEW DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE ABANDONED EXCAVATION OF THE ENGLISH CHANNEL TUNNEL (U.K.) . THE PROJECT INVESTIGATED IS UTILIZED FOR EXPERIMENTAL EXCAVATION AND MINE PURPOSES. THE TBM METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. ROCK TYPES REVIEWED INCLUDE COAL .

R000211 HYDRAULIC FOREPOLING SHIELD DRIVES CAVED-IN TUNNEL DRIFT.
MONAGHAN, J. O.
CONSTRUCTION METHODS EQUIPMENT
46 (6), 96-101, 1964.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
1.HUZLEY CONSTRUCTION (WINSTON BROS.CO.)
2.MINNESOTA FOLEY BROS:ST.PAUL,MN:USA.

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE PROJECT INVESTIGATED IS UTILIZED FOR SEWER PURPOSES. THE SHIELD METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. EXCAVATION ADVANCEMENT RATE IS ALSO DISCUSSED. SOIL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON MATERIALS HANDLING SYSTEM IS ALSO PRESENTED. ROCK TYPES REVIEWED INCLUDE SANDSTONE .

R000212 U. S.-MADE MACHINE SPEEDS TOKYO TUNNEL.
AUTHOR ANON.
CONSTRUCTION METHODS EQUIPMENT
47 (5), 82-4, 1965.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
NISHIMATSU CONSTRUCTION CO:TOKYO,JAPAN

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE COMPLETED EXCAVATION OF THE TOKYO SEWER TUNNEL (TOKYO, JAPAN) . THE PROJECT INVESTIGATED IS UTILIZED FOR SEWER PURPOSES. THE SHIELD METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. SOIL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED.

R000213 BLAST OPENS WAY FOR FLOATING TUNNEL UNITS.
AUTHOR ANON.
CONSTRUCTION METHODS EQUIPMENT
47 (7), 94-8, 1965.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
ATLAS,WILSON AND JANIN,CANADA

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE COMPLETED EXCAVATION OF THE LAFONTAINE BRIDGE TUNNEL (ALSO CALLED LOUIS-HIPPOLYTE OR BOUCHERVILLE TUNNEL) (MONTREAL, QUEBEC, CON.) BOUCHERVILLE TUNNEL) (MONTREAL, QUEBEC, CANADA) . THE PROJECT INVESTIGATED

(CONTINUED)

IS UTILIZED FOR HIGHWAY PURPOSES. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES CONVENTIONAL EXPLOSIVE (DF PRIMER AND GEOGEL) .

R000214 LOADER BUCKET BOOM SPEEDS INSTALLATION OF TUNNEL FANLINE.
AUTHOR ANON.
CONSTRUCTION METHODS EQUIPMENT
47 (8), 106-9, 1965.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
1.KIEWIT-DESCHAMPS,CANADA

FUNDING ORGANIZATION(S)
MONTREAL TRANSPORTATION COMMISSION AND CITY OF MONTREAL

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE COMPLETED EXCAVATION OF THE MONTREAL METRO (CANADA) . THE PROJECT INVESTIGATED IS UTILIZED FOR METRO PURPOSES. THE DRILL AND BLAST (FULL FACE) METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES CONVENTIONAL EXPLOSIVE (UNSPECIFIED) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE SHALE .

R000215 A NEW WAY TO DRIVE TUNNELS.
AUTHOR ANON.
WEST. CONSTR.
43 (5), 53-6, 1968.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
DELAWARE V.M.CORP.

FUNDING ORGANIZATION(S)
S.CALIFORNIA,METROPOLITAN WATER DIST.OF,CA!USA.

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE ON GOING EXCAVATION OF THE SAUGUS TUNNEL (OF METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA (CA., USA) . THE PROJECT INVESTIGATED IS UTILIZED FOR WATER SUPPLY TUNNEL PURPOSES. THE SHIELD METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. EXCAVATION ADVANCEMENT RATE IS ALSO DISCUSSED. SOIL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON MATERIALS HANDLING SYSTEM IS ALSO PRESENTED.

R000216 WATER SPRAY SPEEDS ALPINE TUNNEL JOB.
AUTHOR ANON.
ENG. NEWS-RECORD
175 (21), 111-2, 117, 1965.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
STRASSEN AND TIEFBAU UNTERNEHMUNG AG.AND BAUGESELLSCHAFT H.RELLA
AND CO!EUROPE

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE COMPLETED EXCAVATION OF THE FELBERTAUERN TUNNEL (AUSTRIA) . THE PROJECT INVESTIGATED IS UTILIZED FOR PIPLINE (UNSPEC) PURPOSES. THE DRILL AND BLAST (FULL FACE) METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES CONVENTIONAL EXPLOSIVE (UNSPECIFIED) . EXCAVATION ADVANCEMENT RATE IS ALSO DISCUSSED. PERTINENT INFORMATION ON MATERIALS HANDLING SYSTEM IS ALSO PRESENTED. ROCK TYPES REVIEWED INCLUDE GRANITE .

R000217 DANISH SPECIALITY-PREFABRICATED TUNNELS.
AUTHOR ANON.
ENG. NEWS-RECORD
180 (13), 30-2, 1968.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
CHRISTIANI AND NIELSEN A/S,COPENNAGEN,DENMARK

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE ON GOING EXCAVATION OF THE SCHELDE TUNNEL (ALSO CALLED SCHELDE E3 OR J.F.K.TUNNEL) (ANTWERP, , BELGIUM) . THE PROJECT INVESTIGATED IS UTILIZED FOR MIXED TRAFFIC TUNNEL (RAILWAY-HIGHWAY-BICYCLE) PURPOSES. THE TRENCH METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. SOIL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED.

R000218 SLURRY HOLE TRIED ON SUBWAY TUNNEL.
AUTHOR ANON.
ENG. NEWS RECORD
189 (12), 60-1, 1972.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
NUTTAL,ED.LTD!LONDON,U.K.

FUNDING ORGANIZATION(S)
LONDON TRANSPORT SYSTEM,LONDON,U.K.

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE PROJECT INVESTIGATED IS UTILIZED FOR METRO PURPOSES. THE SHIELD METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. EXCAVATION ADVANCEMENT RATE IS ALSO DISCUSSED. INFORMATION PERTINENT TO EXCAVATION COST IS GIVEN.

R000219 GERMAN TUNNELING MACHINE RELIEVES TRAFFIC CONGESTION.
AUTHOR ANON.
CANADIAN MINING J.
85 (11), 76-7, 1964.
LANGUAGE: ENGLISH

THIS IN-SITU REPORT CONTAINS REVIEW DATA. THE PROJECT INVESTIGATED IS UTILIZED FOR EXPERIMENTAL EXCAVATION PURPOSES. EXCAVATION ADVANCEMENT RATE IS ALSO DISCUSSED.

R000220 GRANDUC'S TUNNELLING RECORD 518 FT. IN 6 DAYS.
MAMEN, C.
CANADIAN MINING J.
89 (6), 46-8, 1968.
LANGUAGE: ENGLISH

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE ON GOING EXCAVATION OF THE GRANDUC TUNNEL . THE DRILL AND BLAST (FULL FACE) METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES CONVENTIONAL EXPLOSIVE (CILGEL) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. EXCAVATION ADVANCEMENT RATE IS ALSO DISCUSSED. PERTIMENT INFORMATION ON MATERIALS HANDLING SYSTEM IS ALSO PRESENTED. PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE ARGILLITE .

R000221 MACHINE TUNNELING ON MISSOURI RIVER DAMS.
UNDERWOOD, L. B.
J. CONSTRUCTION DIVISION, (PROC. AMER. SOC. CIVIL ENGINEERS)
91 (CO1), 1-27, 1965.
(PAPER NO. 4314)
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
1.MASON AND WALSH CO.
2.U.S.GOVT.
1.HEALY,S.AICO,
2.MONTREAL SERVICE CORP.
MASON,SILAS CO.
1.DONOVAN
2.FOLEY BROS.
3.LYTLE
4.MISSOURI VALLEY CONSTRUCTORS
5.OAHE CONSTRUCTORS
6.WINSTON BROS.
1.CONDON-CUNNINGHAM INC.
2.F AND S CONTRACTING CO.
3.JOHNSON,AL
4.KIEWIT,PETER
5.MORRISON-KNUDSEN,INC.
1.AMERICAN PIPE

(CONTINUED)

2.FOLEY BROS.
3.GREEN
4.JOHNSON-DRAKE-PIPER INC.
5.PRAIRE CONSTRUCTORS
6.WINSTON BROS.
WITTRY CONSTRUCTION CO:LOS ANGELES,CA:USA.

FUNDING ORGANIZATION(S)
U.S.ARMY CORPS OF ENGINEERS

THIS IN-SITU REPORT CONTAINS REVIEW DATA. THE UNDERGROUND OPENINGS DISCUSSED INCLUDE THE COMPLETED EXCAVATION OF THE FORT PECK DAM TUNNEL NO.1 (MT., USA), THE COMPLETED EXCAVATION OF THE FORT PECK DAM TUNNEL NO.2 (MT., USA), THE COMPLETED EXCAVATION OF THE FORT PECK DAM TUNNELS (MT., USA), FORT RANDALL DAM TUNNELS NO. 1-8 (SD., USA), FORT RANDALL DAM TUNNELS NO. 9, 11, 12 (SD., USA), FORT RANDALL DAM TUNNEL NO. 10 (SD., USA), THE COMPLETED EXCAVATION OF THE GARRISON DAM TUNNELS NO. 1-5 (ND., USA), THE COMPLETED EXCAVATION OF THE GARRISON DAM TUNNELS NO. 7-8 (ND., USA), THE COMPLETED EXCAVATION OF THE GARRISON DAM TUNNEL NO. 6 (ND., USA), OAHE DAM DOWNSTREAM OUTLET TUNNELS (SD., USA), OAHE DAM DOWNSTREAM POWER TUNNELS (SD., USA), OAHE DAM UPSTREAM OUTLET TUNNELS (SD., USA) AND OAHE DAM UPSTREAM POWER TUNNELS (SD., USA) . THE PROJECTS INVESTIGATED ARE UTILIZED FOR FLOOD CONTROL, HYDROELECTRIC AND REGULATORY TUNNEL (DAM) PURPOSES. THE DRILL AND BLAST (FULL FACE) METHOD, HEADING AND BENCH-PILOT BORE CENTER METHOD, PERIPHERAL SAW AND DRILL-BLAST METHOD AND TBM METHOD REPRESENT THE EXCAVATION TECHNIQUES STUDIED. THE REPORTED FRAGMENTATION METHODS SERVICING PROJECT EFFORTS INCLUDE CONVENTIONAL EXPLOSIVE (UNSPECIFIED), MECHANICAL ABRASION (ROTARY) AND MECHANICAL ABRASION (EXPLOSIVE-ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. TBM EXCAVATION AND EXCAVATION ADVANCEMENT RATES ARE ALSO DISCUSSED. INFORMATION PERTINENT TO EXCAVATION COST IS GIVEN. GEOSTRUCTURAL AND SOIL CHARACTERISTICS AS WELL AS SOIL MECHANICAL PROPERTIES FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON GROUND CONDITIONS AND UNDERGROUND OPENING SUPPORTS AND MATERIALS HANDLING SYSTEM IS ALSO PRESENTED. THE EXCAVATION CHARACTERISTICS FOR BEARPAW SHALE, FORT UNION FORMATION, NIOBRARA CHALK (LIMESTONE OR SHALE) FORMATION AND PIERRE SHALE ARE TREATED. PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE CHALK (ROCK), CLAYSHALE, LIGNITE AND SHALE . THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES (LAB) DATA.

R000222 WHAT'S AHEAD FOR TUNNELING MACHINES.
HILL, G.
J. CONSTRUCTION DIVISION (PROC. AMER. SOC. CIVIL ENGINEERS)
94 (C02), 211-31, 1968.
(PAPER NO. 6178)
LANGUAGE: ENGLISH

THIS IN-SITU REPORT CONTAINS REVIEW DATA. THE UNDERGROUND OPENINGS DISCUSSED INCLUDE THE COMPLETED EXCAVATION OF THE HOMER-WAUSECA IRON MINE (MI.), THE COMPLETED EXCAVATION OF THE ST.LOUIS METRO SEWER DISTRICT (ST.LOUIS, MO., USA), THE COMPLETED EXCAVATION OF THE TUNNEL NO.1, NAVAJO INDIAN IRRIGATION PROJECT (NM., USA) AND THE COMPLETED EXCAVATION OF THE WEBSTER STREET TUNNEL (CA., USA.) (OAKLAND, CA., USA) . THE PROJECTS INVESTIGATED ARE UTILIZED FOR MINE, SEWER AND UNSPECIFIED PURPOSES. THE TBM METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE COPPER ORE, GRANITE, IRON ORE, LIMESTONE, MUDSTONE, SANDSTONE, SHALE AND TUFF . THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES (LAB) DATA.

R000223 WORLD'S LARGEST PRESTRESSED TUNNEL.
GAPLAN, B.
ENGINEERING CONTRACT RECORD
77 (13), 65-6, 1964.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
MARINE INDUSTRIES LTD:CANADA

(CONTINUED)

1.ATLAS-WINSTON-JANIN,JOINT VENTURE OF
2.DESOURDY AND DUFRENSE,JOINT VENTURE OF
3.MCNAMARA CONSTRUCTION
4.SIMARD AND FRERES

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE ON GOING EXCAVATION OF THE LAFONTAINE BRIDGE TUNNEL (ALSO CALLED LOUIS-HIPPOLYTE OR BOUCHERVILLE TUNNEL) (MONTREAL, QUEBEC, CDN.) BOUCHERVILLE TUNNEL) (MONTREAL, QUEBEC, CANADA) , THE PROJECT INVESTIGATED IS UTILIZED FOR HIGHWAY PURPOSES. THE CUT AND COVER METHOD AND TRENCH METHOD REPRESENT THE EXCAVATION TECHNIQUES STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (UNSPECIFIED) . GEOSTRUCTURAL AND SOIL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED.

R000224 THE SEERTHRUST SYSTEM-PIPE FORCING SYSTEM SIMPLIFIES BUILDING PEDESTRIAN TUNNELS.
STEWART, J.
AUSTRALAS. ENGR.
43-4, 1966.
LANGUAGE: ENGLISH

THIS IN-SITU-THEOPETICAL REPORT CONTAINS ORIGINAL DATA. THE PROJECT INVESTIGATED IS UTILIZED FOR PEDESTRIAN TUNNEL PURPOSES. THE SHIELD METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (PERCUSSION) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS.

R000225 FLOW SLIDES PROVE HAZARDOUS IN COLOMBIA TUNNELS.
LI, C. Y.
CIVIL ENGR. (N.Y.)
34 (12), 51-3, 1964.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
GANNETT FLEMING CORDORY AND CARPENTER,INC:
HARRISBURG,PA:USA.

FUNDING ORGANIZATION(S)
TENCHE TUNNEL AND MIRAFLORES DAM,COLOMBIA,S.AMERICA

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENINGS DISCUSSED INCLUDE THE COMPLETED EXCAVATION OF THE MIRAFLORES DAM DIVERSION TUNNEL (COLUMBIA) AND THE COMPLETED EXCAVATION OF THE TENCHE TUNNEL (MEDELLIN, COLUMBIA) . THE PROJECTS INVESTIGATED ARE UTILIZED FOR MINE AND UNDERGROUND POWER STATION PURPOSES, GEOSTRUCTURAL AND SOIL CHARACTERISTICS AS WELL AS SOIL MECHANICAL PROPERTIES FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON GROUND CONDITIONS AND UNDERGROUND OPENING SUPPORTS IS ALSO PRESENTED.

R000226 SOFT-GROUND TUNNELS FOR BART.
THON, J. G. AMOS, M. J.
CIVIL ENG., (N. Y.)
38 (6), 52-5, 1968.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
1.BROWN AND ROOT INC.
2.MORRISON-KNUDSEN CO:INC.
3.PERINI CORP.

FUNDING ORGANIZATION(S)
SAN FRANCISCO BAY AREA RAPID TRANSIT,CA:USA.

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENINGS DISCUSSED INCLUDE THE ON GOING EXCAVATION OF THE TWIN TUNNEL BETWEEN 16TH STREET AND CIVIC CENTER STATIONS (BART PROJECT) (SAN FRANCISCO, CA, USA) AND THE ON GOING EXCAVATION OF THE VENT SHAFT FOR 16TH STREET AND CIVIC CENTER STATIONS TUNNEL (BART PROJECT) (SAN FRANCISCO, CA, USA) . THE PROJECTS INVESTIGATED ARE UTILIZED FOR TWIN HIGHWAY AND VENTILATION PURPOSES. THE SHIELD METHOD REPRESENT THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. TBM EXCAVATION AND EXCAVATION ADVANCEMENT RATES ARE ALSO DISCUSSED. GEOSTRUCTURAL

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AND SOIL CHARACTERISTICS AS WELL AS SOIL MECHANICAL PROPERTIES FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON GROUND CONDITIONS AND UNDERGROUND OPENING SUPPORTS AND MATERIALS HANDLING SYSTEM IS ALSO PRESENTED. THE EXCAVATION CHARACTERISTICS FOR BAY MUD FORMATION ARE TREATED.

R000227 SOFT-GROUND TUNNELLING-DESIGN AND CONSTRUCTION.
PROC. GOLDEN JUBILEE CONVENTION, PROC., OCT. 19-22, 1964.
NOSKIEWICZ, T. M. RAMSAY, J. A.
CAN. GOOD ROADS ASSN.
139-54, 1964.
LANGUAGE: ENGLISH

THIS IN-SITU REPORT CONTAINS REVIEW DATA. THE UNDERGROUND OPENINGS DISCUSSED INCLUDE THE ON GOING EXCAVATION OF THE BALTIMORE HARBOUR TUNNEL (BALTIMORE, MD., USA), THE ON GOING EXCAVATION OF THE BAYTOWN TUNNEL (TX., USA), THE COMPLETED EXCAVATION OF THE BLACKWALL (2ND) TUNNEL (LONDON, ENGLAND, UK), THE COMPLETED EXCAVATION OF THE BROOKLYN BATTERY TUNNEL (NEW YORK CITY, NY., USA), THE COMPLETED EXCAVATION OF THE CLYDE TUNNEL (GLASGOW, SCOTLAND, UK), THE ON GOING EXCAVATION OF THE DEAS ISLAND TUNNEL (VANCOUVER, BRITISH COLUMBIA., CANADA), THE ON GOING EXCAVATION OF THE ELIZABETH RIVER TUNNEL (2ND) (VA., USA), THE COMPLETED EXCAVATION OF THE HUMBER RIVER SEWER TUNNEL (TORONTO, ONTARIO, CANADA), THE COMPLETED EXCAVATION OF THE LINCOLN TUNNEL (NEW YORK, NY, USA), THE ON GOING EXCAVATION OF THE MAAS TUNNEL (ROTTERDAM, HOLLAND, NETHERLANDS), THE COMPLETED EXCAVATION OF THE QUEENS MIDTOWN TUNNEL (NEW YORK, NY., USA), THE COMPLETED EXCAVATION OF THE TYNE TUNNEL (NEW CASTLE, U.K.), THE COMPLETED EXCAVATION OF THE VANCOUVER INTERCEPTOR SEWER (CANADA) AND THE ON GOING EXCAVATION OF THE WEBSTER STREET TUNNEL (CA., USA.) (OAKLAND, CA., USA) . THE PROJECTS INVESTIGATED ARE UTILIZED FOR SEWER AND VEHICULAR TUNNEL (UNSPECIFIED) PURPOSES. THE CUT AND COVER METHOD, STEEL SHELL METHOD AND TBM METHOD REPRESENT THE EXCAVATION TECHNIQUES STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) . TBM EXCAVATION AND EXCAVATION ADVANCEMENT RATES ARE ALSO DISCUSSED. PERTINENT INFORMATION ON UNDERGROUND OPENING SUPPORTS IS ALSO PRESENTED. ROCK TYPES REVIEWED INCLUDE COAL, LIMESTONE, SANDSTONE AND SHALE .

R000228 PRESTRESSED CONCRETE IN SUB-AQUEOUS TUNNEL CONSTRUCTION.
HALL, P. COUTURE, A. EARLE, G.
PRESTRESSED CONCRETE INST. J.
10 (4), 44-53, 1965.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
LES GRANDS TRAVAUX DE MARSEILLE,FRANCE

FUNDING ORGANIZATION(S)
PROVINCE OF QUEBEC,CANADA

THIS LAB REPORT CONTAINS REVIEW DATA. THE UNDERGROUND OPENINGS DISCUSSED INCLUDE THE COMPLETED EXCAVATION OF THE BALTIMORE HARBOUR TUNNEL (BALTIMORE, MD., USA), THE COMPLETED EXCAVATION OF THE BANKHEAD TUNNEL (AL., USA), THE COMPLETED EXCAVATION OF THE BAYTOWN TUNNEL (TX., USA), THE COMPLETED EXCAVATION OF THE BAY OF HAVANA TUNNEL (CUBA), THE ON GOING EXCAVATION OF THE BENELUX TUNNEL (ROTTERDAM, NETHERLANDS), THE COMPLETED EXCAVATION OF THE CHESAPEAKE BAY TUNNELS (VA., USA), THE ON GOING EXCAVATION OF THE COEN TUNNEL (AMSTERDAM, NETHERLANDS), THE COMPLETED EXCAVATION OF THE DEAS ISLAND TUNNEL (VANCOUVER, BRITISH COLUMBIA., CANADA), THE COMPLETED EXCAVATION OF THE DETROIT-WINDSOR TUNNEL (USA-CANADA), THE COMPLETED EXCAVATION OF THE ELIZABETH RIVER TUNNEL (2ND) (VA., USA), THE COMPLETED EXCAVATION OF THE HAMPTON ROADS TUNNEL (VA., USA), THE COMPLETED EXCAVATION OF THE KIEL CANAL TUNNEL (RENDSBURG, GERMANY), THE COMPLETED EXCAVATION OF THE MAAS TUNNEL (ROTTERDAM, HOLLAND, NETHERLANDS), THE COMPLETED EXCAVATION OF THE PASADENA TUNNEL (TX., USA), THE ON GOING EXCAVATION OF THE SOUTHWEST SEWER 13-A (CHICAGO, ILLINOIS, USA), THE ON GOING EXCAVATION OF THE TINGSTAD TUNNEL (GOTHENBURG, SWEDEN), THE COMPLETED EXCAVATION OF THE WEBSTER STREET TUNNEL (CA., USA.) (OAKLAND, CA., USA) AND THE ON GOING

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EXCAVATION OF THE Y TUNNEL (AMSTERDAM, NETHERLANDS) . THE PROJECTS INVESTIGATED ARE UTILIZED FOR HIGHWAY PURPOSES. THE CUT AND COVER METHOD AND TRENCH METHOD REPRESENT THE EXCAVATION TECHNIQUES STUDIED. PERTINENT INFORMATION ON UNDERGROUND OPENING SUPPORTS IS ALSO PRESENTED.

R000230 A RESEARCH PROGRAM FOR RAPID UNDERGROUND CONSTRUCTION, STILLWATER TUNNEL: A PRACTICAL LABORATORY.
U. S. DEPARTMENT OF THE INTERIOR, BUREAU OF RECLAMATION, DENVER, COLORADO
21PP., 1971.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
U.S.BUREAU OF RECLAMATION

FUNDING ORGANIZATION(S)
U.S.BUREAU OF RECLAMATION

THIS IN-SITU-THEORETICAL AND IN-SITU REPORT CONTAINS ORIGINAL AND REVIEW DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE PROPOSED EXCAVATION OF THE STILLWATER TUNNEL (UT., USA) . THE PROJECT INVESTIGATED IS UTILIZED FOR WATER SUPPLY TUNNEL PURPOSES. THE DRILL AND BLAST (FULL FACE) METHOD AND TBM METHOD REPRESENT THE EXCAVATION TECHNIQUES STUDIED. THE REPORTED FRAGMENTATION METHODS SERVICING PROJECT EFFORTS INCLUDE CONVENTIONAL EXPLOSIVE (UNSPECIFIED) AND MECHANICAL ABRASION (ROTARY) . GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. THE EXCAVATION CHARACTERISTICS FOR RED PINE SHALE (IN UNITA MTN.GROUP) ARE TREATED. PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE QUARTZITE AND SHALE .

R000231 SUMMARY OF STILLWATER RESEARCH PROGRAM.
U. S. DEPARTMENT OF THE INTERIOR, BUREAU OF RECLAMATION
3PP., 1972.
LANGUAGE: ENGLISH

FUNDING ORGANIZATION(S)
U.S.BUREAU OF RECLAMATION

THIS IN-SITU REPORT CONTAINS ABSTRACTED ONLY DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE PROPOSED EXCAVATION OF THE STILLWATER TUNNEL (UT., USA) . THE PROJECT INVESTIGATED IS UTILIZED FOR WATER SUPPLY TUNNEL PURPOSES. THE TBM METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) .

R000232 TUNNELS, MACHINE EXCAVATION, RATE OF PROGRESS MACHINE DATA.
U. S. DEPARTMENT OF THE INTERIOR, BUREAU OF RECLAMATION, DENVER, COLORADO
72 (9), 21PP., 1972.
(REC-ERC-72-9, AVAIL. GPO)
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
1.BOYLES BROTHERS DRILLING CO.
2.DUGAN GRAHAM CO.INC;SALT LAKE CITY,UT;USA.
1.COLORADO CONSTRUCTORS,DENVER,CO.
2.HORNER,A.S.CONSTRUCTION CO.,DENVER,CO.
BOYLES BROTHERS DRILLING CO;CO;USA.
FENIX AND SCISSON INC., TULSA,OK
CLYDE AND CO.
1.BOYLES BROTHERS DRILLING CO;
2.GIBBONS AND REED CO.
UTAH CONSTRUCTION AND MINING CO.

FUNDING ORGANIZATION(S)
U.S.BUREAU OF RECLAMATION

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENINGS DISCUSSED INCLUDE THE COMPLETED EXCAVATION OF THE AZOTEA TUNNEL (JUAN-CHAMA PROJECT) (N.CEN.NM., USA), THE COMPLETED EXCAVATION OF THE BLANCO TUNNEL (JUAN-CHAMA PROJECT) (N.CEN.NM., USA), THE COMPLETED EXCAVATION OF THE OSO TUNNEL (CO., USA), THE COMPLETED EXCAVATION OF THE RIVER MOUNTAINS TUNNEL (HENDERSON, NV., USA), THE COMPLETED EXCAVATION OF THE STARVATION TUNNEL (CENTRAL UTAH PROJECT) (UT., USA), THE COMPLETED EXCAVATION OF THE TUNNEL NO.1, NAVAJO INDIAN IRRIGATION PROJECT (NM.,

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USA) AND THE COMPLETED EXCAVATION OF THE WATER HOLLOW TUNNEL (UT., USA) . THE PROJECTS INVESTIGATED ARE UTILIZED FOR WATER SUPPLY TUNNEL PURPOSES. THE MANUAL METHOD AND TBM METHOD REPRESENT THE EXCAVATION TECHNIQUES STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDE MECHANICAL ABRASION (ROTARY) AND UNSPECIFIED . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. TBM EXCAVATION RATE IS ALSO DISCUSSED. GEOSTRUCTURAL AND SOIL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON UNDERGROUND OPENING SUPPORTS AND MATERIALS HANDLING SYSTEM IS ALSO PRESENTED. PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE AGGLOMERATE, CONGLOMERATE, RHYODACITE, RHYOLITE, SANDSTONE, SHALE AND SILTSTONE THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES (LAB) DATA.

R000233 FIVE CASE HISTORIES OF TUNNEL BORING.
BELLPORT, B. P.
MINING ENG.
23 (6), 49-52, 1971.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
1.COLORADO CONSTRUCTORS,DENVER,CO.
2.HORNER,A.S.CONSTRUCTION CO.,DENVER,CO.
BOYLES BROTHERS DRILLING CO:CO:USA.
FENIX AND SCISSON INC., TULSA,OK
1.BOYLES BROTHERS DRILLING CO:
2.GIBBONS AND REED CO.
FLOUR UTAH ENGINEERS AND CONSTRUCTORS INC:FLOUR,UT:
USA.

FUNDING ORGANIZATION(S)
U.S.BUREAU OF RECLAMATION

THIS IN-SITU REPORT CONTAINS REVIEW DATA. THE UNDERGROUND OPENINGS DISCUSSED INCLUDE THE COMPLETED EXCAVATION OF THE AZOTEA TUNNEL (JUAN-CHAMA PROJECT) (N.CEN.NM., USA), THE COMPLETED EXCAVATION OF THE BLANCO TUNNEL (JUAN-CHAMA PROJECT) (N.CEN.NM., USA), THE COMPLETED EXCAVATION OF THE OSO TUNNEL (CO., USA), THE COMPLETED EXCAVATION OF THE RIVER MOUNTAINS TUNNEL (HENDERSON, NV., USA), THE COMPLETED EXCAVATION OF THE STARVATION TUNNEL (CENTRAL UTAH PROJECT) (UT., USA) AND THE COMPLETED EXCAVATION OF THE TUNNEL NO.1, NAVAJO INDIAN IRRIGATION PROJECT (NM., USA) . THE PROJECTS INVESTIGATED ARE UTILIZED FOR WATER SUPPLY TUNNEL PURPOSES. THE TBM METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. TBM EXCAVATION RATE IS ALSO DISCUSSED. GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON UNDERGROUND OPENING SUPPORTS AND MATERIALS HANDLING SYSTEM IS ALSO PRESENTED. THE EXCAVATION CHARACTERISTICS FOR SAN JOSE FORMATION ARE TREATED. PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE LAVA FLOW, RHYODACITE, RHYOLITE, SANDSTONE AND SHALE THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES (LAB) DATA.

R000235 DYNAMICS OF ADVANCE OF AIR-WATER CONTACT IN CAISSON DRIVING OF TUNNELS.
ABDULRAGIMOV, A. I. BABICH, YU. A.
VLASOV, S. N. LISTENGARTEN, L. B.
PIRVERDYAN, A. M.
SOIL MECH. FOUND. ENG.
(4), 273-6, 1968.
(ENGLISH TRANSLATION OF OSN. FUNDAM. MEKH. GRUNTOV, (4), 23-4, 1968., FOR ORIGINAL SEE R-NO. R00234)
LANGUAGE: ENGLISH

THIS THEORETICAL REPORT CONTAINS ORIGINAL DATA. THE CAISSON METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED.

R000236 HARD ROCK TUNNELLING MACHINES.
MUIRHEAD, I. R. GLOSSOP, L. G.
TRANS. INST. MINING MET.
77 (SEC. A), A1-21, 1968.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
MAVOR AND COULSON,LTD:SHEFFIELD,U.K.

(CONTINUED)

THIS IN-SITU AND THEORETICAL REPORT CONTAINS REVIEW DATA. THE UNDERGROUND OPENINGS DISCUSSED INCLUDE THE COMPLETED EXCAVATION OF THE AZOTEA TUNNEL (JUAN-CHAMA PROJECT) (N.CEN.NM., USA), THE COMPLETED EXCAVATION OF THE BLANCO TUNNEL (JUAN-CHAMA PROJECT) (N.CEN.NM., USA), THE COMPLETED EXCAVATION OF THE CANYON TUNNEL (CA., USA), THE COMPLETED EXCAVATION OF THE CHARION TUNNEL (SWITZERLAND), THE COMPLETED EXCAVATION OF THE GOSS TUNNEL (AUSTRIA), THE COMPLETED EXCAVATION OF THE LORAINE MINES (S.AFRICA), THE COMPLETED EXCAVATION OF THE MANGLA DAM DIVERSION AND POWER TUNNELS (PAKISTAN), THE COMPLETED EXCAVATION OF THE NAVAJO IRRIGATION PROJECT (NM., USA), THE COMPLETED EXCAVATION OF THE OAHE TUNNEL (UNSPECIFIED) (SD., USA), THE COMPLETED EXCAVATION OF THE OSO TUNNEL (CO., USA), THE COMPLETED EXCAVATION OF THE ST.LOUIS METRO SEWER DISTRICT (ST.LOUIS, MO., USA), THE COMPLETED EXCAVATION OF THE TUNNEL NO.1, NAVAJO INDIAN IRRIGATION PROJECT (NM., USA) AND THE COMPLETED EXCAVATION OF THE WHITE PINE COPPER MINE (MI., USA) . THE PROJECTS INVESTIGATED ARE UTILIZED FOR EXPERIMENTAL EXCAVATION, EXPLORATORY TUNNEL, HIGHWAY, HYDROELECTRIC, IRRIGATION, METRO, MINE, SEWER, UNSPECIFIED AND WATER SUPPLY TUNNEL PURPOSES. THE DRILL AND BLAST (FULL FACE) METHOD AND TBM METHOD REPRESENT THE EXCAVATION TECHNIQUES STUDIED. THE REPORTED FRAGMENTATION METHODS SERVICING PROJECT EFFORTS INCLUDE CONVENTIONAL EXPLOSIVE (UNSPECIFIED) AND MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. TBM EXCAVATION AND EXCAVATION ADVANCEMENT RATES ARE ALSO DISCUSSED. PERTINENT INFORMATION ON MATERIALS HANDLING SYSTEM IS ALSO PRESENTED. PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE ARGILLITE, GNEISS, GRANITE, IRONSTONE, IRON ORE, LIMESTONE, MUDSTONE, SANDSTONE, SCHIST, SHALE AND TUFF . THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES (LAB) DATA.

R000238 SPRAGS COORDINATE TUNNELER'S MOTORS.
FINK, T. SNYDER, L.
POWER TRANSMISSION DESIGN
13 (4), 64-8, 74, 76, 1971.
LANGUAGE: ENGLISH

THIS THEORETICAL REPORT CONTAINS ORIGINAL DATA. THE TBM METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) .

R000239 EXCAVATION OF THROUGH CUT TO REPLACE MESSITER TUNNEL ON THE CANADIAN NATIONAL RAILWAYS.
MILES, R. D.
AMER. RY. ENG. ASSN. BULL.
(591), 559-66, 1965.
(BULL. NO. 591)
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
STANFORD UNIVERSITY,STANFORD,CA.93405

FUNDING ORGANIZATION(S)
CANADIAN NATIONAL RAILWAYS

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE COMPLETED EXCAVATION OF THE MESSITER TUNNEL (BRITISH COLUMBIA., CANADA) . THE PROJECT INVESTIGATED IS UTILIZED FOR RAILWAY PURPOSES. THE TRENCH METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. SOIL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED.

R000240 PRELOADING AND DEWATERING STABILISE AIRPORT TUNNEL SITE.
AUTHOR ANON.
AUSTRALIAN CIVIL ENG. CONSTR.
7 (11), 11-3, 15, 1966.
LANGUAGE: ENGLISH

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE TRENCH METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. SOIL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED.

R000241 SUMMARY OF THE FIRST INTERNATIONAL SYMPOSIUM ON JET CUTTING TECHNOLOGY.
AUTHOR ANON.

(CONTINUED)

WARWICK COVENTRY, ENGLAND
14PP., 1972.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
FENIX AND SCISSON INC., TULSA,OK
HYDRONAUTICS INC;USA.
ROCK MECHANICS AND EXPLOSIVES RESEARCH CENTER (UNIV. OF MISSOURI
AT ROLLA,MO;USA)
TERRASPACE,INC;304 N.STONESTREET AVE;ROCKVILLE,MD. 20850;USA
I.I.T.RESEARCH INSTITUTE,CHICAGO,IL;USA.
OAK RIDGE NATIONAL LABORATORY,USA.
U.S.ARMY COLD REGIONS RESEARCH AND ENGINEERING LAB; HANOVER,NH;USA.
ESSO PRODUCTION RESEARCH CO;HOUSTON,TX.
KAISER STEEL CORP;USA.
EXOTECH,ROCKVILLE,MD;USA.
GULF RESEARCH AND DEVELOPMENT CO;PITTSBURG,PA;USA
HYDRO-JET SERVICES,INC;AMARILLO,TX;USA
TULSA,UNIVERSITY OF,OK;USA
ONTARIO SAND CO;ONTARIO,IL;USA
CONTINENTAL OIL COMPANY

THIS IN-SITU, LAB-IN-SITU AND LAB REPORT CONTAINS ABSTRACTED ONLY DATA. THE PROJECT INVESTIGATED IS UTILIZED FOR EXPERIMENTAL EXCAVATION, MINE AND UNDERGROUND TESTING PURPOSES. THE HYDRAULIC FRAGMENTATION METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHODS SERVICING PROJECT EFFORTS INCLUDE IMPACT ABRASION (WATER CANNON, INTERMITTANT IMPACT, JET ABRASION (WATER-CONTINUOUS), JET ABRASION (WATER), JET ABRASION (WATER CANNON, CONTINUOUS IMPACT) AND JET ABRASION (CONTINUOUS WATER WITH STEEL SHOT) . PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE ANHYDRITE (ROCK), BASALT, BROWN STONE, CHERT (ROCK), COAL, CONGLOMERATE, DOLOMITE (ROCK), GRANITE, ICE, LIMESTONE, MARBLE, PERMAFROST, SANDSTONE, SAND, SCHIST, SERPENTINE, SHALE AND TUFF .

R000242 SHATTERING ROCK WITH INTENSE BURSTS OF ENERGETIC ELECTRONS.
AVERY, R. T. KEEFE, D. BREKKE, T. L.
FINNIE, I.
LAWRENCE RADIATION LAB., BERKELEY, CALIFORNIA
5PP., 1973.
(LBL-1391)
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
LAWRENCE BERKELEY LAB.(UNIV.OF CALIFORNIA), BERKELEY,CA;USA

FUNDING ORGANIZATION(S)
NATIONAL SCIENCE FOUNDATION,WASHINGTON,D.C.;USA.

THIS LAB REPORT CONTAINS ORIGINAL DATA. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES THERMAL-RADIANT (ELECTRON BEAM) . GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. THE EXCAVATION CHARACTERISTICS FOR SIERRA GRANITE ARE TREATED. ROCK TYPES REVIEWED INCLUDE BASALT, GRANITE AND MARBLE .

R000244 SHIELDS FOR CONSTRUCTION OF LARGE TUNNELS IN SANDY GROUND.
SAMOILOV, V. P.
SOIL MECHANICS FOUNDATION ENGR.
(1), 40-8, 1964.
(ENGLISH TRANSLATION OF OSN., FUNDAM. MEKH. GRUNTOV, (1), 21-3, 1964., FOR ORIGINAL SEE R-NO. R00243)
LANGUAGE: ENGLISH

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE SHIELD METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. EXCAVATION ADVANCEMENT RATE IS ALSO DISCUSSED. SOIL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED.

R000245 TUNNEL DRIVING METHODS.
NOSKIEWICZ, T. M. RAMSAY, J. A.
ENG. CONTRACT REC.
77 (13), 49-57, 1964.
LANGUAGE: ENGLISH

THIS IN-SITU REPORT CONTAINS REVIEW DATA. THE UNDERGROUND OPENINGS DISCUSSED INCLUDE THE COMPLETED

(CONTINUED)

EXCAVATION OF THE BALTIMORE HARBOUR TUNNEL (BALTIMORE, MD., USA), THE COMPLETED EXCAVATION OF THE BAYTOWN TUNNEL (TX., USA), THE COMPLETED EXCAVATION OF THE BLACKWALL (2ND) TUNNEL (LONDON, ENGLAND, UK), THE COMPLETED EXCAVATION OF THE BROOKLYN BATTERY TUNNEL (NEW YORK CITY, NY., USA), THE COMPLETED EXCAVATION OF THE CLYDE TUNNEL (GLASGOW, SCOTLAND, UK), THE COMPLETED EXCAVATION OF THE DARTFORD VEHICULAR TUNNEL (DARTFORD, ENGLAND, U.K.), THE COMPLETED EXCAVATION OF THE DEAS ISLAND TUNNEL (VANCOUVER, BRITISH COLUMBIA., CANADA), THE COMPLETED EXCAVATION OF THE ELIZABETH RIVER TUNNEL (2ND) (VA., USA), THE COMPLETED EXCAVATION OF THE HUMBER RIVER SEWER TUNNEL (TORONTO, ONTARIO, CANADA), THE COMPLETED EXCAVATION OF THE KENSINGTON TUBE, LONDON UNDERGROUND (LONDON, ENGLAND, U.K.), THE ON GOING EXCAVATION OF THE LAFONTAINE BRIDGE TUNNEL (ALSO CALLED LOUIS-HIPPOLYTE OR BOUCHERVILLE TUNNEL) (MONTREAL, QUEBEC, CDN.) BOUCHERVILLE TUNNEL) (MONTREAL, QUEBEC, CANADA), THE COMPLETED EXCAVATION OF THE LINCOLN TUNNEL (NEW YORK, NY, USA), THE COMPLETED EXCAVATION OF THE LT.WILLIAM F.CALLAHAN JR. TUNNEL (BOSTON, MA., USA), THE COMPLETED EXCAVATION OF THE MAAS TUNNEL (ROTTERDAM, HOLLAND, NETHERLANDS), THE COMPLETED EXCAVATION OF THE OAHE DAM DIVERSION TUNNEL (SD., USA), THE COMPLETED EXCAVATION OF THE OAHE TUNNEL (UNSPECIFIED) (SD., USA), THE COMPLETED EXCAVATION OF THE POTTERS BAR RAILWAY TUNNELS (U.K.), THE COMPLETED EXCAVATION OF THE QUEENS MIDTOWN TUNNEL (NEW YORK, NY., USA), THE COMPLETED EXCAVATION OF THE THAMES-LEE WATER MAIN TUNNEL (LONDON, ENGLAND, U.K.), THE COMPLETED EXCAVATION OF THE TORONTO SUBWAY TUNNELS (TORONTO, ONTARIO, CANADA), THE COMPLETED EXCAVATION OF THE TYNE TUNNEL (NEW CASTLE, U.K.), THE COMPLETED EXCAVATION OF THE VANCOUVER INTERCEPTOR SEWER (CANADA), THE COMPLETED EXCAVATION OF THE VICTORIA LINE TUNNEL (LONDON, ENGLAND, U.K.), THE COMPLETED EXCAVATION OF THE VLAKFONTEIN MINE SHAFT (S.AFRICA) AND THE COMPLETED EXCAVATION OF THE WEBSTER STREET TUNNEL (CA., USA.) (OAKLAND, CA., USA) . THE PROJECTS INVESTIGATED ARE UTILIZED FOR EXPERIMENTAL EXCAVATION, METRO, RAILWAY, SEWER, VEHICULAR TUNNEL (UNSPECIFIED) AND WATER SUPPLY TUNNEL PURPOSES. THE SHIELD METHOD, TBM METHOD AND UNSPECIFIED METHOD REPRESENT THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHODS SERVICING PROJECT EFFORTS INCLUDE CONVENTIONAL EXPLOSIVE (AMMONIA GELETIN), MECHANICAL ABRASION (ROTARY), MECHANICAL ABRASION (ROTARY AND PERCUSSION) AND MECHANICAL ABRASION (UNSPECIFIED) . TBM EXCAVATION RATE IS ALSO DISCUSSED. GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON GROUND CONDITIONS AND UNDERGROUND OPENING SUPPORTS IS ALSO PRESENTED. PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE COAL, LIMESTONE, SANDSTONE, SHALE AND TILL .

R000246 SOME ASPECTS OF HIGH SPEED HARD ROCK TUNNELLING IN THE SNOWY MOUNTAINS.
ANDREWS, K. E. MC INTYRE, A. R.
MATTNER, R. H.
CIVIL ENG. TRANS.
6 (2), 51-70, 1964.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
UNIVERSITY OF CALIFORNIA,BERKELEY,COLLEGE OF ENGINEERING
THEISS BROS.
1.KAISER
2.PERINI
3.RAYMOND
4.WALSH
1.KAISER
2.MORRISON
3.PERINI
4.RAYMOND

FUNDING ORGANIZATION(S)
ATLAS COPCO

THIS IN-SITU REPORT CONTAINS REVIEW DATA. THE UNDERGROUND OPENINGS DISCUSSED INCLUDE THE COMPLETED EXCAVATION OF THE EUCUMBENE TUMUT TUNNEL (SNOWY MTS., AUSTRALIA), THE ON GOING EXCAVATION OF THE EUCUMBENE SNOWY TUNNEL (SNOWY MTN. PROJECT) (AUSTRALIA), THE COMPLETED EXCAVATION OF THE GUTHEGA TUNNEL (SNOWY MTN. PROJECT) (AUSTRALIA), THE ON GOING EXCAVATION OF THE MURRAY 1 PRESSURE TUNNEL (SNOWY MTN. PROJECT)

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(AUSTRALIA), THE COMPLETED EXCAVATION OF THE MURRUMBIDGEE-EUCUMBENE TUNNEL (SNOWY MTN. PROJECT) (AUSTRALIA), THE ON GOING EXCAVATION OF THE SNOWY-GEEHI TUNNEL (SNOWY MTN. PROJECT) (AUSTRALIA), THE COMPLETED EXCAVATION OF THE TOOMA TUMUT TUNNEL (AUSTRALIA), THE COMPLETED EXCAVATION OF THE TUMUT 1 PRESSURE TUNNEL (SNOWY MTN. PROJECT) (AUSTRALIA) AND THE COMPLETED EXCAVATION OF THE TUMUT 2 TAILWATER TUNNEL (SNOWY MTN. PROJECT) (AUSTRALIA) . THE PROJECT INVESTIGATED ARE UTILIZED FOR UNSPECIFIED PURPOSES. THE DRILL AND BLAST (FULL FACE) METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES CONVENTIONAL EXPLOSIVE (AMMONIUM NITRATE) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. EXCAVATION ADVANCEMENT RATE IS ALSO DISCUSSED. INFORMATION PERTINENT TO EXCAVATION COST IS GIVEN. PERTINENT INFORMATION ON UNDERGROUND OPENING SUPPORTS AND MATERIALS HANDLING SYSTEM IS ALSO PRESENTED. PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE DIORITE AND GRANITE .

R000247 SEIKAN UNDERSEA TUNNEL. FROM PROC. OF THE TUNNEL AND SHAFT CONFERENCE, MINNEAPOLIS, MINNESOTA, MAY 15-7, 1968.
YOKOYAMA, A.
RAPID EXCAVATION-PROBLEMS AND PROGRESS
(CHAPTER 10), 114-31, 1970.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
JAPAN RAILWAY CONSTRUCTION PUBLIC CORP;SEIKAN TUNNEL RESEARCH OFFICE,TOKYO,JAPAN

FUNDING ORGANIZATION(S)
JAPANESE NATIONAL RAILWAYS

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENINGS DISCUSSED INCLUDE THE ON GOING EXCAVATION OF THE INCLINED SHAFT FOR SEIKAN UNDERSEA TUNNEL, HONSHU SIDE (JAPAN), THE COMPLETED EXCAVATION OF THE INCLINED SHAFT FOR SEIKAN UNDERSEA TUNNEL, HOKKAIDO SIDE (JAPAN), THE ON GOING EXCAVATION OF THE PILOT TUNNELS FOR HONSHU-HOKKAIDO RAILWAY CONNECTION (ALSO CALLED SEIKAN UNDERSEA TUNNEL) (JAPAN) AND THE PROPOSED EXCAVATION OF THE SEIKAN RAILWAY TUNNEL (JAPAN) . THE PROJECTS INVESTIGATED ARE UTILIZED FOR EXPLORATORY TUNNEL AND RAILWAY PURPOSES. THE DRILL AND BLAST (FULL FACE) METHOD AND TBM METHOD REPRESENT THE EXCAVATION TECHNIQUES STUDIED. THE REPORTED FRAGMENTATION METHODS SERVICING PROJECT EFFORTS INCLUDE CONVENTIONAL EXPLOSIVE (UNSPECIFIED) AND MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. TBM EXCAVATION AND EXCAVATION ADVANCEMENT RATES ARE ALSO DISCUSSED. GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON GROUND CONDITIONS AND UNDERGROUND OPENING SUPPORTS AND MATERIALS HANDLING SYSTEM IS ALSO PRESENTED. THE EXCAVATION CHARACTERISTICS FOR KUNNUI FM. AND KUROMATSUNAI FM. ARE TREATED. PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE ANDESITE, BASALT, ROCK (UNSPECIFIED), SANDSTONE, SILTSTONE, TUFF AND VOLCANICS . THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES (LAB) DATA.

R000248 THE PH METHOD FOR TUNNELING THROUGH ROCK. FROM PROC. OF THE TUNNEL AND SHAFT CONFERENCE, MINNEAPOLIS, MINNESOTA, MAY 15-7, 1968.
VAN WALSUM, E.
RAPID EXCAVATION-PROBLEMS AND PROGRESS
(CHAPTER 11), 132-49, 1970.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
PERMALL AND ASSOCIATES,MONTREAL,CANADA

THIS THEORETICAL REPORT CONTAINS ORIGINAL DATA. THE TBM AND DRILL-BLAST METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (EXPLOSIVE-ROTARY) . TBM EXCAVATION AND EXCAVATION ADVANCEMENT RATES ARE ALSO DISCUSSED.

R000249 EXPERIENCE WITH THE HABEGGER MOLE. FROM PROC. OF THE TUNNEL AND SHAFT CONFERENCE, MINNEAPOLIS, MINNESOTA, MAY 15-7, 1968.

(CONTINUED)

BRODBECK, H. W.
RAPID EXCAVATION-PROBLEMS AND PROGRESS
(CHAPTER 12), 153-64, 1970.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
JAPAN RAILWAY CONSTRUCTION PUBLIC CORP;SEIKAN TUNNEL RESEARCH OFFICE,TOKYO,JAPAN

FUNDING ORGANIZATION(S)
HEBEGGER LTD;THUN,SWITZERLAND

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENINGS DISCUSSED INCLUDE THE ON GOING EXCAVATION OF THE HEADRACE TUNNEL, JULIA HYDROELECTRIC SCHEME (ST.MORITZ, SWITZERLAND) AND THE ON GOING EXCAVATION OF THE PILOT TUNNELS FOR HONSHU-HOKKAIDO RAILWAY CONNECTION (ALSO CALLED SEIKAN UNDERSEA TUNNEL) (JAPAN) . THE PROJECTS INVESTIGATED ARE UTILIZED FOR EXPLORATORY TUNNEL AND HYDROELECTRIC PURPOSES. THE TBM METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. TBM EXCAVATION AND EXCAVATION ADVANCEMENT RATES ARE ALSO DISCUSSED. PERTINENT INFORMATION ON MATERIALS HANDLING SYSTEM IS ALSO PRESENTED. PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE ANDESITE, LIMESTONE, SHALE AND TUFF . THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES (LAB) DATA.

R000251 DRIVING THE OSO TUNNEL WITH A MECHANICAL MOLE. FROM PROC. OF THE TUNNEL AND SHAFT CONFERENCE, MINNEAPOLIS, MINNESOTA, MAY 15-7, 1968.
STEVENS, V. L.
RAPID EXCAVATION-PROBLEMS AND PROGRESS
(CHAPTER 14), 191-4, 1970.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
1.BOYLES BROS.DRILLING CO.
2.CIMCO,SALT LAKE CITY,UT;USA
3.GIBBONS AND REED CO.

FUNDING ORGANIZATION(S)
U.S.BUREAU OF RECLAMATION

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE COMPLETED EXCAVATION OF THE OSO TUNNEL (CO., USA) . THE PROJECT INVESTIGATED IS UTILIZED FOR WATER SUPPLY TUNNEL PURPOSES. THE TBM METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHODS SERVICING PROJECT EFFORTS INCLUDE CONVENTIONAL EXPLOSIVE (UNSPECIFIED) AND MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. TBM EXCAVATION AND EXCAVATION ADVANCEMENT RATES ARE ALSO DISCUSSED. GEOSTRUCTURAL AND SOIL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON GROUND CONDITIONS AND UNDERGROUND OPENING SUPPORTS AND MATERIALS HANDLING SYSTEM IS ALSO PRESENTED. THE EXCAVATION CHARACTERISTICS FOR LEWIS SHALE ARE TREATED. ROCK TYPES REVIEWED INCLUDE SHALE .

R000252 HIGH-SPEED SHAFT SINKING IN SOUTH AFRICA. FROM PROC. OF THE TUNNEL AND SHAFT CONFERENCE, MINNEAPOLIS, MINNESOTA, MAY 15-7, 1968.
LAMBERT, R. N.
RAPID EXCAVATION-PROBLEMS AND PROGRESS
(CHAPTER 15), 195-214, 1970.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
SHAFT SINKERS LTD;JOHANNESBURG,REPUBLIC OF S.AFRICA

FUNDING ORGANIZATION(S)
LOWESTOFT BOROUGH COUNCIL

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENINGS DISCUSSED INCLUDE THE COMPLETED EXCAVATION OF THE BUFFELSFONTEIN MINE SHAFT (S.AFRICA), THE COMPLETED EXCAVATION OF THE FREE STATE SAAIPLAAS MINE SHAFT (S.AFRICA), THE COMPLETED EXCAVATION OF THE HARTEBEESFONTEIN MINE SHAFT

(CONTINUED)

(S.AFRICA), THE COMPLETED EXCAVATION OF THE MERRIESPRUIT MINE SHAFT (S.AFRICA), THE COMPLETED EXCAVATION OF THE PRESIDENT STEYN MINE SHAFTS (S.AFRICA), THE COMPLETED EXCAVATION OF THE VAAL REEFS MINES SHAFTS (S.AFRICA), THE COMPLETED EXCAVATION OF THE VIRGINIA MINE SHAFT (S.AFRICA), THE COMPLETED EXCAVATION OF THE VLAKFONTEIN MINE SHAFT (S.AFRICA), THE COMPLETED EXCAVATION OF THE WESTERN REEF MINE SHAFT (S.AFRICA) AND THE COMPLETED EXCAVATION OF THE WEST RAND CONSOLIDATED MINES SHAFTS (S.AFRICA) . THE PROJECTS INVESTIGATED ARE UTILIZED FOR MINE PURPOSES. THE DRILL AND BLAST (FULL FACE) METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES CONVENTIONAL EXPLOSIVE (AMMONIA GELETIN) . EXCAVATION ADVANCEMENT RATE IS ALSO DISCUSSED. PERTINENT INFORMATION ON MATERIALS HANDLING SYSTEM IS ALSO PRESENTED.

R000254 THE *CALWELD* HOLES. FROM PROC. OF THE TUNNEL AND SHAFT CONFERENCE, MINNEAPOLIS, MINNESOTA, MAY 15-7, 1968.
HORN, C. L.
RAPID EXCAVATION-PROBLEMS AND PROGRESS
(CHAPTER 17), 227-42, 1970.
LANGUAGE:ENGLISH

THIS IN-SITU REPORT CONTAINS REVIEW DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE COMPLETED EXCAVATION OF THE BAY AREA RAPID TRANSIT PROJECT (BART) (SECTION UNSPECIFIED) (SAN FRANCISCO, CA., USA) . THE PROJECT INVESTIGATED IS UTILIZED FOR TRANSPORTATION PURPOSES. THE TBM METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. TBM EXCAVATION AND EXCAVATION ADVANCEMENT RATES ARE ALSO DISCUSSED. GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. THE EXCAVATION CHARACTERISTICS FOR ST. PETERS SANDSTONE ARE TREATED. PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE CHALK (ROCK), CLAY, SANDSTONE, SAND, SILT AND TILL .

R000255 THE *JARVA* MOLE. FROM PROC. OF THE TUNNEL AND SHAFT CONFERENCE, MINNEAPOLIS, MINNESOTA, MAY 15-7, 1968.
DELISIO, C. J.
RAPID EXCAVATION-PROBLEMS AND PROGRESS
(CHAPTER 18), 243-7, 1970.
LANGUAGE:ENGLISH

PERFORMING ORGANIZATION(S)
S AND M CONSTRUCTORS INC;SOLON,OH;USA.

THIS IN-SITU REPORT CONTAINS REVIEW DATA. THE PROJECT INVESTIGATED IS UTILIZED FOR MINE PURPOSES. THE TBM METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. PERTINENT INFORMATION ON MATERIALS HANDLING SYSTEM IS ALSO PRESENTED. ROCK TYPES REVIEWED INCLUDE LIMESTONE .

R000256 THE *LAWRENCE* MOLE. FROM PROC. OF THE TUNNEL AND SHAFT CONFERENCE, MINNEAPOLIS, MINNESOTA, MAY 15-7, 1968.
HAMILTON, W. H.
RAPID EXCAVATION-PROBLEMS AND PROGRESS
(CHAPTER 19), 248-55, 1970.
LANGUAGE:ENGLISH

FUNDING ORGANIZATION(S)
GREATER CHICAGO,METROPOLITAN SANITARY DIST.OF, CHICAGO,IL;USA.
CHICAGO, IL, USA

THIS IN-SITU REPORT CONTAINS REVIEW DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE ON GOING EXCAVATION OF THE LAWRENCE AVENUE SEWER SYSTEM (CHICAGO, IL., USA) . THE PROJECT INVESTIGATED IS UTILIZED FOR SEWER PURPOSES. THE TBM METHOD REPRESENT THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS.

R000257 THE *HUGHES TOOL* MOLE DEVELOPMENT. FROM PROC. OF THE TUNNEL AND SHAFT CONFERENCE, MINNEAPOLIS, MINNESOTA, MAY 15-7, 1968.
GLASS, J. M. SHOLTESS, C. D.
RAPID EXCAVATION-PROBLEMS AND PROGRESS
(CHAPTER 20), 256-71, 1970.
LANGUAGE:ENGLISH

FUNDING ORGANIZATION(S)
U.S.BUREAU OF RECLAMATION

THIS IN-SITU REPORT CONTAINS REVIEW DATA. THE UNDERGROUND OPENINGS DISCUSSED INCLUDE THE COMPLETED EXCAVATION OF THE TUNNEL NO.1, NAVAJO INDIAN IRRIGATION PROJECT (NM., USA) AND THE COMPLETED EXCAVATION OF THE TUNNEL NO.2, NAVAJO INDIAN IRRIGATION PROJECT (NM., USA) . THE PROJECTS INVESTIGATED ARE UTILIZED FOR IRRIGATION PURPOSES. THE DRILL AND BLAST (FULL FACE) METHOD AND TBM METHOD REPRESENT THE EXCAVATION TECHNIQUES STUDIED. THE REPORTED FRAGMENTATION METHODS SERVICING PROJECT EFFORTS INCLUDE CONVENTIONAL EXPLOSIVE (UNSPECIFIED) AND MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. TBM EXCAVATION RATE IS ALSO DISCUSSED.

R000258 THE *ROBBINS* MOLE-STATUS AND FUTURE. FROM PROC. OF THE TUNNEL AND SHAFT CONFERENCE, MINNEAPOLIS, MINNESOTA, MAY 15-7, 1968.
ROBBINS, R. J.
RAPID EXCAVATION-PROBLEMS AND PROGRESS
(CHAPTER 21), 272-95, 1970.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
1.COLORADO CONSTRUCTORS,DENVER,CO.
2.HORNER,A.S.CONSTRUCTION CO.,DENVER,CO.
FOUNDATION CO.OF CANADA
INTER MOUNTAIN CONSTRUCTION CO;NORTH VANCOUVER, CANADA
GRAVO CORP.(OR CO.),U.S.A.
HEALY,S.A.CO.
WHITE PINE COPPER COMPANY,WHITE PINE,MI;USA.
PERINI CORP.
MELBOURNE AND METROPOLITAN BOARD OF WORKS
KOMATSU CO;JAPAN
KIEWIT,PETER AND SONS CO;CO;USA
HYDROELECTRIC COMMISSION,HOBART,TASMANIA
MITTRY CONSTRUCTION CO;LOS ANGELES,CA;USA.
MORRISON-KNUDSON CO.OF CANADA LTD.
1.JOHNSON
2.KIEWIT
3.MORRISON-KNUDSEN
ATKINSON,GUY,F.
ETABLISSEMENTS BILLIARD
AZOTEA CONSTRUCTION
SCHINDLER
OCLSA (,,SPAIN)
OAHE CONSTRUCTORS
BLES,M.J. (,,U.S.A.)
THEILER AND KALB
PRADER AG.
OSO CONSTRUCTORS

THIS IN-SITU REPORT CONTAINS REVIEW DATA. THE UNDERGROUND OPENINGS DISCUSSED INCLUDE THE COMPLETED EXCAVATION OF THE MANGLA DAM PROJECT (UNSPECIFIED) (PAKISTAN), THE COMPLETED EXCAVATION OF THE OAHE TUNNEL (UNSPECIFIED) (SD., USA), THE COMPLETED EXCAVATION OF THE SAN JUAN-CHAMA PROJECT (UNSPECIFIED) (CO-NM, USA) AND THE COMPLETED EXCAVATION OF THE WHITE PINE COPPER MINE (MI., USA) . THE PROJECTS INVESTIGATED ARE UTILIZED FOR SEWER, TWIN HIGHWAY, UNDERGROUND POWER STATION, UNSPECIFIED AND WATER SUPPLY TUNNEL PURPOSES. THE TBM METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHODS SERVICING PROJECT EFFORTS INCLUDE CONVENTIONAL EXPLOSIVE (BLACK POWDER) AND MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY DRILLING EQUIPMENT AND TUNNELING MACHINE CHARACTERISTICS. EXCAVATION ADVANCEMENT RATE IS ALSO DISCUSSED. PERTINENT INFORMATION ON UNDERGROUND OPENING SUPPORTS IS ALSO PRESENTED. PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE CONGLOMERATE, LIMESTONE, MARL, MUDSTONE, NOVACULITE, SANDSTONE, SCHIST AND SHALE . THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES (LAB) DATA.

R000259 PANEL DISCUSSION ON *MOLE TUNNELING*. FROM PROC. OF THE TUNNEL AND SHAFT CONFERENCE, MINNEAPOLIS, MINNESOTA, MAY 15-7, 1968.
PFLEIDER, E. P.
RAPID EXCAVATION-PROBLEMS AND PROGRESS
(CHAPTER 22), 296-315, 1970.
LANGUAGE:ENGLISH

THIS IN-SITU REPORT CONTAINS REVIEW DATA. THE RAISE DRIVING (BORING MACHINES) METHOD, SIDE DRIFT METHOD AND TBM METHOD REPRESENT THE EXCAVATION TECHNIQUES STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. EXCAVATION ADVANCEMENT RATE IS ALSO DISCUSSED. PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE GRANITE, GREENSTONE (METAMORPHIC) AND SHALE . THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES (LAB) DATA.

R000260 TUNNELING IN A SUBFREEZING ENVIRONMENT. FROM PROC. OF THE TUNNEL AND SHAFT CONFERENCE, MINNEAPOLIS, MINNESOTA, MAY 15-7, 1968.
MC ANERNEY, J. M.
RAPID EXCAVATION-PROBLEMS AND PROGRESS
(CHAPTER 30), 378-94, 1970.
LANGUAGE:ENGLISH

FUNDING ORGANIZATION(S)
U.S.ARMY COLD REGIONS RESEARCH AND ENGINEERING LAB. (CRREL)

THIS IN-SITU REPORT CONTAINS REVIEW DATA. THE TBM METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHODS SERVICING PROJECT EFFORTS INCLUDE JET ABRASION (WATER) AND JET ABRASION (STEAM) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. PERTINENT INFORMATION ON MATERIALS HANDLING SYSTEM IS ALSO PRESENTED. PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE GRANITE AND SILTSTONE .

R000293 A PRELIMINARY STUDY OF THE NUCLEAR SUBTERRENE.
ROBINSON, E. S. POTTER, R. M.
MC INTEER, B. B. ROWLEY, J. C.
ARMSTRONG, D. E. MILLS, P. L. SMITH, M. S.
LOS ALAMOS SCIENTIFIC LAB., UNIV. OF CALIF., LOS ALAMOS, NEW MEXICO
62PP., 1971.
(LA-4547-UC-38)
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
LOS ALAMOS SCIENTIFIC LAB.(UNIV.OF CALIFORNIA),NM; 87544,USA.

FUNDING ORGANIZATION(S)
ATOMIC ENERGY COMMISSION

THIS LAB-THEORETICAL REPORT CONTAINS ORIGINAL DATA. THE PROJECT INVESTIGATED IS UTILIZED FOR EXPERIMENTAL EXCAVATION PURPOSES. THE SUBTERRENE MELTING METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES THERMAL-NUCLEAR (NUCLEAR HEATING) , THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. TBM EXCAVATION RATE IS ALSO DISCUSSED.

R000294 THERMODYNAMIC STABILITY CONSIDERATIONS IN THE NO-BN-C SYSTEM. APPLICATION TO PROTOTYPE SUBTERRENE PENETRATORS.
KRUPKA, M. C.
LOS ALAMOS SCIENTIFIC LAB., UNIV OF CALIF.,
LOS ALAMOS, NEW MEXICO
10PP., 1972.
(LA-4959-MS)
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
LOS ALAMOS SCIENTIFIC LAB.(UNIV.OF CALIFORNIA),NM; 87544,USA.

FUNDING ORGANIZATION(S)
ATOMIC ENERGY COMMISSION

THIS THEORETICAL REPORT CONTAINS ORIGINAL DATA. THE SUBTERRENE MELTING METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES SUBTERRENE .

R000295 INTERNAL REACTION PHENOMENA IN PROTOTYPE SUBTERRENE RADIANT HEATER PENETRATORS.
KRUPKA, M. C.
LOS ALAMOS SCIENTIFIC LAB., UNIV. OF CALIF.,
LOS ALAMOS, NEW MEXICO
8PP., 1972.
(LA-5094-MS)
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
LOS ALAMOS SCIENTIFIC LAB.(UNIV.OF CALIFORNIA),NM; 87544,USA.

FUNDING ORGANIZATION(S)
ATOMIC ENERGY COMMISSION

THIS THEORETICAL REPORT CONTAINS ORIGINAL DATA. THE SUBTERRENE MELTING METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES SUBTERRENE .

R000296 INTERNAL TEMPERATURE DISTRIBUTION OF A SUBTERRENE ROCK-MELTING PENETRATOR.
GIGO, R. G.
LOS ALAMOS SCIENTIFIC LAB., UNIV. OF CALIF.,
LOS ALAMOS, NEW MEXICO
10PP., 1973.
(LA-5135-MS)
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
LOS ALAMOS SCIENTIFIC LAB.(UNIV.OF CALIFORNIA),NM; 87544,USA.

FUNDING ORGANIZATION(S)
NATIONAL SCIENCE FOUNDATION,WASHINGTON,D.C.;USA.

THIS IN-SITU-THEORETICAL REPORT CONTAINS ORIGINAL DATA. THE PROJECT INVESTIGATED IS UTILIZED FOR EXPERIMENTAL EXCAVATION PURPOSES. THE SUBTERRENE MELTING METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES SUBTERRENE . GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. THE EXCAVATION CHARACTERISTICS FOR BANDELIER TUFF ARE TREATED. ROCK TYPES REVIEWED INCLUDE TUFF , THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES DATA.

R000297 SUBTERRENE PENETRATION RATE. MELTING POWER RELATIONSHIP.
GIGO, R. G.
LOS ALAMOS SCIENTIFIC LAB., UNIV. OF CALIF.,
LOS ALAMOS, NEW MEXICO
10PP., 1973.
(LA-5204-MS)
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
LOS ALAMOS SCIENTIFIC LAB.(UNIV.OF CALIFORNIA),NM; 87544,USA.

FUNDING ORGANIZATION(S)
NATIONAL SCIENCE FOUNDATION,WASHINGTON,D.C.;USA.

THIS LAB REPORT CONTAINS ORIGINAL DATA. THE PROJECT INVESTIGATED IS UTILIZED FOR EXPERIMENTAL EXCAVATION PURPOSES. THE SUBTERRENE MELTING METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES SUBTERRENE . INFORMATION PERTINENT TO EXCAVATION COST IS GIVEN. ROCK TYPES REVIEWED INCLUDE TUFF .

R000298 DESIGN AND DEVELOPMENT OF PROTOTYPE UNIVERSAL EXTRUDING SUBTERRENE PENETRATORS.
NEUDECKER, J. W. GIGER, A. J.
ARMSTRONG, P. E.
LOS ALAMOS SCIENTIFIC LAB., UNIV. OF CALIF.,
LOS ALAMOS, NEW MEXICO
16PP., 1973.
(LA-5205-MS)
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
LOS ALAMOS SCIENTIFIC LAB.(UNIV.OF CALIFORNIA),NM; 87544,USA.

(CONTINUED)

FUNDING ORGANIZATION(S)
NATIONAL SCIENCE FOUNDATION,WASHINGTON,D.C.!USA.

THIS LAB-THEORETICAL REPORT CONTAINS ORIGINAL DATA. THE SUBTERRENE MELTING METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES SUBTERRENE . ROCK TYPES REVIEWED INCLUDE BASALT, GRANITE AND TUFF .

R000300 HEAT LOSS CALCULATIONS FOR SMALL DIAMETER SUBTERRENE PENETRATORS.
MURPHY, D. J. GIDO, R. G.
LOS ALAMOS, SCIENTIFIC LAB., UNIV. OF CALIF.,
LOS ALAMOS, NEW MEXICO
15PP., 1973.
(LA-5207-MS)
LANGUAGE! ENGLISH

PERFORMING ORGANIZATION(S)
LOS ALAMOS SCIENTIFIC LAB.(UNIV.OF CALIFORNIA),NM! 87544,USA.

FUNDING ORGANIZATION(S)
NATIONAL SCIENCE FOUNDATION,WASHINGTON,D.C.!USA.

THIS LAB REPORT CONTAINS ORIGINAL DATA. THE SUBTERRENE MELTING METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES SUBTERRENE . PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE ALBITE, ALLUVIUM, ANORTHITE, BASALT, FELDSPAR, GRANITE, LATITE, LIMESTONE, OLIVINE, ORTHOCLASE, QUARTZ, RHYOLITE, SANDSTONE, SHALE AND TUFF . THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES DATA.

R000301 PHENOMENA ASSOCIATED WITH THE PROCESS OF ROCK MELTING. APPLICATION TO THE SUBTERRENE SYSTEM.
KRUPKA, M. C.
LOS ALAMOS SCIENTIFIC LAB., UNIV. OF CALIF.,
LOS ALAMOS, NEW MEXICO
10PP., 1973.
(LA-5208-MS)
LANGUAGE! ENGLISH

PERFORMING ORGANIZATION(S)
LOS ALAMOS SCIENTIFIC LAB.(UNIV.OF CALIFORNIA),NM! 87544,USA.

FUNDING ORGANIZATION(S)
NATIONAL SCIENCE FOUNDATION,WASHINGTON,D.C.!USA.

THIS LAB-THEORETICAL AND LAB REPORT CONTAINS ABSTRACTED ONLY AND ORIGINAL DATA. THE SUBTERRENE MELTING METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES SUBTERRENE . GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. THE EXCAVATION CHARACTERISTICS FOR BANDELIER TUFF AND SANTA FE FORMATION (OR GROUP) ARE TREATED. ROCK TYPES REVIEWED INCLUDE ALBITE, ALLUVIUM, BASALT, CORUNDUM, DIOPSIDE, FELDSPAR, GRANITE, GRAPHITE, IRON ORE, MAGNETITE, OLIVINE, QUARTZ, SANDSTONE AND SILICA (AMORPHOUS) .

R000302 DEVELOPMENT AND CONSTRUCTION OF A MODULARIZED MOBILE ROCK-MELTING SUBTERRENE DEMONSTRATION UNIT.
WILLIAMS, R. E.
LOS ALAMOS SCIENTIFIC LAB., UNIV. OF CALIFORNIA,
LOS ALAMOS, NEW MEXICO
8PP., 1973.
(LA-5209-MS)
LANGUAGE! ENGLISH

PERFORMING ORGANIZATION(S)
LOS ALAMOS SCIENTIFIC LAB.(UNIV.OF CALIFORNIA),NM! 87544,USA.

FUNDING ORGANIZATION(S)
NATIONAL SCIENCE FOUNDATION,WASHINGTON,D.C.!USA.

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE PROJECT INVESTIGATED IS UTILIZED FOR EXPERIMENTAL EXCAVATION PURPOSES. THE SUBTERRENE MELTING METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES SUBTERRENE . GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION

(CONTINUED)

ACTIVITIES ARE DESCRIBED. THE EXCAVATION CHARACTERISTICS FOR BANDELIER TUFF ARE TREATED. ROCK TYPES REVIEWED INCLUDE TUFF .

R000303 LARGE SUBTERRENE ROCK-MELTING TUNNEL EXCAVATION SYSTEMS. A PRELIMINARY STUDY.
HANOLD, R. J.
LOS ALAMOS SCIENTIFIC LAB., UNIV. OF CALIF.,
LOS ALAMOS, NEW MEXICO
34PP., 1973.
(LA-5210-MS)
LANGUAGE! ENGLISH

PERFORMING ORGANIZATION(S)
LOS ALAMOS SCIENTIFIC LAB.(UNIV.OF CALIFORNIA),NM! 87544,USA.

FUNDING ORGANIZATION(S)
NATIONAL SCIENCE FOUNDATION,WASHINGTON,D.C.!USA.

THIS THEORETICAL REPORT CONTAINS REVIEW DATA. THE SUBTERRENE MELTING METHOD AND TBM METHOD REPRESENT THE EXCAVATION TECHNIQUES STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES SUBTERRENE . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. TBM EXCAVATION RATE IS ALSO DISCUSSED. INFORMATION PERTINENT TO EXCAVATION COST IS GIVEN. PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE DOLOMITE (ROCK), GRANITE, IRON ORE, LIMESTONE, MUDSTONE, PEGMATITE, SANDSTONE, SHALE AND TUFF .

R000304 DESIGN DESCRIPTION OF MELTING-CONSOLIDATING PROTOTYPE SUBTERRENE PENETRATORS.
NEUDECKER, J. W.
LOS ALAMOS SCIENTIFIC LAB., UNIV. OF CALIF.,
LOS ALAMOS, NEW MEXICO
16PP., 1973.
(LA-521.-MS)
LANGUAGE! ENGLISH

PERFORMING ORGANIZATION(S)
LOS ALAMOS SCIENTIFIC LAB.(UNIV.OF CALIFORNIA),NM! 87544,USA.

FUNDING ORGANIZATION(S)
NATIONAL SCIENCE FOUNDATION,WASHINGTON,D.C.!USA.

THIS LAB-THEORETICAL REPORT CONTAINS ORIGINAL DATA. THE SUBTERRENE MELTING METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES SUBTERRENE . ROCK TYPES REVIEWED INCLUDE ALLUVIUM, SHALE AND TUFF . THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES (LAB) DATA.

R000305 DESCRIPTION OF FIELD TESTS FOR ROCK-MELTING PENETRATION.
GIDO, R. G.
LOS ALAMOS SCIENTIFIC LAB., UNIV. OF CALIF.,
LOS ALAMOS, NEW MEXICO
14PP., 1973.
(LA-5213-MS)
LANGUAGE! ENGLISH

PERFORMING ORGANIZATION(S)
LOS ALAMOS SCIENTIFIC LAB.(UNIV.OF CALIFORNIA),NM! 87544,USA.

FUNDING ORGANIZATION(S)
NATIONAL SCIENCE FOUNDATION,WASHINGTON,D.C.!USA.

THIS LAB-IN-SITU REPORT CONTAINS ORIGINAL DATA. THE PROJECT INVESTIGATED IS UTILIZED FOR EXPERIMENTAL EXCAVATION PURPOSES. THE SUBTERRENE MELTING METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES SUBTERRENE . GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. THE EXCAVATION CHARACTERISTICS FOR BANDELIER TUFF ARE TREATED. ROCK TYPES REVIEWED INCLUDE TUFF .

R000328 CONTINUOUS HIGH VELOCITY JET EXCAVATION. PHASE I.
CHADWICH, R. F. KURKO, M. C.
BENDIX RESEARCH LABS, SOUTHFIELD, MICH.
85PP., 1972.
(AO-744-014, RLO-6241, AVAIL. NTIS)
LANGUAGE! ENGLISH

(CONTINUED)

PERFORMING ORGANIZATION(S)
BENDIX RESEARCH LABORATORIES,SOUTHFIELD,MI;USA.

FUNDING ORGANIZATION(S)
ADVANCED RESEARCH PROJECT AGENCY (ARPA)

THIS LAB REPORT CONTAINS ORIGINAL DATA. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES JET ABRASION (WATER-MECHANICAL) . GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. THE EXCAVATION CHARACTERISTICS FOR BARRE GRANITE, BEREA SANDSTONE, DRESSER BASALT, HOLSTON MARBLE (LIMESTONE OR FORMATION)(=TENNESSEE MARBLE), SALEM LIMESTONE, SIOUX QUARTZITE (=JASPER QUARTZITE), ST.CLOUD(GRAY)GRANODIORITE (=CHARCOAL GREY GRANITE) AND WESTERLY GRANITE ARE TREATED. ROCK TYPES REVIEWED INCLUDE BASALT, GRANITE, LIMESTONE, QUARTZITE AND SANDSTONE . THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES (LAB) DATA.

R000329 SPECIAL RIGS SPEED UP DRILLING AND MUCKING ON TUNNEL JOB.
AUTHOR ANON.
WORLD CONSTRUCTION
18 (2), 42-4, 1965.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
POIRIER AND MCLAINE CORP.

FUNDING ORGANIZATION(S)
MONTREAL TRANSPORTATION COMMISSION AND CITY OF MONTREAL

THIS IN-SITU AND LAB REPORT CONTAINS ORIGINAL DATA. THE PROJECT INVESTIGATED IS UTILIZED FOR ACCESS TUNNEL (SHAFTS AND ADITS TO MAIN OPENING) AND UNSPECIFIED PURPOSES. THE DRILL AND BLAST (FULL FACE) METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES CONVENTIONAL EXPLOSIVE (GELATIN) . THIS DOCUMENT INCORPORATES ADDITIONALLY DRILLING EQUIPMENT CHARACTERISTICS. EXCAVATION ADVANCEMENT RATE IS ALSO DISCUSSED. PERTINENT INFORMATION ON GROUND CONDITIONS AND UNDERGROUND OPENING SUPPORTS AND MATERIALS HANDLING SYSTEM IS ALSO PRESENTED. ROCK TYPES REVIEWED INCLUDE GRANITE AND OVERBURDEN (UNSPECIFIED) . THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES DATA.

R000330 MARSEILLE GETS TWIN-TUBE TUNNEL.
MEAD, H. T.
WORLD CONSTRUCTION
21 (4), 31-3, 1968.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
COMPANIE INDUSTIRELLE DE TRAVAUX (CITRA)ENTREPRISE FOUGEROLLE AND
SOCIETE GENERAL D'ENTREPRISES (SGE),PARIS,FRANCE

FUNDING ORGANIZATION(S)
SERVICES TECHNIQUES DE LA VILLE DE MARSEILLE (DIRECTION DE L'URBANISME), FRANCE

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE ON GOING EXCAVATION OF THE MARSEILLE TUNNEL (MARSEILLE, FRANCE) . THE PROJECT INVESTIGATED IS UTILIZED FOR TWIN HIGHWAY PURPOSES. THE TRENCH METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE MARL .

R000331 ROCK FRACTURE RESEARCH SURFACTANTS.
MC GARRY, F. J. MOAVENZADEH, F.
FEDERAL RAILROAD ADMINISTRATION, OFFICE OF RESEARCH, DEVELOPMENT AND DEMONSTRATIONS, WASHINGTON, D. C.
47PP., 1973.
(REPT. NO. FRA-RT-73-22, AVAIL. NTIS)
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
MASSACHUSETTS INSTITUTE OF TECHNOLOGY,MA;USA.

FUNDING ORGANIZATION(S)
DEPT.OF TRANSPORTATION,FEDERAL RAILROAD ADMINISTRATION, OFFICE OF RESEARCH DEVELOPMENT AND DEMONSTRATIONS, WASH. D.C. USA

(CONTINUED)

FEDERAL RAILROAD ADMINISTRATION,DEPT.OF TRANSPORTATION, WASHINGTON D.C;USA.

THIS IN-SITU AND LAB REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE COMPLETED EXCAVATION OF THE WHITE PINE COPPER MINE (MI., USA) . THE PROJECT INVESTIGATED IS UTILIZED FOR MINE PURPOSES. THE TBM METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHODS SERVICING PROJECT EFFORTS INCLUDE CHEMICAL (SURFACTANTS), MECHANICAL ABRASION (ROTARY) AND SUBTERRENE . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. TBM EXCAVATION RATE IS ALSO DISCUSSED. PERTINENT INFORMATION ON MATERIALS HANDLING SYSTEM IS ALSO PRESENTED. PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE GNEISS, GRANITE, MARBLE, SANDSTONE AND SCHIST .

R000368 TUNNELLING, FRACTURING, DRILLING, AND MINING WITH HIGH SPEED WATER JETS UTILIZING CAVITATION DAMAGE.
JOHNSON, V. E., JR. KOHL, R. A.
THIRUVENGADAM, A. CONN, A. F.
PROC. 1ST INTERN. SYMP. ON JET CUTTING TECHNOL. BHRA FLUID ENGINEERING, CRANFIELD, ENGLAND, 1972
A3-37-55PP., 1972.
(PAPER A3)
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
HYDRONAUTICS INC;USA.

FUNDING ORGANIZATION(S)
DEPT.OF TRANSPORTATION OFFICE OF HIGH SPEED GROUND TRANSPORTATION WASHINGTON,D.C;USA.

THIS LAB REPORT CONTAINS ORIGINAL DATA. THE PROJECT INVESTIGATED IS UTILIZED FOR EXPERIMENTAL EXCAVATION PURPOSES. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES JET ABRASION (WATER) . ROCK TYPES REVIEWED INCLUDE GRANITE .

R000369 ENERGY REQUIREMENTS FOR ROCK CUTTING BY HIGH SPEED WATER JETS.
BROOK, N. PAGE, C. H.
PROC. 1ST INTERN. SYMP. ON JET CUTTING TECHNOL. BHRA FLUID ENGINEERING, CRANFIELD, ENGLAND, 1972
B1-1-12PP., 1972.
(PAPER B1)
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
LEEDS UNIVERSITY,DEPT.OF MINING AND MINERAL SCIENCE,U.K.

THIS LAB REPORT CONTAINS ORIGINAL DATA. THE PROJECT INVESTIGATED IS UTILIZED FOR EXPERIMENTAL EXCAVATION PURPOSES. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES JET ABRASION (WATER) . GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. THE EXCAVATION CHARACTERISTICS FOR ABERDEEN GRANITE, ANDES GRANITE, BATH LIMESTONE, BRAIGOCH SLATE, DARLEY DALE SANDSTONE, HORSFORTH SANDSTONE, KIRBYMOORSIDE LIMESTONE, SKIPTON LIMESTONE, ST.BEES SANDSTONE, WOOLTEN SANDSTONE AND YORK SANDSTONE ARE TREATED. PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE CLAYSTONE, GRANITE, LIMESTONE, MARBLE, SANDSTONE AND SLATE . THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES (LAB) DATA.

R000370 ROCK BREAKING WITH CONTINUOUS HIGH SPEED WATER JET STREAM.
KINOSHITA, T. HOSHINO, K. TAKAGI, K.
PROC. 1ST INTERN. SYMP. ON JET CUTTING TECHNOL. BHRA FLUID ENGINEERING, CRANFIELD, ENGLAND, 1972
B2-13-28PP., 1972.
(PAPER B2)
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
JAPANESE NATIONAL RAILWAYS,RAILWAY TECHNICAL RESEARCH INSTITUTE,
JAPAN

THIS LAB REPORT CONTAINS ORIGINAL DATA. THE PROJECT INVESTIGATED IS UTILIZED FOR EXPERIMENTAL EXCAVATION PURPOSES. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES JET ABRASION (WATER) .

(CONTINUED)

PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE ANDESITE, BASALT, DIORITE, GABBRO, GRANITE AND SANDSTONE .

R000371 HYDRAULIC JETTING WITH CLEAR WATER FOR ROCK EXCAVATION.
ASH, J. L.
PROC. 1ST INTERN. SYMP. ON JET CUTTING TECHNOL. BHRA FLUID ENGINEERING, CRANFIELD, ENGLAND, 1972
83-29-51PP., 1972.
(PAPER 83)
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
U.S.ATOMIC ENERGY COMMISSION

THIS LAB REPORT CONTAINS ORIGINAL DATA. THE PROJECT INVESTIGATED IS UTILIZED FOR EXPERIMENTAL EXCAVATION PURPOSES. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES JET ABRASION (WATER) . GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. THE EXCAVATION CHARACTERISTICS FOR RAINIER MESA MEMBER (OF PIAPI CANYON FORMATION) ARE TREATED. PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE DIORITE, GABBRO, GRANITE, RHYOLITE AND TUFF . THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES (LAB) DATA.

R000372 HIGH-PRESSURE JET CUTTING.
MATSUMOTO, K. HAMADA, H. FUKUDA, T.
SHIZYO, A.
PROC. 1ST INTERN. SYMP. ON JET CUTTING TECHNOL. BHRA FLUID ENGINEERING, CRANFIELD, ENGLAND, 1972
84-53-75PP., 1972.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
HONSHU-SHIKOKU BRIDGE AUTHORITY,JAPAN

THIS LAB REPORT CONTAINS ORIGINAL DATA. THE PROJECT INVESTIGATED IS UTILIZED FOR EXPERIMENTAL EXCAVATION PURPOSES. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES JET ABRASION (WATER) . PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE GRANITE, PORPHYRY AND SANDSTONE . THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES (LAB) DATA.

R000373 THE EFFECT OF CHANGE IN ENERGY AND MOMENTUM LEVELS ON THE ROCK REMOVAL RATE IH INDIANA LIMESTONE.
SUMMERS, D. A. HENRY, R. L.
PROC. 1ST INTERN. SYMP. ON JET CUTTING TECHNOL. BHRA FLUID ENGINEERING, CRANFIELD, ENGLAND, 1972
85-77-88PP., 1972.
(PAPER 85)
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
ROCK MECHANICS AND EXPLOSIVES RESEARCH CENTER (UNIV. OF MISSOURI
AT ROLLA,MO:USA)

FUNDING ORGANIZATION(S)
U.S.GOVT:DEPT.OF DEFENSE

THIS LAB REPORT CONTAINS ORIGINAL DATA. THE PROJECT INVESTIGATED IS UTILIZED FOR EXPERIMENTAL EXCAVATION PURPOSES. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES JET ABRASION (WATER) . GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. THE EXCAVATION CHARACTERISTICS FOR BARRE GRANITE, BEREA SANDSTONE AND SALEM LIMESTONE ARE TREATED. ROCK TYPES REVIEWED INCLUDE LIMESTONE AND SANDSTONE .

R000374 ROCK CUTTING AND BREAKING USING HIGH SPEED WATER JETS TOGETHER WITH TBM CUTTERS.
HOSHINO, K. NAGANO, T. TSUCHISHIMA, H.
PROC. 1ST INTERN. SYMP. ON JET CUTTING TECHNOL. BHRA FLUID ENGINEERING, CRANFIELD, ENGLAND, 1972
86-89-100PP., 1972.
(PAPER 86)
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
JAPANESE NATIONAL RAILWAYS,RAILWAY TECHNICAL RESEARCH INSTITUTE,
JAPAN

THIS LAB REPORT CONTAINS ORIGINAL DATA. THE PROJECT INVESTIGATED IS UTILIZED FOR EXPERIMENTAL EXCAVATION

(CONTINUED)

PURPOSES. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES JET ABRASION (WATER) . ROCK TYPES REVIEWED INCLUDE ANDESITE AND GRANITE . THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES (LAB) DATA.

R000375 ROCK BREAKAGE BY PULSED HIGH PRESSURE WATER JETS.
COOLEY, W. C.
PROC. 1ST INTERN. SYMP. ON JET CUTTING TECHNOL. BHRA FLUID ENGINEERING, CRANFIELD, ENGLAND, 1972
87-101-12PP., 1972.
(PAPER 87)
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
TERRASPACE,INC:1304 N.STONESTREET AVE:ROCKVILLE,MD. 20850:USA

FUNDING ORGANIZATION(S)
U.S.GOVT:DEPT.OF TRANSPORTATION

THIS LAB REPORT CONTAINS ORIGINAL DATA. THE PROJECT INVESTIGATED IS UTILIZED FOR EXPERIMENTAL EXCAVATION PURPOSES. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES JET ABRASION (WATER) . GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. THE EXCAVATION CHARACTERISTICS FOR BEREA SANDSTONE AND INDIANA LIMESTONE ARE TREATED. PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE GRANITE, LIMESTONE AND SANDSTONE . THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES (LAB) DATA.

R000376 ROCK BREAKAGE BY HIGH PRESSURE WATER JETS.
SINGH, M. M. FINLAYSON, L. A. HUCK, P. J.
PROC. 1ST INTERN. SYMP. ON JET CUTTING TECHNOL. BHRA FLUID ENGINEERING, CRANFIELD, ENGLAND, 1972
88-113-24PP., 1972.
(PAPER 88)
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
I.I.T.RESEARCH INSTITUTE,CHICAGO,IL:USA.

FUNDING ORGANIZATION(S)
U.S.GOVT:DEPT.OF DEFENSE

THIS LAB REPORT CONTAINS ORIGINAL DATA. GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. THE EXCAVATION CHARACTERISTICS FOR CONNECTICUT BROWNSTONE, FRENCH CREEK GABBRO, INDIANA LIMESTONE, MASSILLON SANDSTONE (IN POTTSVILLE FORMATION), MILFORD PINK GRANITE AND MINNESOTTA DOLOMITE ARE TREATED. ROCK TYPES REVIEWED INCLUDE DOLOMITE (ROCK), GABBRO, GRANITE, LIMESTONE AND SANDSTONE . THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES (LAB) DATA.

R000377 SOME COMPARISONS OF CONTINUOUS AND PULSED JETS FOR EXCAVATION.
BRESEE, J. C. CRISTY, G. A. MC CLAIN, W. C.
PROC. 1ST INTERN. SYMP. ON JET CUTTING TECHNOL. BHRA FLUID ENGINEERING, CRANFIELD, ENGLAND, 1972
89-125-32, 1972.
(PAPER 89)
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
OAK RIDGE NATIONAL LABORATORY,USA.

THIS LAB REPORT CONTAINS ORIGINAL DATA. THE PROJECT INVESTIGATED IS UTILIZED FOR EXPERIMENTAL EXCAVATION PURPOSES. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES JET ABRASION (WATER) . GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. THE EXCAVATION CHARACTERISTICS FOR BEDFORD LIMESTONE AND BEREA SANDSTONE ARE TREATED. PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE GRANITE, LIMESTONE AND SANDSTONE . THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES (LAB) DATA.

R000378 SOME RELATIONSHIPS IN THE COAL PENETRATION BY HIGH PRESSURE THIN WATER JETS.
KUZNICH, I. A.
PROC. 1ST INTERN. SYMP. ON JET CUTTING TECHNOL. BHRA FLUID ENGINEERING, CRANFIELD, ENGLAND, 1972
E1-1-8PP., 1972.

(CONTINUED)

(PAPER E1)
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
SKOCHINSKY MINING INSTITUTE,U.S.S.R.

THIS THEORETICAL REPORT CONTAINS ORIGINAL DATA. THE PROJECT INVESTIGATED IS UTILIZED FOR EXPERIMENTAL EXCAVATION PURPOSES. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES JET ABRASION (WATER) . ROCK TYPES REVIEWED INCLUDE COAL .

R000379 COAL AND ROCK PENETRATION BY FINE, CONTINUOUS HIGH PRESSURE WATER JETS.
NIKONOV, G. P. GOLDIN, YU. A.
PROC. 1ST INTERN. SYMP. ON JET CUTTING TECHNOL. BHRA FLUID ENGINEERING, CRANFIELD, ENGLAND, 1972
E2-9-24PP., 1972.
(PAPER E2)
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
SKOCHINSKY MINING INSTITUTE,U.S.S.R.

THIS LAB-IN-SITU REPORT CONTAINS ORIGINAL DATA. THE PROJECT INVESTIGATED IS UTILIZED FOR EXPERIMENTAL EXCAVATION PURPOSES. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES JET ABRASION (WATER) . GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. THE EXCAVATION CHARACTERISTICS FOR INKERMANSKI LIMESTONE AND KOROBCHEEVSKI LIMESTONE ARE TREATED. ROCK TYPES REVIEWED INCLUDE COAL, GRANITE, LABRADORITE (USED BY FRENCH AND RUSSIANS FOR NORITE OR GABBRO), LIMESTONE AND MARBLE . THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES (LAB) DATA.

R000380 SOME EXPERIMENTS ON THE APPLICATION OF HIGH PRESSURE WATER JETS FOR MINERAL EXCAVATION.
MODDIE, K. ARTINGSTALL, G.
PROC. 1ST INTERN. SYMP. ON JET CUTTING TECHNOL. BHRA FLUID ENGINEERING, CRANFIELD, ENGLAND, 1972
E3-25-44, 1972.
(PAPER E3)
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
SAFETY IN MINES RESEARCH ESTABLISHMENT,U.K.

THIS LAB REPORT CONTAINS ORIGINAL DATA. THE PROJECT INVESTIGATED IS UTILIZED FOR EXPERIMENTAL EXCAVATION PURPOSES. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES JET ABRASION (WATER) . GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. THE EXCAVATION CHARACTERISTICS FOR ABERDEEN GRANITE, CARRARA MARBLE, OARLEY DALE SANDSTONE, PENNANT SANDSTONE AND WOOLTEN SANDSTONE ARE TREATED. ROCK TYPES REVIEWED INCLUDE GRANITE, MARBLE AND SANDSTONE . THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES (LAB) DATA.

R000382 ON DESTRUCTION OF ROCKS AND METALS BY HIGH PRESSURE JETS OF WATER.
VOITSEKHOVSKY, B. V. SOLOVKIN, E. B.
GREBENNIK, O. I. KUVSHINOV, V. A.
SHOIKHET, G. YA. NIKOLAEV, V. P.
LESIC, N. P.
PROC. 1ST INTERN. SYMP. ON JET CUTTING TECHNOL. BHRA FLUID ENGINEERING, CRANFIELD, ENGLAND, 1972
G8-93-112PP., 1972.
(PAPER G8)
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
INSTITUTE OF HYDRODYNAMICS,NOBOSIBIRK,USSR.

THIS LAB REPORT CONTAINS ORIGINAL DATA. THE PROJECT INVESTIGATED IS UTILIZED FOR EXPERIMENTAL EXCAVATION PURPOSES. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES JET ABRASION (WATER) . PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE GRANITE . THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES (LAB) DATA.

R000383 THERMALLY ASSISTED CUTTING OF GRANITE.
RAD, P. F. MC GARRY, F. J.
SOC. MINING ENG., AIME, PROC. 12TH SYMP. ON ROCK

(CONTINUED)

MECHANICS, NOV. 16-8, 1970
721-57, 1971.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
MASSACHUSETTS INSTITUTE OF TECHNOLOGY,MA:USA.

THIS LAB REPORT CONTAINS ORIGINAL DATA. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES ROTARY MECHANICAL ABRASION-LASER . GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. THE EXCAVATION CHARACTERISTICS FOR BARRE GRANITE ARE TREATED. PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE GRANITE . THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES (LAB) DATA.

R000384 SOME COMMENTS ON THE DESIGN OF MEDIUM TO HARD ROCK TUNNEL BORING MACHINES.
ROSS, N. A.
SOC. MINING ENG., AIME, PROC. 12TH SYMP. ON ROCK MECHANICS, NOV. 16-8, 1970
977-92, 1971.
LANGUAGE: ENGLISH

FUNDING ORGANIZATION(S)
U.S.GOVT:DEPT.OF DEFENSE

THIS THEORETICAL REPORT CONTAINS REPUBLISHED DATA. THE PROJECT INVESTIGATED IS UTILIZED FOR UNSPECIFIED PURPOSES. THE TBM METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. TBM EXCAVATION RATE IS ALSO DISCUSSED. THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES (LAB) DATA.

R000407 THE USE OF UNDERGROUND SPACE TO ACHIEVE NATIONAL GOALS.
BAKER, R. F. CAY, D. A. FITZ SIMONS, N.
HILL, O. W. MICHAELS, R. M. POERTNER, H. G.
WILKINSON, M. D.
UNDERGROUND CONSTRUCTION RES. COUNCIL, AMER. SOC. CIVIL ENG., NATIONAL SCIENCE FOUNDATION,
WASHINGTON, D. C.
335PP., 1972.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
UNDERGROUND CONSTRUCTION RESEARCH COUNCIL

FUNDING ORGANIZATION(S)
NATIONAL SCIENCE FOUNDATION,WASHINGTON,D.C.:USA.

THIS THEORETICAL REPORT CONTAINS REVIEW DATA. THE TBM METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. EXCAVATION ADVANCEMENT RATE IS ALSO DISCUSSED.

R000408 THE MECHANICAL CUTTING CHARACTERISTICS OF THE LOWER CHALK.
ROXBOROUGH, F. F. RISPIN, A.
TUNNELS AND TUNNELLING
5 (1), 45-67, 1973.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
NATIONAL COAL BOARD,U.K.

FUNDING ORGANIZATION(S)
BRITISH TUNNELING SOCIETY

THIS LAB REPORT CONTAINS ORIGINAL DATA. THIS DOCUMENT INCORPORATES ADDITIONALLY DRILLING EQUIPMENT CHARACTERISTICS. GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. THE EXCAVATION CHARACTERISTICS FOR LOWER CHALK ARE TREATED. PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE CHALK (ROCK) . THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES (LAB) DATA.

R000409 MECHANICAL CUTTING CHARACTERISTICS OF LOWER CHALK.
ROXBOROUGH, F. F. RISPIN, A.
TUNNELS AND TUNNELLING

(CONTINUED)

5 (3), 261-74, 1973.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
NATIONAL COAL BOARD,U.K.
1.HAZAMAGUMI LTD.
2.HAEDA CONSTRUCTION CO.
3.TAISEI CORP.
ARGE HOCHTIEF AG/KUNZ AND CO.

FUNDING ORGANIZATION(S)
BRITISH TUNNELING SOCIETY
STADT FRIBOURG
STADT ZURICH,ZURICH,SWITZERLAND
GEMEINDE PESEUX,SWITZERLAND
PAPIERFABRIK,AUSTRIA
KUPFERBERGBAU MITTERBERG,GMBH,AUSTRIA
GEMEINDE FLAWIL,SWITZERLAND
ELEKTRIZITATSWERK D.STADT BERN,SWITZERLAND
STADT BERN,SWITZERLAND
SCHWEIZ,BUNDESBAHNEN,SWITZERLAND
ENEL,ITALY
BAUDIREKTION DES KANTONS ZUG,SWITZERLAND

THIS IN-SITU REPORT CONTAINS REVIEW DATA. THE TBM METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. THE EXCAVATION CHARACTERISTICS FOR LOWER CHALK ARE TREATED. PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE CHALK (ROCK), CONGLOMERATE, MARL, PHYLLITE AND SANDSTONE . THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES (LAB) DATA.

R000410 STUDIES ON THE CUTTING OF ROCK BY ROTARY CUTTERS. PART 2.. CUTTING USING A SPHERICAL CHIP AND A MILLED TOOTH CUTTER.
TAKAOKA, S. HAYAMIZU, H. MISAWA, S. KURIYAGAWA, M.
TUNNELS AND TUNNELLING
5 (3), 276-83, 1973.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
NATIONAL RESEARCH INSTITUTE OF POLLUTION AND RESOURCES,SAITAMA,
JAPAN

FUNDING ORGANIZATION(S)
NATIONAL RESEARCH INSITUTE OF POLLUTION AND RESOURCES, SAITAMA JAPANAPAN

THIS LAB-THEORETICAL REPORT CONTAINS REPUBLISHED DATA. THE PROJECT INVESTIGATED IS UTILIZED FOR EXPERIMENTAL EXCAVATION PURPOSES. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. THE EXCAVATION CHARACTERISTICS FOR FUKUSHIMA ANDESITE, KOFU ANDESITE AND SAMAIRI GRANITE ARE TREATED. ROCK TYPES REVIEWED INCLUDE ANDESITE AND GRANITE .

R000412 METRO: LONDON'S PICADILLY LINE EXTENSION: HOUNSLOW WEST TO HEATHROW AIRPORT CENTRE., PROGRESS AT HALFWAY STAGE.
AUTHOR ANON.
TUNNELS AND TUNNELLING
5 (3), 294-7, 1973.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
W AND C FRENCH CONSTRUCTION,LTD.
MOWLEM,JOHN AND CO.LTD.
TAYLOR WOODROW CONSTRUCTION LTD.

FUNDING ORGANIZATION(S)
1.SERVICES TECHNIQUES DE LA VILLE DE MARSEILLE (DIRECTION DE L'URBANISME) FRANCE
2.GREATER LONDON COUNCIL
3.BRITISH GOVT.

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENINGS DISCUSSED INCLUDE THE ON GOING

(CONTINUED)

EXCAVATION OF THE HATTON CROSS-HEATHROW CENTRAL RAILWAY LINK (LONDON, U.K.), THE ON GOING EXCAVATION OF THE HEATHROW CENTRAL STATION (RAILWAY) (LONDON, U.K.) AND THE ON GOING EXCAVATION OF THE HOUNSLOW WEST-HATTON CROSS RAILWAY LINK (LONDON, U.K.) . THE PROJECTS INVESTIGATED ARE UTILIZED FOR METRO PURPOSES. THE CUT AND COVER METHOD AND SHIELD METHOD REPRESENT THE EXCAVATION TECHNIQUES STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES CONVENTIONAL EXPLOSIVE (UNSPECIFIED) . PERTINENT INFORMATION ON UNDERGROUND OPENING SUPPORTS AND MATERIALS HANDLING SYSTEM IS ALSO PRESENTED.

R000414 DEVELOPMENT OF STABILITY RATIOS FOR TUNNELS DRIVEN IN CLAY.
ATTEWELL, P. B. BODEN, J. B.
TUNNELS AND TUNNELLING
3 (3), 195-8, 1971.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
DURHAM,UNIVERSITY OF

FUNDING ORGANIZATION(S)
DEPT.OF ENVIRONMENT,ROAD RESEARCH LAB.

THIS LAB-THEORETICAL REPORT CONTAINS ORIGINAL DATA. SOIL CHARACTERISTICS AS WELL AS SOIL MECHANICAL PROPERTIES FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED.

R000415 DESIGN AND CONSTRUCTION OF THE HONG KONG CROSS-HARBOUR TUNNEL.
INNES, K. W.
TUNNELS AND TUNNELLING
3 (4), 249-55, 1971.
LANGUAGE:ENGLISH

PERFORMING ORGANIZATION(S)
SCOTT WILSON KIRKPATRICK AND PARTNERS,CONSULTING ENGINEERS,
LONDON,U.K.

FUNDING ORGANIZATION(S)
HONG KONG CROSS-HARBOUR TUNNEL CO:LTD.

THIS IN-SITU-THEORETICAL REPORT CONTAINS REPUBLISHED DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE ON GOING EXCAVATION OF THE HONG KONG CROSS HARBOR TUNNEL (HONG KONG) .

R000416 DESIGN AND CONSTRUCTION OF KINGSWAY THE SECOND MERSEY ROAD TUNNEL AND MOLE NOW PROGRESSING IN THIRD MERSEY ROAD TUNNEL DRIVE.
MEGAN, T. M.
TUNNELS AND TUNNELLING
3 (4), 257-70, 1971.
LANGUAGE:ENGLISH

PERFORMING ORGANIZATION(S)
MOTT,HAY AND ANDERSON,CONSULTING ENGINEERS,LONDON, U.K.

FUNDING ORGANIZATION(S)
MERSEY TUNNEL JOINT COMMITTEE,U.K.

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENINGS DISCUSSED INCLUDE THE ON GOING EXCAVATION OF THE PILOT TUNNEL FOR SECOND MERSEY ROAD TUNNEL (U.K.) AND THE ON GOING EXCAVATION OF THE SECOND MERSEY ROAD TUNNEL (LIVERPOOL, U.K.) . THE PROJECTS INVESTIGATED ARE UTILIZED FOR EXPLORATORY TUNNEL PURPOSES. THE DRILL AND BLAST (FULL FACE) METHOD AND PILOT BORE-CENTER METHOD REPRESENT THE EXCAVATION TECHNIQUES STUDIED. THIS DOCUMENT INCORPORATES ADDITIONALLY DRILLING EQUIPMENT AND TUNNELING MACHINE CHARACTERISTICS. TBM EXCAVATION RATE IS ALSO DISCUSSED. GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE SANDSTONE .

R000420 MECHANICAL TUNNELLING IN CANADA.
VERSITY, T. M.
TUNNELS AND TUNNELLING
3 (5), 361, 1971.
LANGUAGE: ENGLISH

(CONTINUED)

PERFORMING ORGANIZATION(S)
FOUNDATION CO.OF CANADA
KIERRIT-JOHNSON-POOLE,CANADA
NORTHERN CONSTRUCTION CO.(J.W.STEWART LTD.)
INTER MOUNTAIN CONSTRUCTION CO:NORTH VANCOUVER, CANADA

FUNDING ORGANIZATION(S)
TORONTO,METROPOLITAN MUNICIPALITY,TORONTO,CANADA
DEPT.OF AGRICULTURE PRAIRE FARM REHABILITATION ADMINISTRATION
(SOUTH SASKATCHEWAN RIVER DAM)
GREATER VANCOUVER SEWERAGE AND DRAINAGE DISTRICT
GREATER VICTORIA WATER DIST:BRITISH COLUMBIA,CANADA

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENINGS DISCUSSED INCLUDE THE COMPLETED EXCAVATION OF THE GREATER VICTORIA WATER SUPPLY TUNNEL (VICTORIA, B.C., CANADA), THE COMPLETED EXCAVATION OF THE SOUTH SASKATCHEWAN RIVER DAM, THE COMPLETED EXCAVATION OF THE TORONTO SEWER TUNNEL (TORONTO, ONTARIO, CANADA) AND 8TH AVENUE SEWER TUNNEL (VANCOUVER, B.C., CANADA) . THE PROJECTS INVESTIGATED ARE UTILIZED FOR DIVERSION TUNNEL, SEWER AND WATER SUPPLY TUNNEL PURPOSES. THE TBM METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY DRILLING EQUIPMENT AND TUNNELING MACHINE CHARACTERISTICS. GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. THE EXCAVATION CHARACTERISTICS FOR BEARPAW SHALE ARE TREATED. PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE SCHIST AND SHALE . THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES (LAB) DATA.

R000421 BEAS-SUTLEJ LINK PROJECT IN INDIA: 25 KM OF TUNNELLING.
LAMBA, S. S. MALHOTRA, R. K.
TUNNELS AND TUNNELLING
3 (2), 87-94, 1971.
LANGUAGE: ENGLISH

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENINGS DISCUSSED INCLUDE THE ON GOING EXCAVATION OF THE PANDOH BAGGI TUNNEL (BEAS-SUTLEJ LINK PROJECT) (PANDOH, HIMACHAL PRADESH, INDIA) AND THE ON GOING EXCAVATION OF THE SUNDERNAGAR SUTLEJ TUNNEL (BEAS SUTLEJ LINK PROJECT) (SUNDERNAGAR, HIMACH AL PRADESH, INDIA) . THE PROJECTS INVESTIGATED ARE UTILIZED FOR HYDROELECTRIC AND IRRIGATION PURPOSES. THE DRILL AND BLAST (FULL FACE) METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES CONVENTIONAL EXPLOSIVE (GELEX) . THIS DOCUMENT INCORPORATES ADDITIONALLY DRILLING EQUIPMENT CHARACTERISTICS. GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON GROUND CONDITIONS AND UNDERGROUND OPENING SUPPORTS IS ALSO PRESENTED. THE EXCAVATION CHARACTERISTICS FOR JAUNSAR PHYLLITE ARE TREATED. PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE DOLOMITE (ROCK), GRANITE, LIMESTONE, PHYLLITE, QUARTZITE AND SHALE .

P000425 CONSTRUCTING THE DEEP LEVEL DRAINAGE SYSTEM OF MEXICO CITY.
HARRIES, D. A.
TUNNELS AND TUNNELLING
3 (1), 35-41, 1971.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
SIPHA-COGUSA
1.CAMINOS Y URBANIZACIONES,S.A.
2.CONSTRUCTORA BELTHER S.DE R.L.
3.CONSTRUCTORA ESTRELLA,S.A.
4.CONSTRCTORA RAUDALES
5.CONSTRUCTORA Y FRACCIONADORA
6.CONSTRUCTORA URBANOS MEXICO
7.INGENIEROS CIVILES ASOCIADOS

FUNDING ORGANIZATION(S)
MEXICO CITY,CITY ADMINISTRATION OF,MEXICO

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENINGS DISCUSSED INCLUDE THE ON GOING EXCAVATION OF THE DEEP LEVEL DRAINAGE INTERCEPTOR TUNNELS-MEXICO CITY (MEX.CITY, MEX) AND THE ON GOING EXCAVATION OF THE DEEP LEVEL DRAINAGE OUTFALL TUNNEL-MEXICO CITY (MEXICO CITY, MEX.) . THE PROJECTS INVESTIGATED ARE UTILIZED FOR DRAINAGE TUNNEL PURPOSES. THE SHIELD METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. TBM EXCAVATION RATE IS ALSO DISCUSSED. GEOSTRUCTURAL AND SOIL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED.

R000426 TUNNEL OUTLET SCHEME FROM LOCH THOM IN RENFREWSHIRE, SCOTLAND.
MACDONALD, N.
TUNNELS AND TUNNELLING
2 (6), 351-3, 1970.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
THYSSEN (GREAT BRITAIN)LTD.

FUNDING ORGANIZATION(S)
U.S.AIR FORCE WEAPONS LAB:AIRFORCE SYSTEMS COMMAND KIRTLAND AFB, NM., USA.

THIS IN-SITU-THECRETICAL REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE ON GOING EXCAVATION OF THE LOCH THOM WATER TUNNEL (UK) . THE PROJECT INVESTIGATED IS UTILIZED FOR WATER SUPPLY TUNNEL PURPOSES, THE DRILL AND BLAST (FULL FACE) METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES CONVENTIONAL EXPLOSIVE (UNSPECIFIED) . THIS DOCUMENT INCORPORATES ADDITIONALLY DRILLING EQUIPMENT CHARACTERISTICS. GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON GROUND CONDITIONS AND UNDERGROUND OPENING SUPPORTS AND MATERIALS HANDLING SYSTEM IS ALSO PRESENTED. ROCK TYPES REVIEWED INCLUDE BASALT, MARL AND SANDSTONE .

R000431 FULLFACE BORING FOR SWISS SEWAGE TUNNEL.. ATLAS COPCO FULLFACER DRIVES 3.4M DIA. TUNNEL.
AUTHOR ANON.
TUNNELS AND TUNNELLING
2 (6), 383-4, 1970.
LANGUAGE: ENGLISH

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE ON GOING EXCAVATION OF THE RORSCHACH SEWAGE TUNNEL (RORSCHAH, SWITZERLAND) . THE PROJECT INVESTIGATED IS UTILIZED FOR SEWER PURPOSES. THE TBM METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. TBM EXCAVATION RATE IS ALSO DISCUSSED. GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON UNDERGROUND OPENING SUPPORTS AND MATERIALS HANDLING SYSTEM IS ALSO PRESENTED. ROCK TYPES REVIEWED INCLUDE LIMESTONE AND SANDSTONE . THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES (LAB) DATA.

R000435 BUDAPEST'S UNDERGROUND RAILWAY LINE.
VAJDA, Z. KELEMEN, J.
TUNNELS AND TUNNELLING
2 (5), 307-14, 1970.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
BUDAPEST,TECHNICAL UNIVERSITY OF,HUNGARY

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE PROJECT INVESTIGATED IS UTILIZED FOR RAILWAY PURPOSES. THE SHIELD METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES CONVENTIONAL EXPLOSIVE (UNSPECIFIED) . SOIL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON UNDERGROUND OPENING SUPPORTS IS ALSO PRESENTED.

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R000436 BACKGROUND TO KAIMAI RAIL TUNNEL IN NEW ZEALAND.
AUTHOR ANON.
TUNNELS AND TUNNELLING
2 (5), 315-6, 1970.
LANGUAGE: ENGLISH

FUNDING ORGANIZATION(S)
MINISTRY OF WORKS,NEW ZEALAND

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE ON GOING EXCAVATION OF THE KAIMAI RAILWAY TUNNEL (NEW ZEALAND) . THE TBM METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. PERTINENT INFORMATION ON UNDERGROUND OPENING SUPPORTS AND MATERIALS HANDLING SYSTEM IS ALSO PRESENTED.

R000438 THE BELLEGREVE OUTFALL TUNNEL.. GUERNSEY, CHANNEL ISLANDS.
COATES, T.
TUNNELS AND TUNNELLING
2 (4), 209-14, 1970.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
MARPLES RIDGWAY LTD:LONDON,U.K.

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE PROJECT INVESTIGATED IS UTILIZED FOR SEWER PURPOSES. THE DRILL AND BLAST (FULL FACE) METHOD AND INCLINED STAGE METHOD REPRESENT THE EXCAVATION TECHNIQUES STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES CONVENTIONAL EXPLOSIVE (UNSPECIFIED) . GEOSTRUCTURAL AND SOIL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON GROUND CONDITIONS AND UNDERGROUND OPENING SUPPORTS AND MATERIALS HANDLING SYSTEM IS ALSO PRESENTED. THE EXCAVATION CHARACTERISTICS FOR ST.PETER PORT GABBRO ARE TREATED. PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE BOJITE AND GABBRO .

R000439 U. S. RESEARCH TO REDUCE TUNNELLING COSTS.
MARC, E. J. LUCKE, W. N.
TUNNELS AND TUNNELLING
2 (4), 239-43, 1970.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
1.DEPT.OF TRANSPORTATION,WASHINGTON,D.C:
2.UNITED AIRCRAFT RESEARCH LABORATORIES,CT:USA.

FUNDING ORGANIZATION(S)
DEPT.OF TRANSPORTATION OFFICE OF HIGH SPEED GROUND TRANSPORTATION WASHINGTON,D.C:USA.

THIS LAB-THEORETICAL REPORT CONTAINS REVIEW DATA. THE PROJECT INVESTIGATED IS UTILIZED FOR EXPERIMENTAL EXCAVATION PURPOSES. THE REPORTED FRAGMENTATION METHODS SERVICING PROJECT EFFORTS INCLUDE CHEMICAL (SURFACTANTS), JET ABRASION (STEAM), JET ABRASION (FLAME) AND THERMAL-RADIANT (COHERENT LIGHT-LASER) .

R000442 TUNNELS ON FRANCE#S RESEAU EXPRESS REGIONAL.
BOIS, A.
TUNNELS AND TUNNELLING
2 (3), 165-9, 1970.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
REGIE AUTONOME DES TRANSPORTS PARISIENS,FRANCE

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE COMPLETED EXCAVATION OF THE TUNNELS OF FRANCE#S REGIONAL RAILWAY SYSTEM (RESEAU EXPRESS REGIONAL) (FRANCE) . THE PROJECT INVESTIGATED IS UTILIZED FOR METRO PURPOSES. THE SHIELD METHOD AND TBM METHOD REPRESENT THE EXCAVATION TECHNIQUES STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. GEOSTRUCTURAL AND SOIL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON UNDERGROUND OPENING SUPPORTS IS ALSO PRESENTED. THE

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EXCAVATION CHARACTERISTICS FOR LUTETIEN FORMATION AND SOISSONNAIS FORMATION ARE TREATED. PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE ALLUVIUM, LIMESTONE AND SANDSTONE .

R000445 PRE-CONTRACT PLANNING FOR THE LIVERPOOL-WALLASEY ROAD TUNNEL.
TORPEY, K. W.
TUNNELS AND TUNNELLING
2 (2), 79-85, 1970.
LANGUAGE:ENGLISH

PERFORMING ORGANIZATION(S)
NUTTALL,ATKINSON AND CO.
MARPLES RIDGWAY LTD:LONDON,U.K.

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENINGS DISCUSSED INCLUDE THE COMPLETED EXCAVATION OF THE PILOT TUNNEL FOR SECOND MERSEY ROAD TUNNEL (U.K.) AND THE ON GOING EXCAVATION OF THE SECOND MERSEY ROAD TUNNEL (LIVERPOOL, U.K.) . THE PROJECTS INVESTIGATED ARE UTILIZED FOR EXPLORATORY TUNNEL AND HIGHWAY PURPOSES. THE DRILL AND BLAST (FULL FACE) METHOD AND TBM METHOD REPRESENT THE EXCAVATION TECHNIQUES STUDIED. THE REPORTED FRAGMENTATION METHODS SERVICING PROJECT EFFORTS INCLUDE CONVENTIONAL EXPLOSIVE (UNSPECIFIED) AND MECHANICAL ABRASION (ROTARY) . GEOSTRUCTURAL AND SOIL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON UNDERGROUND OPENING SUPPORTS IS ALSO PRESENTED. THE EXCAVATION CHARACTERISTICS FOR MIDDLE BUNTER SANDSTONE FORMATION ARE TREATED. ROCK TYPES REVIEWED INCLUDE SANDSTONE .

R000449 TUNNELLING ON H-E POWER PLANT EL NIHUIL NO. 3 IN ARGENTIAN.
PEIRANO, C.
TUNNELS AND TUNNELLING
2 (1), 37-8, 1970.
LANGUAGE:ENGLISH

PERFORMING ORGANIZATION(S)
CONEVIAL,S.A:ARGENTINA

FUNDING ORGANIZATION(S)
GOVT.AUTHORITY AGUA Y ENERGIA ELECTRICA,ARGENTINA

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENINGS DISCUSSED INCLUDE THE COMPLETED EXCAVATION OF THE EL NIHUIL NO.3-INTAKE TUNNEL (MENDOZA, ARGENTINE REPUBLIC) AND THE COMPLETED EXCAVATION OF THE EL NIHUIL NO.3-PRESSURE TUNNEL (MENDOA, ARGENTINE REPUBLIC) . THE PILOT BORE-INVERT METHOD, PILOT BORE-CENTER METHOD AND RAISE DRIVING (BORING MACHINES) METHOD REPRESENT THE EXCAVATION TECHNIQUES STUDIED. THIS DOCUMENT INCORPORATES ADDITIONALLY DRILLING EQUIPMENT AND TUNNELING MACHINE CHARACTERISTICS. SOIL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON MATERIALS HANDLING SYSTEM IS ALSO PRESENTED. PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE QUARTZITE .

R000451 SECOND MERSEY TUNNEL.. INSITU REPLACEMENT OF 16 FT. DIA. BEARING IN MOLE TUNNELLING MACHINE.
HITCHINGS, D. C. MC KENZIE, J. C.
TUNNELS AND TUNNELLING
1 (4), 173, 1969.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
MOTT,HAY AND ANDERSON,CONSULTING ENGINEERS,LONDON, U.K.

FUNDING ORGANIZATION(S)
MERSEY TUNNEL JOINT COMMITTEE,U.K.

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE ON GOING EXCAVATION OF THE SECOND MERSEY ROAD TUNNEL (LIVERPOOL, U.K.) . THE PROJECT INVESTIGATED IS UTILIZED FOR HIGHWAY PURPOSES. THE TBM METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY DRILLING EQUIPMENT AND TUNNELING MACHINE CHARACTERISTICS.

R000456 PLANT COMPARISON IN NORWEGIAN SEWER TUNNEL.
DRAKE, J.
TUNNELS AND TUNNELLING
1 (3), 138-9, 1969.
LANGUAGE:ENGLISH

PERFORMING ORGANIZATION(S)
ASTRUP AND AUBERT A/S,OSLO,NORWAY

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE COMPLETED EXCAVATION OF THE OPPEGARD SEWER TUNNEL (OPPEGARD, NORWAY) . THE DRILL AND BLAST (FULL FACE) METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. PERTINENT INFORMATION ON MATERIALS HANDLING SYSTEM IS ALSO PRESENTED.

R000489 REVIEW OF EFFECTS OF HYPERVELOCITY JETS AND PROJECTILES ON ROCK.
CLARK, G. B. HAAS, C. J. BROWN, J. W.
MUIR, C. O.
ROCK MECHANICS AND EXPLOSIVES RESEARCH CENTER, UNIVERSITY OF MISSOURI, ROLLA
424PP., 1968.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
MISSOURI,UNIVERSITY OF,ROLLA,MO:USA

FUNDING ORGANIZATION(S)
ADVANCED RESEARCH PROJECT AGENCY (ARPA)
DEPT.OF TRANSPORTATION OFFICE OF HIGH SPEED GROUND TRANSPORTATION WASHINGTON,D.C:USA.

THIS LAB-THEORETICAL REPORT CONTAINS REVIEW DATA. THE REPORTED FRAGMENTATION METHODS SERVICING PROJECT EFFORTS INCLUDE JET ABRASION (WATER), JET ABRASION (WATER CANNON, CONTINUOUS IMPACT) AND JET ABRASION (PROJECTILES, CONTINUOUS IMPACT) . GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. THE EXCAVATION CHARACTERISTICS FOR DARLEY DALE SANDSTONE ARE TREATED. ROCK TYPES REVIEWED INCLUDE BASALT, LIMESTONE AND SANDSTONE . THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES (LAB) DATA.

R000490 SCIENTIFIC AND TECHNICAL APPLICATIONS FORECAST-1964 EXCAVATION.
WILLIAMSON, T. N. PARISH, V. W.
OFFICE OF THE CHIEF OF RESEARCH AND DEVELOPMENT DEPARTMENT OF THE ARMY, WASHINGTON, D. C.
458PP., 1964.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
HUGHES TOOL CO.(OIL TOOL DIVISION,RESEARCH DEPT.), HOUSTON,TX:USA.

FUNDING ORGANIZATION(S)
DEPT.OF THE ARMY,OFFICE OF THE CHIEF OF RESEARCH AND DEVELOPMENT, WASHINGTON,D.C.:USA.

THIS THEORETICAL REPORT CONTAINS REVIEW DATA. THE UNDERGROUND OPENINGS DISCUSSED INCLUDE THE COMPLETED EXCAVATION OF THE DUTCH STATE MINES (HOLLAND, NETHERLANDS), THE COMPLETED EXCAVATION OF THE FORT RANDELL DAM TUNNELS (MO., USA), THE COMPLETED EXCAVATION OF THE HAROLD D. ROBERTS TUNNEL (USA), THE COMPLETED EXCAVATION OF THE THAMES-LEE WATER MAIN TUNNEL (LONDON, ENGLAND, U.K.) AND THE COMPLETED EXCAVATION OF THE WEST DELAWARE TUNNEL (NEW YORK CITY, NY., USA) . THE PROJECTS INVESTIGATED ARE UTILIZED FOR EXPERIMENTAL EXCAVATION, HYDROELECTRIC, MINE AND UNSPECIFIED PURPOSES. THE DRILL AND BLAST (FULL FACE) METHOD, PERIPHERAL SAW AND DRILL-BLAST METHOD, PILOT BORE-CENTER METHOD, RAISE DRIVING (BORING MACHINES) METHOD, TBM METHOD AND VERTICAL ROTARY METHOD REPRESENT THE EXCAVATION TECHNIQUES STUDIED. THE REPORTED FRAGMENTATION METHODS SERVICING PROJECT EFFORTS INCLUDE CONVENTIONAL EXPLOSIVE (UNSPECIFIED), CONVENTIONAL EXPLOSIVE (AMMON GELIGINITE), MECHANICAL ABRASION (ROTARY), MECHANICAL ABRASION (PERCUSSION) AND MECHANICAL ABRASION (ROTARY AND DRAG) . THIS DOCUMENT INCORPORATES ADDITIONALLY DRILLING EQUIPMENT AND TUNNELING MACHINE CHARACTERISTICS. TBM EXCAVATION AND EXCAVATION

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ADVANCEMENT RATES ARE ALSO DISCUSSED. GEOSTRUCTURAL AND SOIL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON UNDERGROUND OPENING SUPPORTS AND MATERIALS HANDLING SYSTEM IS ALSO PRESENTED. THE EXCAVATION CHARACTERISTICS FOR MANHATTAN SCHIST AND PIERRE SHALE ARE TREATED. ROCK TYPES REVIEWED INCLUDE CHALK (ROCK), COAL, DIABASE, DOLOMITE (ROCK), GNEISS, GRANITE, IRON ORE, JASPER, LIMESTONE, MARL, MUDSTONE, QUARTZITE, SALT, SANDSTONE, SCHIST, SHALE AND SLATE . THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES (LAB) DATA.

R000491 GREAT CHARLES STREET ROAD TUNNEL.
LYONS, A. G. SCOFIELD, J.
TUNNELS AND TUNNELLING
1 (1), 23-6, 1969.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
HALCROW,SIR WILLIAM AND PARTNERS,CONSULTING ENGINEERS,LONDON,U.K.

FUNDING ORGANIZATION(S)
BIRMINGHAM,SURVEYOR AND PLANNING OFFICE OF,U.K.

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE COMPLETED EXCAVATION OF THE GREAT CHARLES STREET ROAD TUNNEL (BIRMINGHAM, U.K.) . THE PROJECT INVESTIGATED IS UTILIZED FOR TWIN HIGHWAY PURPOSES. THE PARTIAL FACE TUNNEL MACHINE METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. TBM EXCAVATION RATE IS ALSO DISCUSSED. PERTINENT INFORMATION ON UNDERGROUND OPENING SUPPORTS AND MATERIALS HANDLING SYSTEM IS ALSO PRESENTED. ROCK TYPES REVIEWED INCLUDE SANDSTONE .

R000493 MEXICAN DRAINAGE TUNNELS.
AUTHOR ANON.
TUNNELS AND TUNNELLING
1 (1), 39, 1969.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
MITCHELL CONSTRUCTION KINNEAR MOODIE GROUP LTD: PETERBOROUGH

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE PROPOSED EXCAVATION OF THE MEXICO CITY DRAINAGE TUNNELS (MEXICO CITY, MEXICO) . THE PROJECT INVESTIGATED IS UTILIZED FOR DRAINAGE TUNNEL PURPOSES. THE SHIELD METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. GEOSTRUCTURAL CHARACTERISTICS AS WELL AS SOIL MECHANICAL PROPERTIES FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE HYPIDIOMORPHIC .

R000495 HINKLEY TUNNELS PROVE ECONOMICS OF MACHINE FOR SHORT DISTANCE TUNNELS.
PIRRIE, N. D.
TUNNELS AND TUNNELLING
1 (1), 46-7, 1969.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
MCALPINES,SIR ROBERTS SONS LTD.

FUNDING ORGANIZATION(S)
CENTRAL ELECTRICITY GENERATING BOARD,U.K.

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE COMPLETED EXCAVATION OF THE HINKLEY TUNNELS (HINKLEY PT., U.K.) . THE PROJECT INVESTIGATED IS UTILIZED FOR WATER CONVEYANCE (OTHER THAN WATER SUPPLY) PURPOSES. THE TBM METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. PERTINENT INFORMATION ON UNDERGROUND OPENING SUPPORTS IS ALSO PRESENTED.

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PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE LIMESTONE AND MUDSTONE .

R000496 COO-TROIS PONTS H-E SCHEME IN BELGIUM.
AUTHOR ANON.
TUNNELS AND TUNNELLING
1 (2), 77, 1969.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
COMPAGNIE CENTRE PRISES C.F.E.(BRUSSELS,BELGIUM) (
REPRESENTING
JOINT VENTURE OF SIX COMPANIES)

FUNDING ORGANIZATION(S)
BECA (BUREAU POUR L'ETUDE DE CENTRALES DE POMPAGE
EN ARDENNES)
EN ARDENNES)

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENINGS DISCUSSED INCLUDE THE ON GOING EXCAVATION OF THE COO-TROIS PONTS H-E SCHEME, UNDERGROUND POWER STATION OF(BELGIUM), THE PROPOSED EXCAVATION OF THE COO-TROIS PONTS H-E SCHEME, ACCESS SHAFT (BELGIUM). THE COMPLETED EXCAVATION OF THE COO-TROIS PONTS H-E SCHEME, VENTILATION TUNNEL OF (BELGIUM), THE PROPOSED EXCAVATION OF THE COO-TROIS PONTS H-E SCHEME, PRESSURE TUNNEL OF (BELGIUM), THE PROPOSED EXCAVATION OF THE COO-TROIS PONTS H-E SCHEME, TAILRACE TUNNELS OF (BELGIUM) AND THE ON GOING EXCAVATION OF THE COO-TROIS PONTS H-E SCHEME, ACCESS TUNNEL FOR UNDERGROUND POWER STATION (BELGIUM) . THE PROJECTS INVESTIGATED ARE UTILIZED FOR ACCESS TUNNEL (SHAFTS AND ADITS TO MAIN OPENING), HYDROELECTRIC AND VENTILATION PURPOSES. THE DRILL AND BLAST (OTHER THAN FULL FACE) METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES CONVENTIONAL EXPLOSIVE (UNSPECIFIED) . PERTINENT INFORMATION ON UNDERGROUND OPENING SUPPORTS IS ALSO PRESENTED. PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE SCHIST .

R000499 THE MERSEY OUTFALLS INTERCEPTOR SEWER AT
WARRINGTON, LANCS.
PAKES, B.
TUNNELS AND TUNNELLING
3 (6), 415-7, 1971.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
WARRINGTON,COUNTY BOROUGH OF,U.K.
MITCHELL BROTHERS,SONS AND CO.LTD.

FUNDING ORGANIZATION(S)
WARRINGTON,COUNTY BOROUGH OF,U.K.

THIS IN-SITU AND LAB REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE ON GOING EXCAVATION OF THE MERSEY OUTFALL INTERCEPTOR SEWER TUNNEL (WARRINGTON, LANCASHIRE, U.K.) . THE PROJECT INVESTIGATED IS UTILIZED FOR SEWER PURPOSES. THE SHIELD METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES HAND MINING . GEOSTRUCTURAL AND SOIL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON GROUND CONDITIONS AND UNDERGROUND OPENING SUPPORTS AND MATERIALS HANDLING SYSTEM IS ALSO PRESENTED. THE EXCAVATION CHARACTERISTICS FOR BUNTER SANDSTONE ARE TREATED.

R000503 GROUND FREEZING FOR TUNNELLING IN WATER BEARING SOIL
AT DORTMUND, GERMANY.
BRAUN, B.
TUNNELS AND TUNNELLING
4 (1), 27-32, 1972.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
1.DEILMAN-HANIEL GMBH,DORTMUND-KURL,HAUSTENBECKE 1,
P.O.BOX 130220,
46,DORTMUND-ASSELN,W.GERMANY
2.WIX AND LIESENHOFF,DORTMUND-WAMBEL,
RUSCHEBRINKSTRASSE 99-101,
P.O.BOX 774,46 DORTMUND,W.GERMANY

FUNDING ORGANIZATION(S)
DORTMUND,CITY OF,W.GERMANY

(CONTINUED)

THIS IN-SITU REPORT CONTAINS ABSTRACTED ONLY AND ORIGINAL DATA. THE UNDERGROUND OPENINGS DISCUSSED INCLUDE THE COMPLETED EXCAVATION OF THE ALBERG TUNNEL (AUSTRIA), THE COMPLETED EXCAVATION OF THE HORNSEA STORAGE SCHEME, UNDERGROUND OPENINGS (HORNSEA, YORKSHIRE U.K.), THE COMPLETED EXCAVATION OF THE HORNSEA STORAGE SCHEME, LEACHING MAINS PUMPING SHAFT INTAKE (HORNSEA, YORKSHIRE, U.K.), THE COMPLETED EXCAVATION OF THE HORNSEA STORAGE SCHEME, LEACHING MAINS INTAKE-OUTFALL PIPE TUNNEL (HORNSEA, YORKSHIRE, U.K.), THE COMPLETED EXCAVATION OF THE LOHSCHBERG TUNNEL AND THE COMPLETED EXCAVATION OF THE PRAGUE METRO SYSTEM, TUNNELS OF (PRAGUE, CZECHOSLOVAKIA) . THE PROJECTS INVESTIGATED ARE UTILIZED FOR ACCESS TUNNEL (SHAFTS AND ADITS TO MAIN OPENING) AND SEWER PURPOSES. THE CIRCULAR CONCRETE SEGMENTS SUNK BY UNDERMINING WITHIN CIRCULAR SHEETPILE CUTOFF METHOD AND TBM METHOD REPRESENT THE EXCAVATION TECHNIQUES STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. EXCAVATION ADVANCEMENT RATE IS ALSO DISCUSSED. GEOSTRUCTURAL AND SOIL CHARACTERISTICS AS WELL AS SOIL MECHANICAL PROPERTIES FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON MATERIALS HANDLING SYSTEM IS ALSO PRESENTED. ROCK TYPES REVIEWED INCLUDE FROZEN SOIL . THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES (LAB) DATA.

R000505 A US MOLE CONTRACTOR'S VIEWS ON RAPID EXCAVATION,
PLANNING AND CONSTRUCTION PROBLEMS.
NORMAN, N. E.
TUNNELS AND TUNNELLING
4 (1), 34-5, 1972.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
S AND M CONSTRUCTORS INC(SOLON,OH)USA.

FUNDING ORGANIZATION(S)
BAY AREA RAPID TRANSIT,SAN FRANCISCO,CA)USA

THIS IN-SITU REPORT CONTAINS REVIEW DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE COMPLETED EXCAVATION OF THE BAY AREA RAPID TRANSIT PROJECT (BART) (SECTION UNSPECIFIED) (SAN FRANCISCO, CA., USA) . THE PROJECT INVESTIGATED IS UTILIZED FOR METRO PURPOSES. THE MANUAL METHOD AND TBM METHOD REPRESENT THE EXCAVATION TECHNIQUES STUDIED. THE REPORTED FRAGMENTATION METHODS SERVICING PROJECT EFFORTS INCLUDE HAND MINING AND MECHANICAL ABRASION (ROTARY) SOIL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE SANDSTONE AND SERPENTINE .

R000506 EFFICIENT EXCAVATION WITH PARTICULAR REFERENCE TO
CUTTING HEAD DESIGN OF HARD ROCK TUNNELLING
MACHINES.
GAYE, F.
TUNNELS AND TUNNELLING
4 (1), 39-48, 1972.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
GAYE,FELIX(CONSULTANTS IN TUNNELING MACHINE,LONDON,
U.K.

THIS IN-SITU AND LAB REPORT CONTAINS REPUBLISHED AND REVIEW DATA. THE UNDERGROUND OPENINGS DISCUSSED INCLUDE THE COMPLETED EXCAVATION OF THE COOKHOUSE TUNNEL (S.AFRICA), THE COMPLETED EXCAVATION OF THE DORCHESTER WATER TUNNEL (BOSTON, MA., USA), THE COMPLETED EXCAVATION OF THE LAWRENCE AVENUE SEWER SYSTEM (CHICAGO, IL., USA), THE COMPLETED EXCAVATION OF THE MAGMA COPPER MINE (SUPERIOR, AZ., USA) AND THE COMPLETED EXCAVATION OF THE PORT HURON (WATER SUPPLY) TUNNEL (DETROIT, MI., USA) . THE PROJECTS INVESTIGATED ARE UTILIZED FOR MINE, SEWER AND WATER SUPPLY TUNNEL PURPOSES. THE TBM METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. THE EXCAVATION CHARACTERISTICS FOR ANTRIM SHALE, HOLSTON MARBLE (LIMESTONE OR FORMATION)(=TENNESSEE MARBLE), INDIANA LIMESTONE AND KASOTA SANDSTONE ARE TREATED.

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PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE ANDESITE, ARGILLITE, CONGLOMERATE, LIMESTONE, MARBLE, MUDSTONE, QUARTZITE, RHYOLITE, SANDSTONE, SHALE AND SILTSTONE . THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES (LAB) DATA.

R000507 HISTORICAL ASPECTS OF TUNNELLING.
HARDING, H.
TUNNELS AND TUNNELLING
4 (1), 53-61, 1972.
LANGUAGE: ENGLISH

THIS IN-SITU REPORT CONTAINS REVIEW DATA. THE UNDERGROUND OPENINGS DISCUSSED INCLUDE THE COMPLETED EXCAVATION OF THE ALBERG TUNNEL (AUSTRIA), THE COMPLETED EXCAVATION OF THE HOOSAC TUNNEL (MA., USA), THE COMPLETED EXCAVATION OF THE LOHSCHBERG TUNNEL, THE COMPLETED EXCAVATION OF THE MOUNT CENIS (FREJUS) TUNNEL (FRANCE-ITALY), THE COMPLETED EXCAVATION OF THE SIMPLON TUNNEL (SWITZERLAND-ITALY) AND THE COMPLETED EXCAVATION OF THE ST. GOTTHARD TUNNEL (SWITZERLAND-ITALY) . THE PROJECTS INVESTIGATED ARE UTILIZED FOR HIGHWAY AND TWIN HIGHWAY PURPOSES. THE DRILL AND BLAST (OTHER THAN FULL FACE) METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES CONVENTIONAL EXPLOSIVE (BLACK POWDER) . SOIL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE GNEISS, KAOLIN AND SCHIST .

R000508 PRAGUE METRO CONSTRUCTION PROCEEDS THROUGH DIFFICULT GEOLOGICAL CONDITIONS.
AUTHOR ANON.
TUNNELS AND TUNNELLING
4 (1), 63-5, 1972.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
VODNI STAVBY OF PRAGUE,PRAGUE,CZECHOSLOVAKIA

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE ON GOING EXCAVATION OF THE PRAGUE METRO SYSTEM, TUNNELS OF (PRAGUE, CZECHOSLOVAKIA) . THE PROJECT INVESTIGATED IS UTILIZED FOR METRO PURPOSES. THE SHIELD METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) . TBM EXCAVATION RATE IS ALSO DISCUSSED. GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON MATERIALS HANDLING SYSTEM IS ALSO PRESENTED. ROCK TYPES REVIEWED INCLUDE ROCK (UNSPECIFIED) . THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES (LAB) DATA.

R000509 PUMPED STORAGE PLAT AT RACCOON MOUNTAIN IN USA.
KIMMONS, G. H.
TUNNELS AND TUNNELLING
4 (2), 108-13, 1972.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
TENNESSEE VALLEY AUTHORITY

FUNDING ORGANIZATION(S)
TENNESSEE VALLEY AUTHORITY,USA.

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENINGS DISCUSSED INCLUDE THE ON GOING EXCAVATION OF THE RACCOON MOUNTAIN PUMPED STORAGE PROJECT, UNDERGROUND POWER HOUSE (RACCOON MTN., TN., USA), THE ON GOING EXCAVATION OF THE RACCOON MOUNTAIN PUMPED STORAGE PROJECT, TRANSFORMER VAULT (RACCOON MTN., TN., USA), THE ON GOING EXCAVATION OF THE RACCOON MOUNTAIN PUMPED STORAGE PROJECT, SURG CHAMBER (RACCOON MTN., TN., USA), THE ON GOING EXCAVATION OF THE RACCOON MOUNTAIN PUMPED STORGAE PROJECT, MAIN ACCESS TUNNEL (RACCOON MTN., TN., USA), THE ON GOING EXCAVATION OF THE RACCOON MOUNTAIN PUMPED STORAGE PROJECT, VENTILATION AND EMERGENCY EXIT TUNNEL (RACCOON MTN., TN., USA), THE ON GOING EXCAVATION OF THE RACCOON MOUNTAIN PUMPED STORAGE PROJECT, CABLE AND VISITOR ACCESS SHAFT (RACCOON MTN., TN., USA), THE ON GOING EXCAVATION OF THE RACCOON MOUNTAIN PUMPED STORAGE PROJECT, INTAKE SHAFT AND POWER PLANT CONNECTING TUNNEL (RACCOON MTN., TN., USA), THE ON

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GOING EXCAVATION OF THE RACCOON MOUNTAIN PUMPED STORAGE PROJECT, SURGE CHAMBER ACCESS TUNNEL (RACCOON MTN., TN., USA), THE ON GOING EXCAVATION OF THE RACCOON MOUNTAIN PUMPED STORAGE PROJECT, INTAKE SHAFT (RACCOON MTN., TN., USA), THE ON GOING EXCAVATION OF THE RACCOON MOUNTAIN PUMPED STORAGE PROJECT, DISCHARGE TUNNEL (RACCOON MTN., TN., USA) AND THE ON GOING EXCAVATION OF THE RACCOON MOUNTAIN PUMPED STORAGE PROJECT, PENSTOCK TUNNELS (RACCOON MTN., TN., USA) . THE PROJECTS INVESTIGATED ARE UTILIZED FOR ACCESS TUNNEL (SHAFTS AND ADITS TO MAIN OPENING), PUMP STORAGE AND VENTILATION AND EMERGENCY EXIT PURPOSES. THE DRILL AND BLAST (LINE DRILLED) METHOD, HEADING AND BENCH METHOD AND RAISE DRIVING (MECH.PLATFORM) METHOD REPRESENT THE EXCAVATION TECHNIQUES STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDE CONVENTIONAL EXPLOSIVE (TRIMTEX) AND MECHANICAL ABRASION (ROTARY) . GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON UNDERGROUND OPENING SUPPORTS AND MATERIALS HANDLING SYSTEM IS ALSO PRESENTED. PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE LIMESTONE . THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES DATA.

R000510 EFFICIENT EXCAVATION WITH PARTICULAR REFERENCE TO CUTTING HEAD DESIGN OF HARD ROCK TUNNELLING MACHINES.
GAYE, F.
TUNNELS AND TUNNELLING
4 (2), 135-43, 1972.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
GAYE,FELIX:CONSULTANTS IN TUNNELING MACHINE,LONDON, U.K.

THIS LAB-IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE COMPLETED EXCAVATION OF THE CLOUD HILL QUARRY (BREEDON, LEICESTERSHIRE, U.K.) . THE PROJECT INVESTIGATED IS UTILIZED FOR EXPERIMENTAL EXCAVATION PURPOSES. THE TBM METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. THE EXCAVATION CHARACTERISTICS FOR BREEDON LIMESTONE ARE TREATED. ROCK TYPES REVIEWED INCLUDE IRON ORE . THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES (LAB) DATA.

R000511 SPAIN: MADRID METRO, CURRENT WORK.
GONZALEZ, J. M. G.
TUNNELS AND TUNNELLING
4 (2), 147-51, 1972.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
MINISTRY OF PUBLIC WORKS,DEPT.OF RAIL CONSTRUCTION, MADRID,SPAIN

FUNDING ORGANIZATION(S)
SPAIN,GOVT.OF

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE ON GOING EXCAVATION OF THE MADRID SUBWAY TUNNELS (MADRID, SPAIN) . THE PROJECT INVESTIGATED IS UTILIZED FOR METRO PURPOSES. THE HEADING AND BENCH METHOD AND SHIELD METHOD REPRESENT THE EXCAVATION TECHNIQUES STUDIED. THE REPORTED FRAGMENTATION METHODS SERVICING PROJECT EFFORTS INCLUDE CONVENTIONAL EXPLOSIVE (UNSPECIFIED) AND MECHANICAL ABRASION (ROTARY) . TBM EXCAVATION RATE IS ALSO DISCUSSED. GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. THE EXCAVATION CHARACTERISTICS FOR MIGA, PENUELAS SHALE, SARMANTIENSE AND TOSCO ARE TREATED. PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE CLAY AND SAND .

R000514 CHAPTER VI. ECONOMIC ANALYSIS OF HEAT-ASSISTED TUNNEL BORING MACHINES.
CARSTENS, J. P. DAVISON, H. R. BROWN, C. A. SMITH, A. R. MC GARRY, F. J.
UNITED AIRCRAFT CORP., EAST HARTFORD, CONNECTICUT
277-311, 1970.

(CONTINUED)

(PB-197 243, UARL-REPT. J-970802-12, FRA-RT-71-63)
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
UNITED AIRCRAFT RESEARCH LAB;E.HARTFORD,CT;USA.

FUNDING ORGANIZATION(S)
U.S.GOVT;DEPT.OF TRANSPORTATION

THIS IN-SITU, LAB-IN-SITU-THEORETICAL AND LAB REPORT CONTAINS ORIGINAL AND REVIEW DATA. THE UNDERGROUND OPENINGS DISCUSSED INCLUDE THE COMPLETED EXCAVATION OF THE AZOYEA TUNNEL (JUAN-CHAMA PROJECT) (N.CEN.NM., USA), THE COMPLETED EXCAVATION OF THE BAY AREA RAPID TRANSIT PROJECT (BART) (SECTION UNSPECIFIED) (SAN FRANCISCO, CA., USA), THE COMPLETED EXCAVATION OF THE BLANCO TUNNEL (JUAN-CHAMA PROJECT) (N.CEN.NM., USA), THE COMPLETED EXCAVATION OF THE CHICAGO SEWER SYSTEM (CHICAGO, IL., USA), THE COMPLETED EXCAVATION OF THE MATHER B MINE (NAUGAUNEE, MI., USA), THE COMPLETED EXCAVATION OF THE OSO TUNNEL (CO., USA), THE COMPLETED EXCAVATION OF THE PHILADELPHIA SEWER, THE COMPLETED EXCAVATION OF THE ST.LOUIS METRO SEWER DISTRICT (ST.LOUIS, MO., USA) AND THE COMPLETED EXCAVATION OF THE TUNNEL NO.1, NAVAJO INDIAN IRRIGATION PROJECT (NM., USA) . THE RAISE DRIVING (BORING MACHINES) METHOD AND TBM METHOD REPRESENT THE EXCAVATION TECHNIQUES STUDIED. THE REPORTED FRAGMENTATION METHODS SERVICING PROJECT EFFORTS INCLUDE MECHANICAL ABRASION (ROTARY), THERMAL-RADIANT (COHERENT LIGHT-LASER) AND THERMAL-RADIANT (ELECTRON BEAM) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. TBM EXCAVATION RATE IS ALSO DISCUSSED. GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. THE EXCAVATION CHARACTERISTICS FOR BARRE GRANITE ARE TREATED. PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE GRANITE AND ROCK (UNSPECIFIED) . THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES (LAB) DATA.

R000521 SEMIANNUAL TECHNICAL REPORT FOR ARPA CONTRACT H0210035 REVIEW AND CRITICAL ANALYSIS OF THE STATE-OF-THE-ART IN UNDERGROUND WORKS CONSTRUCTION.
DODDS, R. K.
ADVANCED RESEARCH PROJECTS AGENCY
127PP., 1971.
(ARPA-1579)
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
1,DRAKE-WINSTON
HARZA ENGINEERING
BECHTEL INC;SD,BEALE ST;SAN FRANSISCO,CA;94119
HARDEM,PAUL AND INC.
DIXON,L.;EGO.

FUNDING ORGANIZATION(S)
OREGON STATE HIGHWAY DEPT;OR;USA.
SEATTLE POWER AND LIGHT CO;SEATTLE,WA;USA.
TACOMA,CITY OF;WA;USA.
EUGENE WATER AND ELECTRIC BOARD,EUGENE,OR;USA.

THIS IN-SITU REPORT CONTAINS REVIEW DATA. THE UNDERGROUND OPENINGS DISCUSSED INCLUDE THE COMPLETED EXCAVATION OF THE CARMEN-SMITH DIVERSION AND POWER TUNNEL (LANE CO., OR., USA), THE COMPLETED EXCAVATION OF THE EQUIPMENT CHAMBERS AND TUNNELS (BOUNDARY DAM PROJECT) (PEND OREILLE CO., WA., USA), THE COMPLETED EXCAVATION OF THE LAGRANDE POWER TUNNEL (PIERCE CO., WA., USA), THE COMPLETED EXCAVATION OF THE MOSSY ROCK DIVERSION TUNNELS (LEWIS CO., WA., USA) AND THE COMPLETED EXCAVATION OF THE VISTA RIDGE TUNNEL (MULTNOMAH CO., OR., USA) . THE PROJECTS INVESTIGATED ARE UTILIZED FOR HIGHWAY AND HYDROELECTRIC PURPOSES. THE DRILL AND BLAST (FULL FACE) METHOD AND HEADING AND BENCH METHOD REPRESENT THE EXCAVATION TECHNIQUES STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES CONVENTIONAL EXPLOSIVE (UNSPECIFIED) . GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON GROUND CONDITIONS AND UNDERGROUND OPENING SUPPORTS IS ALSO PRESENTED. PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE BASALT AND LIMESTONE .

R000527 A STRUCTURAL INTERPRETATION OF THE GARLOCK FAULT ZONE AT THE TEHACHAPI CROSSING.
PETERS, C. M. F.

(CONTINUED)

PROC. 1ST NORTH AMER. RAPID EXCAVATION TUNNELING CONF.
1, 133-55, 1972.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
PETERS,C.M.F;CONSULTANTS,SAN FRANSISCO,CA;USA.

FUNDING ORGANIZATION(S)
CALIFORNIA, STATE OF,DEPT. OF WATER RESOURCES,CA;USA.

THIS IN-SITU-THEORETICAL AND THEORETICAL REPORT CONTAINS ORIGINAL AND REVIEW DATA. THE UNDERGROUND OPENINGS DISCUSSED INCLUDE THE COMPLETED EXCAVATION OF THE CARLEY V.PORTER TUNNEL ADIT (CA.AQUEDUCT SYSTEM) (CA., USA) AND THE COMPLETED EXCAVATION OF THE TEHACHAPI TUNNEL NO.3 (CA., USA) . THE PROJECTS INVESTIGATED ARE UTILIZED FOR EXPLORATORY TUNNEL AND WATER SUPPLY TUNNEL PURPOSES. THE DRILL AND BLAST (FULL FACE) METHOD AND HEADING AND BENCH METHOD REPRESENT THE EXCAVATION TECHNIQUES STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES CONVENTIONAL EXPLOSIVE (UNSPECIFIED) . GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON GROUND CONDITIONS AND UNDERGROUND OPENING SUPPORTS IS ALSO PRESENTED. THE EXCAVATION CHARACTERISTICS FOR PELONA SCHIST AND TEJON LOOKOUT GRANITE ARE TREATED. PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE DIORITE, FAULT GOUGE, GNEISS, GRANITE AND SCHIST . THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES DATA.

R000528 GEOPHYSICAL MEASUREMENTS RELATED TO TUNNELLING.
SCHWARZ, S. D.
PROC. 1ST NORTH AMER. RAPID EXCAVATION TUNNELING CONF.
1, 195-204, 1972.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
SHANNON AND WILSON INC;SEATTLE,WA;USA.

FUNDING ORGANIZATION(S)
DETROIT,CITY OF,DEPT.OF WATER SUPPLY,DETROIT,MI;USA.

THIS IN-SITU-THEORETICAL REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE COMPLETED EXCAVATION OF THE PORT HURON (WATER SUPPLY) TUNNEL (DETROIT, MI., USA) . THE PROJECT INVESTIGATED IS UTILIZED FOR WATER SUPPLY TUNNEL PURPOSES. THE TBM METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) . GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON GROUND CONDITIONS IS ALSO PRESENTED. THE EXCAVATION CHARACTERISTICS FOR ANTRIM SHALE ARE TREATED. PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE SHALE .

R000529 SOFT GROUND TUNNELS FOR THE BART PROJECT.
KUESEL, T. R.
PROC. 1ST NORTH AMER. RAPID EXCAVATION TUNNELING CONF.
1, 287-313, 1972.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
PARSONS,BRINCKERHOFF,QUADE AND DOUGLAS,ENGINEERS, NEW YORK AND
SAN FRANCISCO;USA.

FUNDING ORGANIZATION(S)
BAY AREA RAPID TRANSIT,SAN FRANCISCO,CA;USA

THIS IN-SITU-THEORETICAL REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE COMPLETED EXCAVATION OF THE BAY AREA RAPID TRANSIT PROJECT (BART) (MARKET AND MISSION STREET SECTIONS) (SAN FRANCISCO, CA., USA) . THE PROJECT INVESTIGATED IS UTILIZED FOR METRO PURPOSES. THE SHIELD METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHODS SERVICING PROJECT EFFORTS INCLUDE HAND MINING AND MECHANICAL ABRASION (ROTARY) . SOIL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT

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INFORMATION ON GROUND CONDITIONS AND UNDERGROUND OPENING SUPPORTS IS ALSO PRESENTED. PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE 'SANDSTONE AND SERPENTINITE .

R000530 PERFORMANCE OF A SOFT GROUND TUNNEL ON THE WASHINGTON METRO.
HANSMIRE, W. H. CORDING, E. J.
PROC. 1ST NORTH AMER. RAPID EXCAVATION TUNNELING CONF.
1, 371-89, 1972.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
ILLINOIS,UNIVERSITY OF,URBANA,IL;USA

FUNDING ORGANIZATION(S)
WASHINGTON METRO,WASHINGTON,D.C;USA.

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGRGOUND OPENING DISCUSSED INCLUDES THE ON GOING EXCAVATION OF THE WASHINGTON METRO PROJECT B-V (WASHINGTON, D.C., USA) . THE PROJECT INVESTIGATED IS UTILIZED FOR METRO PURPOSES. THE SHIELD METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (UNSPECIFIED) . GEOSTRUCTURAL AND SOIL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON UNDERGROUND OPENING SUPPORTS AND MATERIALS HANDLING SYSTEM IS ALSO PRESENTED.

R000531 THE THRESHOLD OF THE SEVENTIES, THE EAST 63RD STREET TUNNEL.
CASEY, E. F.
PROC. 1ST NORTH AMER. RAPID EXCATION TUNNELING CONF.
1, 419-37, 1972.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
NEW YORK CITY TRANSIT AUTHORITY

FUNDING ORGANIZATION(S)
NEW YORK CITY TRANSIT AUTHORITY

THIS REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE ON GOING EXCAVATION OF THE EAST 63RD STREET TUNNEL (NEW YORK, NY., USA) . THE PROJECT INVESTIGATED IS UTILIZED FOR VEHICULAR TUNNEL (RAILWAY AND SUBWAY, 2 LEVEL) PURPOSES. THE HEADING AND BENCH METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES CONVENTIONAL EXPLOSIVE (N.G.) . PERTINENT INFORMATION ON UNDERGROUND OPENING SUPPORTS AND MATERIALS HANDLING SYSTEM IS ALSO PRESENTED. PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE GNEISS, LIMESTONE AND SCHIST .

R000534 CONTROLLED BLASTING TECHNIQUES FOR THE CHURCHILL FALLS UNDERGROUND COMPLEX.
GAGNE, L. L.
PROC. 1ST NORTH AMER. RAPID EXCAVATION TUNNELING CONF.
1, 739-64, 1972.
LANGUAGE: ENGLISH

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE COMPLETED EXCAVATION OF THE CHURCHILL FALLS UNDERGROUND CHAMBERS (CANADA) . THE PROJECT INVESTIGATED IS UTILIZED FOR HYDROELECTRIC PURPOSES. THE AUSTRIAN METHOD, DRILL AND BLAST (FULL FACE) METHOD AND PILOT BORE-INVERT METHOD REPRESENT THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES CONVENTIONAL EXPLOSIVE (CILGEL) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. EXCAVATION ADVANCEMENT RATE IS ALSO DISCUSSED. PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE GNEISS .

R000535 TUNNEL EXCAVATION GRAND COULEE THIRD POWERPLANT.
DUCK, D. J.
PROC. 1ST NORTH AMER. RAPID EXCAVATION TUNNELING CONF.
1, 765-83, 1972.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
1.GIBBONS AND REED CO;
2.JELCO,INC.
1.DRAVO
2.LOCKHEED
3.MANNIX
4.WINNEL

FUNDING ORGANIZATION(S)
U.S.BUREAU OF RECLAMATION

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE COMPLETED EXCAVATION OF THE TUNNELS OF GRAND COULEE THIRD POWER PLANT (GRAND COULEE DAM, WA., USA) . THE DRILL AND BLAST (FULL FACE) METHOD, PILOT BORE-CENTER METHOD AND RAISE DRIVING (MECH.PLATFORM) METHOD REPRESENT THE EXCAVATION TECHNIQUES STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES CONVENTIONAL EXPLOSIVE (UNSPECIFIED) . EXCAVATION ADVANCEMENT RATE IS ALSO DISCUSSED. PERTINENT INFORMATION ON MATERIALS HANDLING SYSTEM IS ALSO PRESENTED. PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE GRANITE . THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES (LAB) DATA.

R000794 MINING BY HYDRAULIC JET.
BAKER, J. H.
MINING CONGR. J.
45 (5), 45-6, 52, 1959.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
AMERICAN GILSONITE CO.

FUNDING ORGANIZATION(S)
AMERICAN GILSONITE CO.

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE COMPLETED EXCAVATION OF THE AMERICAN GILSONITE MINE (CO., USA) THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES JET ABRASION (WATER) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON UNDERGROUND OPENING SUPPORTS AND MATERIALS HANDLING SYSTEM IS ALSO PRESENTED. THE EXCAVATION CHARACTERISTICS FOR UINTAH FORMATION ARE TREATED. ROCK TYPES REVIEWED INCLUDE GILSONITE . THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES DATA.

R000796 THE MECHANICAL EXCAVATION OF ROCK-EXPERIMENTS WITH ROLLER CUTTERS.
TEALE, R.
INT. J. ROCK MECH. MIN. SCI.
1 (4), 63-78, 1964.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
NATIONAL COAL BOARD,U.K.

FUNDING ORGANIZATION(S)
NATIONAL COAL BOARD,U.K.

THIS LAB REPORT CONTAINS ORIGINAL DATA. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. THE EXCAVATION CHARACTERISTICS FOR DARLEY DALE SANDSTONE AND PENNANT SANDSTONE ARE TREATED. ROCK TYPES REVIEWED INCLUDE SANDSTONE .

R000797 A LABORATORY INVESTIGATION OF ROCK CUTTING USING LARGE PICKS.
BARKER, J. S.
INT. J. ROCK MECH. MIN. SCI.
1 (4), 519-34, 1964.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
NATIONAL COAL BOARD,U.K.

FUNDING ORGANIZATION(S)
NATIONAL COAL BOARD,MINING RESEARCH ESTABLISHMENT, U.K.
BOARD, U.K.

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THIS LAB REPORT CONTAINS ORIGINAL DATA. THE PROJECT INVESTIGATED IS UTILIZED FOR EXPERIMENTAL EXCAVATION PURPOSES. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES (LAB) DATA.

R000799 HARD ROCK TUNNEL BORING MOVES AHEAD.
AUTHOR ANON.
ENGR. MINING J.
163 (5), 172-3, 1962.
LANGUAGE: ENGLISH

THIS THEORETICAL REPORT CONTAINS ABSTRACTED ONLY DATA. THE UNDERGROUND OPENINGS DISCUSSED INCLUDE THE COMPLETED EXCAVATION OF THE GREAT LAKE POWER DEVELOPMENT (TASMANIA, AUSTRALIA), MANGLA DAM DIVERSION AND POWER TUNNELS (PAKISTAN), POTOMAC INTERCEPTOR SEWERS AND SOUTH SASKATCHEWAN RIVER DAM . THE PROJECTS INVESTIGATED ARE UTILIZED FOR HYDROELECTRIC, SEWER AND UNSPECIFIED PURPOSES. THE TBM METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. TBM EXCAVATION RATE IS ALSO DISCUSSED. PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE CLAYSTONE, MUDSTONE, SANDSTONE AND SHALE . THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES (LAB) DATA.

R000800 RAISE BORER.
AUTHOR ANON.
ENGR. MINING J.
163 (12), 78-9, 1962.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
1.ROBBINS,JAMES S AND ASSOCIATES
2.SECURITY ENGINEERING DIVISION

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE PROJECT INVESTIGATED IS UTILIZED FOR MINE PURPOSES. THE RAISE DRIVING (BORING MACHINES) METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. TBM EXCAVATION RATE IS ALSO DISCUSSED. ROCK TYPES REVIEWED INCLUDE TACONITE .

R000801 HARD ROCK HOLE TEAMS UP WITH RAISE BORER TO HELP DEVELOP HOMER-MAUSECA IRON MINE.
CANNON, R. E.
ENGR. MINING J.
165 (3), 80-2, 1964.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
DRESSER INDUSTRIES,SECURITY ENGINEERING DIVISION OF

FUNDING ORGANIZATION(S)
DRESSER INDUSTRIES, SECURITY ENGINEERING DIVISION

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENINGS DISCUSSED INCLUDE THE ON GOING EXCAVATION OF THE HOMER-MAUSECA IRON MINE (MI.) AND THE PROPOSED EXCAVATION OF THE HOMER-MAUSECA IRON MINE (MI.) . THE PROJECTS INVESTIGATED ARE UTILIZED FOR MINE PURPOSES. THE RAISE DRIVING (BORING MACHINES) METHOD AND TBM METHOD REPRESENT THE EXCAVATION TECHNIQUES STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. TBM EXCAVATION RATE IS ALSO DISCUSSED. INFORMATION PERTINENT TO EXCAVATION COST IS GIVEN. PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE IRON ORE . THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES (LAB) DATA.

R000802 FOR SHAFT SINKING--A SPECIAL CENTENNIAL REPORT.
OELLINGER, T. B.
ENGR. MINING J.
167 (3), 76-86, 1966.
LANGUAGE: ENGLISH

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THIS IN-SITU-THEORETICAL REPORT CONTAINS REVIEW DATA. THE PROJECT INVESTIGATED IS UTILIZED FOR UNSPECIFIED PURPOSES. THE TBM METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. TBM EXCAVATION RATE IS ALSO DISCUSSED. PERTINENT INFORMATION ON UNDERGROUND OPENING SUPPORTS AND MATERIALS HANDLING SYSTEM IS ALSO PRESENTED. PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE LIMESTONE, SANDSTONE AND SHALE . THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES (LAB) DATA.

R000803 THE GEOTECHNICAL APPLICATION OF ARTIFICIALLY PRODUCED HYDRAULIC BREAK-UP TO SOILS.
DOMJAN, J.
ACTA TECH. ACAD. SCI., HUNG.
63 (1-4), 57-68, 1968.
LANGUAGE: ENGLISH

THIS IN-SITU-THEORETICAL REPORT CONTAINS REVIEW DATA. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES JET ABRASION (WATER) . SOIL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED.

R000804 UNDERGROUND GASIFICATION OF COAL. HYDRAULIC FRACTURING AS METHOD OF PREPARING A COALBED.
CAPP, J. P. ELER, J. L. PEARS, C. D.
LOWE, R. W. PLANTS, K. D. FIES, M. H.
U. S. BUREAU OF MINES, REPORT OF INVESTIGATION
50PP., 1960.
(BM-RI-5666)
LANGUAGE: ENGLISH

FUNDING ORGANIZATION(S)
FEDERAL BUREAU OF MINES

THIS LAB-IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE COMPLETED EXCAVATION OF THE WARRIOR COAL FIELD (GORGAS, WALKER CO., USA) . THE PROJECT INVESTIGATED IS UTILIZED FOR EXPERIMENTAL EXCAVATION PURPOSES. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES IMPACT ABRASION (HYDRO-FRACTURING) . GEOSTRUCTURAL AND SOIL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. THE EXCAVATION CHARACTERISTICS FOR AMERICA BEDS AND PRATT ARE TREATED. PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE COAL, SANDSTONE AND SHALE .

R000814 JARVA MACHINES AND MURPHY CUTTERS FOR TUNNELING.
AUTHOR ANON.
PETROLEUM AND MINING DIVISION, G. W. MURPHY INDUSTRIES, INC.
16PP., 1973.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
S AND M CONSTRUCTORS INC:SOLON,OH:USA.
TULLY,JOHN C:COMPANY
TOMARO CONSTRUCTION CO.
CONSOLIDATION COAL CO,HANNA COAL DIVISION OF,CADIZ, OH:USA.

FUNDING ORGANIZATION(S)
SAN FRANCISCO BAY AREA RAPID TRANSIT,CA:USA.
ST.LOUIS METROPOLITAN SEWER DIST:ST.LOUIS,MO:USA.
CHICAGO,CITY OF,CHICAGO,IL:USA.
MILWAUKEE SEWER COMMISSION,MILWAUKEE,WI:USA.
CONSOLIDATION COAL CO:HANNA COAL DIVISION,CADIZ,OH: USA.
OH. USA

THIS IN-SITU REPORT CONTAINS ABSTRACTED ONLY DATA. THE UNDERGROUND OPENINGS DISCUSSED INCLUDE THE COMPLETED EXCAVATION OF THE BAY AREA RAPID TRANSIT PROJECT (BART) (SECTION UNSPECIFIED) (SAN FRANCISCO, CA., USA), THE COMPLETED EXCAVATION OF THE MILWAUKEE SEWER TUNNEL (MILWAUKEE, WI., USA), THE COMPLETED EXCAVATION OF THE OAK PARK MINE (CADIZ, OH., USA) AND THE COMPLETED EXCAVATION OF THE ST.LOUIS METRO SEWER DISTRICT (ST.LOUIS, MO., USA) . THE PROJECTS INVESTIGATED ARE UTILIZED FOR METRO, MINE, SEWER AND UNSPECIFIED PURPOSES. THE TBM METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS

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INCLUDES MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. TBM EXCAVATION AND EXCAVATION ADVANCEMENT RATES ARE ALSO DISCUSSED. PERTINENT INFORMATION ON UNDERGROUND OPENING SUPPORTS AND MATERIALS HANDLING SYSTEM IS ALSO PRESENTED. PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE LIMESTONE, SHALE AND VOLCANICS . THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES (LAB) DATA.

R000817 INGERSOLL-RAND TUNNEL BORING MACHINES, TUNNEL DATA.
AUTHOR ANON.
INGERSOLL-RAND CORPORATION
1PP., 1972.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
INGERSOLL-RAND RESEARCH INC.

THIS IN-SITU REPORT CONTAINS REPUBLISHED DATA. THE UNDERGROUND OPENINGS DISCUSSED INCLUDE THE COMPLETED EXCAVATION OF THE COOKHOUSE TUNNEL (S.AFRICA), THE COMPLETED EXCAVATION OF THE CROSS IRONDEQUOIT TUNNEL, THE COMPLETED EXCAVATION OF THE LAWRENCE AVENUE SEWER SYSTEM (CHICAGO, IL., USA), THE COMPLETED EXCAVATION OF THE MAGMA MINE DEVELOPMENT DRIFT (SUPERIOR, AZ., USA) AND THE COMPLETED EXCAVATION OF THE PORT HURON (WATER SUPPLY) TUNNEL (DETROIT, MI., USA) . THE PROJECTS INVESTIGATED ARE UTILIZED FOR IRRIGATION, RAILWAY AND SEWER PURPOSES. THE TBM METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. TBM EXCAVATION RATE IS ALSO DISCUSSED. PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE CONGLOMERATE, LIMESTONE, MUDSTONE, QUARTZITE, SANDSTONE, SHALE AND SILTSTONE .

R000820 ORESSER TUNNEL BORER BEST WAY THROUGH A MOUNTAIN.
AUTHOR ANON.
ORESSER DRILLER
2, 1-12, 1972.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
FLOUR UTAH ENGINEERS AND CONSTRUCTORS INC:FLOUR,UT: USA.

FUNDING ORGANIZATION(S)
U.S.BUREAU OF RECLAMATION

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE PROJECT INVESTIGATED IS UTILIZED FOR WATER SUPPLY TUNNEL PURPOSES. THE TBM METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. TBM EXCAVATION RATE IS ALSO DISCUSSED. PERTINENT INFORMATION ON MATERIALS HANDLING SYSTEM IS ALSO PRESENTED.

R000821 MOLE BREAKS THROUGH AFTER 293-FT DAY AND 1,114-FT WEEK.
AUTHOR ANON.
ENG. NEWS-REC.
2PP., 1969.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
UTAH CONSTRUCTION AND MINING CO.

FUNDING ORGANIZATION(S)
U.S.BUREAU OF RECLAMATION

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE COMPLETED EXCAVATION OF THE RIVER MOUNTAINS TUNNEL (HENDERSON, NV., USA) . THE PROJECT INVESTIGATED IS UTILIZED FOR UNSPECIFIED PURPOSES. THE TBM METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. TBM EXCAVATION AND EXCAVATION ADVANCEMENT RATES ARE ALSO DISCUSSED. PERTINENT INFORMATION ON MATERIALS HANDLING SYSTEM IS ALSO

(CONTINUED)

PRESENTED. ROCK TYPES REVIEWED INCLUDE BRECCIA, RHYODACITE, RHYOLITE AND TUFF .

R000822 A NEW APPROACH TO THE DYNAMIC BREAKAGE OF ROCK.
KENNEDY, P. A.
TUNNELS AND TUNNELLING
4 (5), 427-8, 1972.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
GEOTECHNICAL ENGINEERING LTD:GLOUCESTER,U.K.
SHAFT DRILLERS INC.

THIS LAB REPORT CONTAINS ORIGINAL DATA. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES ELECTRICAL ABRASION (UNSPECIFIED) . GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE BASALT, LIMESTONE AND SANDSTONE . THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES (LAB) DATA.

R000823 TUNNELLING ON THE NEW ROME METRO BETWEEN LARGO COLLI ALBANI AND STAZIONE TERMINI.
BERTI, P.
TUNNELS AND TUNNELLING
4 (5), 430-5, 1972.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
IMPRESIT AND SGRIGOLA,ROME,ITALY

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE COMPLETED EXCAVATION OF THE ROME METRO TUNNEL (ROME, ITALY) . THE PROJECT INVESTIGATED IS UTILIZED FOR RAILWAY PURPOSES. THE HEADING AND BENCH METHOD AND SHIELD METHOD REPRESENT THE EXCAVATION TECHNIQUES STUDIED. THE REPORTED FRAGMENTATION METHODS SERVICING PROJECT EFFORTS INCLUDE CONVENTIONAL EXPLOSIVE (N.G.) AND MECHANICAL ABRASION (ROTARY) . GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON UNDERGROUND OPENING SUPPORTS IS ALSO PRESENTED. THE EXCAVATION CHARACTERISTICS FOR MAREMMANO ARE TREATED. PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE TUFF .

R000824 THREE VALLEYS AQUEDUCT IN TUNNEL.
COLLINS, S. P.
TUNNELS AND TUNNELLING
4 (5), 441-5, 1972.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
BINNIE AND PARTNERS,LONDON,U.K.

FUNDING ORGANIZATION(S)
THREE VALLEYS WATER COMMITTEE (,,U.K.)

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE PROJECT INVESTIGATED IS UTILIZED FOR WATER SUPPLY TUNNEL PURPOSES. THE SHIELD METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. GEOSTRUCTURAL AND SOIL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. THE EXCAVATION CHARACTERISTICS FOR WOOLWICH AND READING BEDS ARE TREATED.

R000825 TUNNEL BLASTED UNDER BUILDINGS.
AUTHOR ANON.
TUNNELS AND TUNNELLING
4 (5), 445, 1972.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
ROCK FALL CO.LTD:GLASGOW,U.K.

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE PROJECT INVESTIGATED IS UTILIZED FOR ACCESS TUNNEL (OTHER THAN SHAFTS AND AUDITS TO MAIN TUNNELS)) PURPOSES. THE DRILL AND BLAST (FULL FACE) METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES CONVENTIONAL EXPLOSIVE (N.G.) . PERTINENT INFORMATION ON UNDERGROUND OPENING SUPPORTS IS ALSO PRESENTED. PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE MUDSTONE .

R000826 RORSCHACH: UNDERCUTTING FOR HARD ROCK TUNNELS.
AUTHOR ANON.
TUNNELS AND TUNNELLING
4 (5), 462-5, 1972.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
MCALPINES,SIR ROBERTS SONS LTD.

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE COMPLETED EXCAVATION OF THE RORSCHACH SEWAGE TUNNEL (RORSCHAH, SWITZERLAND) . THE PROJECT INVESTIGATED IS UTILIZED FOR SEWER PURPOSES. THE CUT AND COVER METHOD AND RAISE DRIVING (BORING MACHINES) METHOD REPRESENT THE EXCAVATION TECHNIQUES STUDIED. THE REPORTED FRAGMENTATION METHODS SERVICING PROJECT EFFORTS INCLUDE CONVENTIONAL EXPLOSIVE (UNSPECIFIED) AND MECHANICAL ABRASION (ROTARY) . TBM EXCAVATION RATE IS ALSO DISCUSSED. GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. ROCK TYPES REVIEWED INCLUDE LIMESTONE, MARL AND SANDSTONE THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES (LAB) DATA.

R000827 TRAFFIC NOW STREAMING THROUGH HONG KONG CROSS HARBOLR TUNNEL.
AUTHOR ANON.
TUNNELS AND TUNNELLING
4 (5), 467-70, 1972.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
1.CESTIN INTERNATIONAL OF LONDON,
2.POUL Y.CONSTRUCTION CO.LTD.OF HONGKONG
3.RAYMOND INTERNATIONAL OF NEW YORK

FUNDING ORGANIZATION(S)
HONG KONG GOVT.

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE COMPLETED EXCAVATION OF THE HONG KONG CROSS HARBOR TUNNEL (HONG KONG) . THE PROJECT INVESTIGATED IS UTILIZED FOR TWIN HIGHWAY PURPOSES. THE TRENCH METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. PERTINENT INFORMATION ON UNDERGROUND OPENING SUPPORTS AND MATERIALS HANDLING SYSTEM IS ALSO PRESENTED.

R000828 BENTONITE TUNNELLING SHIELD.
AUTHOR ANON.
TUNNELS AND TUNNELLING
4 (6), 515, 1972.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
MUTTAL,EO.LTD:LONDON,U.K.

FUNDING ORGANIZATION(S)
NATIONAL RESEARCH DEVELOPMENT CORP.

THIS IN-SITU REPORT CONTAINS REVIEW DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE ON GOING EXCAVATION OF THE NEW CROSS TUNNEL (U.K.) . THE PROJECT INVESTIGATED IS UTILIZED FOR METRO PURPOSES. THE SHIELD METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY AND DRAG) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. INFORMATION PERTINENT TO EXCAVATION COST IS GIVEN. SOIL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON MATERIALS HANDLING SYSTEM IS ALSO PRESENTED.

R000829 NEW ZEALAND TUNNELS FOR TONGARIRO POWER DEVELOPMENT.
GILMOUR, L. W.
TUNNELS AND TUNNELLING
4 (6), 521-4, 1972.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
NORCONSTRUCTION,NORWAY
CODELFA-COGEFAR (N.Z.)LTD:
1.CODELFA CONSTRUCTION DEL FAIERO SP A,SUBSIDIARY OF
2.CONSTRUZIONI GENERALI FARSURA SP A,MILAN

(CONTINUED)

FUNDING ORGANIZATION(S)
MINISTRY OF WORKS,NEW ZEALAND

THIS IN-SITU REPORT CONTAINS REVIEW DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE COMPLETED EXCAVATION OF THE TUNNELS FOR TONGARIRO POWER DEVELOPMENT PROJECT (NEW ZEALAND) . THE PROJECT INVESTIGATED IS UTILIZED FOR HYDROELECTRIC PURPOSES. THE DRILL AND BLAST (FULL FACE) METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES CONVENTIONAL EXPLOSIVE (AMMONIUM NITRATE) . TBM EXCAVATION RATE IS ALSO DISCUSSED. GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON UNDERGROUND OPENING SUPPORTS AND MATERIALS HANDLING SYSTEM IS ALSO PRESENTED. PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE CONGLOMERATE, GRAYWACKE AND SANDSTONE . THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES DATA.

R000830 SHIELD TUNNELLING WITH LINER PLATES.
ENGELMANN, O. E. HORNHINWEG, D.
TUNNELS AND TUNNELLING
4 (6), 525-31, 1972.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
HAYSS AND FREYTAG KGINIEDERLASSUNG,MUNICH,GERMANY

FUNDING ORGANIZATION(S)
DEUTSCHE BUNDESPOST FERNMELDAMT 4,MUNCHEN,GERMANY
BERLINER ENTWASSERUNGWERKE,GERMANY

THIS IN-SITU-THEORETICAL AND IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENINGS DISCUSSED INCLUDE THE COMPLETED EXCAVATION OF THE CABLE TUNNEL FOR GERMAN GENERAL POST OFFICE (MUNICH, W.GERMANY), THE COMPLETED EXCAVATION OF THE MIXED WATER SYPHON FOR BERLINER ENTWASSERUNGSWERKE (BERLIN, W.GERMANY) AND THE COMPLETED EXCAVATION OF THE SEWAGE SYPHON FOR BERLINER ENTWASSERUNGSWERKE (BERLIN, W.GERMANY) . THE PROJECTS INVESTIGATED ARE UTILIZED FOR CABLE TUNNEL, SEWER AND VEHICULAR TUNNEL (RAILWAY AND SUBWAY, 2 LEVEL) PURPOSES. THE SHIELD METHOD AND TBM METHOD REPRESENT THE EXCAVATION TECHNIQUES STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) . TBM EXCAVATION AND EXCAVATION ADVANCEMENT RATES ARE ALSO DISCUSSED. GEOSTRUCTURAL AND SOIL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON MATERIALS HANDLING SYSTEM IS ALSO PRESENTED. PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE MARL .

R000831 SECOND DARTFORD TUNNEL.
AUTHOR ANON.
TUNNELS AND TUNNELLING
4 (6), 533, 1972.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
BEATTY,BALFOUR AND CO.LTD:U.K.

FUNDING ORGANIZATION(S)
DARTFORD TUNNEL JOINT COMMITTEE,U.K.

THIS IN-SITU REPORT CONTAINS REVIEW DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE ON GOING EXCAVATION OF THE SECOND DARTFORD TUNNEL (UK) . THE PROJECT INVESTIGATED IS UTILIZED FOR TWIN HIGHWAY PURPOSES. THE PILOT BORE-INVERT METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY AND DRAG) . SOIL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. ROCK TYPES REVIEWED INCLUDE CHALK (MINERAL) .

R000832 MECHANISED PERIPHERAL EXCAVATION METHOD FOR UNDERGROUND CHAMBERS.
AUTHOR ANON.
TUNNELS AND TUNNELLING
4 (6), 542-3, 1972.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
KUNZ,ALFRED AND CO:MUNICH,GERMANY

(CONTINUED)

THIS REPORT CONTAINS ORIGINAL DATA. THE PROJECT INVESTIGATED IS UTILIZED FOR EXPERIMENTAL EXCAVATION PURPOSES. THE MULTI DRIFT METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (EXPLOSIVE-ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. ROCK TYPES REVIEWED INCLUDE DOLOMITE (ROCK) .

R000833 RAIL TUNNEL IN ROCK SPEEDS B. C. TRAINS.
AUTHOR ANON.
TUNNELS AND TUNNELLING
4 (6), 546, 1972.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
STANDARD GENERAL CONSTRUCTION LTD;GRANVILLE ISLAND, VANCOUVER,B.C; CANADA

FUNDING ORGANIZATION(S)
BRITISH COLUMBIA RAILWAY,CANADA

THIS IN-SITU REPORT CONTAINS REVIEW DATA. THE PROJECT INVESTIGATED IS UTILIZED FOR RAILWAY PURPOSES. THE DRILL AND BLAST (FULL FACE) METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES CONVENTIONAL EXPLOSIVE (UNSPECIFIED) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. PERTINENT INFORMATION ON UNDERGROUND OPENING SUPPORTS AND MATERIALS HANDLING SYSTEM IS ALSO PRESENTED. PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE GRANODIORITE .

R000835 SWITZERLAND N.9 - AUTOROUTE DU LEMAN.
BETSCHEN, G.
TUNNELS AND TUNNELLING
5 (2), 158-64, 1973.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
SOCIETE GENERALE POUR L'INDUSTRIE,LAUSANNE, SWITZERLAND

FUNDING ORGANIZATION(S)
SWITZERLAND,GOVT.OF.

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE COMPLETED EXCAVATION OF THE CHAUDERON TUNNEL (NO.9 AUTOROUTE DU LEMAN) (SWITZERLAND) . THE PROJECT INVESTIGATED IS UTILIZED FOR TWIN HIGHWAY PURPOSES. THE PILOT BORE-CROWN METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES CONVENTIONAL EXPLOSIVE (UNSPECIFIED) . THIS DOCUMENT INCORPORATES ADDITIONALLY DRILLING EQUIPMENT CHARACTERISTICS. GEOSTRUCTURAL AND SOIL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON UNDERGROUND OPENING SUPPORTS IS ALSO PRESENTED. THE EXCAVATION CHARACTERISTICS FOR MOLASSE ROCK ARE TREATED. ROCK TYPES REVIEWED INCLUDE MARLSTONE .

R000836 EXCAVATION OF TUNNELS BY THE USE OF SMOOTH-BORE CANNONS TO FIRE SOLID 10 LB CONCRETE PROJECTILES INTO THE ROCK.
AUTHOR ANON.
TUNNELS AND TUNNELLING
5 (2), 177-80, 1973.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
PHYSICS INTERNATIONAL CO.

FUNDING ORGANIZATION(S)
BUREAU OF MINES,U.S.GOVT.

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE PROJECT INVESTIGATED IS UTILIZED FOR EXPERIMENTAL EXCAVATION PURPOSES. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES IMPACT ABRASION (PROJECTILE, INTERMITTANT IMPACT) . ROCK TYPES REVIEWED INCLUDE GRANODIORITE . THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES (LAB) DATA.

R000840 SOFT CLAY TUNNEL AND CAISSON CONSTRUCTION IN BANGKOK, THAILAND.
KLINE, C. E. LOVEWELL, J. S. JENNY, R. J. GIFFORD, D.
TUNNELS AND TUNNELLING
5 (5), 460-71, 1973.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
1.GAMMON LTD;HONG KONG
2.KINNEAR-NOODIE

FUNDING ORGANIZATION(S)
BANGKOK MUNICIPALITY,THAILAND

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE PROJECT INVESTIGATED IS UTILIZED FOR SEWER PURPOSES. THE SHIELD METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. SOIL CHARACTERISTICS AS WELL AS SOIL MECHANICAL PROPERTIES FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON GROUND CONDITIONS AND UNDERGROUND OPENING SUPPORTS IS ALSO PRESENTED.

R000841 CLAW-ARMED DIGGER SHIELD.
MAZZOTTI, P. C.
TUNNELS AND TUNNELLING
5 (5), 486-7, 1973.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
NEWCASTLE-UPON-TYNE,UNIVERSITY OF

THIS IN-SITU REPORT CONTAINS REVIEW DATA. THE PROJECT INVESTIGATED IS UTILIZED FOR SEWER PURPOSES. THE SHIELD METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. THE EXCAVATION CHARACTERISTICS FOR CORN BRASH LIMESTONE, KELLAWAY BEDS AND OXFORD CLAY ARE TREATED. ROCK TYPES REVIEWED INCLUDE CLAYSHALE AND LIMESTONE .

R000842 CREIGHTON NO. 9 SHAFT 7,137 FEET SUNK IN ONE LIFT.
REDPATH, J. S.
PROC. NORTH AMER. RAPID EXCAVATION TUNNELLING CONF.
2, 843-62, 1972.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
GEO-ENGINEERING LABORATORIES,INC.

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE COMPLETED EXCAVATION OF THE CREIGHTON NO. 9 SHAFT . THE PROJECT INVESTIGATED IS UTILIZED FOR HYDROELECTRIC AND MINE PURPOSES. THE RAISE DRIVING (MECH.PLATFORM) METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES CONVENTIONAL EXPLOSIVE (UNSPECIFIED) . EXCAVATION ADVANCEMENT RATE IS ALSO DISCUSSED. PERTINENT INFORMATION ON MATERIALS HANDLING SYSTEM IS ALSO PRESENTED. PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE GABBRO, GRANITE AND NORITE .

R000844 DECLINE DEVELOPMENT AT THE LAKESHORE PROPERTY.
HENDRICKS, R. S.
PROC. NORTH AMER. RAPID EXCAVATION TUNNELLING CONF.
2, 897-913, 1972.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
HECLA MINING CO;CASA GRANDE;AZ;USA.

FUNDING ORGANIZATION(S)
EL PASO NATURAL GAS CO;EL PASO,TX;USA.

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE COMPLETED EXCAVATION OF THE LAKE SHORE COPPER MINE . THE PROJECT INVESTIGATED IS UTILIZED FOR MINE PURPOSES. THE DRILL AND BLAST (FULL FACE) METHOD AND RAISE DRIVING (BORING MACHINES) METHOD REPRESENT THE EXCAVATION TECHNIQUES STUDIED. THE REPORTED FRAGMENTATION METHODS SERVICING PROJECT EFFORTS INCLUDE CONVENTIONAL EXPLOSIVE (AMMONIUM NITRATE) AND

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MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. EXCAVATION ADVANCEMENT RATE IS ALSO DISCUSSED. PERTINENT INFORMATION ON GROUND CONDITIONS AND UNDERGROUND OPENING SUPPORTS AND MATERIALS HANDLING SYSTEM IS ALSO PRESENTED. PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE MONZONITE AND TACTITE . THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES (LAB) DATA.

R000845 OFFSHORE SHAFT CONSTRUCTION IN THE NORTH SEA.
ADAMSON, J. M.
PROC. NORTH AMER. RAPID EXCAVATION TUNNELLING CONF.
2, 915-29, 1972.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
CEMENTATION SPECIALIST HOLDING CO.LTD.

FUNDING ORGANIZATION(S)
ALCAN LTD;U.K.

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE COMPLETED EXCAVATION OF THE LYNE MOUTH COAST SHAFT . THE PROJECT INVESTIGATED IS UTILIZED FOR WATER SUPPLY TUNNEL PURPOSES. THE SHIELD METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) . PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE SANDSTONE .

R000846 TUNNELING EXPERIENCES, CITY OF EDMONTON, ALBERTA CANADA.
BEAULIEU, A. C.
PROC. NORTH AMER. RAPID EXCAVATION TUNNELLING CONF.
2, 933-63, 1972.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
EDMONTON,CITY OF, ALBERTA,CANADA

FUNDING ORGANIZATION(S)
EDMONTON,CITY OF,ALBERTA,CANADA

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE ON GOING EXCAVATION OF THE EDMONTON SANITARY TUNNELS (EDMONTON, ALBERTA, CANADA) . THE PROJECT INVESTIGATED IS UTILIZED FOR SEWER PURPOSES. THE TBM METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. EXCAVATION ADVANCEMENT RATE IS ALSO DISCUSSED. GEOSTRUCTURAL AND SOIL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON UNDERGROUND OPENING SUPPORTS AND MATERIALS HANDLING SYSTEM IS ALSO PRESENTED.

R000847 STILLWATER TUNNEL PROJECT.
ARTHUR, H. G.
PROC. NORTH AMER. RAPID EXCAVATION TUNNELLING CONF.
2, 965-81, 1972.
LANGUAGE: ENGLISH

FUNDING ORGANIZATION(S)
U.S.BUREAU OF RECLAMATION

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE PROPOSED EXCAVATION OF THE STILLWATER TUNNEL (UT., USA) . THE PROJECT INVESTIGATED IS UTILIZED FOR IRRIGATION PURPOSES. THE DRILL AND BLAST (FULL FACE) METHOD AND TBM METHOD REPRESENT THE EXCAVATION TECHNIQUES STUDIED. THE REPORTED FRAGMENTATION METHODS SERVICING PROJECT EFFORTS INCLUDE CONVENTIONAL EXPLOSIVE (UNSPECIFIED) AND MECHANICAL ABRASION (ROTARY) . GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON UNDERGROUND OPENING SUPPORTS IS ALSO PRESENTED. THE EXCAVATION CHARACTERISTICS FOR ROCKVILLE QUARTZ MONZONITE AND TOPANGA FORMATION ARE TREATED. PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE QUARTZITE AND SHALE . THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES (LAB) DATA.

R000848 THE JACKING METHOD IN TUNNEL CONSTRUCTION.
SULINSKI, S. J.

(CONTINUED)

PROC. NORTH AMER. RAPID EXCAVATION TUNNELLING CONF.
2, 983-95, 1972.
LANGUAGE: ENGLISH

FUNDING ORGANIZATION(S)
CHICAGO,CITY OF,CHICAGO,IL;USA.

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENINGS DISCUSSED INCLUDE THE COMPLETED EXCAVATION OF THE CHICAGO SEWER SYSTEM (CHICAGO, IL., USA) AND THE ON GOING EXCAVATION OF THE CHICAGO SEWER SYSTEM (CHICAGO, IL., USA) . THE PROJECTS INVESTIGATED ARE UTILIZED FOR SEWER PURPOSES. THE TBM METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. EXCAVATION ADVANCEMENT RATE IS ALSO DISCUSSED. SOIL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON UNDERGROUND OPENING SUPPORTS IS ALSO PRESENTED.

R000849 CONSTRUCTION DIFFICULTY INDEX FOR TUNNEL CONSTRUCTION.
SULINSKI, S. J.
PROC. NORTH AMER. RAPID EXCAVATION TUNNELLING CONF.
2, 997-1015, 1972.
LANGUAGE: ENGLISH

FUNDING ORGANIZATION(S)
CHICAGO,CITY OF,CHICAGO,IL;USA.

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE ON GOING EXCAVATION OF THE CHICAGO SEWER SYSTEM (CHICAGO, IL., USA) . THE PROJECT INVESTIGATED IS UTILIZED FOR SEWER PURPOSES. THE TBM METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. TBM EXCAVATION AND EXCAVATION ADVANCEMENT RATES ARE ALSO DISCUSSED. SOIL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON UNDERGROUND OPENING SUPPORTS AND MATERIALS HANDLING SYSTEM IS ALSO PRESENTED.

R000850 TUNNELING TORONTO CANADA 1970.
JENKINS, G. F. HOBDEN, P. S.
PROC. NORTH AMER. RAPID EXCAVATION TUNNELLING CONF.
2, 1017-34, 1972.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
MCNALLY AND SONS,HAMILTON

FUNDING ORGANIZATION(S)
TORONTO,CITY OF,CANADA

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENINGS DISCUSSED INCLUDE THE ON GOING EXCAVATION OF THE TORONTO MIDTOWN INTERCEPTOR TUNNEL (CANADA), THE COMPLETED EXCAVATION OF THE TORONTO SUBWAY TUNNELS (TORONTO, ONTARIO, CANADA) AND THE COMPLETED EXCAVATION OF THE WILKET CREEK TUNNEL (STORM DRAINAGE) (TORONTO, CON.) . THE PROJECTS INVESTIGATED ARE UTILIZED FOR RAILWAY AND SEWER PURPOSES. THE SHIELD METHOD AND TBM METHOD REPRESENT THE EXCAVATION TECHNIQUES STUDIED. THE REPORTED FRAGMENTATION METHODS SERVICING PROJECT EFFORTS INCLUDE MECHANICAL ABRASION (ROTARY) AND MECHANICAL ABRASION (DRAG) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. GEOSTRUCTURAL AND SOIL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON UNDERGROUND OPENING SUPPORTS AND MATERIALS HANDLING SYSTEM IS ALSO PRESENTED. THE EXCAVATION CHARACTERISTICS FOR DUNDAS FORMATION ARE TREATED. ROCK TYPES REVIEWED INCLUDE SHALE . THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES (LAB) DATA.

R000851 ROCK TUNNELS RECENTLY COMPLETED IN CHICAGO.
IRONS, J. WESTFALL, D.
PROC. NORTH AMER. RAPID EXCAVATION TUNNELLING CONF.
2, 1063-76, 1972.
LANGUAGE: ENGLISH

(CONTINUED)

PERFORMING ORGANIZATION(S)
CHICAGO,CITY OF,METROPOLITAN SANITARY DISTRICT, CHICAGO,IL:USA.

FUNDING ORGANIZATION(S)
CHICAGO,CITY OF,CHICAGO,IL:USA.

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE ON GOING EXCAVATION OF THE CHICAGO SEWER SYSTEM (CHICAGO, IL., USA) . THE PROJECT INVESTIGATED IS UTILIZED FOR SEWER PURPOSES. THE TBM METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON GROUND CONDITIONS AND UNDERGROUND OPENING SUPPORTS AND MATERIALS HANDLING SYSTEM IS ALSO PRESENTED. THE EXCAVATION CHARACTERISTICS FOR NIAGARAN LIMESTONE (OR DOLOMITE OR GROUP) ARE TREATED. ROCK TYPES REVIEWED INCLUDE LIMESTONE . THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES (LAB) DATA.

R000852 CONSTRUCTION PROCEDURES AND EQUIPMENT FOR DROP SHAFTS METROPOLITAN SANITARY DISTRICT OF GREATER CHICAGO.
DI PONIO, J. LYNCH, J.
PROC. NORTH AMER. RAPID EXCAVATION TUNNELLING CONF.
2, 1077-88, 1972.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
UNDERGROUND CONSTRUCTION RESEARCH COUNCIL

FUNDING ORGANIZATION(S)
CHICAGO,CITY OF,CHICAGO,IL:USA.

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENINGS DISCUSSED INCLUDE THE ON GOING EXCAVATION OF THE CONNECTING TUNNELS FROM CHICAGO DEEP SEWER TUNNELS TO DROP SHAFTS (CHICAGO, IL., USA) AND THE ON GOING EXCAVATION OF THE DROP SHAFTS FOR CHICAGO DEEP SEWER TUNNEL (CHICAGO, IL., USA) . THE PROJECTS INVESTIGATED ARE UTILIZED FOR SEWER PURPOSES. THE DRILL AND BLAST (FULL FACE) METHOD AND RAISE DRIVING (BORING MACHINES) METHOD REPRESENT THE EXCAVATION TECHNIQUES STUDIED. THE REPORTED FRAGMENTATION METHODS SERVICING PROJECT EFFORTS INCLUDE CONVENTIONAL EXPLOSIVE (UNSPECIFIED) AND MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY DRILLING EQUIPMENT CHARACTERISTICS. EXCAVATION ADVANCEMENT RATE IS ALSO DISCUSSED. GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON UNDERGROUND OPENING SUPPORTS IS ALSO PRESENTED. THE EXCAVATION CHARACTERISTICS FOR NIAGARAN LIMESTONE (OR DOLOMITE OR GROUP) ARE TREATED. ROCK TYPES REVIEWED INCLUDE LIMESTONE .

R000853 ROLE OF THE TUNNELING MACHINE.
HAMILTON, W. H.
PROC. NORTH AMER. RAPID EXCAVATION TUNNELLING CONF.
2, 1093-1112, 1972.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
INGERSOLL-RAND RESEARCH INC.

FUNDING ORGANIZATION(S)
DETROIT,CITY OF,DEPT.OF WATER SUPPLY,DETROIT,MI: USA.

THIS IN-SITU REPORT CONTAINS REPUBLISHED DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE COMPLETED EXCAVATION OF THE HURON PORT WATER INTAKE SHAFT (USA) . THE PROJECT INVESTIGATED IS UTILIZED FOR WATER SUPPLY TUNNEL PURPOSES. THE TBM METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. TBM EXCAVATION RATE IS ALSO DISCUSSED. GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON GROUND CONDITIONS AND UNDERGROUND OPENING SUPPORTS AND MATERIALS HANDLING SYSTEM IS ALSO PRESENTED. THE EXCAVATION

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CHARACTERISTICS FOR ANTRIM SHALE ARE TREATED. ROCK TYPES REVIEWED INCLUDE LIMESTONE . THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES (LAB) DATA.

R000854 THE ROMEO TUNNELS-DETROIT, MICHIGAN A CURRENT REPORT ON RAPID EXCAVATION IN DIFFICULT GROUND.
TRAYLOR, T. W.
PROC. NORTH AMER. RAPID EXCAVATION TUNNELLING CONF.
2, 1113-24, 1972.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
1.MANCINI CONSTRUCTION,DETROIT,MI:USA.
2.TAYLOR BROS:INC:IN:USA

FUNDING ORGANIZATION(S)
DETROIT,CITY OF,DEPT.OF WATER SUPPLY,DETROIT,MI: USA.

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE ON GOING EXCAVATION OF THE ROMEO TUNNELS (OAKLAND-MACOMB SYSTEM) (DETROIT, MI., USA) . THE PROJECT INVESTIGATED IS UTILIZED FOR SEWER PURPOSES. THE SHIELD METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. TBM EXCAVATION AND EXCAVATION ADVANCEMENT RATES ARE ALSO DISCUSSED. SOIL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON GROUND CONDITIONS AND UNDERGROUND OPENING SUPPORTS AND MATERIALS HANDLING SYSTEM IS ALSO PRESENTED.

R000855 MECHANICAL BORING OF A MIXED FACE TUNNEL.
NORMAN, N. E.
PROC. NORTH AMER. RAPID EXCAVATION TUNNELLING CONF.
2, 1125-36, 1972.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
S AND M CONSTRUCTORS INC:SOLON,OH:USA.

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE ON GOING EXCAVATION OF THE MOSS POINT DRAINAGE PROJECT (EUCERO, OH., USA) . THE PROJECT INVESTIGATED IS UTILIZED FOR SEWER PURPOSES. THE TBM METHOD REPRESENT THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. ROCK TYPES REVIEWED INCLUDE SHALE .

R000856 NAST TUNNEL EXCAVATION HISTORY.
GEARY, D. W., JR.
PROC. NORTH AMER. RAPID EXCAVATION TUNNELLING CONF.
2, 1137-47, 1972.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
KIEWIT,PETER AND SONS CO:CO:USA

FUNDING ORGANIZATION(S)
U.S.BUREAU OF RECLAMATION

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE PROPOSED EXCAVATION OF THE NAST TUNNEL (CO., USA) . THE PROJECT INVESTIGATED IS UTILIZED FOR WATER SUPPLY TUNNEL PURPOSES. THE TBM METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. TBM EXCAVATION RATE IS ALSO DISCUSSED. INFORMATION PERTINENT TO EXCAVATION COST IS GIVEN. PERTINENT INFORMATION ON GROUND CONDITIONS AND UNDERGROUND OPENING SUPPORTS AND MATERIALS HANDLING SYSTEM IS ALSO PRESENTED. PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE GRANITE .

R000858 SOME ASPECTS OF THE ART OF RAISE BORING.
HARRISON, G. P. GREEN, N. E. BENNETT, H. E.
PROC. NORTH AMER. RAPID EXCAVATION TUNNELLING CONF.
2, 1161-83, 1972.
LANGUAGE: ENGLISH

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PERFORMING ORGANIZATION(S)
HARRISON,P.AND CO.LTD!MINING AND ENGINEERING CONTRACTORS,TORONTO, ONTARIO,CANADA

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE PROJECT INVESTIGATED IS UTILIZED FOR MINE AND UNSPECIFIED PURPOSES. THE RAISE DRIVING (MECH.PLATFORM) METHOD AND RAISE DRIVING (BORING MACHINES) METHOD REPRESENT THE EXCAVATION TECHNIQUES STUDIED. THE REPORTED FRAGMENTATION METHODS SERVICING PROJECT EFFORTS INCLUDE CONVENTIONAL EXPLOSIVE (UNSPECIFIED) AND MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. EXCAVATION ADVANCEMENT RATE IS ALSO DISCUSSED. GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES (LAB) DATA.

R000859 THE MECHANICAL MOLE - A BREAKTRHROUGH IN INCLINED SHAFT MINE CONSTRUCTION.
BRICKLE, E. W. MC GUIRE, E. J.
PROC. NORTH AMER. RAPID EXCAVATION TUNNELLING CONF. 2, 1185-96, 1972.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
SMITH TOOL CO!ENGINEERING DEPT.OF

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE ON GOING EXCAVATION OF THE SOUTHEASTERN ILLINOIS COAL MINE TUNNEL (IL., USA) . THE PROJECT INVESTIGATED IS UTILIZED FOR MINE PURPOSES. THE TBM METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON GROUND CONDITIONS AND UNDERGROUND OPENING SUPPORTS AND MATERIALS HANDLING SYSTEM IS ALSO PRESENTED.

R000860 UNDERCUTTING - A UNIQUE METHOD TO BORE NON-CIRCULAR OPENINGS.
BARENDSEN, P.
PROC. NORTH AMER. RAPID EXCAVATION TUNNELLING CONF. 2, 1197-1230, 1972.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
ATLAS COPCO A.B!STOCKHOLM,SWEDEN

FUNDING ORGANIZATION(S)
RORSCHACH (TUNNEL) MUNICIPAL AUTHORITIES

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE COMPLETED EXCAVATION OF THE RORSCHACH SEWAGE TUNNEL (RORSCHAH, SWITZERLAND) . THE PROJECT INVESTIGATED IS UTILIZED FOR SEWER PURPOSES. THE PARTIAL FACE TUNNEL MACHINE METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. TBM EXCAVATION RATE IS ALSO DISCUSSED. ROCK TYPES REVIEWED INCLUDE SANDSTONE . THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES (LAB) DATA.

R000861 OPERATING DATA FOR AN ALPINE MINER USED AT THE NEVADA TEST SITE WITH A CONVEYOR FOR RAIL HAULAGE MUCK DISPOSAL.
JONES, L. S. GOOD, R. V. MARVEY, J. B.
PROC. NORTH AMER. RAPID EXCAVATION TUNNELLING CONF. 2, 1267-78, 1972.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
PENIX AND SCISSON INC., TULSA,OK

FUNDING ORGANIZATION(S)
UNITED STATES GOVT.

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE COMPLETED EXCAVATION OF THE UNDERGROUND OPENINGS AND TUNNELS

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(NEVADA TEST SITE) (NV., USA) . THE PROJECT INVESTIGATED IS UTILIZED FOR EXPERIMENTAL EXCAVATION PURPOSES. THE PARTIAL FACE TUNNEL MACHINE METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. TBM EXCAVATION AND EXCAVATION ADVANCEMENT RATES ARE ALSO DISCUSSED. PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE TUFF . THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES (LAB) DATA.

R000862 A COMPARISON OF LABORATORY CUTTING RESULTS AND ACTUAL TUNNEL BORING PERFORMANCE.
HUSTRULID, W. A.
PROC. NORTH AMER. RAPID EXCAVATION TUNNELLING CONF. 2, 1299-1323, 1972.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
COLORADO SCHOOL OF MINES,DEPT.OF MINING,GOLDEN,CO! 80401

FUNDING ORGANIZATION(S)
U.S.GOVT!DEPT.OF DEFENSE

THIS LAB-IN-SITU-THEORETICAL REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE COMPLETED EXCAVATION OF THE RIVER MOUNTAINS TUNNEL (HENDERSON, NV., USA) . THE PROJECT INVESTIGATED IS UTILIZED FOR IRRIGATION PURPOSES. THE TBM METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) . PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE PERLITE, RHYOLITE AND SILEXITE . THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES (LAB) DATA.

R000863 WATER JETS AND ROCK HAMMERS FOR TUNNELING IN THE U.S. AND U.S.S.R.
COOLEY, W. C.
PROC. NORTH AMER. RAPID EXCAVATION TUNNELLING CONF. 2, 1325-60, 1972.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
TERRASPACE,INC!304 N.STONESTREET AVE!ROCKVILLE,MD. 20850!USA

FUNDING ORGANIZATION(S)
TERRASPACE INC!MD!USA.

THIS LAB-IN-SITU-THEORETICAL REPORT CONTAINS REVIEW DATA. THE PROJECT INVESTIGATED IS UTILIZED FOR EXPERIMENTAL EXCAVATION PURPOSES. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES JET ABRASION (WATER) .

R000864 THERMAL FRACTURE OF ROCK - A REVIEW OF EXPERIMENTAL RESULTS.
CARSTENS, J. P.
PROC. NORTH AMER. RAPID EXCAVATION TUNNELLING CONF. 2, 1363-92, 1972.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
UNITED AIRCRAFT RESEARCH LAB!E.HARTFORD,CT!USA.

FUNDING ORGANIZATION(S)
UNITED AIRCRAFT RESEARCH LAB!E.HARTFORD,CT!06108

THIS LAB-THEORETICAL REPORT CONTAINS REVIEW DATA. THE PROJECT INVESTIGATED IS UTILIZED FOR EXPERIMENTAL EXCAVATION PURPOSES. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES THERMAL-RADIANT (COHERENT LIGHT-LASER) .

R000865 RESEARCH AND DEVELOPMENT - KEY TO ADVANCES FOR RAPID EXCAVATION IN HARD ROCK.
OLSON, J. J. ATCHISON, T. C.
PROC. NORTH AMER. RAPID EXCAVATION TUNNELLING CONF. 2, 1393-1441, 1972.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
U.S.BUREAU OF MINES,MINNEAPOLIS,MN!USA.

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FUNDING ORGANIZATION(S)
BUREAU OF MINES,U.S.GOVT.

THIS LAB-THEORETICAL REPORT CONTAINS REVIEW DATA. THE PROJECT INVESTIGATED IS UTILIZED FOR EXPERIMENTAL EXCAVATION PURPOSES. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES JET ABRASION (WATER) . GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. THE EXCAVATION CHARACTERISTICS FOR BARRE GRANITE, BEREA SANDSTONE, DRESSER BASALT, HOLSTON MARBLE (LIMESTONE OR FORMATION)(=TENNESSEE MARBLE), SALEM LIMESTONE, SIOUX QUARTZITE (=JASPER QUARTZITE), ST.CLOUD(GRAY)GRANODIORITE (=CHARCOAL GREY GRANITE) AND WESTERLY GRANITE ARE TREATED. ROCK TYPES REVIEWED INCLUDE BASALT, GRANITE, LIMESTONE, MARBLE, QUARTZITE AND SANDSTONE . THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES (LAB) DATA.

R000866 EXPLOSIVE EXCAVATION RESEARCH.
GATES, R. H.
PROC. NORTH AMER. RAPID EXCAVATION TUNNELLING CONF.
2, 1569-84, 1972.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
U.S.ARMY WATERWAYS EXPERIMENT STATION,EXPLOSIVE EXCAVATION
RESEARCH LABORATORY (EERL),LIVERMORE,CA;USA

FUNDING ORGANIZATION(S)
U.S.ARMY CORPS OF ENGINEERS

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE COMPLETED EXCAVATION OF THE RESERVOIR CONNECTION (FORT PECK, MT., USA) . THE PROJECT INVESTIGATED IS UTILIZED FOR CHANNEL DEPLUGGING, EXPERIMENTAL EXCAVATION AND RAILWAY PURPOSES. THE TRENCH METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES CONVENTIONAL EXPLOSIVE (ANFO) . PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE SANDSTONE AND SHALE .

R000966 EUROPEAN DEVELOPMENT AND EXPERIENCE WITH MECHANICAL MOLES IN HARD ROCK TUNNELING.
BARENDSEN, P.
PROC. DEEP TUNNELS IN HARD ROCK, CIVIC CENTER CAMPUS, NOV. 9-10, 1970, MILWAUKEE, WIS.
93-112, 1970.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
ATLAS COPCO A.B;STOCKHOLM,SWEDEN

FUNDING ORGANIZATION(S)
ATLAS COPCO AB;STOCKHOLM,SWEDEN

THIS IN-SITU-THEORETICAL REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENINGS DISCUSSED INCLUDE THE COMPLETED EXCAVATION OF THE RORSCHACH SEWAGE TUNNEL (RORSCHAH, SWITZERLAND), THE COMPLETED EXCAVATION OF THE SEIKAN RAILWAY TUNNEL (JAPAN) AND THE COMPLETED EXCAVATION OF THE WHITE PINE COPPER MINE (MI., USA) . THE PROJECTS INVESTIGATED ARE UTILIZED FOR EXPLORATORY TUNNEL, MINE AND SEWER PURPOSES. THE TBM METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. TBM EXCAVATION RATE IS ALSO DISCUSSED. GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON GROUND CONDITIONS IS ALSO PRESENTED. THE EXCAVATION CHARACTERISTICS FOR WHITE PINE ORE FORMATION ARE TREATED. PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE SANDSTONE AND SHALE . THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES (LAB) DATA.

R000968 EXPERIENCE IN EDMONTON CANADA WITH EMPHASIS ON PNEUMATIC CONVEYANCE OF MUCK.
CHRYSANTHOU, C. G.
PROC. DEEP TUNNELS IN HARD ROCK, CIVIC CENTER, CAMPUS, NOV. 9-10, 1970, MILWAUKEE, WIS.
131-40, 1970.
LANGUAGE: ENGLISH

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PERFORMING ORGANIZATION(S)
EDMONTON,CITY OF, ALBERTA,CANADA

FUNDING ORGANIZATION(S)
EDMONTON,CITY OF,ALBERTA,CANADA

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE ON GOING EXCAVATION OF THE EDMONTON SANITARY TUNNELS (EDMONTON, ALBERTA, CANADA) . THE PROJECT INVESTIGATED IS UTILIZED FOR SEWER PURPOSES. THE TBM METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) . TBM EXCAVATION RATE IS ALSO DISCUSSED. PERTINENT INFORMATION ON MATERIALS HANDLING SYSTEM IS ALSO PRESENTED.

R000969 RAPID EXCAVATION IN HARD ROCK: A STATE-OF-THE-ART REPORT.
BRUCE, W. E. MORRELL, R. J.
PROC. DEEP TUNNELS IN HARD ROCK, CIVIC CENTER CAMPUS, NOV. 9-10, 1970, MILWAUKEE, WIS.
157-221, 1970.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
U.S BUREAU OF MINES,MINNEAPOLIS,MN;USA.

FUNDING ORGANIZATION(S)
BUREAU OF MINES,U.S.GOVT.

THIS IN-SITU REPORT CONTAINS REPUBLISHED DATA. THE UNDERGROUND OPENINGS DISCUSSED INCLUDE THE COMPLETED EXCAVATION OF THE CALUMET INTERCEPTING SEWER (18E, 127THAND CRAWFOLD AVE.) (CHICAGO, IL., USA), THE COMPLETED EXCAVATION OF THE CHICAGO SEWER TUNNEL (CHICAGO, IL., USA), THE COMPLETED EXCAVATION OF THE CLIMAX MINE (CO., USA), THE COMPLETED EXCAVATION OF THE DOBLESTER WATER TUNNEL (BOSTON, MA., USA), THE COMPLETED EXCAVATION OF THE INCLINED SHAFT ADIRONDACK MINE (MINEVILLE, NY., USA), THE COMPLETED EXCAVATION OF THE LAWRENCE AVENUE SEWER SYSTEM (CHICAGO, IL., USA), THE COMPLETED EXCAVATION OF THE MAGMA MINE DEVELOPMENT DRIFT (SUPERIOR, AZ., USA), THE COMPLETED EXCAVATION OF THE RICHMOND WATER TUNNEL (NEW YORK, NY., USA), THE COMPLETED EXCAVATION OF THE RIVER MOUNTAINS TUNNEL (HENDERSON, NV., USA), THE COMPLETED EXCAVATION OF THE SOUTHWEST SEWER 13-A (CHICAGO, ILLINOIS, USA), THE COMPLETED EXCAVATION OF THE STAR MINE(WALLACE DEVELOPMENT DRIFT) (ID., USA) AND THE COMPLETED EXCAVATION OF THE WHITE PINE COPPER MINE (MI., USA) . THE PROJECTS INVESTIGATED ARE UTILIZED FOR MINE, SEWER AND WATER SUPPLY TUNNEL PURPOSES. THE TBM METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. TBM EXCAVATION RATE IS ALSO DISCUSSED. GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON GROUND CONDITIONS AND UNDERGROUND OPENING SUPPORTS IS ALSO PRESENTED. PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE ARGILLITE, CONGLOMERATE, DIORITE, DOLOMITE (ROCK), GNEISS, LIMESTONE, MONZONITE, QUARTZITE, RHYODACITE, RHYOLITE, SANDSTONE, SCHIST, TUFA (ROCK) AND VOLCANICS . THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES (LAB) DATA.

R000970 TWO UNDERWATER SHAFTS TO CONNECT TWIN TUNNELS IN ENGLAND'S MEDWAY ESTUARY.
AUTHOR ANON.
TUNNELS AND TUNNELLING
4 (4), 310-11, 1972.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
MOODIE,KINNEAR AND CO.LTD;U.K.

FUNDING ORGANIZATION(S)
CENTRAL ELECTRICITY GENERATING BOARD,U.K.

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE SHIELD METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. SOIL CHARACTERISTICS FOR THE

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REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON GROUND CONDITIONS AND UNDERGROUND OPENING SUPPORTS IS ALSO PRESENTED.

R000971 DIFFICULTIES OVERCOME IN DRIVING WATER TUNNEL.
BEALE, R. A. ST.J.
TUNNELS AND TUNNELLING
4 (4), 323-7, 1972.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
THYSSEN (GREAT BRITAIN)LTD.

THIS IN-SITU REPORT CONTAINS REPUBLISHED DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE COMPLETED EXCAVATION OF THE CROSS HANDS TUNNEL (U.K.) . THE PROJECT INVESTIGATED IS UTILIZED FOR WATER SUPPLY TUNNEL PURPOSES. THE DRILL AND BLAST (OTHER THAN FULL FACE) METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES CONVENTIONAL EXPLOSIVE (UNSPECIFIED) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. TBM EXCAVATION RATE IS ALSO DISCUSSED. GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON GROUND CONDITIONS AND UNDERGROUND OPENING SUPPORTS AND MATERIALS HANDLING SYSTEM IS ALSO PRESENTED. THE EXCAVATION CHARACTERISTICS FOR BRITISH COAL MEASURE ARE TREATED.

R000972 ROCKETS FOR RUSSIAN DRILLING.
AUTHOR ANON.
UNDERGROUND SERVICES
3 (1), 36, 1973.
LANGUAGE: ENGLISH

THIS IN-SITU AND LAB-IN-SITU REPORT CONTAINS REVIEW DATA. THE PROJECT INVESTIGATED IS UTILIZED FOR EXPERIMENTAL EXCAVATION AND UNSPECIFIED PURPOSES. THE COMPRESSED AIR METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHODS SERVICING PROJECT EFFORTS INCLUDE JET ABRASION (GAS) AND MECHANICAL ABRASION (UNSPECIFIED) .

R000973 RAPID EXCAVATION BY ROCK MELTING--LASL SUBTERRENE PROGRAM--.
HAROLD, R. J.
LOS ALAMOS SCIENTIFIC LABORATORY, UNIV. OF CALIFORNIA
35PP., 1973.
(LA-5459--SR, AVAIL. NTIS)
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
LOS ALAMOS SCIENTIFIC LAB.(UNIV.OF CALIFORNIA),NM 87544,USA.

FUNDING ORGANIZATION(S)
UNITED STATES GOVT.

THIS LAB REPORT CONTAINS REVIEW DATA. THE PROJECT INVESTIGATED IS UTILIZED FOR DRAINAGE (UNSPECIFIED) AND EXPERIMENTAL EXCAVATION PURPOSES. THE REPORTED FRAGMENTATION METHODS SERVICING PROJECT EFFORTS INCLUDE CHEMICAL (SURFACTANTS) AND SUBTERRENE . GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. THE EXCAVATION CHARACTERISTICS FOR BANDELIER TUFF ARE TREATED. ROCK TYPES REVIEWED INCLUDE TUFF .

R000975 DRILLING ROCKS WITH PLASMA JETS.
BOUCHE, R. E.
COLORADO SCHOOL OF MINES, GOLDEN, COLO., M. S. THESIS
62PP., 1964.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
COLORADO SCHOOL OF MINES,DEPT.OF MINING,GOLDEN,CO 80401

FUNDING ORGANIZATION(S)
AMERICAN PETROLEUM INSTITUTE

THIS LAB REPORT CONTAINS ORIGINAL DATA. THE PROJECT INVESTIGATED IS UTILIZED FOR EXPERIMENTAL EXCAVATION PURPOSES. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES THERMAL-ELECTRICAL

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(TRANSFERRED ARC METHODS, PLASMA ARC) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE GRANITE, LIMESTONE, MARBLE AND SHALE .

R000994 CHANNEL TUNNEL MACHINERY.
MILLBANK, P.
TUNNELS AND TUNNELLING
5 (6), 561-2, 1973.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
1.CROSS CHANNEL CONSTRACTORS,U.K;
2.E.HEILKAMP GMBH,(R.A.F),
3.LA SA DES ENTERPRISES LEON BALLOT,FRANCE
4.L'ENTERPRISES CAPAG-CENTRA,FRANCE
5.L'ENTERPRISES QUILLERY SAINT-MAUR,FRANCE
6.L'ENTERPRISES TRUCHETET-TANSINI,FRANCE
7.TRAPP ET CIE GMBH (R.A.F.),FRANCE.

FUNDING ORGANIZATION(S)
BRITISH CHANNEL TUNNEL CO(U.K.AND SOCIETE FRANCAISE OU TUNNEL SOUS LA MANCHE,FRANCE

THIS IN-SITU REPORT CONTAINS REVIEW DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE PROPOSED EXCAVATION OF THE ENGLISH CHANNEL TUNNEL (U.K.) . THE PROJECT INVESTIGATED IS UTILIZED FOR VEHICULAR TUNNEL (RAILWAY AND SUBWAY, 2 LEVEL) PURPOSES. THE TBM METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. PERTINENT INFORMATION ON UNDERGROUND OPENING SUPPORTS AND MATERIALS HANDLING SYSTEM IS ALSO PRESENTED. PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE CHALK (MINERAL) . THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES DATA.

R000995 SYDNEY RAIL TUNNEL MACHINERY.
JESSOP, M. P.
TUNNELS AND TUNNELLING
5 (6), 564, 1973.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
CODELFA CONSTRUCTIONS PVT.LTD;AUSTRALIA

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE COMPLETED EXCAVATION OF THE SYDNEY RAIL TUNNEL (SYDNEY, AUSTRALIA) . THE PROJECT INVESTIGATED IS UTILIZED FOR RAILWAY PURPOSES. THE TBM METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. PERTINENT INFORMATION ON MATERIALS HANDLING SYSTEM IS ALSO PRESENTED.

R000996 AN AMERICAN VIEW OF EUROPEAN TUNNELLING.
DEGALL, A. A.
TUNNELS AND TUNNELLING
5 (6), 619-23, 1973.
LANGUAGE: ENGLISH

THIS IN-SITU REPORT CONTAINS ABSTRACTED ONLY DATA. THE UNDERGROUND OPENINGS DISCUSSED INCLUDE THE COMPLETED EXCAVATION OF THE ELBE TUNNEL (HAMBURG, W.GERMANY) AND ST. GOTTHARD TUNNEL (NORTH HEADING) (SWITZERLAND) . THE PROJECTS INVESTIGATED ARE UTILIZED FOR UNSPECIFIED PURPOSES. THE DRILL AND BLAST (FULL FACE) METHOD AND SHIELD METHOD REPRESENT THE EXCAVATION TECHNIQUES STUDIED. THE REPORTED FRAGMENTATION METHODS SERVICING PROJECT EFFORTS INCLUDE CONVENTIONAL EXPLOSIVE (UNSPECIFIED) AND MECHANICAL ABRASION (ROTARY) . PERTINENT INFORMATION ON UNDERGROUND OPENING SUPPORTS AND MATERIALS HANDLING SYSTEM IS ALSO PRESENTED. PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE GRANITE AND SCHIST .

R001018 BREAKTHROUGH ON SECOND MERSEY ROAD TUNNEL AS WORK COMMENCES ON DUPLICATE.
AUTHOR ANON.
CIVIL ENG. PUBLIC WORKS REV.

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65 (765), 378, 1970.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
MUTTALL,ATKINSON AND CO.

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENINGS DISCUSSED INCLUDE THE ON GOING EXCAVATION OF THE PILOT TUNNEL FOR DUPLICATE MERSEY TUNNEL (U.K.) AND THE COMPLETED EXCAVATION OF THE SECOND MERSEY ROAD TUNNEL (LIVERPOOL, U.K.) . THE PROJECTS INVESTIGATED ARE UTILIZED FOR PILOT BORE AND TWIN HIGHWAY PURPOSES. THE TBM METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. ROCK TYPES REVIEWED INCLUDE SANDSTONE .

R001019 EQUIPMENT DEVELOPMENT TRENDS IN MODERN TUNNELLING
ABSTRACTS OF PAPERS READ AT THE ROCK DRILLING DAY IN SWEDEN.
BARENDSEN, P.
CIVIL ENG. PUBLIC WORKS REV.
65 (772), 1304-5, 1972.
LANGUAGE: ENGLISH

FUNDING ORGANIZATION(S)
WHITE PINE COPPER CO;WHITE PINE,MI;USA.

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE ON GOING EXCAVATION OF THE WHITE PINE COPPER MINE (MI., USA) . THE PROJECT INVESTIGATED IS UTILIZED FOR MINE PURPOSES. THE PARTIAL FACE TUNNEL MACHINE METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. TBM EXCAVATION RATE IS ALSO DISCUSSED.

R001021 WHITE PINE BORES TO MINE SHAFT BENCHMARK.
AUTHOR ANON.
ENG. MINING J.
170 (4), 110-11, 1969.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
DRAVO CORP.(OR CO.),U.S.A.

FUNDING ORGANIZATION(S)
EDMONTON,CITY OF,ALBERTA,CANADA

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENINGS DISCUSSED INCLUDE THE COMPLETED EXCAVATION OF THE WHITE PINE COPPER MINE (MI., USA) AND THE ON GOING EXCAVATION OF THE WHITE PINE COPPER MINE (MI., USA) . THE PILOT BORE-CENTER METHOD AND TBM METHOD REPRESENT THE EXCAVATION TECHNIQUES STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. TBM EXCAVATION RATE IS ALSO DISCUSSED.

R001022 RAPID EXCAVATION CONCEPTS NOW IN FOCUS AS PARAMETERS AND DIMENSIONS EMERGE.
AUTHOR ANON.
ENG. MINING J.,
171 (1), 77-81, 1970.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
HENDRICKS,R.S.AND MINER,G.M;WALLACE,ID;USA.

THIS IN-SITU REPORT CONTAINS REPUBLISHED DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE COMPLETED EXCAVATION OF THE HELCA MINE (COVER D'ALENE, ID., USA) . THE PROJECT INVESTIGATED IS UTILIZED FOR MINE PURPOSES. THE RAISE DRIVING (BORING MACHINES) METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) . TBM EXCAVATION RATE IS ALSO DISCUSSED. INFORMATION PERTINENT TO EXCAVATION COST IS GIVEN. PERTINENT INFORMATION ON MATERIALS HANDLING SYSTEM IS ALSO PRESENTED.

R001023 WATER JET IS PROPOSED AS ROCK CUTTING MEDIUM FOR RAPID TUNNELLING.
AUTHOR ANON.
ENG. MINING J.
172 (1), 89, 1971.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
I.I.T.RESEARCH INSTITUTE,CHICAGO,IL;USA.

THIS LAB REPORT CONTAINS ORIGINAL DATA. THE HYDRAULIC FRAGMENTATION METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES JET ABRASION (WATER) . TBM EXCAVATION RATE IS ALSO DISCUSSED.

R001024 RUSSIA DEVELOPS ROCKET FOR USE IN DRILLING.
AUTHOR ANON.
ENG. MINING J.
172 (12), 32, 1971.
LANGUAGE: ENGLISH

THIS IN-SITU-THEORETICAL REPORT CONTAINS ORIGINAL DATA. THE PROJECT INVESTIGATED IS UTILIZED FOR EXPERIMENTAL EXCAVATION PURPOSES. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES JET ABRASION (GAS) . TBM EXCAVATION RATE IS ALSO DISCUSSED. PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE PERMAFROST .

R001025 SOFT GROUND TUNNELLING TECHNOLOGY ON THE BART PROJECT.
PETERSON, E. FROBENIUS, P.
CIVIL ENG., ASCE
41 (10), 72-6, 1971.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
DELAWARE V.M.CORP.
UNIVERSITY OF MINNESOTA,DEPT.OF CIVIL AND MINERAL ENGINEERING
1.KIEWIT SONS
2.TRAYLOR BROTHERS,SAN FRANSISCO,CA;USA

THIS IN-SITU REPORT CONTAINS REPUBLISHED DATA. THE UNDERGROUND OPENINGS DISCUSSED INCLUDE THE COMPLETED EXCAVATION OF THE BAY AREA RAPID TRANSIT PROJECT (BART) (SECTION UNSPECIFIED) (SAN FRANCISCO, CA., USA) AND THE COMPLETED EXCAVATION OF THE BAY AREA RAPID TRANSIT PROJECT (BART) (MARKET STREET SECTION) (SAN FRANCISCO, CA., USA) . THE PROJECTS INVESTIGATED ARE UTILIZED FOR METRO PURPOSES. THE SHIELD METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHODS SERVICING PROJECT EFFORTS INCLUDE HAND MINING AND MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. TBM EXCAVATION AND EXCAVATION ADVANCEMENT RATES ARE ALSO DISCUSSED. GEOSTRUCTURAL AND SOIL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON GROUND CONDITIONS AND UNDERGROUND OPENING SUPPORTS AND MATERIALS HANDLING SYSTEM IS ALSO PRESENTED.

R001026 TUNNEL DRIVEN USING SUBSURFACE FREEZING.
GAIL, C. P.
CIVIL ENG., ASCE
42 (5), 37-40, 1972.
LANGUAGE: ENGLISH

THIS IN-SITU REPORT CONTAINS REPUBLISHED DATA. THE PROJECT INVESTIGATED IS UTILIZED FOR SEWER PURPOSES. THE SHIELD METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON GROUND CONDITIONS AND UNDERGROUND OPENING SUPPORTS IS ALSO PRESENTED.

R001029 DESIGN AND APPLICATION OF ROLLING CUTTERS FOR RAISE AND TUNNEL BORING.
DIXON, R. L. WORDEN, E. P.
MINING CONGR. J.
57, 40-8, 1971.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
SMITH TOOL CO;ENGINEERING DEPT.OF

(CONTINUED)

THIS THEORETICAL REPORT CONTAINS REVIEW DATA. THE TBM METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) .

R001030 UNDERGROUND MINING.
EDWARDS, R. W.
MINING CONGR. J.
57 (2), 49-53, 1971.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
KERR-MCGEE CORP.
SHAFT DRILLERS INC.

FUNDING ORGANIZATION(S)
ATOMIC ENERGY COMMISSION
HUDSON BAY MINING AND SMELTING CO:CANADA
CONSOLIDATION COAL CO:HANNA COAL DIVISION,CADIZ,OH: USA.
OH, USA
INTERNATIONAL NICKEL CO: (INCO)

THIS IN-SITU REPORT CONTAINS REVIEW DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES CREIGHTON NO. 9 SHAFT . THE PROJECT INVESTIGATED IS UTILIZED FOR MINE AND UNSPECIFIED PURPOSES. THE TBM METHOD AND VERTICAL ROTARY METHOD REPRESENT THE EXCAVATION TECHNIQUES STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY DRILLING EQUIPMENT AND TUNNELING MACHINE CHARACTERISTICS. PERTINENT INFORMATION ON MATERIALS HANDLING SYSTEM IS ALSO PRESENTED. ROCK TYPES REVIEWED INCLUDE COAL, POTASH AND SANDSTONE .

R001031 BORER FOR TUNNEL PROJECT IN GREECE.
AUTHOR ANON.
CAN. MIN. METALL. BULL.
64 (711), 106, 1971.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
EDOK-ETER,GREECE

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE PROPOSED EXCAVATION OF THE GHIONA TUNNEL (ATHENS, GREECE) . THE PROJECT INVESTIGATED IS UTILIZED FOR WATER SUPPLY TUNNEL PURPOSES. THE TBM METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. TBM EXCAVATION RATE IS ALSO DISCUSSED. ROCK TYPES REVIEWED INCLUDE LIMESTONE .

R001033 NEW TUNNEL BORER TO DIG TORONTO SEWER.
AUTHOR ANON.
CAN. MINING J.
91 (10), 115, 1970.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
MCNALLY AND SONS,HAMILTON

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE PROPOSED EXCAVATION OF THE TORONTO SEWER TUNNEL (TORONTO, ONTARIO, CANADA) . THE PROJECT INVESTIGATED IS UTILIZED FOR SEWER PURPOSES. THE TBM METHOD REPRESENT THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS.

R001036 PNEUMATIC BORING TOOLS IN CONSTRUCTIONAL ENGINEERING AND MINING.
SUDNISHNIKOV, B. V. KOSTYLEV, A. D.
TUPITSYN, K. K.
SOV. MIN. SCI.
(2), 169-8, 1970.
(ENGLISH TRANSLATION OF FIZ. TEKH. PROBL. RAZRAB. POLEZ. ISKOP., (2), 44-9, 1973: FOR ORIGINAL SEE R001035)
LANGUAGE: ENGLISH

(CONTINUED)

PERFORMING ORGANIZATION(S)
INSTITUTE OF MINING,SIBERIAN BRANCH,ACADEMY OF SCIENCES OF THE USSR:NOVOSIBIRSK,USSR.

THIS IN-SITU REPORT CONTAINS REVIEW DATA. THE PROJECT INVESTIGATED IS UTILIZED FOR UNSPECIFIED PURPOSES. THE PNEUMATIC BORING METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES JET ABRASION (AIR) . THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES (LAB) DATA.

R001038 THE TUNNEL UNDER THE BRIDGE.
PHILLIPS, M.
ENGINEERING
445-7, 1970.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
BRAND,CHARLES AND SON LTD:LONDON,U.K.

FUNDING ORGANIZATION(S)
CEBG (CENTRAL ELECTRICITY GENERATING BOARD), TRANSMISSION PROJECT ELECTRICITY GENERATING BOARD),U.K.

THIS IN-SITU REPORT CONTAINS REPUBLISHED DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE COMPLETED EXCAVATION OF THE SEVERN CABLE TUNNEL (U.K.) . THE PROJECT INVESTIGATED IS UTILIZED FOR CABLE TUNNEL PURPOSES. THE TBM METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. ROCK TYPES REVIEWED INCLUDE LIMESTONE, MARL AND MUDSTONE .

R001046 THE APPLICATION OF CONTINUOUS MINING MACHINES AT COALBROOK COLLERIES.
BURNTON, R. E. FERGUSON, J. G.
J. S. AFRICAN INST. MINING MET.
72 (2), 27-33, 1971.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
COALBROCK COLLIERIES,CLYDESDALE COLLIERIES LTD: TRANSVAL,AFRICA

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE ON GOING EXCAVATION OF THE COALBROOK COLLIERIES (S.AFRICA) . THE PROJECT INVESTIGATED IS UTILIZED FOR MINE PURPOSES. THE TBM METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES CONVENTIONAL EXPLOSIVE (AMMONIUM NITRATE) . GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON MATERIALS HANDLING SYSTEM IS ALSO PRESENTED. THE EXCAVATION CHARACTERISTICS FOR HAMMELSBERGER QUARTZITE ARE TREATED. PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE COAL .

R001047 HIGH SPEED DEVELOPMENT OF A 2,000 FOOT 12 DEGREE DECLINE.
LAWTON, M. D. STEEN, P.
CAN. INST. MIN. METALL. BULL.
105-11, 1971.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
ANGLO-ROUYN MINES LTD.

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE PROJECT INVESTIGATED IS UTILIZED FOR MINE PURPOSES. THIS DOCUMENT INCORPORATES ADDITIONALLY DRILLING EQUIPMENT AND TUNNELING MACHINE CHARACTERISTICS. GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON GROUND CONDITIONS AND MATERIALS HANDLING SYSTEM IS ALSO PRESENTED.

R001048 MINE PLANNING FOR RAISE BORING.
DURK, R. R.
CAN. INST. MIN. METALL. BULL.
62 (687), 748-55, 1969.
LANGUAGE: ENGLISH

(CONTINUED)

PERFORMING ORGANIZATION(S)
SINGSTAD,KEHART,NOVEMBER AND HURKA (ONE WORLD TRADE CENTER,SUITE 2341),NEW YORK,NY:10048
GEO-ENGINEERING LABORATORIES,INC.

FUNDING ORGANIZATION(S)
BRUNSWICK MINING AND SMELTING CO:BATHURST,NEW BRUNSWICK,CANADA
MAGMA COPPER CORPORATION,SUPERIOR,AZ:USA.
KAISER RESOURCES LTD:BRITISH COLUMBIA, CANADA

THIS IN-SITU REPORT CONTAINS REVIEW DATA. THE UNDERGROUND OPENINGS DISCUSSED INCLUDE THE ON GOING EXCAVATION OF THE CUPRA MINE (QUEBEC, CANADA), THE ON GOING EXCAVATION OF THE MAGMA COPPER MINE (SUPERIOR, AZ., USA), THE ON GOING EXCAVATION OF THE MINES OF BRUNSWICK MINING AND SMELTING CO. (BATHURST, NEW BRUNSWICK., CANADA), THE ON GOING EXCAVATION OF THE NIGADOO RIVER MINES AND THE ON GOING EXCAVATION OF THE WHITE PINE COPPER MINE (MI., USA) . THE PROJECTS INVESTIGATED ARE UTILIZED FOR MINE PURPOSES. THE RAISE DRIVING (BORING MACHINES) METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. TBM EXCAVATION RATE IS ALSO DISCUSSED.

R001049 PREDICITING THE ECONOMIC SUCCESS OF CONTINUOUS TUNNELLING IN HARD ROCK.
HANDEWITH, H. J.
CAN. INST. MIN. METALL. BULL.
63 (697), 595-9, 1970.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
UNIVERSITY OF CALIFORNIA,BERKELEY,COLLEGE OF ENGINEERING

THIS LAB REPORT CONTAINS REVIEW DATA. GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. THE EXCAVATION CHARACTERISTICS FOR BARRE GRANITE ARE TREATED. PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE BASALT, GRANITE AND LIMESTONE .

R001050 BIG HOLE DRILLING IS COMING OF AGE UNDERGROUND.
NORMAN, N. E.
MINING ENG.
20, 41-6, 1968.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
SHAFT DRILLERS INC.
CALIFORNIA,UNIVERSITY OF,SCHOOL OF ENGINEERING AND APPLIED SCIENCE,LOS ANGELES,CA.
CEMENTATIONS PROJECTS LTD:U.K.
CAMAY DRILLING CO.
1.CAMAY DRILLING CO.
2.FENIX AND SCISSON
TETON EXPLORATION DRILLING CO.
KUEHN AND RHODES
LOFFLAND BROTHERS
PERRY AND FAUST DRILLING CO.
1.LAYNE-TEXAS
2.PERRY AND FAUST
BUNKER HILL CO.

FUNDING ORGANIZATION(S)
AMERICAN GILSONITE CO.
REPUBLIC STEEL CORP:ADIRONDACK MINE,MINEVILLE,NY: USA.
TEXAS GULF SULPHUR CO.
BUNKER HILL CO.
ALTOS HORNOS DE MEXICO
COMINCO AMERICAN
HOMESTAKE-SAPIN AND PARTNERS
KERR-MCGEE DRILLING CO.
UNION CARBIDE
UNITED NUCLEAR CORPORATION
WESTERN NUCLEAR CORPORATION
HANNA MINING CO.
CLEVELAND CLIFFS IRON CO.
THE ANACONDA COMPANY

(CONTINUED)

THIS IN-SITU REPORT CONTAINS REVIEW DATA. THE UNDERGROUND OPENINGS DISCUSSED INCLUDE THE COMPLETED EXCAVATION OF THE BYPASS TUNNEL, UNDERGROUND POWER HOUSE, KEMANO SCHEME (KEMANO, BRITISH COLUMBIA, CANADA), THE COMPLETED EXCAVATION OF THE HIGDON MINE (MISSOURI, USA), THE COMPLETED EXCAVATION OF THE HOMER-MAUSECA IRON MINE (MI.), THE ON GOING EXCAVATION OF THE LAWRENCE AVENUE SEWER SYSTEM (CHICAGO, IL., USA), THE ON GOING EXCAVATION OF THE MATHER 8 MINE (NALGAUNEE, MI., USA), THE COMPLETED EXCAVATION OF THE MOAB MINE (POTASH, UT., USA) AND THE COMPLETED EXCAVATION OF THE REPUBLIC STEEL CORP. (MINEVILLE, NY., USA) . THE PROJECTS INVESTIGATED ARE UTILIZED FOR MINE, PIPLINE (UNSPEC), SEWER AND UNSPECIFIED PURPOSES. THE DRILL AND BLAST (FULL FACE) METHOD, RAISE DRIVING (BORING MACHINES) METHOD, TBM METHOD AND VERTICAL ROTARY METHOD REPRESENT THE EXCAVATION TECHNIQUES STUDIED. THE REPORTED FRAGMENTATION METHODS SERVICING PROJECT EFFORTS INCLUDE CONVENTIONAL EXPLOSIVE (UNSPECIFIED) AND MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. TBM EXCAVATION RATE IS ALSO DISCUSSED. PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE GNEISS, HEMATITE, IRON ORE AND SANDSTONE . THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES (LAB) DATA.

R001051 ROCK DISINTEGRATION-THE KEY TO MINING PROGRESS.
CLARK, G. B.
MINING ENG.
23 (3), 47-51, 1971.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
MISSOURI,UNIVERSITY OF,ROLLA,MO:USA

THIS LAB-IN-SITU-THEORETICAL AND THEORETICAL REPORT CONTAINS REVIEW DATA. THE PROJECT INVESTIGATED IS UTILIZED FOR EXPERIMENTAL EXCAVATION PURPOSES. THE HEADING AND BENCH-PILOT BORE CENTER METHOD AND WATER JET ASSISTED FULL FACE TUNNELING MACHINE METHOD REPRESENT THE EXCAVATION TECHNIQUES STUDIED.

R001053 RECORD TUNNEL EXCAVATION WITH BORING MACHINES.
CANNON, D. E.
CIVIL ENG., ASCE
37 (8), 45-8, 1967.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
1.BOYLES BROTHERS DRILLING CO.
2.DUGAN GRAHAM CO.INC:SALT LAKE CITY,UT:USA.
1.COLORADO CONSTRUCTORS,DENVER,CO.
2.HORNER,A.S.CONSTRUCTION CO.,DENVER,CO.

FUNDING ORGANIZATION(S)
U.S.BUREAU OF RECLAMATION

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENINGS DISCUSSED INCLUDE THE COMPLETED EXCAVATION OF THE AZOTEA TUNNEL (JUAN-CHAMA PROJECT) (N.CEN.NM., USA), THE COMPLETED EXCAVATION OF THE BLANCO TUNNEL (JUAN-CHAMA PROJECT) (N.CEN.NM., USA) AND THE COMPLETED EXCAVATION OF THE OSO TUNNEL (CO., USA) . THE PROJECTS INVESTIGATED ARE UTILIZED FOR IRRIGATION PURPOSES. THE TBM METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY DRILLING EQUIPMENT AND TUNNELING MACHINE CHARACTERISTICS. TBM EXCAVATION AND EXCAVATION ADVANCEMENT RATES ARE ALSO DISCUSSED. GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON UNDERGROUND OPENING SUPPORTS IS ALSO PRESENTED. THE EXCAVATION CHARACTERISTICS FOR LEWIS SHALE, MANCOS FORMATION AND MESAVERDE FORMATION (OR GROUP) ARE TREATED.

R001054 DIFFICULT EXCAVATION AT CARLEY PORTER TUNNEL.
VARELLO, P. J.
CIVIL ENG., ASCE
40 (6), 66-9, 1970.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
1.ATKINSON,GUY F:CO:SAN FRANCISCO,CA.

(CONTINUED)

2.DRAVO CORP!PITTSBURG,PA.
3.GROVES,S.J.AND SON,MINNEAPOLIS,MN!USA.

FUNDING ORGANIZATION(S)
CALIFORNIA, STATE OF,DEPT. OF WATER RESOURCES,CA! USA.

THIS IN-SITU REPORT CONTAINS REVIEW DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE COMPLETED EXCAVATION OF THE CARLEY V.PORTER TUNNEL (CA.AQUEDUCT SYSTEM) (CA., USA) . THE PROJECT INVESTIGATED IS UTILIZED FOR WATER SUPPLY TUNNEL PURPOSES. THE SHIELD METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES CONVENTIONAL EXPLOSIVE (UNSPECIFIED) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON GROUND CONDITIONS AND UNDERGROUND OPENING SUPPORTS AND MATERIALS HANDLING SYSTEM IS ALSO PRESENTED. PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE CLAYSTONE, GRANITE AND MUDSTONE .

R001055 THE GIBRALTER HILL TUNNELS, MONMOUTH (GREAT BRITAIN).
BAKER, C. O. HOWELLS, D. A.
ENG. GEOL.
3 (2), 121-34, 1969.
LANGUAGE! ENGLISH

PERFORMING ORGANIZATION(S)
HUMPHREYS AND SONS,EPSON,U.K.

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE COMPLETED EXCAVATION OF THE GIBRALTAR HILL TUNNELS (MONMOUTH, U.K.) . THE PROJECT INVESTIGATED IS UTILIZED FOR HIGHWAY PURPOSES. THE SHIELD METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES CONVENTIONAL EXPLOSIVE (UNSPECIFIED) . THIS DOCUMENT INCORPORATES ADDITIONALLY DRILLING EQUIPMENT CHARACTERISTICS. TBM EXCAVATION RATE IS ALSO DISCUSSED. GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON UNDERGROUND OPENING SUPPORTS AND MATERIALS HANDLING SYSTEM IS ALSO PRESENTED. THE EXCAVATION CHARACTERISTICS FOR OLD RED SANDSTONE SYSTEM ARE TREATED.

R001056 CROSSING THE SIERRA MADRE FAULT ZONE IN THE GLENDORA TUNNEL, SAN GABRIEL MOUNTAINS.
PROCTOR, R. J. PAYNE, C. M. KALIN, D. C.
ENG. GEOL.
4 (1), 5-63, 1970.
LANGUAGE! ENGLISH

PERFORMING ORGANIZATION(S)
SHEA,J.F!CO.INC!CA!USA.

FUNDING ORGANIZATION(S)
CALIFORNIA, STATE OF,DEPT. OF WATER RESOURCES,CA! USA.

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE COMPLETED EXCAVATION OF THE GLENDORA TUNNEL (SAN GABRIEL MTS., CA., USA) . THE PROJECT INVESTIGATED IS UTILIZED FOR WATER SUPPLY TUNNEL PURPOSES. THE HEADING AND BENCH METHOD AND UNSPECIFIED METHOD REPRESENT THE EXCAVATION TECHNIQUES STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES CONVENTIONAL EXPLOSIVE (UNSPECIFIED) . THIS DOCUMENT INCORPORATES ADDITIONALLY DRILLING EQUIPMENT CHARACTERISTICS. TBM EXCAVATION AND EXCAVATION ADVANCEMENT RATES ARE ALSO DISCUSSED. GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON GROUND CONDITIONS AND UNDERGROUND OPENING SUPPORTS AND MATERIALS HANDLING SYSTEM IS ALSO PRESENTED. THE EXCAVATION CHARACTERISTICS FOR CRETACEOUS QUARTZ-RICH GARNITE, MESAVERDE FORMATION (OR GROUP) AND PUENTE FORMATION ARE TREATED. PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE ANDESITE, DIORITE, GNEISS, GRANITE, SCHIST, SHALE, TERRACE DEPOSIT AND VOLCANICS . THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES (LAB) DATA.

R001058 PERFORMANCES OF TUNNEL BORING MACHINES.
PROCTOR, R. J.
BULL. ASS. ENG. GEOL.
6 (2), 105-17, 1969.
LANGUAGE! ENGLISH

FUNDING ORGANIZATION(S)
U.S.BUREAU OF RECLAMATION

THIS IN-SITU REPORT CONTAINS REVIEW DATA. THE UNDERGROUND OPENINGS DISCUSSED INCLUDE THE COMPLETED EXCAVATION OF THE AZOTEA TUNNEL (JUAN-CHAMA PROJECT) (N.CEN.NM., USA), THE COMPLETED EXCAVATION OF THE BAY AREA RAPID TRANSIT PROJECT (BART) (SECTION UNSPECIFIED) (SAN FRANCISCO, CA., USA), THE ON GOING EXCAVATION OF THE HELCA MINE (COVER D'ALENE, ID., USA), OSO TUNNEL (CO., USA) AND THE COMPLETED EXCAVATION OF THE RIVER MOUNTAINS TUNNEL (HENDERSON, NV., USA) . THE PROJECTS INVESTIGATED ARE UTILIZED FOR METRO, MINE AND UNSPECIFIED PURPOSES. THE SHIELD METHOD AND TBM METHOD REPRESENT THE EXCAVATION TECHNIQUES STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDE MECHANICAL ABRASION (ROTARY) AND MECHANICAL ABRASION (UNSPECIFIED) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. TBM EXCAVATION RATE IS ALSO DISCUSSED. GEOSTRUCTURAL AND SOIL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON GROUND CONDITIONS AND UNDERGROUND OPENING SUPPORTS IS ALSO PRESENTED. THE EXCAVATION CHARACTERISTICS FOR BAY MUD FORMATION AND MANCOS FORMATION ARE TREATED. PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE GRANITE, LIMESTONE, QUARTZITE, RHYODACITE, SANDSTONE AND SLATE . THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES (LAB) DATA.

R001068 GREENSIDE-MC ALPINE HEADING MACHINE CUTS 28 FT. A DAY (BIRMINGHAM TUNNEL PROJECT).
AUTHOR ANON.
CONTRACT JOURNAL (REPRINT)
1PP., 1968.
LANGUAGE! ENGLISH

PERFORMING ORGANIZATION(S)
MCALPINES,SIR ROBERTS SONS LTD.

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE ON GOING EXCAVATION OF THE GREAT CHARLES STREET ROAD TUNNEL (BIRMINGHAM, U.K.) . THE PROJECT INVESTIGATED IS UTILIZED FOR TWIN HIGHWAY PURPOSES. THE CUT AND COVER METHOD AND TBM METHOD REPRESENT THE EXCAVATION TECHNIQUES STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDE MECHANICAL ABRASION (ROTARY) AND MECHANICAL ABRASION (UNSPECIFIED) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. TBM EXCAVATION RATE IS ALSO DISCUSSED. GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON UNDERGROUND OPENING SUPPORTS AND MATERIALS HANDLING SYSTEM IS ALSO PRESENTED. THE EXCAVATION CHARACTERISTICS FOR KEUPER SANDSTONE ARE TREATED. ROCK TYPES REVIEWED INCLUDE SANDSTONE .

R001069 GREENSIDE-MC ALPINE TUNNELLER.
MORSE, B.
CONTRACTORS PLANT REVIEW, (REPRINT)
4PP., 1965.
LANGUAGE! ENGLISH

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE ON GOING EXCAVATION OF THE HINKLEY TUNNELS (HINKLEY PT., U.K.) . THE PROJECT INVESTIGATED IS UTILIZED FOR EXPERIMENTAL EXCAVATION PURPOSES. THE TBM METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. TBM EXCAVATION RATE IS ALSO DISCUSSED. ROCK TYPES REVIEWED INCLUDE LIMESTONE . THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES (LAB) DATA.

R001071 DEMAG, VORTRIEBSMASCHINEN.
AUTHOR ANON.
DEMAG PUBLICATION FOR ADVERTISEMENT

(CONTINUED)

2PP., 1971.
LANGUAGE: GERMAN

THIS IN-SITU REPORT CONTAINS REVIEW DATA. THE PROJECT INVESTIGATED IS UTILIZED FOR METRO PURPOSES. THE TBM METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. PERTINENT INFORMATION ON MATERIALS HANDLING SYSTEM IS ALSO PRESENTED. ROCK TYPES REVIEWED INCLUDE SANDSTONE AND SCHIST .

R001073 DEMAG-TUNNELVORTRIEBS MASCHINEN FUR HARTGESTEIN.
AUTHOR ANON.
DEMAG-PUBLICATION FOR ADVERTISEMENT
7PP., 1970.
LANGUAGE: GERMAN

THIS IN-SITU REPORT CONTAINS REVIEW DATA. THE PROJECT INVESTIGATED IS UTILIZED FOR UNSPECIFIED PURPOSES. THE TBM METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. TBM EXCAVATION RATE IS ALSO DISCUSSED. PERTINENT INFORMATION ON MATERIALS HANDLING SYSTEM IS ALSO PRESENTED.

R001074 GREENSIDE-MC ALPINE ROCK TUNNELLER.
AUTHOR ANON.
MC ALPINE PUBLICATIONS FOR ADVERTISING
4PP., 1972.
LANGUAGE: GERMAN

THIS IN-SITU REPORT CONTAINS REVIEW DATA. THE PROJECT INVESTIGATED IS UTILIZED FOR UNSPECIFIED PURPOSES. THE TBM METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. TBM EXCAVATION RATE IS ALSO DISCUSSED. PERTINENT INFORMATION ON MATERIALS HANDLING SYSTEM IS ALSO PRESENTED.

R001075 THE MC ALPINE TUNNELLING MACHINE.
AUTHOR ANON.
MC ALPINE PUBLICATION FOR ADVERTISING PURPOSES
4PP., 1973.
LANGUAGE: ENGLISH

THIS IN-SITU REPORT CONTAINS REVIEW DATA. THE PROJECT INVESTIGATED IS UTILIZED FOR UNSPECIFIED PURPOSES. THE TBM METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. PERTINENT INFORMATION ON MATERIALS HANDLING SYSTEM IS ALSO PRESENTED.

R001076 GREENSIDE-MC ALPINE ROADWAY AND TUNNEL HEADING MACHINE MK III.
AUTHOR ANON.
GREENSIDE, MC ALPINE PUBLICATION
4PP., 1972.
LANGUAGE: ENGLISH

THIS IN-SITU REPORT CONTAINS REVIEW DATA. THE PROJECT INVESTIGATED IS UTILIZED FOR UNSPECIFIED PURPOSES. THE TBM METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. PERTINENT INFORMATION ON MATERIALS HANDLING SYSTEM IS ALSO PRESENTED. ROCK TYPES REVIEWED INCLUDE PEAT .

R001077 THE HOLE STORY ON ROBBINS.
AUTHOR ANON.
ROBBINS ADVERTISING PUBLICATION
3PP., 1970.
LANGUAGE: ENGLISH

THIS IN-SITU REPORT CONTAINS REVIEW DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE COMPLETED EXCAVATION OF THE ALTAMIRA TUNNEL (MADRID, SPAIN) . THE PROJECT INVESTIGATED IS UTILIZED FOR METRO, MINE, UNSPECIFIED AND WATER SUPPLY TUNNEL PURPOSES. THE TBM METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED.

(CONTINUED)

THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. TBM EXCAVATION RATE IS ALSO DISCUSSED. PERTINENT INFORMATION ON MATERIALS HANDLING SYSTEM IS ALSO PRESENTED. PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE SANDSTONE AND SHALE .

R001078 THE DEVELOPMENT OF MC ALPINE TUNNELLING MACHINE.
AUTHOR ANON.
ALAN CHADWICK AND PARTNERS LTD., LONDON, ENGLAND
3PP.,
LANGUAGE: ENGLISH

THIS IN-SITU REPORT CONTAINS REVIEW DATA. THE TBM METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON MATERIALS HANDLING SYSTEM IS ALSO PRESENTED. THE EXCAVATION CHARACTERISTICS FOR LONDON CLAY ARE TREATED.

R001084 CORRELATION OF DATA ON ROCK DISINTEGRATION BY LIQUID JETS.
COOLEY, W. C.
CONFERENCE ON RESEARCH IN TUNNELING AND EXCAVATION TECHNOLOGY, WAYZATA, MINN.
2PP., 1973.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
SINGSTAD,KEHART,NOVEMBER AND HURKA (ONE WORLD TRADE CENTER,SUITE 2341),NEW YORK,NY;10048

THIS LAB-THEORETICAL REPORT CONTAINS ORIGINAL DATA. THE PROJECT INVESTIGATED IS UTILIZED FOR EXPERIMENTAL EXCAVATION PURPOSES. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES JET ABRASION (WATER) .

R001085 EXPERIMENTAL STUDY OF MECHANICS OF ROCK FRACTURE BY WATER JET.
DANIEL, I. M.
CONFERENCE ON RESEARCH IN TUNNELING AND EXCAVATION TECHNOLOGY, WAYZATA, MINN.
8PP., 1973.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
I.I.T.RESEARCH INSTITUTE,CHICAGO,IL;USA.

THIS LAB REPORT CONTAINS ORIGINAL DATA. THE PROJECT INVESTIGATED IS UTILIZED FOR EXPERIMENTAL EXCAVATION PURPOSES. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES JET ABRASION (WATER) .

R001086 MECHANICS OF HYDRAULIC ROCK CUTTING.
CROW, S.
CONFERENCE ON RESEARCH IN TUNNELING AND EXCAVATION TECHNOLOGY, WAYZATA, MINN.
5PP., 1973.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
CALIFORNIA,UNIVERSITY OF,LOS ANGELES,CA;USA

THIS LAB-THEORETICAL REPORT CONTAINS ORIGINAL DATA. THE PROJECT INVESTIGATED IS UTILIZED FOR EXPERIMENTAL EXCAVATION PURPOSES. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES THERMAL-MECHANICAL (DRILLING AND THERMAL FRAGMENTATION) . GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. THE EXCAVATION CHARACTERISTICS FOR WILKESON FORMATION (IN PUGET GROUP) ARE TREATED. ROCK TYPES REVIEWED INCLUDE SANDSTONE . THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES (LAB) DATA.

R001087 THERMAL FRAGMENTATION OF HARD ROCK FOR RAPID EXCAVATION.
CLARK, G. B.
CONFERENCE ON RESEARCH IN TUNNELING AND EXCAVATION TECHNOLOGY, WAYZATA, MINN.
2PP., 1973.
LANGUAGE: ENGLISH

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PERFORMING ORGANIZATION(S)
MISSOURI,UNIVERSITY OF,ROLLA,MO:USA

THIS LAB-THEORETICAL REPORT CONTAINS ORIGINAL DATA. THE PROJECT INVESTIGATED IS UTILIZED FOR EXPERIMENTAL EXCAVATION PURPOSES. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES THERMAL-ELECTRICAL (TRANSFERRED ARC METHODS, COVERED METAL ARC) .

R001088 ROCK SHATTERING WITH ENERGETIC ELECTRONS, PHASE II.
AVERY, R. T.
CONFERENCE ON RESEARCH IN TUNNELING AND EXCAVATION TECHNOLOGY, WAYZATA, MINN.
3PP., 1973.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
LAWRENCE BERKELEY LAB.(UNIV.OF CALIFORNIA), BERKELEY,CA:USA

THIS LAB REPORT CONTAINS ORIGINAL DATA. THE PROJECT INVESTIGATED IS UTILIZED FOR EXPERIMENTAL EXCAVATION PURPOSES. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES THERMAL-RADIANT (ELECTRON BEAM) .

R001089 RAPID EXCAVATION BY ROCK MELTING.
ROWLEY, J. C.
CONFERENCE ON RESEARCH IN TUNNELING AND EXCAVATION TECHNOLOGY, WAYZATA, MINN.
3PP., 1973.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
LOS ALAMOS SCIENTIFIC LAB.(UNIV.OF CALIFORNIA),NM: 87544,USA.

FUNDING ORGANIZATION(S)
NATIONAL SCIENCE FOUNDATION,WASHINGTON,D.C.:USA.

THIS LAB REPORT CONTAINS ORIGINAL DATA. THE PROJECT INVESTIGATED IS UTILIZED FOR EXPERIMENTAL EXCAVATION PURPOSES. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES SUBTERRENE .

R001090 ROCK DISINTEGRATION BY THERMAL WEAKENING AND WATER JET IMPACT.
RINEY, T. D.
CONFERENCE ON RESEARCH IN TUNNELING AND EXCAVATION TECHNOLOGY, WAYZATA, MINN.
4PP., 1973.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
SYSTEMS,SCIENCE AND SOFTWARE,LA JOLLA,CA:USA.

THIS LAB REPORT CONTAINS ORIGINAL DATA. THE PROJECT INVESTIGATED IS UTILIZED FOR EXPERIMENTAL EXCAVATION PURPOSES. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES JET ABRASION (WATER) .

R001091 ENVIRONMENT-ENHANCED DISINTEGRATION OF HARD ROCKS.
WESTWOOD, A. R. C. MACMILLAN, N. H.
CONFERENCE ON RESEARCH IN TUNNELING AND EXCAVATION TECHNOLOGY, WAYZATA, MINN.
2PP., 1973.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
MARTIN MARIETTA LAB:BALTIMORE,MD:USA

FUNDING ORGANIZATION(S)
NATIONAL SCIENCE FOUNDATION,WASHINGTON,D.C.:USA.

THIS LAB REPORT CONTAINS ORIGINAL DATA. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES CHEMICAL (SURFACTANTS) . ROCK TYPES REVIEWED INCLUDE GRANITE . THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES DATA.

R001092 FABRICATE AND TEST A CONICAL BORING DEVICE.
HUG, H. A.
CONFERENCE ON RESEARCH IN TUNNELING AND EXCAVATION TECHNOLOGY, WAYZATA, MINN.
4PP., 1973.
LANGUAGE: ENGLISH

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PERFORMING ORGANIZATION(S)
ILLINOIS,UNIVERSITY OF,URBANA,IL:USA

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE PROJECT INVESTIGATED IS UTILIZED FOR EXPERIMENTAL EXCAVATION PURPOSES. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) .

R001093 RELATION OF TUNNEL BORING MACHINE FEASIBILITY AND ROCK HARDNESS AND ABRASIVITY.
HENDRON, A. J., JR.
CONFERENCE ON RESEARCH IN TUNNELING AND EXCAVATION TECHNOLOGY, WAYZATA, MINN.
2PP., 1973.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
MILLER,FOSTER ASSOCIATES,INC:135 SECOND AVE: WALTHAM,MA:02154

THIS THEORETICAL REPORT CONTAINS ORIGINAL DATA. THE PROJECT INVESTIGATED IS UTILIZED FOR EXPERIMENTAL EXCAVATION PURPOSES. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) .

R001094 ROCK-CUTTER BOREABILITY PARAMETERS.
WANG, F.-D.
CONFERENCE ON RESEARCH IN TUNNELING AND EXCAVATION TECHNOLOGY, WAYZATA, MINN.
5PP., 1973.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
COLORADO SCHOOL OF MINES,DEPT.OF MINING,GOLDEN,CO: 80401

THIS LAB-THEORETICAL REPORT CONTAINS ORIGINAL DATA. THE PROJECT INVESTIGATED IS UTILIZED FOR EXPERIMENTAL EXCAVATION PURPOSES. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) .

R001108 ROCK FRACTURE BY HIGH SPEED WATER JET.
HUCK, P. J. SINGH, M. M.
IIT RESEARCH INSTITUTE, CHICAGO, ILLINOIS
98PP., 1970.
(PB-197 651, IITRI-06009-11, FRA-RT-71-58, AVAIL. NTIS)
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
I.I.T.RESEARCH INSTITUTE,CHICAGO,IL:USA.

FUNDING ORGANIZATION(S)
DEPT.OF TRANSPORTATION OFFICE OF HIGH SPEED GROUND TRANSPORTATION WASHINGTON,D.C:USA.

THIS LAB REPORT CONTAINS ORIGINAL DATA. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES JET ABRASION (WATER) . GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. THE EXCAVATION CHARACTERISTICS FOR CONNECTICUT BROWNSTONE, FRENCH CREEK GABBRO, INDIANA LIMESTONE, MASSILLON SANDSTONE (IN POTTSVILLE FORMATION), MILFORD PINK GRANITE AND MINNESOTTA DOLOMITE ARE TREATED. PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE CONGLOMERATE, DOLOMITE (ROCK), GABBRO, GRANITE, LIMESTONE AND SANDSTONE . THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES (LAB) DATA.

R001117 A STUDY OF ROCK PROPERTIES AND TUNNEL BORING MACHINE ADVANCE RATES IN TWO MICA SCHIST FORMATIONS.
TARKOY, P. J.
15TH SYMPOSIUM ON ROCK MECHANICS, CUSTER STATE PARK, SOUTH DAKOTA, SEPT. 17-19, 1973
30PP., 1973.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
ILLINOIS,UNIVERSITY OF,URBANA,IL:USA

FUNDING ORGANIZATION(S)
NATIONAL SCIENCE FOUNDATION,WASHINGTON,D.C.:USA.

THIS LAB-IN-SITU-THEORETICAL REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE

(CONTINUED)

COMPLETED EXCAVATION OF THE NORTH BRANCH INTERCEPTING SEWER TUNNEL (NEW YORK CITY, NY., USA) . THE PROJECT INVESTIGATED IS UTILIZED FOR SEWER PURPOSES. THE TBM METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. TBM EXCAVATION RATE IS ALSO DISCUSSED. GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. THE EXCAVATION CHARACTERISTICS FOR MANHATTAN SCHIST AND WISSAHICKON FORMATION (OR SCHIST) ARE TREATED. PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE SCHIST . THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES DATA.

R001118 ROCK TUNNELLING FOR HYDRO-ELECTRIC AND HYDRAULIC PURPOSES IN CENTRAL AND SOUTHERN AFRICA.
ENGELS, E. T. BURDEN, J. J.
SOUTH AFRICAN TUNNELLING CONFERENCE
1, 39-45, 1970.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
WATERMEYER,LEGGE,PIESOLD AND UHLMANN

THIS IN-SITU AND THEORETICAL REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENINGS DISCUSSED INCLUDE THE PROPOSED EXCAVATION OF THE HEADRACE TUNNEL (KAFUE GORGE HYDROELECTRIC SCHMEME) (ZAMBIA), THE COMPLETED EXCAVATION OF THE HEADRACE TUNNEL (NKULA FALLS HYDROELECTRIC SCHEME) (MALAWI, AFRICA), THE COMPLETED EXCAVATION OF THE HEADRACE TUNNEL (VICTORIA FALLS HYDROELECTRIC SCHEME) (ZAMBESI RIVER, AFRICA), THE COMPLETED EXCAVATION OF THE INYANKUNI TUNNEL (AFRICA), THE COMPLETED EXCAVATION OF THE MACHINERY HALL, UNDERGROUND POWER PLANT (VICTORIA FALLS, ZAMBESI RIVER, AFRICA), MACHINE HALL POWER PLANT (KAFUE GORGE HYDROELECTRIC SCHEME) (ZAMBIA), THE COMPLETED EXCAVATION OF THE PENSTOCK SHAFTS (VICTORIA FALLS HYDROELECTRIC SCHEME) (ZAMBESI RIVER, AFRICA), PENSTOCK TUNNELS (KAFUE GORGE HYDROELECTRIC SCHEME) (ZAMBIA), THE COMPLETED EXCAVATION OF THE TAILRACE TUNNELS, UNDERGROUND POWER PLANT (VICTORIA FALLS, ZAMBESI RIVER, AFRICA) AND TRANSFORMER HALL (POWER PLANT, KAFUE GORGE HYDROELECTRIC SCHEME) (ZAMBIA) . THE PROJECTS INVESTIGATED ARE UTILIZED FOR DIVERSION TUNNEL AND HYDROELECTRIC PURPOSES. THE DRILL AND BLAST (FULL FACE) METHOD, HEADING AND BENCH METHOD, MULTI DRIFT METHOD, RAISE DRIVING (MECH.PLATFORM) METHOD AND TBM METHOD REPRESENT THE EXCAVATION TECHNIQUES STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDE CONVENTIONAL EXPLOSIVE (UNSPECIFIED) AND MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY DRILLING EQUIPMENT CHARACTERISTICS. EXCAVATION ADVANCEMENT RATE IS ALSO DISCUSSED. GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON GROUND CONDITIONS AND UNDERGROUND OPENING SUPPORTS IS ALSO PRESENTED. THE EXCAVATION CHARACTERISTICS FOR BASEMENT COMPLEX, NCHANGA RED GRANITE AND PLATEAU SERIES ARE TREATED. PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE BASALT, GNEISS, GRANITE AND GRANULITE . THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES (LAB) DATA.

R001119 ROAD TUNNEL CONSTRUCTION.
MEGAW, T. M.
SOUTH AFRICAN TUNNELLING CONFERENCE
1, 47-51, 1970.
LANGUAGE: ENGLISH

FUNDING ORGANIZATION(S)
MERSEY TUNNEL JOINT COMMITTEE,U.K.

THIS IN-SITU REPORT CONTAINS REVIEW DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE ON GOING EXCAVATION OF THE MERSEY RIVER TUNNELS (LIVERPOOL, UK) . THE PROJECT INVESTIGATED IS UTILIZED FOR TWIN HIGHWAY PURPOSES. THE PILOT BORE-CENTER METHOD AND TBM METHOD REPRESENT THE EXCAVATION TECHNIQUES STUDIED. THE REPORTED FRAGMENTATION METHODS SERVICING PROJECT EFFORTS INCLUDE CONVENTIONAL EXPLOSIVE (UNSPECIFIED) AND MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. PERTINENT INFORMATION ON UNDERGROUND OPENING SUPPORTS IS ALSO PRESENTED. PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE CLAY AND SANDSTONE .

R001121 UNDERGROUND OIL STORAGE IN FINLAND.
KILPINEN, H.
SOUTH AFRICAN TUNNELLING CONFERENCE
1, 59-64, 1970.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
OY YLEINEN INSINOORITOIMISTO,FINLAND

FUNDING ORGANIZATION(S)
NESTE OY PORVOO REFINERY,PORVOO,FINLAND

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE COMPLETED EXCAVATION OF THE UNDERGROUND OIL STORAGE RESERVOIR (PROVO REFINERY) (SKOLDVIK, FINLAND) . THE PROJECT INVESTIGATED IS UTILIZED FOR OIL STORAGE PURPOSES. THE DRILL AND BLAST (FULL FACE) METHOD, HEADING AND BENCH METHOD AND RAISE DRIVING (BORING MACHINES) METHOD REPRESENT THE EXCAVATION TECHNIQUES STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES CONVENTIONAL EXPLOSIVE (UNSPECIFIED) . THIS DOCUMENT INCORPORATES ADDITIONALLY DRILLING EQUIPMENT AND TUNNELING MACHINE CHARACTERISTICS. EXCAVATION ADVANCEMENT RATE IS ALSO DISCUSSED. PERTINENT INFORMATION ON UNDERGROUND OPENING SUPPORTS AND MATERIALS HANDLING SYSTEM IS ALSO PRESENTED. PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE GRANITE . THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES DATA.

R001122 THE NEW AUSTRIAN TUNNELLING METHOD.
WAGNER, H.
SOUTH AFRICAN TUNNELLING CONFERENCE
1, 121-7, 1970.
LANGUAGE: ENGLISH

THIS IN-SITU REPORT CONTAINS ABSTRACTED ONLY DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE COMPLETED EXCAVATION OF THE MASSENBERG TUNNEL (LEOBEN, AUSTRIA) . THE PROJECT INVESTIGATED IS UTILIZED FOR HIGHWAY PURPOSES. THE NEW AUSTRAIN METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES CONVENTIONAL EXPLOSIVE (UNSPECIFIED) . PERTINENT INFORMATION ON GROUND CONDITIONS AND UNDERGROUND OPENING SUPPORTS IS ALSO PRESENTED. PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE LIMESTONE AND SCHIST .

R001130 MACHINE TUNNELLING IN HARD ROCK.
GLAASSENS, G. C. D. PIKE, D. R.
SOUTH AFRICAN TUNNELLING CONFERENCE
1, 209-16, 1970.
LANGUAGE: ENGLISH

FUNDING ORGANIZATION(S)
REPUBLIC OF S.AFRICA,DEPT.OF WATER AFFAIRS

THIS IN-SITU AND LAB-IN-SITU REPORT CONTAINS REVIEW DATA. THE UNDERGROUND OPENINGS DISCUSSED INCLUDE THE PROPOSED EXCAVATION OF THE COOKHOUSE TUNNEL (S.AFRICA), THE COMPLETED EXCAVATION OF THE GAMTOOS CANALS TUNNEL (S.AFRICA), THE COMPLETED EXCAVATION OF THE KAAPMUIDEN TUNNEL (S.AFRICA), THE COMPLETED EXCAVATION OF THE KRANSKLOOF TUNNEL (S.AFRICA), THE COMPLETED EXCAVATION OF THE LANGEFONTEIN TUNNEL (S.AFRICA), THE COMPLETED EXCAVATION OF THE MIDMAR TUNNEL (S.AFRICA), THE COMPLETED EXCAVATION OF THE ORANGE FISH INLET TUNNEL (S.AFRICA), THE COMPLETED EXCAVATION OF THE ORANGE FISH PLATEAU TUNNEL (S.AFRICA), THE COMPLETED EXCAVATION OF THE ORANGE FISH OUTLET TUNNEL (S.AFRICA), THE COMPLETED EXCAVATION OF THE REUNION UMLAZI TUNNEL (S.AFRICA), THE COMPLETED EXCAVATION OF THE SANDDRIFT TUNNEL (S.AFRICA), THE COMPLETED EXCAVATION OF THE TUNNEL BA6A (S.AFRICA), THE COMPLETED EXCAVATION OF THE TUNNEL BA6B (S.AFRICA), THE COMPLETED EXCAVATION OF THE TUNNEL BA8 (S.AFRICA), THE COMPLETED EXCAVATION OF THE TUNNEL ZW29 (S.AFRICA), THE COMPLETED EXCAVATION OF THE VRYHEID EMPANGENI TUNNEL (S.AFRICA), THE COMPLETED EXCAVATION OF THE VRYHEID EMPANGENI TUNNEL (EXTENSION) (S.AFRICA) AND THE COMPLETED EXCAVATION OF THE WESTOE TUNNEL (S.AFRICA) THE PROJECTS INVESTIGATED ARE UTILIZED FOR IRRIGATION, RAILWAY AND UNSPECIFIED PURPOSES. THE DRILL AND BLAST (FULL FACE) METHOD AND TBM METHOD REPRESENT THE EXCAVATION TECHNIQUES STUDIED. THE REPORTED FRAGMENTATION METHODS SERVICING PROJECT

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EFFORTS INCLUDE CONVENTIONAL EXPLOSIVE (UNSPECIFIED) AND MECHANICAL ABRASION (ROTARY) . INFORMATION PERTINENT TO EXCAVATION COST IS GIVEN. GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON GROUND CONDITIONS IS ALSO PRESENTED. THE EXCAVATION CHARACTERISTICS FOR BEAUFORT SERIES, DWYKA TILLITE, ECCA SERIES, ENON CONGLOMERATE, INSUZI ANDESITE AND TABLE MOUNTAIN SANDSTONE ARE TREATED. PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE CONGLOMERATE, DIABASE, DOLERITE, GRANITE, MUDSTONE, SANDSTONE, SILTSTONE AND TILLITE . THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES (LAB) DATA.

R001132 MECHANICAL TUNNEL BORING.
STEVENS, V. L.
SOUTH AFRICAN TUNNELLING CONFERENCE
1, 223-6, 1970.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
1.BOYLES BROS.DRILLING CO.
2.CIMCO,SALT LAKE CITY,UT:USA
3.GIBBONS AND REED CO.

FUNDING ORGANIZATION(S)
U.S.BUREAU OF RECLAMATION

THIS IN-SITU REPORT CONTAINS REVIEW DATA. THE TBM METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. TBM EXCAVATION AND EXCAVATION ADVANCEMENT RATES ARE ALSO DISCUSSED. PERTINENT INFORMATION ON MATERIALS HANDLING SYSTEM IS ALSO PRESENTED. PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE MUDSTONE AND SHALE .

R001133 OPERATION OF WIRTH TUNNEL BORING UNITS IN GRANITE.
HILDEBRAND, W.
SOUTH AFRICAN TUNNELLING CONFERENCE
1, 227-30, 1970.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
WIRTH,ALFRED AND CO:KG:GERMANY

FUNDING ORGANIZATION(S)
WIRTH,ALFRED AND CO:KG:GERMANY

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENINGS DISCUSSED INCLUDE THE COMPLETED EXCAVATION OF THE BARBARINE TUNNEL (GRAND EMOSSON HYDRO-ELECTRIC POWER STATION) (GRAND EMOSSON, SWITZERLAND), THE COMPLETED EXCAVATION OF THE CORBES TUNNEL (GRAND EMOSSON HYDRO-ELECTRIC POWER STATION) (GRAND EMOSSON, SWITZERLAND), LUCERNE HIGHWAY TUNNEL (LUCERNE, SWITZERLAND) AND THE COMPLETED EXCAVATION OF THE ZEMM HYDROELECTRIC POWER STATION TUNNEL (AUSTRIA) . THE PROJECTS INVESTIGATED ARE UTILIZED FOR HYDROELECTRIC AND TWIN HIGHWAY PURPOSES. THE PILOT BORE-CENTER METHOD AND TBM METHOD REPRESENT THE EXCAVATION TECHNIQUES STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. TBM EXCAVATION RATE IS ALSO DISCUSSED. GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. THE EXCAVATION CHARACTERISTICS FOR VALLORCINE GRANITE ARE TREATED. THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES (LAB) DATA.

R001135 THE CLAREMENT TO DANVILLE ROAD TUNNEL.
EDWARDS, J. H. GRAHAM, D. R.
SOUTH AFRICAN TUNNELLING CONFERENCE
1, 237-41, 1970.
LANGUAGE: ENGLISH

FUNDING ORGANIZATION(S)
PRETORIA,CITY OF,S.AFRICA

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE ON GOING EXCAVATION OF THE CLAREMONT-DANVILLE ROAD TUNNEL (PRETORIA, S. AFRICA) . THE PROJECT INVESTIGATED IS UTILIZED FOR TWIN HIGHWAY PURPOSES. THE DRILL AND BLAST (FULL FACE) METHOD REPRESENTS THE EXCAVATION

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TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES CONVENTIONAL EXPLOSIVE (ANFO) . EXCAVATION ADVANCEMENT RATE IS ALSO DISCUSSED. GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. THE EXCAVATION CHARACTERISTICS FOR OASPORT SERIES (OF PRETORIA SYSTEM) ARE TREATED. ROCK TYPES REVIEWED INCLUDE DIABASE, QUARTZITE AND SHALE . THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES (LAB) DATA.

R001142 GROUND FREEZING TECHNIQUES AT SALERNO.
BRAUN, B. MACCHI, A.
TUNNELS AND TUNNELLING
6 (2), 81-3, 87, 89, 1974.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
IMPRESA COSTRUZIONI ING.E.RECCHI SP.A:TURIN,ITALY

FUNDING ORGANIZATION(S)
FERROVIE DELLO STATO-SERVIZIO LAVORI E
COSTRUZIONI,ROME,ITALY
ROME ITALY

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE COMPLETED EXCAVATION OF THE SANTA LUCIA TUNNEL (SALERNO, ITALY) . THE PROJECT INVESTIGATED IS UTILIZED FOR RAILWAY PURPOSES. THE MANUAL METHOD AND UNSPECIFIED METHOD REPRESENT THE EXCAVATION TECHNIQUES STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES CONVENTIONAL EXPLOSIVE (N.G.) . GEOSTRUCTURAL AND SOIL CHARACTERISTICS AS WELL AS SOIL MECHANICAL PROPERTIES FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON GROUND CONDITIONS AND UNDERGROUND OPENING SUPPORTS AND MATERIALS HANDLING SYSTEM IS ALSO PRESENTED. PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE DOLOMITE (ROCK) .

R001147 ROCK EXCAVATION BY HYDRAULIC SPLITTER.
DUNCAN, N. J. LANGFIELD, E. R.
PROC. 1ST NORTH AMER. RAPID EXCAVATION TUNNELING CONF.
1, 785-91, 1972.
LANGUAGE: ENGLISH

THIS LAB-IN-SITU REPORT CONTAINS ORIGINAL DATA. THE PROJECT INVESTIGATED IS UTILIZED FOR UNSPECIFIED PURPOSES. THE HYDRAULIC FRAGMENTATION METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES JET ABRASION (WATER) .

R001151 FABRICATION AND TESTING OF A WATER CANNON FOR ROCK TUNNELING EXPERIMENTS.
COOLEY, W. C.
FEDERAL RAILROAD ADMINISTRATION, DEPT. OF TRANSPORTATION, WASHINGTON, D. C.
89PP., 1974.
(FRA-ORD-D-74-38, AVAIL. NTIS)
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
TERRASPACE,INC:304 N.STONESTREET AVE:ROCKVILLE,MD. 20850:USA

FUNDING ORGANIZATION(S)
FEDERAL RAILROAD ADMINISTRATION,DEPT.OF TRANSPORTATION, WASHINGTON D.C:USA.

THIS IN-SITU AND LAB REPORT CONTAINS ORIGINAL DATA. THE PROJECT INVESTIGATED IS UTILIZED FOR EXPERIMENTAL EXCAVATION PURPOSES. THE HYDRAULIC FRAGMENTATION METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES IMPACT ABRASION (WATER CANNON, INTERMITTANT IMPACT . GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. THE EXCAVATION CHARACTERISTICS FOR BARRE GRANITE, BEREA SANDSTONE AND INDIANA LIMESTONE ARE TREATED. PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE GNEISS, GRANITE, LIMESTONE AND SANDSTONE .

R001167 ALLUVIAL TUNNELLING MACHINE FOR FAST ADVANCE AT LOW COST.
AUTHOR ANON.
CAN. INST. MIN. METALL. BULL.

(CONTINUED)

66 (731), 182, 1973.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
NUTTAL,ED.LTD:LONDON,U.K.

THIS IN-SITU REPORT CONTAINS REVIEW DATA. THE TBM METHOD REPPESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. TBM EXCAVATION AND EXCAVATION ADVANCEMENT RATES ARE ALSO DISCUSSED. SOIL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON MATERIALS HANDLING SYSTEM IS ALSO PRESENTED.

R001168 MODIFIED DRILLING EQUIPMENT. BRIEF REVIEW OF IMPROVED EQUIPMENT FROM INTERNATIONAL NICKEL.
AUTHOR ANON.
CAN. INST. MIN. METALL, BULL.
66, (733), 113, 1973.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
INTERNATIONAL NICKEL CO.[INCO]

FUNDING ORGANIZATION(S)
INTERNATIONAL NICKEL CO: [INCO]

THIS IN-SITU REPORT CONTAINS ABSTRACTED ONLY DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE COMPLETED EXCAVATION OF THE NORTH MINE [INCO] (COPPER CLIFF, ONTARIO, CANADA) . THE PROJECT INVESTIGATED IS UTILIZED FOR MINE PURPOSES. THE RAISE DRIVING (BORING MACHINES) METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. THE EXCAVATION CHARACTERISTICS FOR SUDBURY GRANITE ARE TREATED. ROCK TYPES REVIEWED INCLUDE GRANITE .

R001173 EXPERIMENTAL STUDY OF THE RELATION BETWEEN THE RELATIVE RESISTANCE OF ROCK AND PUNCH PENETRATION DEPTH.
BEZRUCHKO, N. P.
SOV. MIN. SCI.
7 (4), 424-6, 1971.
(ENGLISH TRANSLATION OF FIZ. TEKH. PROBL. RAZRAB. POLEZ. ISKOP., (4), 50-2, 1971: FOR ORIGINAL SEE R1172)
LANGUAGE: ENGLISH

THIS LAB REPORT CONTAINS ORIGINAL DATA. THE AUSTRIAN METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES IMPACT ABRASION (SHOCK WAVE DRILL) .

R001188 A THEORY OF HYDRAULIC ROCK CUTTING.
CROW, S. C.
INT. J. ROCK MECH. MIN. SCI.
10 (6), 567-84, 1973.
LANGUAGE: ENGLISH

FUNDING ORGANIZATION(S)
FLOW RESEARCH INC:KENT,WA:98031,USA.

THIS THEORETICAL REPORT CONTAINS ORIGINAL DATA. THE AUSTRIAN METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES JET ABRASION (WATER) .

R001212 STUDY OF HIGH POWERED PLASMA FOR IN SITU HARD ROCK DISINTEGRATION.
POOLE, J. W. THORPE, M. L.
TAFA DIVISION, HUMPHREY#S CORP., BOW, NEW HAMPSHIRE
83PP., 1973.
(AD-772 506, TAFA-7311-9)
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
HUMPHERY CORP:NH:USA.

FUNDING ORGANIZATION(S)
ADVANCED RESEARCH PROJECT AGENCY (ARPA)

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THIS LAB REPORT CONTAINS ORIGINAL DATA. THE PROJECT INVESTIGATED IS UTILIZED FOR EXPERIMENTAL EXCAVATION PURPOSES. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES THERMAL-ELECTRICAL (TRANSFERRED ARC METHODS, PLASMA ARC) . GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. THE EXCAVATION CHARACTERISTICS FOR CONCORD GRANITE, DRESSER BASALT, MANISTIQUE DOLOMITE (OR FORMATION) AND ST.CLOUD(GRAY)GRANODIORITE (=CHARCOAL GREY GRANITE) ARE TREATED. THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES DATA.

R001213 PERCUSSIVE WATER JETS FOR RAPID EXCAVATION.
NEBEKER, E. B. RODRIGUEZ, S. E.
SCIENTIFIC ASSOCIATES, INC., SANTA MONICA, CALIF.
63PP., 1973.
(AD-772 931)
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
SCIENTIFIC ASSOCIATES INC:CA:USA.

FUNDING ORGANIZATION(S)
U.S.ARMY MOBILITY EQUIPMENT RESEARCH AND DEVELOPMENT CENTER, FORT BELVOIR,VA:USA.

THIS LAB REPORT CONTAINS ORIGINAL DATA. THE PROJECT INVESTIGATED IS UTILIZED FOR EXPERIMENTAL EXCAVATION PURPOSES. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES JET ABRASION (WATER) . GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE GABBRO, LIMESTONE AND SANDSTONE . THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES (LAB) DATA.

R001214 AN INVESTIGATION OF THERMAL-MECHANICAL FRAGMENTATION OF HARD ROCK.
CLARK, G. B. LEHNHOFF, T. F. PATEL, M.
ALLEN, V.
MISSOURI UNIVERSITY, ROLLA
209PP., 1973.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
ROCK MECHANICS AND EXPLOSIVES RESEARCH CENTER (UNIV. OF MISSOURI
AT ROLLA,MO:USA)

FUNDING ORGANIZATION(S)
ADVANCED RESEARCH PROJECT AGENCY (ARPA)

THIS LAB-IN-SITU REPORT CONTAINS ORIGINAL DATA. THE PROJECT INVESTIGATED IS UTILIZED FOR EXPERIMENTAL EXCAVATION PURPOSES. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES THERMAL-MECHANICAL (DRILLING AND THERMAL FRAGMENTATION) . THIS DOCUMENT INCORPORATES ADDITIONALLY DRILLING EQUIPMENT CHARACTERISTICS. GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. ROCK TYPES REVIEWED INCLUDE GRANITE .

R001227 TUNNELING TECHNOLOGY, ITS PAST AND PRESENT.
NASIATKA, T. M.
U. S. BUREAU OF MINES, WASHINGTON, D. C.
12PP., 1968.
(BM-IC-8375)
LANGUAGE: ENGLISH

THIS IN-SITU REPORT CONTAINS REPUBLISHED DATA. THE UNDERGROUND OPENINGS DISCUSSED INCLUDE THE COMPLETED EXCAVATION OF THE ALLEGHENY PORTAGE TUNNEL (PA., USA), THE COMPLETED EXCAVATION OF THE ALVA B. ADAMS TUNNEL, THE COMPLETED EXCAVATION OF THE APPALACHIA PROJECT (TN., USA), THE COMPLETED EXCAVATION OF THE ARLBERG TUNNEL (AUSTRIA), THE COMPLETED EXCAVATION OF THE AUBURN (CANAL) TUNNEL (PA., USA), THE COMPLETED EXCAVATION OF THE BERGEN TUNNEL (NJ., USA), THE COMPLETED EXCAVATION OF THE BIG CREEK NO.3 TUNNEL (CA., USA), THE COMPLETED EXCAVATION OF THE BINGHAM CANYON TUNNEL (UT., USA), THE COMPLETED EXCAVATION OF THE BLECHINGLY TUNNEL (UK), THE COMPLETED EXCAVATION OF THE BLUE MOUNTAIN TUNNEL (PA., USA), THE COMPLETED EXCAVATION OF THE BLUE RIDGE TUNNEL (VA., USA), THE COMPLETED EXCAVATION OF THE BOOTLEG CANYON TUNNEL (UT., USA), THE COMPLETED EXCAVATION OF THE CANYON TUNNEL (CA., USA), THE COMPLETED EXCAVATION OF THE

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CARLTON TUNNEL (CO., USA), THE COMPLETED EXCAVATION OF THE CHICAGO AVE.SEWER TUNNEL (CHICAGO, IL., USA), THE COMPLETED EXCAVATION OF THE CLEAR CREEK TUNNEL (CA., USA), THE COMPLETED EXCAVATION OF THE COLORADO RIVER TUNNEL (CA., USA), THE COMPLETED EXCAVATION OF THE CONNAUGHT TUNNEL (BRITISH COLUMBIA., CANADA), THE COMPLETED EXCAVATION OF THE COOPER BASIN TUNNEL (CA., USA), THE COMPLETED EXCAVATION OF THE COWBURN TUNNEL (U.K.), THE COMPLETED EXCAVATION OF THE ELIZABETH TUNNEL (CA., USA), THE COMPLETED EXCAVATION OF THE EUCUMBENE TUMUT TUNNEL (SNOWY MTS., AUSTRALIA), THE COMPLETED EXCAVATION OF THE FLORENCE LAKE TUNNEL (CA., USA), THE COMPLETED EXCAVATION OF THE FUCINUS TUNNEL (ITALY), THE COMPLETED EXCAVATION OF THE GUNNISON TUNNEL (CO., USA), THE COMPLETED EXCAVATION OF THE HOOSAC TUNNEL (MA., USA), THE COMPLETED EXCAVATION OF THE ISERE ARC TUNNEL (FRANCE), THE COMPLETED EXCAVATION OF THE JAYBIRD TUNNEL (CA., USA), THE COMPLETED EXCAVATION OF THE KEMANO TUNNEL (BRITISH COLUMBIA., CANADA), THE COMPLETED EXCAVATION OF THE KITTATINNY TUNNEL (PA., USA), THE COMPLETED EXCAVATION OF THE LA QUIEBRA TUNNEL (COLUMBIA), THE COMPLETED EXCAVATION OF THE LEBANON CANAL (PA., USA), THE COMPLETED EXCAVATION OF THE LOETSCHBERG TUNNEL (SWITZERLAND), THE COMPLETED EXCAVATION OF THE LYDGATE TUNNEL (UK), THE COMPLETED EXCAVATION OF THE MALPUS CANAL (FRANCE), THE COMPLETED EXCAVATION OF THE MOFFAT TUNNEL (CO., USA), THE COMPLETED EXCAVATION OF THE MONT BLANC TUNNEL (FRANCE), THE COMPLETED EXCAVATION OF THE MOUNTAIN DIVISION TUNNEL (CA., USA), THE COMPLETED EXCAVATION OF THE MOUNT CENIS (FREJUS) TUNNEL (FRANCE-ITALY), THE COMPLETED EXCAVATION OF THE MUSCONETCONG TUNNEL (NJ., USA), THE COMPLETED EXCAVATION OF THE NEW CASCADE (WA., USA), THE COMPLETED EXCAVATION OF THE NEW ELKHORN TUNNEL (WV., USA), THE COMPLETED EXCAVATION OF THE OWENS RIVER TUNNEL (CA., USA), THE COMPLETED EXCAVATION OF THE OWYHEE TUNNEL (OR.-ID., USA), THE COMPLETED EXCAVATION OF THE PINE MOUNTAIN TUNNEL (VA.-KY., USA), THE COMPLETED EXCAVATION OF THE ROOSEVELT TUNNEL (CO., USA), THE COMPLETED EXCAVATION OF THE SALTWOOD RAILWAY TUNNEL (U.K.), THE COMPLETED EXCAVATION OF THE SANDY RIDGE TUNNEL (VA., USA), THE COMPLETED EXCAVATION OF THE SHANDAKEN TUNNEL (NEW YORK, NY., USA), THE COMPLETED EXCAVATION OF THE SIMPLON TUNNEL (SWITZERLAND-ITALY), THE COMPLETED EXCAVATION OF THE SQUIRREL HILL TUNNEL (PA., USA), THE COMPLETED EXCAVATION OF THE STRAWBERY TUNNEL (UT., USA), THE COMPLETED EXCAVATION OF THE ST.LOUIS METRO SEWER DISTRICT (ST.LOUIS, MO., USA), THE COMPLETED EXCAVATION OF THE ST.PAUL PASS TUNNEL (MT.-ID., USA), THE COMPLETED EXCAVATION OF THE ST. GOTTHARD TUNNEL (SWITZERLAND-ITALY), THE COMPLETED EXCAVATION OF THE SUTRO TUNNEL (NV., USA), THE COMPLETED EXCAVATION OF THE TOOMA TUMUT TUNNEL (AUSTRALIA), THE COMPLETED EXCAVATION OF THE TOTLEY TUNNEL (U.K.), THE COMPLETED EXCAVATION OF THE TRACE FORK TUNNEL (WV., USA), THE COMPLETED EXCAVATION OF THE TUSCARORA TUNNEL (PA., USA), THE COMPLETED EXCAVATION OF THE WINTON TUNNEL (WA., USA) AND THE COMPLETED EXCAVATION OF THE WOODHEAD RAILWAY TUNNEL (U.K.) . THE PROJECTS INVESTIGATED ARE UTILIZED FOR HIGHWAY, HYDROELECTRIC, IRRIGATION, MINE, RAILWAY, SEWER AND WATER SUPPLY TUNNEL PURPOSES. THE DRILL AND BLAST (FULL FACE) METHOD, MANUAL METHOD, PERIPHERAL SAW AND DRILL-BLAST METHOD AND TBM METHOD REPRESENT THE EXCAVATION TECHNIQUES STUDIED. THE REPORTED FRAGMENTATION METHODS SERVICING PROJECT EFFORTS INCLUDE CONVENTIONAL EXPLOSIVE (N.G.), CONVENTIONAL EXPLOSIVE (ANFO), CONVENTIONAL EXPLOSIVE (UNSPECIFIED), CONVENTIONAL EXPLOSIVE (C-4), CONVENTIONAL EXPLOSIVE (BLACK POWDER), CONVENTIONAL EXPLOSIVE (DYNAMITE) AND MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY DRILLING EQUIPMENT AND TUNNELING MACHINE CHARACTERISTICS. TBM EXCAVATION AND EXCAVATION ADVANCEMENT RATES ARE ALSO DISCUSSED. INFORMATION PERTINENT TO EXCAVATION COST IS GIVEN. GEOSTRUCTURAL AND SOIL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON MATERIALS HANDLING SYSTEM IS ALSO PRESENTED. PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE ANDESITE, CHERT (ROCK), DIORITE, DOLERITE, GNEISS, GRANITE, GREENSTONE (IGNEOUS), LIMESTONE, PORPHYRY, QUARTZITE, RHYOLITE, SANDSTONE, SCHIST, SHALE, SLATE AND TUFA (ROCK) .

R001230 HARD-ROCK MOLES SUCCEED WHERE OTHERS FAILED.
YOUNG, E. M.
CONSTRUCTION METHODS EQUIPMENT, REPRINT

(CONTINUED)

3PP., 1973.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
1.BALL,GORDON H,INC:DANVILLE,CA:
2.BROWN AND ROOT INC:HOUSTON,TX:
3.PERINI CORP:FRAMINGHAM,MA:
4.S AND M CONTRACTORS,CLEVELAND

FUNDING ORGANIZATION(S)
NEW YORK,CITY OF,NY:USA.

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE COMPLETED EXCAVATION OF THE TUNNEL FOR NORTH RIVER WATER POLLUTION CONTROL PROJECT (NEW YORK THE ON GOING EXCAVATION OF THE TUNNEL FOR NORTH RIVER WATER POLLUTION CONTROL PROJECT (NEW YORK CITY, NY., USA.) THE PROJECT INVESTIGATED IS UTILIZED FOR ACCESS TUNNEL (SHAFTS AND ADITS TO MAIN OPENING), SEWER AND VENTILATION PURPOSES. THE COMPRESSED AIR METHOD AND TBM METHOD REPRESENT THE EXCAVATION TECHNIQUES STUDIED. THE REPORTED FRAGMENTATION METHODS SERVICING PROJECT EFFORTS INCLUDE JET ABRASION (AIR) AND MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. TBM EXCAVATION RATE IS ALSO DISCUSSED. GEOSTRUCTURAL AND SOIL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON UNDERGROUND OPENING SUPPORTS AND MATERIALS HANDLING SYSTEM IS ALSO PRESENTED. THE EXCAVATION CHARACTERISTICS FOR VIRGINIA LIMESTONE (IN MOENKOPI GROUP) ARE TREATED. ROCK TYPES REVIEWED INCLUDE GNEISS, SCHIST AND TILL . THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES (LAB) DATA.

R001234 BIG JOHN EXCAVATOR 3038 FOR MIXED-FACE TUNNEL EXCAVATING.
MEMCO MINING EQUIPMENT MANUFACTURING CORP.,
RACINE, WISCONSIN
2PP.
LANGUAGE: ENGLISH

THIS IN-SITU REPORT CONTAINS ABSTRACTED ONLY DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE ON GOING EXCAVATION OF THE TAKATSUKAYAMA TUNNEL (KODE, JAPAN) . THE PROJECT INVESTIGATED IS UTILIZED FOR UNSPECIFIED PURPOSES. THE FULL FACE METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (PERCUSSION AND DRAG) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. TBM EXCAVATION RATE IS ALSO DISCUSSED. GEOSTRUCTURAL AND SOIL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON UNDERGROUND OPENING SUPPORTS IS ALSO PRESENTED. ROCK TYPES REVIEWED INCLUDE CONGLOMERATE, MUDSTONE, SANDSTONE AND TUFF .

R001235 BIG JOHN EXCAVATOR 1626 FOR MIXED-FACE TUNNEL EXCAVATING.
MEMCO MINING EQUIPMENT MANUFACTURING CORP.,
RACINE, WISCONSIN
2PP.
LANGUAGE: ENGLISH

THIS IN-SITU REPORT CONTAINS ABSTRACTED ONLY DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE COMPLETED EXCAVATION OF THE CASTAIC TUNNEL, LOS ANGELES (CA., USA.) . THE PROJECT INVESTIGATED IS UTILIZED FOR UNSPECIFIED PURPOSES. THE SHIELD METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. TBM EXCAVATION RATE IS ALSO DISCUSSED. PERTINENT INFORMATION ON UNDERGROUND OPENING SUPPORTS IS ALSO PRESENTED. ROCK TYPES REVIEWED INCLUDE CONGLOMERATE, LIMESTONE, SANDSTONE AND SHALE .

R001240 JARVA TUNNELING MACHINES AND CUTTERS.
JARVA INC., SOLON, OHIO
16PP.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
JARVA TUNNELING MACHINES AND CUTTERS,OH:USA.

(CONTINUED)

FUNDING ORGANIZATION(S)
JARVA TUNNELING MACHINES AND CUTTERS,OH:USA.

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE SHIELD METHOD AND TBM METHOD REPRESENT THE EXCAVATION TECHNIQUES STUDIED. THIS DOCUMENT INCORPORATES ADDITIONALLY DRILLING EQUIPMENT AND TUNNELING MACHINE CHARACTERISTICS. TBM EXCAVATION RATE IS ALSO DISCUSSED. PERTINENT INFORMATION ON MATERIALS HANDLING SYSTEM IS ALSO PRESENTED.

R001241 TUNNEL SHIELDS FOR ALL MIXED GROUND REQUIREMENTS.
MILWAUKEE, WISCONSIN
MILWAUKEE BOILER MFG. COMP., MILWAUKEE, WISCONSIN
4PP.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
MILWAUKEE BOILER MANUFACTURING CO:MILWAUKEE,WI:USA

FUNDING ORGANIZATION(S)
MILWAUKEE BOILER MANUFACTURING CO:MILWAUKEE,WI:USA.

THIS IN-SITU REPORT CONTAINS REPUBLISHED DATA. THE PROJECT INVESTIGATED IS UTILIZED FOR HIGHWAY, MINE AND SEWER PURPOSES. THE SHIELD METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS.

R001244 METROPOLITAN SANITARY DISTRICT OF GREATER CHICAGO EXPERIENCES AND FUTURE PLANS FOR HARD ROCK TUNNELS.
NEIL, F.
PROC. DEEP TUNNELS IN HARD ROCK
9-30, 1970.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
S AND M CONSTRUCTORS INC:SOLON,OH:USA.
1.HEALY,SA:CO.
2.KENNY CONSTRUCTION CO.
3.MCHUGH,J.CONSTRUCTION CO.
1.HEALY,S.A.
2.KENNEY CONSTRUCTION CO.

FUNDING ORGANIZATION(S)
GREATER CHICAGO,METROPOLITAN SANITARY DIST.OF,
CHICAGO,IL:USA.
CHICAGO, IL. USA

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA, THE UNDERGROUND OPENINGS DISCUSSED INCLUDE THE ON GOING EXCAVATION OF THE CALUMET INTERCEPTING SEWER (18E, 127THAND CRAWFORD AVE.) (CHICAGO, IL., USA), THE ON GOING EXCAVATION OF THE LAWNDALE AVENUE AND 49TH STREET S.W.INTERCEPTING SEWER (CHICAGO, IL., USA) AND THE ON GOING EXCAVATION OF THE LAWRENCE AVENUE SEWER SYSTEM (CHICAGO, IL., USA) . THE PROJECTS INVESTIGATED ARE UTILIZED FOR SEWER PURPOSES. THE HEADING AND BENCH METHOD AND TBM METHOD REPRESENT THE EXCAVATION TECHNIQUES STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES CONVENTIONAL EXPLOSIVE (UNSPECIFIED) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. TBM EXCAVATION RATE IS ALSO DISCUSSED. GEOSTRUCTURAL AND SOIL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON MATERIALS HANDLING SYSTEM IS ALSO PRESENTED. THE EXCAVATION CHARACTERISTICS FOR NIAGARAN LIMESTONE (OR DOLOMITE OR GROUP) ARE TREATED.

R001262 NEW RAISE-BORING EQUIPMENT WILL ACCELERATE UNDERGROUND DEVELOPMENT.
AUTHOR ANON.
AUSTRAL. MIN.
65 (9), 62-3, 1973.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
ANGLO-AMERICAN CORP.OF SOUTH AFRICA

FUNDING ORGANIZATION(S)
ANGLO AMERICAN CORP:GOLD DIVISION RESEARCH AND DEVELOPMENT DEPT.

THIS LAB REPORT CONTAINS REPUBLISHED DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE COMPLETED EXCAVATION OF THE SOUTH AFRICAN GOLD MINES (S.AFRICA)

(CONTINUED)

. THE PROJECT INVESTIGATED IS UTILIZED FOR MINE PURPOSES. THE RAISE DRIVING (BORING MACHINES) METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. TBM EXCAVATION RATE IS ALSO DISCUSSED.

R001263 RAISE BORING. EXPERIENCE IN GOLD MINES OF S. AFRICA AND OF TYNAGH MINE, IRELAND.
WILSON, J. W. ORAM, R. A. J.
TRANS. INST. MINING MET., SECT. A
82 (803), 142-4, 1973.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
ANGLO-AMERICAN CORP.OF SOUTH AFRICA

FUNDING ORGANIZATION(S)
ANGLO AMERICAN CORP:GOLD DIVISION RESEARCH AND DEVELOPMENT DEPT.

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE COMPLETED EXCAVATION OF THE TYNAGH MINE (IRELAND) . THE PROJECT INVESTIGATED IS UTILIZED FOR MINE PURPOSES. THE RAISE DRIVING (BORING MACHINES) METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. INFORMATION PERTINENT TO EXCAVATION COST IS GIVEN. GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. THE EXCAVATION CHARACTERISTICS FOR WITWATERSRAND QUARTZITE ARE TREATED.

R001264 RAISE AND SHAFT DRILLING, A CONTINUING DEVELOPMENT.
ROBBINS, R. J.
J. S. AFRICAN INST. MINING MET.
74 (2), 61-8, 1973.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
ROBBINS RAISE BORING CO:SEATTLE,WA:USA.

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE PROJECT INVESTIGATED IS UTILIZED FOR MINE PURPOSES. THE RAISE DRIVING (BORING MACHINES) METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THIS DOCUMENT INCORPORATES ADDITIONALLY DRILLING EQUIPMENT AND TUNNELING MACHINE CHARACTERISTICS.

R001265 FORCE REDUCTION IN EXCAVATION DEVICES.
PETERSON, C. A.
J. CONSTR. DIV.
99, (CO1), 21-33, 1973.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
MILLER,FOSTER ASSOCIATES,INC:135 SECOND AVE:
WALTHAM,MA:02154
INGERSOLL-RAND RESEARCH INC.

FUNDING ORGANIZATION(S)
JEFFREY MINING MACHINERY CO:USA.
1.COLORADO SCHOOL OF MINES
2.FLOW RESEARCH INC.
3.NATIONAL SCIENCE FOUNDATION
4.ROBBINS COMPANY
5.U.S.BUREAU OF MINES

THIS LAB REPORT CONTAINS ORIGINAL DATA. THIS DOCUMENT INCORPORATES ADDITIONALLY DRILLING EQUIPMENT CHARACTERISTICS. EXCAVATION ADVANCEMENT RATE IS ALSO DISCUSSED.

R001266 RECENT DEVELOPMENT OF NEW AUSTRIAN TUNNELLING METHOD.
NUSSBAUM, H.
J. CONSTR. DIV.
99 (CO1), 115-32, 1973.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
CRIPPEN,G.E.AND ASSOCIATES,LTD:VANCOUVER,B.C:CANADA
PORR-UNION-UNIVERSALE-HINTEREGGER-MOUYREDER KRAUS-

(CONTINUED)

RELLA,AUSTRIA
OBERRANZMAYER-SORAVIA-ISOLA,LARCHBAUMER,AUSTRIA

FUNDING ORGANIZATION(S)
TAUERNAUTOBAHN AKTIENGESSELSCHAFT,SALZBURG,AUSTRIA

THIS IN-SITU AND LAB-THEORETICAL REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENINGS DISCUSSED INCLUDE THE COMPLETED EXCAVATION OF THE KATSCHBERG TUNNEL (AUSTRIA) AND THE COMPLETED EXCAVATION OF THE TAVERN TUNNEL (AUSTRIA) . THE PROJECTS INVESTIGATED ARE UTILIZED FOR HIGHWAY PURPOSES. THE NEW AUSTRAIN METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHODS SERVICING PROJECT EFFORTS INCLUDE CONVENTIONAL EXPLOSIVE (UNSPECIFIED) AND MECHANICAL ABRASION (PERCUSSION) . THIS DOCUMENT INCORPORATES ADDITIONALLY DRILLING EQUIPMENT CHARACTERISTICS. TBM EXCAVATION RATE IS ALSO DISCUSSED. GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON GROUND CONDITIONS AND UNDERGROUND OPENING SUPPORTS IS ALSO PRESENTED.

R001267 THE ART OF TUNNELLING IN VIENNA.
BRAUN, W. M.
TUNNELS AND TUNNELLING
9 (3), 29-32, 1974.
LANGUAGE: ENGLISH

THIS IN-SITU REPORT CONTAINS REVIEW DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE COMPLETED EXCAVATION OF THE KARLSPLATZ UNDERGROUND TRAFFIC CENTRE (VIENNA, AUSTRIA) . THE PROJECT INVESTIGATED IS UTILIZED FOR METRO PURPOSES. THE AUSTRIAN METHOD AND SHIELD METHOD REPRESENT THE EXCAVATION TECHNIQUES STUDIED. THE REPORTED FRAGMENTATION METHODS SERVICING PROJECT EFFORTS INCLUDE MECHANICAL ABRASION (ROTARY) AND UNSPECIFIED . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. TBM EXCAVATION RATE IS ALSO DISCUSSED. SOIL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON GROUND CONDITIONS AND UNDERGROUND OPENING SUPPORTS IS ALSO PRESENTED.

R001268 CONCRETE PIPE JACKING IN THE UNITED KINGDOM.
HOUGH, C. M.
TUNNELS AND TUNNELLING
6 (3), 51-2, 1974.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
REES/HUGH LTD:U.K.

THIS IN-SITU REPORT CONTAINS REVIEW DATA. THE SHIELD METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. SOIL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON UNDERGROUND OPENING SUPPORTS IS ALSO PRESENTED.

R001269 THE HEITERSBERG PROJECT.
ANDRASKAY, E. SCHNEEBELI, R.
TUNNELS AND TUNNELLING
6 (3), 69-70, 73-4, 1974.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
1.BASLER AND HOFMANN,ZURCIH,SWITZERLAND
2.SCHAFIR AND MUGGLIN,AG:ZURICH,SWITZERLAND

FUNDING ORGANIZATION(S)
SWISS FEDERAL RAILWAYS,SWITZERLAND

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENINGS DISCUSSED INCLUDE THE COMPLETED EXCAVATION OF THE HEITERSBERG RAILWAY TUNNEL (SWITZERLAND) AND THE COMPLETED EXCAVATION OF THE KILLMANGEN RAILWAY TUNNEL (HEITERSBERG PROJECT) (SWITZERLAND) . THE PROJECTS INVESTIGATED ARE UTILIZED FOR RAILWAY PURPOSES. THE CUT AND COVER METHOD, RAISE DRIVING (BORING MACHINES) METHOD AND SHIELD METHOD REPRESENT THE EXCAVATION TECHNIQUES STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY DRILLING EQUIPMENT AND TUNNELING MACHINE CHARACTERISTICS. SOIL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON GROUND CONDITIONS AND UNDERGROUND OPENING SUPPORTS

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AND MATERIALS HANDLING SYSTEM IS ALSO PRESENTED. PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE SANDSTONE .

R001270 TUNNELLING IN THE RUHR.
JACOMB-HOOD, E. W.
TUNNELS AND TUNNELLING
6 (3), 83-6, 1974.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
KUNZ,ALFRED AND CO:MUNICH,GERMANY
HOCHTIEF,A.G:WEST GERMANY
1.ANGUST PAPE KG,CASTROP-RAUXEL
2.BETON AND MONIERBAU,GMBH,INNSBRUCK
3.THYSSEN SCHACHTBAU,GMBH,MULHEIM-RUHR

FUNDING ORGANIZATION(S)
FEDERAL REPUBLIC OF W.GERMANY

THIS IN-SITU REPORT CONTAINS REPUBLISHED DATA. THE PROJECT INVESTIGATED IS UTILIZED FOR RAILWAY PURPOSES. THE AUSTRIAN METHOD, CUT AND COVER METHOD AND PILOT BORE-CROWN METHOD REPRESENT THE EXCAVATION TECHNIQUES STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDE CONVENTIONAL EXPLOSIVE (UNSPECIFIED) AND MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY DRILLING EQUIPMENT AND TUNNELING MACHINE CHARACTERISTICS. SOIL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON UNDERGROUND OPENING SUPPORTS AND MATERIALS HANDLING SYSTEM IS ALSO PRESENTED. ROCK TYPES REVIEWED INCLUDE MARL .

R001282 GEOTECHNICAL OBSERVATIONS DURING CONSTRUCTION OF A TUNNEL THROUGH SOFT CLAY IN TRONDHEIM, NORWAY.
HARTMARK, H.
FELSMECHANIK UND INGENIEURGEOLOGIE
2 (1), 9-21, 1964.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
NORWEGIAN STATE RAILWAYS,GEOTECHNICAL DEPT:OSLO, NORWAY

THIS IN-SITU REPORT CONTAINS REPUBLISHED DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE COMPLETED EXCAVATION OF THE TYHOLT RAILWAY TUNNEL (NORWAY) . THE PROJECT INVESTIGATED IS UTILIZED FOR RAILWAY PURPOSES. THE DRILL AND BLAST (FULL FACE) METHOD AND SHIELD METHOD REPRESENT THE EXCAVATION TECHNIQUES STUDIED. THE REPORTED FRAGMENTATION METHODS SERVICING PROJECT EFFORTS INCLUDE CONVENTIONAL EXPLOSIVE (UNSPECIFIED) AND MECHANICAL ABRASION (DRAG) . GEOSTRUCTURAL AND SOIL CHARACTERISTICS AS WELL AS SOIL MECHANICAL PROPERTIES FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON GROUND CONDITIONS AND UNDERGROUND OPENING SUPPORTS IS ALSO PRESENTED.

R001297 BUREAU OF RECLAMATION EXPERIENCE IN USE OF BORING MACHINES IN TUNNEL EXCAVATION.
BELLPORT, B. P.
PAPER FOR THE FALL MEETING OF THE SOCIETY OF MINING ENGINEERS, ST. LOUIS, MISSOURI
21-3, 46PP., 1970.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
1.COLORADO CONSTRUCTORS,DENVER,CO.
2.HORNER,A.S.CONSTRUCTION CO.,DENVER,CO.
BOYLES BROTHERS DRILLING CO:CO:USA.
FENIX AND SCISSON INC., TULSA,OK
CLYDE AND CO.
1.BOYLES BROTHERS DRILLING CO:
2.GIBBONS AND REED CO.
UTAH CONSTRUCTION AND MINING CO.

FUNDING ORGANIZATION(S)
U.S.BUREAU OF RECLAMATION
EL PASO NATURAL GAS CO:EL PASO,TX:USA.

THIS IN-SITU AND LAB REPORT CONTAINS ORIGINAL AND REPUBLISHED DATA. THE UNDERGROUND OPENINGS DISCUSSED INCLUDE THE COMPLETED EXCAVATION OF THE AZOTEA TUNNEL (JUAN-CHAMA PROJECT) (N.CEN.NM., USA), THE COMPLETED EXCAVATION OF THE BLANCO TUNNEL (JUAN-CHAMA PROJECT) (N.CEN.NM., USA), THE COMPLETED EXCAVATION OF THE OSO

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TUNNEL (CO., USA), THE COMPLETED EXCAVATION OF THE RIVER MOUNTAINS TUNNEL (HENDERSON, NV., USA), THE COMPLETED EXCAVATION OF THE STARVATION TUNNEL (CENTRAL UTAH PROJECT) (UT., USA) AND THE COMPLETED EXCAVATION OF THE TUNNEL NO.1, NAVAJO INDIAN IRRIGATION PROJECT (NM., USA) . THE PROJECTS INVESTIGATED ARE UTILIZED FOR IRRIGATION PURPOSES. THE TBM METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. TBM EXCAVATION RATE IS ALSO DISCUSSED. GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON UNDERGROUND OPENING SUPPORTS AND MATERIALS HANDLING SYSTEM IS ALSO PRESENTED. THE EXCAVATION CHARACTERISTICS FOR LEWIS SHALE, MANCOS FORMATION, MESAVERDE FORMATION (UP GROUP), ROCKVILLE QUARTZ MONZONITE AND SAN JOSE FORMATION ARE TREATED. PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE CONGLOMERATE, RHYODACITE, RHYOLI SANDSTONE, SHALE, SILTSTONE AND VOLCANICS . THIS D ENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTI (LAB) DATA.

R001258 TUNNELS-MACHINE EXCAVATION RATE OF PROGRESS-MACHINE DATA.
BUREAU OF RECLAMATION.
BUREAU OF RECLAMATION, DENVER, COLORADO
12PP., 1974.
(REC-ERC-74-7)
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
FLOUR UTAH ENGINEERS AND CONSTRUCTORS INC:FLOUR,UT: USA.
HEALY,S.A.CO.
KIEWIT,PETER:SONS CO.

FUNDING ORGANIZATION(S)
U.S.BUREAU OF RECLAMATION

THIS IN-SITU REPORT CONTAINS ABSTRACTED ONLY DATA. THE UNDERGROUND OPENINGS DISCUSSED INCLUDE THE COMPLETED EXCAVATION OF THE CURRANT TUNNEL (UT., USA), THE COMPLETED EXCAVATION OF THE LAYOUT TUNNEL (UT., USA), THE COMPLETED EXCAVATION OF THE NAST TUNNEL (CO., USA) AND THE COMPLETED EXCAVATION OF THE TUNNEL NO.3, NAVAJO INDIAN IRRIGATION PROJECT (NM., USA) . THE PROJECTS INVESTIGATED ARE UTILIZED FOR IRRIGATION AND WATER SUPPLY TUNNEL PURPOSES. THE TBM METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. TBM EXCAVATION AND EXCAVATION ADVANCEMENT RATES ARE ALSO DISCUSSED. GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON GROUND CONDITIONS AND UNDERGROUND OPENING SUPPORTS AND MATERIALS HANDLING SYSTEM IS ALSO PRESENTED. PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE CONGLOMERATE, GNEISS, GRANITE, GRANODIORITE, LIMESTONE, SANDSTONE, SHALE AND SILTSTONE . THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES (LAB) DATA.

R001304 EXPERIMENTS WITH WATER AS A DYNAMIC PRESSURE MEDIUM.
FARMER, I. W. ATTEWELL, P. B.
MINE QUARRY ENG.
524-30, 1963.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
SHEFFIELD,UNIVERSITY OF,POST GRADUATE SCHOOL IN MINING,U.K.

THIS LAB REPORT CONTAINS REPUBLISHED DATA. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES JET ABRASION (WATER) . GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. THE EXCAVATION CHARACTERISTICS FOR ABERDEEN LIMESTONE, CARRARA MARBLE, DARLEY DALE SANDSTONE, GATUNA FORMATION, PENNANT SANDSTONE AND RED SANDSTONE ARE TREATED. ROCK TYPES REVIEWED INCLUDE DIORITE, GRANITE, LIMESTONE, MARBLE AND SANDSTONE . THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES (FLD) DATA.

R001314 APPLICATION OF RAISE BORING TO VERTICAL DEVELOPMENT AT MT. ISA.
BOYD, R. J. HOWE, A. W.
AUSTRAL. MINING
63 (4), 52-5, 1971.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
MT.ISA MINES,AUSTRALIA

FUNDING ORGANIZATION(S)
MT.ISA MINES,AUSTRALIA

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE PROJECT INVESTIGATED IS UTILIZED FOR MINE PURPOSES. THE RAISE DRIVING (BORING MACHINES) METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY DRILLING EQUIPMENT AND TUNNELING MACHINE CHARACTERISTICS. EXCAVATION ADVANCEMENT RATE IS ALSO DISCUSSED. GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED.

R001339 VEHICULAR TUNNELS IN ROCK-DIRECTION FOR DEVELOPMENT.
ROBBINS, R. J.
J. CONSTR. DIV. (PROC. AMER. SOC. CIVIL ENGINEERS)
98 (CO2), 235-50, 1972.
(PAPER NO. 9173)
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
ESSO PRODUCTION RESEARCH CO:HOUSTON,TX.
KOMATSU CO:JAPAN
1.ATKINSON,GUY F.
2.NUTTALL,EDMUND SONS AND CO.
PRACER-LOSINGER AND OTHERS

THIS IN-SITU REPORT CONTAINS REVIEW DATA. THE UNDERGROUND OPENINGS DISCUSSED INCLUDE THE COMPLETED EXCAVATION OF THE ENA TUNNEL (JAPAN), THE COMPLETED EXCAVATION OF THE HEITERSBERG RAILWAY TUNNEL (SWITZERLAND), THE COMPLETED EXCAVATION OF THE LEUGISLAND HIGHWAY TUNNEL (SWITZERLAND), THE COMPLETED EXCAVATION OF THE MANGLA DAM DIVERSION AND POWER TUNNELS (PAKISTAN), THE COMPLETED EXCAVATION OF THE MERSEY RIVER TUNNELS (LIVERPOOL, UK), THE COMPLETED EXCAVATION OF THE PARIS EXPRESS METRO (PARIS, FRANCE) AND THE PROPOSED EXCAVATION OF THE THAMES-LEE WATER MAIN TUNNEL (LONDON, ENGLAND, U.K.) THE PROJECTS INVESTIGATED ARE UTILIZED FOR EXPLORATORY TUNNEL, HIGHWAY, HYDROELECTRIC AND RAILWAY PURPOSES. THE DRILL AND BLAST (FULL FACE) METHOD, SHIELD METHOD AND TBM METHOD REPRESENT THE EXCAVATION TECHNIQUES STUDIED. THE REPORTED FRAGMENTATION METHODS SERVICING PROJECT EFFORTS INCLUDE CONVENTIONAL EXPLOSIVE (UNSPECIFIED) AND MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. TBM EXCAVATION AND EXCAVATION ADVANCEMENT RATES ARE ALSO DISCUSSED. GEOSTRUCTURAL AND SOIL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON GROUND CONDITIONS AND UNDERGROUND OPENING SUPPORTS AND MATERIALS HANDLING SYSTEM IS ALSO PRESENTED. PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE CHALK (ROCK), CONGLOMERATE, GRANITE, LIMESTONE, MARL, SANDSTONE, SHALE AND TACONITE . THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES (FLD) (LAB) DATA.

R001341 RAISE BORING AT RHOKANA.
HELLISH, M. CRISP, R.
MINING MAG.
122 (6), 447-57, 1970.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
RHOKANA CORP.LTD.

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE COMPLETED EXCAVATION OF THE MINDOLA MINE (ZAMBIA) . THE PROJECT INVESTIGATED IS UTILIZED FOR MINE PURPOSES. THE RAISE DRIVING (BORING MACHINES) METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED

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FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. TBM EXCAVATION RATE IS ALSO DISCUSSED. GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. THE EXCAVATION CHARACTERISTICS FOR BASEMENT COMPLEX AND KATANGA SEDIMENTS ARE TREATED. THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES (FLD) DATA.

R001342 TUNNEL BORER.
AUTHOR ANON.
MINING MAG.
123 (1), 73, 1970.
LANGUAGE: ENGLISH

THIS IN-SITU REPORT CONTAINS ABSTRACTED ONLY DATA. THE PROJECT INVESTIGATED IS UTILIZED FOR MINE PURPOSES. THE TBM METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES (FLD) DATA.

R001343 THE ORANGE-FISH TUNNEL.
COOPER, W. H.
MINING MAG.
123 (4), 298-9, 1970.
LANGUAGE: ENGLISH

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE ON GOING EXCAVATION OF THE ORANGE-FISH TUNNEL (S.AFRICA) . THE PROJECT INVESTIGATED IS UTILIZED FOR IRRIGATION PURPOSES. THE DRILL AND BLAST (FULL FACE) METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES CONVENTIONAL EXPLOSIVE (UNSPECIFIED) . PERTINENT INFORMATION ON UNDERGROUND OPENING SUPPORTS AND MATERIALS HANDLING SYSTEM IS ALSO PRESENTED.

R001344 ECONOMIC FACTORS IN TUNNEL BORING.
ROBBINS, R. J.
MINING MAG.
123 (4), 301-3, 1970.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
ROBBINS RAISE BORING CO;SEATTLE,WA;USA.
MELBOURNE AND METROPOLITAN BOARD OF WORKS

THIS IN-SITU REPORT CONTAINS REVIEW DATA. THE TBM METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. TBM EXCAVATION RATE IS ALSO DISCUSSED. GEOSTRUCTURAL AND SOIL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON GROUND CONDITIONS IS ALSO PRESENTED.

R001345 TUNNELING MACHINE.
AUTHOR ANON.
MINING MAG.
122 (4), 309, 1970.
LANGUAGE: ENGLISH

THIS IN-SITU REPORT CONTAINS REVIEW DATA. THE TBM METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. PERTINENT INFORMATION ON MATERIALS HANDLING SYSTEM IS ALSO PRESENTED.

R001346 MECHANICAL TUNNEL BORING.
STEVENS, V. L.
MINING MAG.
123 (4), 307, 1970.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
OY YLEINEN INSINOORITOIMISTO,FINLAND

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FUNDING ORGANIZATION(S)
U.S.BUREAU OF RECLAMATION
EL PASO NATURAL GAS CO;EL PASO,TX;USA.

THIS IN-SITU REPORT CONTAINS ABSTRACTED ONLY DATA. THE UNDERGROUND OPENINGS DISCUSSED INCLUDE THE COMPLETED EXCAVATION OF THE AZOTEA TUNNEL (JUAN-CHAMA PROJECT) (N.CEN.NM., USA), THE COMPLETED EXCAVATION OF THE OSO TUNNEL (CO., USA) AND THE COMPLETED EXCAVATION OF THE WATER HOLLOW TUNNEL (UT., USA) . THE PROJECTS INVESTIGATED ARE UTILIZED FOR IRRIGATION PURPOSES. THE TBM METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. TBM EXCAVATION RATE IS ALSO DISCUSSED. GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON MATERIALS HANDLING SYSTEM IS ALSO PRESENTED. THE EXCAVATION CHARACTERISTICS FOR AZORTEA SHALE AND SANDSTONE, OSO CANYON FORMATION AND WATER HOLLOW MUDSTONE ARE TREATED. ROCK TYPES REVIEWED INCLUDE SANDSTONE .

R001348 TUNNEL BORING. NEW TUNNEL BORER AIMING AT RECORD PERFORMANCE.
AUTHOR ANON.
MINING MAG.
124 (5), 403-5, 1971.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
FLOUR UTAH ENGINEERS AND CONSTRUCTORS INC;FLOUR,UT;USA.

FUNDING ORGANIZATION(S)
U.S.BUREAU OF RECLAMATION

THIS IN-SITU REPORT CONTAINS REPUBLISHED DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE ON GOING EXCAVATION OF THE TUNNEL NO.1, NAVAJO INDIAN IRRIGATION PROJECT (NM., USA) . THE PROJECT INVESTIGATED IS UTILIZED FOR IRRIGATION PURPOSES. THE TBM METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. EXCAVATION ADVANCEMENT RATE IS ALSO DISCUSSED. GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON UNDERGROUND OPENING SUPPORTS AND MATERIALS HANDLING SYSTEM IS ALSO PRESENTED. ROCK TYPES REVIEWED INCLUDE SANDSTONE AND SILTSTONE .

R001375 TUNNELS OF NORWEGIAN STATE RAILWAYS. DESIGN, CONSTRUCTION AND MAINTENANCE.
HARTMARK, H.
TUNNELS AND TUNNELLING
2 (6), 379-84, 1970.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
NORWEGIAN STATE RAILWAYS,GEOTECHNICAL DEPT;OSLO, NORWAY

FUNDING ORGANIZATION(S)
NORWEGIAN STATE RAILWAYS,OSLO,NORWAY

THIS IN-SITU REPORT CONTAINS REVIEW DATA. THE UNDERGROUND OPENINGS DISCUSSED INCLUDE THE ON GOING EXCAVATION OF THE LIERASEN RAILWAY TUNNEL (NORWAY) AND THE ON GOING EXCAVATION OF THE NORWEGIAN RAILWAY TUNNELS (NORWAY) . THE PROJECTS INVESTIGATED ARE UTILIZED FOR RAILWAY PURPOSES. THE DRILL AND BLAST (FULL FACE) METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES CONVENTIONAL EXPLOSIVE (UNSPECIFIED) . GEOSTRUCTURAL AND SOIL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON GROUND CONDITIONS AND UNDERGROUND OPENING SUPPORTS IS ALSO PRESENTED. ROCK TYPES REVIEWED INCLUDE GNEISS .

R001383 JAPAN. SEIKAN UNDERSEA TUNNEL.
TANAKA, T.
TUNNELS AND TUNNELLING
3 (5), 362-4, 1971.
LANGUAGE: ENGLISH

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PERFORMING ORGANIZATION(S)
JAPANESE NATIONAL RAILWAYS,JAPAN
TEITO RAPID TRANSIT AUTHORITY,JAPAN

FUNDING ORGANIZATION(S)
JAPANESE NATIONAL RAILWAYS
TEITO RAPID TRANSIT AUTHORITY,JAPAN

THIS IN-SITU AND LAB REPORT CONTAINS REPUBLISHED DATA. THE UNDERGROUND OPENINGS DISCUSSED INCLUDE THE ON GOING EXCAVATION OF THE ENA TUNNEL (JAPAN), THE ON GOING EXCAVATION OF THE ROKKO TUNNEL (SANYO LINE) (JAPAN), THE ON GOING EXCAVATION OF THE SEIKAN RAILWAY TUNNEL (JAPAN), THE COMPLETED EXCAVATION OF THE TAMAGAWA TUNNEL (JAPAN) AND TOKYO SUBWAY NETWORK (CHIYODA LINE) (JAPAN) . THE PROJECTS INVESTIGATED ARE UTILIZED FOR EXPLORATORY TUNNEL, HIGHWAY, METRO AND RAILWAY PURPOSES. THE DRILL AND BLAST (FULL FACE) METHOD, HEADING AND BENCH METHOD, SHIELD METHOD, STEEL SHELL METHOD AND TBM METHOD REPRESENT THE EXCAVATION TECHNIQUES STUDIED. THE REPORTED FRAGMENTATION METHODS SERVICING PROJECT EFFORTS INCLUDE CONVENTIONAL EXPLOSIVE (UNSPECIFIED) AND MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY DRILLING EQUIPMENT AND TUNNELING MACHINE CHARACTERISTICS. GEOSTRUCTURAL AND SOIL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON UNDERGROUND OPENING SUPPORTS IS ALSO PRESENTED. ROCK TYPES REVIEWED INCLUDE GRANITE . THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES DATA.

R001384 NOVEL SHIELD DEVELOPMENT IN DENMARK.
ZACHARIASSEN, J. A.
TUNNELS AND TUNNELLING
4 (2), 126-7, 1972.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
COPENHAGEN MUNICIPALITY,DENMARK

FUNDING ORGANIZATION(S)
COPENHAGEN MUNICIPALITY,DENMARK

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE PROJECT INVESTIGATED IS UTILIZED FOR PEDESTRIAN TUNNEL AND PIPLINE (UNSPEC) PURPOSES. THE CUT AND COVER METHOD AND SHIELD METHOD REPRESENT THE EXCAVATION TECHNIQUES STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (SAW-UNDERCUTTING) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. EXCAVATION ADVANCEMENT RATE IS ALSO DISCUSSED. GEOSTRUCTURAL AND SOIL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON UNDERGROUND OPENING SUPPORTS IS ALSO PRESENTED.

R001385 PORT HURON FRESH WATER TUNNEL.
AUTHOR ANON.
TUNNELS AND TUNNELLING
4 (4), 317, 1972.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
GREENFIELD AND ASSOCIATES,LIVONIA,MI:USA.

FUNDING ORGANIZATION(S)
DETROIT METROPOLITAN WATER DEPT:DETROIT,MI:USA.

THIS IN-SITU REPORT CONTAINS REVIEW DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE ON GOING EXCAVATION OF THE PORT HURON (WATER SUPPLY) TUNNEL (DETROIT, MI,, USA) . THE PROJECT INVESTIGATED IS UTILIZED FOR WATER SUPPLY TUNNEL PURPOSES. THE TBM METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. TBM EXCAVATION RATE IS ALSO DISCUSSED. GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON GROUND CONDITIONS AND UNDERGROUND OPENING SUPPORTS IS ALSO PRESENTED. THE EXCAVATION CHARACTERISTICS FOR ANTRIM SHALE ARE TREATED. ROCK TYPES REVIEWED INCLUDE LIMESTONE AND SHALE . THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES (LAB) DATA.

R001389 TUNNELS FOR EMPINGHAM RESERVOIR SCHEME.
AUTHOR ANON.
TUNNELS AND TUNNELLING
5 (1), 42-3, 1973.
LANGUAGE:ENGLISH

PERFORMING ORGANIZATION(S)
NUTTAL,EDMUND LTD:U.K.

FUNDING ORGANIZATION(S)
JOINT VENTURE:
1.MID-NORTHAMPTONSHIRE WATER BOARD,U.K.
2.WELLAND AND NENE RIVER AUTHORITY

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE ON GOING EXCAVATION OF THE TUNNELS FO EMPINGHAM RESERVOIR SCHEME (U.K.) . THE PROJECT INVESTIGATED IS UTILIZED FOR HYDROELECTRIC PURPOSES. THE SHIELD METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON UNDERGROUND OPENING SUPPORTS AND MATERIALS HANDLING SYSTEM IS ALSO PRESENTED. THE EXCAVATION CHARACTERISTICS FOR UP-LIAS CLAY ARE TREATED. ROCK TYPES REVIEWED INCLUDE CLAYSTONE . THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES DATA.

R001392 DETERMINING OF QUASIHOMOGENEOUS ZONES OF ELASTICITY AND DEFORMABILITY CHARACTERISTICS OF ROCK MASS IN TUNNEL, ON THE BASIS OF IN SITU INVESTIGATIONS.
PAVLOVIC, M.
PROC. INT. CONGR. ROCK MECH., 2ND, BELGRADE
1, 5PP., 1970.
(PAPER NO. 1-2)
LANGUAGE: ENGLISH

THIS LAB-IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE COMPLETED EXCAVATION OF THE RAMA TUNNEL (YUGOSLAVIA) . THE PROJECT INVESTIGATED IS UTILIZED FOR HYDROELECTRIC PURPOSES. THE DRILL AND BLAST (FULL FACE) METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES CONVENTIONAL EXPLOSIVE (UNSPECIFIED) . PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE DOLOMITE (ROCK) AND LIMESTONE . THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES (FLD) (LAB) DATA.

R001434 DEFORMATION OF ROCK MASS AND STRESS IN CONCRETE LINING AROUND THE MACHINE HALL OF KISENYAMA UNDERGROUND POWER PLANT.
YOSHIDA, M. YOSHIMURA, K.
PROC. INT. CONGR. ROCK MECH., 2ND, BELGRADE
2, 15PP., 1970.
(PAPER NO. 4-29)
LANGUAGE: ENGLISH

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE COMPLETED EXCAVATION OF THE KISENYAMA UNDERGROUND POWER PLANT (JAPAN) . THE PROJECT INVESTIGATED IS UTILIZED FOR HYDROELECTRIC PURPOSES. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES CONVENTIONAL EXPLOSIVE (UNSPECIFIED) . GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON UNDERGROUND OPENING SUPPORTS IS ALSO PRESENTED. PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE CHERT (ROCK) AND SLATE . THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES (LAB) DATA.

R001439 ROCK BREAKAGE BY HIGH-SPEED IMPACT.
SINGH, M. M.
PROC. INT. CONGR. ROCK MECH., 2ND, BELGRADE
3, 11PP., 1970.
(PAPER NO. 5-13)
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
I.I.T.RESEARCH INSTITUTE,CHICAGO,IL:USA.

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FUNDING ORGANIZATION(S)
DEPT.OF TRANSPORTATION OFFICE OF HIGH SPEED GROUND TRANSPORTATION WASHINGTON,D.C.USA.

THIS LAB REPORT CONTAINS ORIGINAL DATA. THE PROJECT INVESTIGATED IS UTILIZED FOR EXPERIMENTAL EXCAVATION PURPOSES. THE REPORTED FRAGMENTATION METHODS SERVICING PROJECT EFFORTS INCLUDE IMPACT ABRASION (PELLET IMPACT) AND JET ABRASION (WATER) . GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. THE EXCAVATION CHARACTERISTICS FOR CONNECTICUT BROWNSTONE, FRENCH CREEK GABBRO, INDIANA LIMESTONE, MASSILLON SANDSTONE (IN POTTSVILLE FORMATION), MILFORD PINK GRANITE AND MINNESOTTA DOLOMITE ARE TREATED. PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE DOLOMITE (ROCK), GABBRO, GRANITE, GRAYWACKE, LIMESTONE AND SANDSTONE . THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES (LAB) DATA.

R001455 THE UNDERGROUND POWERHOUSE IN LOWER HIMALAYAS, DEHRADUN, INDIA.
NARAIN, T. G.
PROC. INT. CONGR. ROCK MECH., 2ND, BELGRADE
4, 399, 1970.
LANGUAGE: ENGLISH

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE ON GOING EXCAVATION OF THE UNDERGROUND POWER HOUSE (YAMUNA HYDEL PROJECT) (DEHRADUN, UTTAR PRADESH, INDIA) . THE PROJECT INVESTIGATED IS UTILIZED FOR HYDROELECTRIC PURPOSES. THE HEADING AND BENCH METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES CONVENTIONAL EXPLOSIVE (UNSPECIFIED) . GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON UNDERGROUND OPENING SUPPORTS IS ALSO PRESENTED. ROCK TYPES REVIEWED INCLUDE LIMESTONE AND SLATE .

R001458 A STUDY OF FULL-FACE BORING IN U. S. A. AND EUROPE WITH A VIEW TO UTILIZING THIS EQUIPMENT IN DIFFERENT KINDS OF NORWEGIAN ROCKS.
BRONDER, S. O.
NORWEGIAN INSTITUTE OF TECHNOLOGY, M. S. THESIS
141PP., 1968.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
NORWEGIAN INSTITUTE OF TECHNOLOGY (N.H.T.)

THIS THEORETICAL REPORT CONTAINS REVIEW DATA. THE PROJECT INVESTIGATED IS UTILIZED FOR EXPERIMENTAL EXCAVATION, HIGHWAY, IRRIGATION, METRO, MINE, RAILWAY, SEWER, UNDERGROUND POWER STATION AND WATER SUPPLY TUNNEL PURPOSES. THE TBM METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. EXCAVATION ADVANCEMENT RATE IS ALSO DISCUSSED. GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE CLAYSTONE, GNEISS, GRANITE, GRAYWACKE, GREENSTONE (METAMORPHIC), IRON ORE, LIMESTONE, QUARTZITE, SANDSTONE AND SLATE . THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES (LAB) DATA.

R001463 ROCK SALT MINE.
AUTHOR ANON.
MINE QUARRY ENG.
167-73, 1956.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
MEADOWBANK ROCK SALT MINE,U.K.

FUNDING ORGANIZATION(S)
IMPERIAL CHEMICAL INDUSTRIES,SALT DIVISION OF,U.K.

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE COMPLETED EXCAVATION OF THE MEADOWBANK ROCK SALT MINE (CHESHIRE, UK) . THE PROJECT INVESTIGATED IS UTILIZED FOR MINE PURPOSES. THE HEADING AND BENCH METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE

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REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES CONVENTIONAL EXPLOSIVE (UNSPECIFIED) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. THE EXCAVATION CHARACTERISTICS FOR KEUPER MARL FORMATION ARE TREATED. ROCK TYPES REVIEWED INCLUDE ROCKSALT .

R001464 THE MEADOWBANK ROCK SALT MINE.
AUTHOR ANON.
MINE QUARRY ENG.
211-9, 1956.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
MEADOWBANK ROCK SALT MINE,U.K.

FUNDING ORGANIZATION(S)
IMPERIAL CHEMICAL INDUSTRIES,SALT DIVISION OF,U.K.

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE COMPLETED EXCAVATION OF THE MEADOWBANK ROCK SALT MINE (CHESHIRE, UK) . THE PROJECT INVESTIGATED IS UTILIZED FOR MINE PURPOSES. THE HEADING AND BENCH METHOD AND LONGWALL CUTTING MACHINE METHOD REPRESENT THE EXCAVATION TECHNIQUES STUDIED. THE REPORTED FRAGMENTATION METHODS SERVICING PROJECT EFFORTS INCLUDE CONVENTIONAL EXPLOSIVE (UNSPECIFIED) AND MECHANICAL ABRASION (SAW-UNDERCUTTING) . THIS DOCUMENT INCORPORATES ADDITIONALLY DRILLING EQUIPMENT AND TUNNELING MACHINE CHARACTERISTICS. GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. THE EXCAVATION CHARACTERISTICS FOR KEUPER MARL FORMATION ARE TREATED. ROCK TYPES REVIEWED INCLUDE ROCKSALT .

R001465 SHOCK-WAVE FLUIDICS: CONTROLS FOR THE FUTURE.
YEAPLE, F. O.
PROD. ENG.
56-8, 1968.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
FLUIDCNICS RESEARCH LAB:SALT LAKE CITY,UT:USA.

FUNDING ORGANIZATION(S)
FLUIDONICS RESEARCH LAB:SALT LAKE CITY,UT:USA

THIS LAB REPORT CONTAINS REVIEW DATA. THE PROJECT INVESTIGATED IS UTILIZED FOR EXPERIMENTAL EXCAVATION PURPOSES. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES IMPACT ABRASION (SHOCK WAVE DRILL) . GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. ROCK TYPES REVIEWED INCLUDE GRANITE .

R001467 NOTABLE WATER TUNNEL.
GRUNDY, C. F.
WATER POWER
24-30, 1951.
LANGUAGE: ENGLISH

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE ON GOING EXCAVATION OF THE BOWLAND FOREST TUNNEL (GB) . THE PROJECT INVESTIGATED IS UTILIZED FOR WATER SUPPLY TUNNEL PURPOSES. THE DRILL AND BLAST (FULL FACE) METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES CONVENTIONAL EXPLOSIVE (UNSPECIFIED) . THIS DOCUMENT INCORPORATES ADDITIONALLY DRILLING EQUIPMENT CHARACTERISTICS. GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON GROUND CONDITIONS AND UNDERGROUND OPENING SUPPORTS AND MATERIALS HANDLING SYSTEM IS ALSO PRESENTED. ROCK TYPES REVIEWED INCLUDE GRIT, LIMESTONE AND SHALE .

R001468 TUNNELLING IN SWEDEN. ESSENTIAL FEATURES OF IMPROVEMENTS SINCE THE 1930S.
AHLSTROM, R.
WATER WATER ENGINEERING
393-400, 1954.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
HJALA,A.B.AND HARRSELE,A.B:STOCKHOLM,SWEDEN

(CONTINUED)

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENINGS DISCUSSED INCLUDE THE COMPLETED EXCAVATION OF THE DISCHARGE TUNNEL (HARSELE HYDRO-ELECTRIC POWER PLANT) (GUERNSEY, U.K.), THE COMPLETED EXCAVATION OF THE HAMMARBY RAILWAY TUNNEL (STOCKHOLM, SWEDEN), THE COMPLETED EXCAVATION OF THE POWER PLANT DISCHARGE TUNNEL (JARPSTROMMEN HYDROELECTRIC PROJECT) (SWEDEN) AND THE COMPLETED EXCAVATION OF THE POWER PLANT DISCHARGE TUNNEL (HJALTA HYDROELECTRIC PROJECT) (SWEDEN) . THE PROJECT INVESTIGATED ARE UTILIZED FOR HYDROELECTRIC AND RAILWAY PURPOSES. THE DRILL AND BLAST (FULL FACE) METHOD AND HEADING AND BENCH METHOD REPRESENT THE EXCAVATION TECHNIQUES STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES CONVENTIONAL EXPLOSIVE (UNSPECIFIED) . THIS DOCUMENT INCORPORATES ADDITIONALLY DRILLING EQUIPMENT CHARACTERISTICS. EXCAVATION ADVANCEMENT RATE IS ALSO DISCUSSED. INFORMATION PERTINENT TO EXCAVATION COST IS GIVEN. GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON UNDERGROUND OPENING SUPPORTS AND MATERIALS HANDLING SYSTEM IS ALSO PRESENTED. PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE AMPHIBOLITE, GNEISS, GRANITE AND QUARTZITE .

R001469 CONSTRUCTING A SOFT-GROUND TUNNEL UNDER BOSTON HARBOR.
AUTHOR: RICHARDSON, C. A.
CIVIL ENG.
4PP., 1961.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
PERINI CORP.

FUNDING ORGANIZATION(S)
MASSACHUSETTS TURNPIKE AUTHORITY

THIS IN-SITU REPORT CONTAINS REPUBLISHED DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE ON GOING EXCAVATION OF THE LT.WILLIAM F.CALLAHAN JR. TUNNEL (BOSTON, MA., USA) . THE PROJECT INVESTIGATED IS UTILIZED FOR HIGHWAY PURPOSES. THE SHIELD METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) . TBM EXCAVATION RATE IS ALSO DISCUSSED. GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON UNDERGROUND OPENING SUPPORTS AND MATERIALS HANDLING SYSTEM IS ALSO PRESENTED.

R001470 MOVING EARTH QUICKER AND CHEAPER.
AUTHOR: ANON.
CIVIL ENG.
56-7, 1972.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
MILLER,FOSTER ASSOCIATES,INC:135 SECOND AVE:
WALTHAM,MA:02154
INGERSOLL-RAND RESEARCH INC.

FUNDING ORGANIZATION(S)
JEFFREY MINING MACHINERY CO:USA.

THIS LAB REPORT CONTAINS REVIEW DATA. THIS DOCUMENT INCORPORATES ADDITIONALLY DRILLING EQUIPMENT AND TUNNELING MACHINE CHARACTERISTICS. EXCAVATION ADVANCEMENT RATE IS ALSO DISCUSSED.

R001473 THERMAL FRAGMENTATION SYSTEM UNDER NEW STUDY.
AUTHOR: ANON.
PROD. ENG.
5, 1971.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
U.S.BUREAU OF MINES,SPOKANE MINING RESEARCH CENTER, SPOKANE,WA:USA.

THIS REPORT CONTAINS REVIEW DATA, THE PROJECT INVESTIGATED IS UTILIZED FOR EXPERIMENTAL EXCAVATION PURPOSES. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES THERMAL-ELECTRICAL (UNSPECIFIED) . GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. ROCK TYPES REVIEWED INCLUDE BASALT AND QUARTZITE .

R001475 DRILL WITH 9 BITS CUTS BORING TIME.
AUTHOR: ANON.
NEW YORK TIMES
1966.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
NEW JERSEY DRILLING CO.

THIS IN-SITU REPORT CONTAINS REPUBLISHED DATA. THE PROJECT INVESTIGATED IS UTILIZED FOR BUILDING FOUNDATION PURPOSES. THE DRILLING METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (PERCUSSION) . THIS DOCUMENT INCORPORATES ADDITIONALLY DRILLING EQUIPMENT AND TUNNELING MACHINE CHARACTERISTICS. TBM EXCAVATION RATE IS ALSO DISCUSSED. GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON MATERIALS HANDLING SYSTEM IS ALSO PRESENTED. ROCK TYPES REVIEWED INCLUDE GRANITE .

R001476 A REVIEW OF TUNNELLING TECHNIQUES IN THE GOLD MINING INDUSTRY OF SOUTH AFRICA.
AUTHOR: NEWMAN, S. C.
TRANS. 7TH COM. MINING MET. CONG., SOUTH AFRICA
2, 629-53, 1961.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
RAND MINES LTD:S.AFRICA

THIS IN-SITU REPORT CONTAINS REVIEW DATA. THE PROJECT INVESTIGATED IS UTILIZED FOR MINE PURPOSES. THE DRILL AND BLAST (FULL FACE) METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES CONVENTIONAL EXPLOSIVE (UNSPECIFIED) . THIS DOCUMENT INCORPORATES ADDITIONALLY DRILLING EQUIPMENT CHARACTERISTICS. PERTINENT INFORMATION ON MATERIALS HANDLING SYSTEM IS ALSO PRESENTED.

R001477 MOLE VERSUS CONVENTIONAL: A COMPARISON OF TWO TUNNEL DRIVING TECHNIQUES.
AUTHOR: BENNETT, N. B.
HIGHWAY RESEARCH RECORD
(185), 1-8, 1967.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
U.S.BUREAU OF RECLAMATION

FUNDING ORGANIZATION(S)
U.S.BUREAU OF RECLAMATION

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENINGS DISCUSSED INCLUDE THE COMPLETED EXCAVATION OF THE TUNNEL NO.1, NAVAJO INDIAN IRRIGATION PROJECT (NM., USA) AND THE COMPLETED EXCAVATION OF THE TUNNEL NO.2, NAVAJO INDIAN IRRIGATION PROJECT (NM., USA) . THE PROJECTS INVESTIGATED ARE UTILIZED FOR IRRIGATION PURPOSES. THE DRILL AND BLAST (FULL FACE) METHOD AND TBM METHOD REPRESENT THE EXCAVATION TECHNIQUES STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES CONVENTIONAL EXPLOSIVE (UNSPECIFIED) . THIS DOCUMENT INCORPORATES ADDITIONALLY DRILLING EQUIPMENT AND TUNNELING MACHINE CHARACTERISTICS. TBM EXCAVATION RATE IS ALSO DISCUSSED. GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON GROUND CONDITIONS AND UNDERGROUND OPENING SUPPORTS AND MATERIALS HANDLING SYSTEM IS ALSO PRESENTED. THE EXCAVATION CHARACTERISTICS FOR SAN JOSE FORMATION ARE TREATED. PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE SANDSTONE, SHALE AND SILTSTONE . THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES (LAB) DATA.

R001480 TUNNELING MACHINES OF TODAY AND TOMORROW.
AUTHOR: WILLIAMSON, T. N.
HIGHWAY RESEARCH RECORD
(339), 19-25, 1970.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
JACOBS ASSOCIATES,SAN FRANSISCO,CA:USA.

(CONTINUED)

FUNDING ORGANIZATION(S)
COMMITTEE ON SOILS AND ROCK PROPERTIES

THIS IN-SITU REPORT CONTAINS REVIEW DATA. THE TBM METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS.

R001481 RESEARCH INVESTIGATION OF LASER ROCK KERFING.
CARSTENS, J. P. BANAS, C. M.
BIANCARDI, F. R. MELIKIAN, G. PETERS, G. T.
JUREWICZ, S. R. SESSIONS, E. C.
UNITED AIRCRAFT RESEARCH LAB., EAST HARTFORD, CONN.
244PP., 1972.
(UARL-L-911329-8)
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
UNITED AIRCRAFT RESEARCH LAB:E.HARTFORD,CT:USA.

FUNDING ORGANIZATION(S)
FEDERAL RAILROAD ADMINISTRATION,DEPT.OF TRANSPORTATION, WASHINGTON D.C:USA.

THIS LAB REPORT CONTAINS ORIGINAL, REPUBLISHED AND REVIEW DATA. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES THERMAL-RADIANT (COHERENT LIGHT-LASER) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. TBM EXCAVATION RATE IS ALSO DISCUSSED. INFORMATION PERTINENT TO EXCAVATION COST IS GIVEN. GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. THE EXCAVATION CHARACTERISTICS FOR BARRE GRANITE, BEREA SANDSTONE, DRESSER BASALT, NEW HAVEN TRAP ROCK, SIOUX QUARTZITE (=JASPER QUARTZITE) AND ST.CLOUD(GRAY)GRANODIORITE (=CHARCOAL GREY GRANITE) ARE TREATED. PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE ANDESITE, ARGILLITE, BASALT, BENTONITE (ROCK), BRECCIA, CHERT (MINERAL), CLAY, CONGLOMERATE, DOLOMITE (ROCK), GNEISS, GRANITE, GRAYWACKE, HEMATITE, IGNIMBRITE, LIMESTONE, MAGNETITE, MONZONITE, MUDSTONE, PORPHYRY, QUARTZITE, RHYODACITE, RHYOLITE, SANDSTONE, SCHIST, SERPENTINE, SHALE, SILTSTONE, TRAP AND TUFF . THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES (LAB) DATA.

R001483 METHODS OF EXCAVATION AND ROOF SUPPORT USED IN SOME RECENTLY CONSTRUCTED TUNNELS.
POLACK, S. P.
U. S. DEPT. OF THE INTERIOR, BUREAU OF MINES
42PP., 1950.
(BM-IC-7568)
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
U.S.BUREAU OF MINES,SPOKANE MINING RESEARCH CENTER, SPOKANE,WA:USA.

FUNDING ORGANIZATION(S)
U.S.BUREAU OF MINES

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENINGS DISCUSSED INCLUDE THE COMPLETED EXCAVATION OF THE BALTIMORE AND OHIO RAILROAD TUNNEL (MD., USA), THE COMPLETED EXCAVATION OF THE CROOKED CREEK TUNNEL (CROOKED CREEK RESERVOIRS) (FORD CITY, ARMSTRONG CO., PA., USA), THE COMPLETED EXCAVATION OF THE EAST BRANCH TUNNEL (EAST BRANCH DAM) (PA., USA), THE COMPLETED EXCAVATION OF THE PENN-LINCOLN PARKWAY TUNNELS (PITTSBURG, PA., USA), THE COMPLETED EXCAVATION OF THE SALTSBURG RAILROAD TUNNEL (PA., USA) AND THE COMPLETED EXCAVATION OF THE YOUGHIOGHENY TUNNEL (YOUGHIOGENY RIVER RESERVOIR PROJECT) (CONFLUENCE, PA., USA) . THE PROJECTS INVESTIGATED ARE UTILIZED FOR HIGHWAY AND RAILWAY PURPOSES. THE DRILL AND BLAST (FULL FACE) METHOD, HEADING AND BENCH METHOD AND PILOT BORE-CENTER METHOD REPRESENT THE EXCAVATION TECHNIQUES STUDIED. THE REPORTED FRAGMENTATION METHODS SERVICING PROJECT EFFORTS INCLUDE CONVENTIONAL EXPLOSIVE (ANFO) AND CONVENTIONAL EXPLOSIVE (UNSPECIFIED) . THIS DOCUMENT INCORPORATES ADDITIONALLY DRILLING EQUIPMENT CHARACTERISTICS. EXCAVATION ADVANCEMENT RATE IS ALSO DISCUSSED. GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON GROUND CONDITIONS AND UNDERGROUND OPENING SUPPORTS AND MATERIALS HANDLING SYSTEM IS ALSO PRESENTED. PETROGRAPHY AND ROCK TYPES

(CONTINUED)

REVIEWED INCLUDE CLAYSTONE, COAL, CONGLOMERATE, LIMESTONE, SANDSTONE AND SHALE .

R001484 COMMINUTION OF ROCK WITH CONTROLLED STRESS WAVES.
MURTHA, F. N. ODELLO, R. J. ALLGOOD, J. R.
NAVAL CIVIL ENGINEERING LAB., PORT HUENEME, CALIF.
43PP., 1971.
(NCEL-TN-1184)
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
NAVAL CIVIL ENGINEERING LAB:PORT HUENEME,CA:93043

FUNDING ORGANIZATION(S)
U.S.GOVT:OFFICE OF NAVAL RESEARCH,EARTH SCIENCE DIVISION

THIS LAB REPORT CONTAINS ORIGINAL DATA. THE DRILL AND BLAST (OTHER THAN FULL FACE) METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES CONVENTIONAL EXPLOSIVE (PRIMACORD) . GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON MATERIALS HANDLING SYSTEM IS ALSO PRESENTED. THE EXCAVATION CHARACTERISTICS FOR BEDFORD LIMESTONE AND EDWARDS LIMESTONE (IN FREDERICKS-GROUP) ARE TREATED. ROCK TYPES REVIEWED INCLUDE GRANITE, LIMESTONE, MARBLE AND TACONITE . THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES DATA.

R001486 PENETRATION IN GRANITE BY SHAPED CHARGE LINERS OF VARIOUS METALS.
ROLLINS, R. R. CLARK, G. B. KALIA, H. N.
ROCK MECHANICS AND EXPLOSIVES RESEARCH CENTER, UNIVERSITY OF MISSOURI, ROLLA
56PP., 1971.
(RMERC-TR-70-13)
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
MISSOURI,UNIVERSITY OF,ROLLA,MO:USA

THIS LAB REPORT CONTAINS ORIGINAL DATA. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES CONVENTIONAL EXPLOSIVE (C-4) . GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. ROCK TYPES REVIEWED INCLUDE GRANITE AND RHYOLITE . THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES (LAB) DATA.

R001489 REPORT ON HARD-ROCK TUNNELLING INVESTIGATION.
MIRSCHFELD, R. C.
DEPARTMENT OF CIVIL ENGINEERING, MASSACHUSETTS INSTITUTE OF TECHNOLOGY, CAMBRIDGE, MASSACHUSETTS
56PP., 1965.
(UNPUBLISHED REPORT)
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
MASSACHUSETTS INSTITUTE OF TECHNOLOGY,MA:USA.

FUNDING ORGANIZATION(S)
U.S.GOVT:DEPT.OF COMMERCE

THIS IN-SITU-THEORETICAL REPORT CONTAINS REVIEW DATA. THE UNDERGROUND OPENINGS DISCUSSED INCLUDE THE COMPLETED EXCAVATION OF THE AZOTEA TUNNEL (JUAN-CHAMA PROJECT) (N.CEN.NM., USA), THE COMPLETED EXCAVATION OF THE BROOKLYN-STATEN ISLAND TUNNEL (NY., USA), THE COMPLETED EXCAVATION OF THE HUMBER RIVER SEWER TUNNEL (TORONTO, ONTARIO, CANADA), THE COMPLETED EXCAVATION OF THE OAHE DAM DIVERSION TUNNEL (SD., USA), THE COMPLETED EXCAVATION OF THE OAHE DAM POWER TUNNEL (PIERRE, SD., USA), THE COMPLETED EXCAVATION OF THE PARIS EXPRESS METRO (PARIS, FRANCE), THE COMPLETED EXCAVATION OF THE POATINA TUNNEL (TASMANIA, AUSTRALIA), THE COMPLETED EXCAVATION OF THE SOUTH SASKATCHEWAN RIVER DAM AND THE COMPLETED EXCAVATION OF THE TUNNEL NO.1, NAVAJO INDIAN IRRIGATION PROJECT (NM., USA) . THE PROJECTS INVESTIGATED ARE UTILIZED FOR EXPERIMENTAL EXCAVATION, HYDROELECTRIC, METRO, MINE AND SEWER PURPOSES. THE TBM METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHODS SERVICING PROJECT EFFORTS INCLUDE MECHANICAL ABRASION (ROTARY) AND MECHANICAL ABRASION (DRAG) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. TBM

(CONTINUED)

EXCAVATION RATE IS ALSO DISCUSSED. GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON GROUND CONDITIONS AND UNDERGROUND OPENING SUPPORTS IS ALSO PRESENTED. PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE CLAYSTONE, GNEISS, GRANITE, IRON ORE, LIMESTONE, MUDSTONE, PEGMATITE, SANDSTONE, SCHIST AND SHALE . THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES (LAB) DATA.

R001495 A STUDY ON A NEW CONCEPT OF THERMAL HARD ROCK CRUSHING.
THIRUMALAI, K. CHEUNG, J. B.
14TH SYMPOSIUM ON ROCK MECHANICS, PENNSYLVANIA STATE UNIVERSITY, 12-14 JUNE, 1972
29PP., 1972.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
U.S.BUREAU OF MINES,MINNEAPOLIS,MN!USA.

FUNDING ORGANIZATION(S)
U.S.BUREAU OF MINES

THIS LAB REPORT CONTAINS ORIGINAL DATA. THE PROJECT INVESTIGATED IS UTILIZED FOR EXPERIMENTAL EXCAVATION PURPOSES. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES THERMAL-ELECTRICAL (TRANSFERRED ARC METHODS, GAS SHEILDED METAL OR TUNGSTEN) . GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. THE EXCAVATION CHARACTERISTICS FOR DRESSER BASALT, SIOUX QUARTZITE (=JASPER QUARTZITE) AND ST.CLOUD(GRAY)GRANODIORITE (=CHARCOAL GREY GRANITE) ARE TREATED. PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE QUARTZITE .

R001500 BLAST HOLE CRILLING AT EAGLE MOUNTAIN MINE.
HUGHES, H. J.
MINING CONGR. J.
44-6, 50, 1957.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
KAISER STEEL CORP!USA.

FUNDING ORGANIZATION(S)
KAISER STEEL CORP!USA.

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE COMPLETED EXCAVATION OF THE EAGLE MOUNTAIN MINE (CA., USA) . THE PROJECT INVESTIGATED IS UTILIZED FOR MINE PURPOSES. THE DRILL AND BLAST (FULL FACE) METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES CONVENTIONAL EXPLOSIVE (UNSPECIFIED) . THIS DOCUMENT INCORPORATES ADDITIONALLY DRILLING EQUIPMENT AND TUNNELING MACHINE CHARACTERISTICS. EXCAVATION ADVANCEMENT RATE IS ALSO DISCUSSED. INFORMATION PERTINENT TO EXCAVATION COST IS GIVEN. GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE IRON ORE, MONZONITE AND QUARTZITE .

R001505 THE NEW AUSTRIAN TUNNELLING METHOD.
RABCEWICZ, L. V.
WATER POWER
453-7, 511-5, 1964.
LANGUAGE: ENGLISH

THIS IN-SITU REPORT CONTAINS REPUBLISHED DATA. THE UNDERGROUND OPENINGS DISCUSSED INCLUDE THE COMPLETED EXCAVATION OF THE KAUNERTAL HYDROELECTRIC SCHEME (AUSTRIA), THE COMPLETED EXCAVATION OF THE SEMMERING TUNNEL, THE COMPLETED EXCAVATION OF THE SERRA RIPOLI TUNNEL (1ST TUBE) (ITALY), THE COMPLETED EXCAVATION OF THE SERRA RIPOLI TUNNEL (2ND TUBE) (ITALY) AND THE COMPLETED EXCAVATION OF THE SUPER HIGHWAY TWIN TUNNEL (VENEZUELA) . THE PROJECTS INVESTIGATED ARE UTILIZED FOR HIGHWAY, HYDROELECTRIC AND TWIN HIGHWAY PURPOSES. THE NEW AUSTRAIN METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES CONVENTIONAL EXPLOSIVE (UNSPECIFIED) . GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON GROUND CONDITIONS AND UNDERGROUND OPENING SUPPORTS

(CONTINUED)

AND MATERIALS HANDLING SYSTEM IS ALSO PRESENTED. PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE AMPHIBOLITE, GNEISS, GRAPHITE, LIMESTONE, MARL, MYLONITE (MINERAL), SANDSTONE AND SLATE .

R001506 THE NEW AUSTRIAN TUNNELLING METHOD.
RABCEWICZ, L. V.
WATER POWER
19-24, 1965.
LANGUAGE: ENGLISH

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE PROJECT INVESTIGATED IS UTILIZED FOR HIGHWAY PURPOSES. THE NEW AUSTRAIN METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON GROUND CONDITIONS AND UNDERGROUND OPENING SUPPORTS IS ALSO PRESENTED. PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE LIMESTONE AND SCHIST .

R001508 USE OF A LINEAR CUTTER TO PREDICT LARGE DIAMETER TUNNEL BORING RATES.
ROSS, N. HUSTRULID, W.
MINES MAG.
10-11, 1970.
LANGUAGE: ENGLISH

FUNDING ORGANIZATION(S)
GAS AND WATER DEPT!BASEL,SWITZERLAND

THIS LAB REPORT CONTAINS ORIGINAL DATA. THE PROJECT INVESTIGATED IS UTILIZED FOR EXPERIMENTAL EXCAVATION PURPOSES. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) . GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. ROCK TYPES REVIEWED INCLUDE GRANITE AND MARBLE .

R001509 DEVELOPMENTS IN CONTINUOUS MINING MACHINES.
KOGELMANN, W. J. SIGOTT, S.
MINING CONGR. J.
9PP., 1971.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
ALPINE EQUIPMENT CORP!USA.

THIS IN-SITU REPORT CONTAINS REVIEW DATA. THE PROJECT INVESTIGATED IS UTILIZED FOR MINE PURPOSES. THE TBM METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. TBM EXCAVATION RATE IS ALSO DISCUSSED. GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON UNDERGROUND OPENING SUPPORTS IS ALSO PRESENTED. PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE COAL, LIGNITE, MARL, PHOSPHORITE (ROCK), SANDSTONE AND SHALE . THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES (LAB) DATA.

R001511 CONTRACTOR BUILDS LOW-COST.
AUTHOR ANON.
ENG. NEWS-REC.
42-3, 1960.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
DOHERTY,JOHN!COMPANY,CHICAGO,IL!USA.

FUNDING ORGANIZATION(S)
GREATER CHICAGO,METROPOLITAN SANITARY DIST.OF, CHICAGO,IL!USA.
CHICAGO, IL. USA

THIS IN-SITU REPORT CONTAINS REVIEW DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE ON GOING EXCAVATION OF THE SOUTHWEST SEWER 13-A (CHICAGO, ILLINOIS, USA) . THE PROJECT INVESTIGATED IS UTILIZED FOR SEWER PURPOSES. THE TBM METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. TBM EXCAVATION RATE IS ALSO DISCUSSED. PERTINENT INFORMATION ON GROUND CONDITIONS

(CONTINUED)

AND UNDERGROUND OPENING SUPPORTS AND MATERIALS HANDLING SYSTEM IS ALSO PRESENTED.

R001513 DEVELOPMENT OF TUNNELING METHODS AND CONTROLS.
ARMSTRONG, E. L.
J. CONSTR. DIV. (PROC. AMER. SOC. CIVIL ENG.)
96, (CO2), 99-118, 1970.
LANGUAGE: ENGLISH

FUNDING ORGANIZATION(S)
U.S.BUREAU OF RECLAMATION

THIS IN-SITU REPORT CONTAINS REVIEW DATA. THE UNDERGROUND OPENINGS DISCUSSED INCLUDE THE COMPLETED EXCAVATION OF THE AZOTEA TUNNEL (JUAN-CHAMA PROJECT) (N.CEN.NM., USA), THE COMPLETED EXCAVATION OF THE BLANCO TUNNEL (JUAN-CHAMA PROJECT) (N.CEN.NM., USA), THE COMPLETED EXCAVATION OF THE HUMBER RIVER SEWER TUNNEL (TORONTO, ONTARIO, CANADA), THE COMPLETED EXCAVATION OF THE OAHE DAM DIVERSION TUNNEL (SD., USA), THE COMPLETED EXCAVATION OF THE OSO TUNNEL (CO., USA), THE COMPLETED EXCAVATION OF THE PHILADELPHIA SEWER, THE COMPLETED EXCAVATION OF THE POATINA TUNNEL (TASMANIA, AUSTRALIA), THE COMPLETED EXCAVATION OF THE RIVER MOUNTAINS TUNNEL (HENDERSON, NV., USA), THE COMPLETED EXCAVATION OF THE STARVATION TUNNEL (CENTRAL UTAH PROJECT) (UT., USA), THE COMPLETED EXCAVATION OF THE ST.LOUIS METRO SEWER DISTRICT (ST.LOUIS, MO., USA), THE COMPLETED EXCAVATION OF THE TUNNEL NO.1, NAVAJO INDIAN IRRIGATION PROJECT (NM., USA), THE COMPLETED EXCAVATION OF THE VANCOUVER INTERCEPTOR SEWER (CANADA) AND THE COMPLETED EXCAVATION OF THE WATER HOLLOW TUNNEL (UT., USA) . THE PROJECTS INVESTIGATED ARE UTILIZED FOR IRRIGATION PURPOSES. THE TBM METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) . TBM EXCAVATION RATE IS ALSO DISCUSSED. PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE LIMESTONE, RHYOLITE, SANDSTONE, SCHIST AND SHALE . THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES (LAB) DATA.

R001514 THE DEVELOPMENT OF LARGE DIAMETER ROTARY DRILLING MACHINES AND EQUIPMENT FOR THE MINING AND CONSTRUCTION INDUSTRIES.
ALLEN, J. F.
NINTH ANNUAL DRILLING SYMP.
10PP., 1959.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
WILLIAMS,HUGH B. MANUFACTURING CO.

FUNDING ORGANIZATION(S)
WILLIAMS,HUGHS B.MANUFACTURING CO.

THIS LAB-IN-SITU REPORT CONTAINS ORIGINAL DATA. THE PROJECT INVESTIGATED IS UTILIZED FOR EXPERIMENTAL EXCAVATION, MINE AND UNSPECIFIED PURPOSES. THE PILOT BORE-CENTER METHOD AND TBM METHOD REPRESENT THE EXCAVATION TECHNIQUES STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY DRILLING EQUIPMENT AND TUNNELING MACHINE CHARACTERISTICS. TBM EXCAVATION AND EXCAVATION ADVANCEMENT RATES ARE ALSO DISCUSSED. GEOSTRUCTURAL AND SOIL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON MATERIALS HANDLING SYSTEM IS ALSO PRESENTED. PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE GRANITE, LIMESTONE, SANDSTONE AND SHALE .

R001516 MACHINE TUNNELING IN TASMANIA.
THOMAS, H. H.
MINING ENG.
49, 1963.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
HYDROELECTRIC COMMISSION,HOBART,TASMANIA

FUNDING ORGANIZATION(S)
HYDROELECTRIC COMMISSION,HOBART,TASMANIA

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE COMPLETED EXCAVATION OF THE GREAT LAKE POWER DEVELOPMENT

(CONTINUED)

(TASMANIA, AUSTRALIA) . THE PROJECT INVESTIGATED IS UTILIZED FOR HYDROELECTRIC PURPOSES. THE TBM METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. TBM EXCAVATION RATE IS ALSO DISCUSSED. INFORMATION PERTINENT TO EXCAVATION COST IS GIVEN. GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE MUDSTONE

R001517 A STUDY OF HYDRAULIC BURSTING OF ROCK AND COAL.
TURSKI, A. E.
COLLIERY ENG.
106-12, 151-6, 197-201, 1965.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
NATIONAL COAL BOARD,U.K.

FUNDING ORGANIZATION(S)
NATIONAL COAL BOARD,U.K.

THIS LAB-IN-SITU REPORT CONTAINS ORIGINAL DATA. THE PROJECT INVESTIGATED IS UTILIZED FOR EXPERIMENTAL EXCAVATION PURPOSES. THE HYDRAULIC FRAGMENTATION METHOD REFRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES JET ABRASION (WATER-MECHANICAL) . GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. THE EXCAVATION CHARACTERISTICS FOR DARLEY DALE SANDSTONE, OAK DALE COAL, PENNANT SANDSTONE AND TOPHARD COAL ARE TREATED. ROCK TYPES REVIEWED INCLUDE COAL AND SANDSTONE . THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES (LAB) DATA.

R001519 BLASTING ROCK WITH WATER.
AUTHOR ANON.
BUSINESS WEEK
1PP., 1969.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
EXOTECH,ROCKVILLE,MD:USA.

FUNDING ORGANIZATION(S)
U.S.ARMY MOBILITY EQUIPMENT RESEARCH AND DEVELOPMENT CENTER, FORT BELVOIR,VA:USA.

THIS LAB REPORT CONTAINS ABSTRACTED ONLY DATA. THE PROJECT INVESTIGATED IS UTILIZED FOR EXPERIMENTAL EXCAVATION PURPOSES. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES JET ABRASION (WATER) .

R001524 TUNNEL BORING.
MURER.
WIRTH TECHNISCHE INFORMATIONEN
10PP.
LANGUAGE: GERMAN

PERFORMING ORGANIZATION(S)
MURER,BIAGIERSTFELD,SWITZERLAND

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE ON GOING EXCAVATION OF THE INCLINED TUNNELS (EMMOSSON PROJECT) (SWITZERLAND) . THE PROJECT INVESTIGATED IS UTILIZED FOR UNDERGROUND POWER STATION PURPOSES. THE DRILL AND BLAST (FULL FACE) METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES CONVENTIONAL EXPLOSIVE (UNSPECIFIED) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. TBM EXCAVATION RATE IS ALSO DISCUSSED. GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON MATERIALS HANDLING SYSTEM IS ALSO PRESENTED. THE EXCAVATION CHARACTERISTICS FOR VALLORCINE GRANITE ARE TREATED. ROCK TYPES REVIEWED INCLUDE GRANITE . THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES (LAB) DATA.

R001527 SOVIET CAPABILITIES FOR BIG-HOLE DRILLING AND TUNNELING IN REMOTE AREAS.
PURDY, J. B.

(CONTINUED)

REMOTE AREA CONFLICT INFORMATION CENTER
72PP., 1967.
(RACIC-TR-58)
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
BATTELLE MEMORIAL INSTITUTE,COLUMBUS,OH;USA.

FUNDING ORGANIZATION(S)
ADVANCED RESEARCH PROJECT AGENCY AND AIRFORCE SYSTEMS COMMAND, USAF

THIS LAB-IN-SITU REPORT CONTAINS REVIEW DATA. THE UNDERGROUND OPENINGS DISCUSSED INCLUDE THE COMPLETED EXCAVATION OF THE DEGTYARSKIY MINE (USSR), THE COMPLETED EXCAVATION OF THE KARAGANDE MINE NO.35-B15 (USSR), THE COMPLETED EXCAVATION OF THE KRIVOY BOG BASIN TUNNELS (USSR), THE COMPLETED EXCAVATION OF THE LEVIKHINSKY MINE (USSR), THE COMPLETED EXCAVATION OF THE MIRGALIMSAYSKIY MINE (USSR) AND THE COMPLETED EXCAVATION OF THE SARANSKAYA MINE NO.122 (USSR) . THE PROJECTS INVESTIGATED ARE UTILIZED FOR MINE AND UNSPECIFIED PURPOSES. THE DRILL AND BLAST (FULL FACE) METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES CONVENTIONAL EXPLOSIVE (UNSPECIFIED) . THIS DOCUMENT INCORPORATES ADDITIONALLY DRILLING EQUIPMENT AND TUNNELING MACHINE CHARACTERISTICS. TBM EXCAVATION RATE IS ALSO DISCUSSED. THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES (LAB) DATA.

R001530 DOOURS OVER THE TYNE.
AUTHOR ANON.
TUNNELS AND TUNNELLING
6 (4), 11, 15, 1974.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
BRAND,CHARLES AND SON LTD;LONDON,U.K.
JOHNSTON CONSTRUCTION CO;U.K.
STREETER CONSTRUCTION CO;U.K.

FUNDING ORGANIZATION(S)
NORTHUMBRIAN WATER AUTHORITY,U.K.

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE ON GOING EXCAVATION OF THE TYNE SIPHON SEWER TUNNEL (U.K.) . THE PROJECT INVESTIGATED IS UTILIZED FOR SEWER PURPOSES. THE SHIELD METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES JET ABRASION (AIR-MECHANICAL) . GEOSTRUCTURAL AND SOIL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE MUDSTONE .

R001531 MODEL TESTS ON SHALLOW TUNNELS IN SAND AND CLAY.
ATKINSON, J. H. CAIRNCROSS, A. M.
JAMES, R. G.
TUNNELS AND TUNNELLING
6 (4), 28-32, 1974.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
CAMBRIDGE UNIVERSITY;ENGINEERING DEPT.

THIS LAB REPORT CONTAINS ORIGINAL DATA. SOIL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED.

R001532 A NEW TALE FROM WOOKEY HOLE.
GOSSELIN, C.
TUNNELS AND TUNNELLING
6 (4), 43-4, 1974.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
FORAKY LTD.OF COLWICK,NOTTINGHAM,U.K.

FUNDING ORGANIZATION(S)
WOOKEY HOLE CAVES LTD;U.K.

THIS IN-SITU REPORT CONTAINS REVIEW DATA. THE PROJECT INVESTIGATED IS UTILIZED FOR ACCESS TUNNEL (OTHER THAN SHAFTS AND AUDITS TO MAIN TUNNELS)) PURPOSES. PERTINENT INFORMATION ON UNDERGROUND OPENING SUPPORTS AND MATERIALS HANDLING SYSTEM IS ALSO PRESENTED.

R001533 GROUND SETTLEMENT ABOVE A TUNNEL IN SILT - A CASE RECORD.
HARRIS, G. M.
TUNNELS AND TUNNELLING
6 (4), 50-3, 1974.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
GEOCON LTD;CANADA

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE COMPLETED EXCAVATION OF THE TUNNELS FOR MARSH CREEK SEWERAGE SCHME (ST. JOHN, NEW BRUNSWICK, CANADA) . THE PROJECT INVESTIGATED IS UTILIZED FOR SEWER PURPOSES. THE HEADING AND BENCH METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. SOIL CHARACTERISTICS AS WELL AS SOIL MECHANICAL PROPERTIES FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON GROUND CONDITIONS AND UNDERGROUND OPENING SUPPORTS IS ALSO PRESENTED.

R001716 GRANITE TESTS NEW DRILL RIG.
ALFRED, R. C.
ROCK PROD.
81-3, 1961.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
CAMPBELL LIMESTONE CO;SC;USA

FUNDING ORGANIZATION(S)
CAMPBELL LIMESTONE CO;SC;USA.

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE COMPLETED EXCAVATION OF THE LIBERTY QUARRY (LIBERTY, SC., USA) THE PROJECT INVESTIGATED IS UTILIZED FOR MINE PURPOSES. THE DRILL AND BLAST (FULL FACE) METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES CONVENTIONAL EXPLOSIVE (UNSPECIFIED) . THIS DOCUMENT INCORPORATES ADDITIONALLY DRILLING EQUIPMENT AND TUNNELING MACHINE CHARACTERISTICS. EXCAVATION ADVANCEMENT RATE IS ALSO DISCUSSED. INFORMATION PERTINENT TO EXCAVATION COST IS GIVEN. GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. THE EXCAVATION CHARACTERISTICS FOR CAROLINA GNEISS (OR SERIES) ARE TREATED. PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE GNEISS .

R001720 NOVEL METHODS OF ROCK FRACTURE.
LUCKE, W. N.
MINING CONGR. J.
59, 64-9, 1973.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
1.DEPT.OF TRANSPORTATION,WASHINGTON,D.C;
2.UNITED AIRCRAFT RESEARCH LABORATORIES,CT;USA.

FUNDING ORGANIZATION(S)
U.S.GOVT;DEPT.OF TRANSPORTATION

THIS LAB REPORT CONTAINS REVIEW DATA. THE PROJECT INVESTIGATED IS UTILIZED FOR EXPERIMENTAL EXCAVATION PURPOSES. THE REPORTED FRAGMENTATION METHODS SERVICING PROJECT EFFORTS INCLUDE JET ABRASION (WATER) AND THERMAL-RADIANT (COHERENT LIGHT-LASER) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. THE EXCAVATION CHARACTERISTICS FOR NEW HAVEN TRAP ROCK ARE TREATED. ROCK TYPES REVIEWED INCLUDE GRANITE AND TRAP .

R001734 PERCUSSIVE ROCK BREAKING BY ROD-TYPE BITS.
SOVETOV, G. A. KUZIN, YU. S.
SOV. MIN. SCI.
9 (1), 80-1, 1973.
(ENGLISH TRANSLATION OF FIZ. TEKH. PROBL. RAZRAB. POLEZ. ISKOP., (1), 86-8, 1973; FOR ORIGINAL SEE R1733)
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
ALL UNION SCIENTIFIC RESEARCH AND PLANNING, TECHNOLOGICAL INSTITUTE

(CONTINUED)

OF COAL,MINING MACHINE CONSTRUCTION (VNIIPTU GLEMASHI,MOSCOW,USSR.

THIS LAB REPORT CONTAINS ORIGINAL DATA. THE PROJECT INVESTIGATED IS UTILIZED FOR EXPERIMENTAL EXCAVATION PURPOSES. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (PERCUSSION) . THIS DOCUMENT INCORPORATES ADDITIONALLY DRILLING EQUIPMENT CHARACTERISTICS. GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. ROCK TYPES REVIEWED INCLUDE GRANITE .

R001739 UNDERGROUND COAL MINING USING THE HYDRAULIC METHOD.
GRIPLEY, A. M.
CAN. INST. MIN. MET., BULL., (CIM)
67 (741), 44-7, 1974.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
KAISER RESOURCES LTD;BRITISH COLUMBIA,CANADA

FUNDING ORGANIZATION(S)
KAISER RESOURCES LTD;BRITISH COLUMBIA, CANADA

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE ON GOING EXCAVATION OF THE E.KOOTENAY COALFIELD (BALMER COAL SEAM) (BRITISH COLUMBIA., CANADA) . THE PROJECT INVESTIGATED IS UTILIZED FOR MINE PURPOSES. THE HYDRAULIC FRAGMENTATION METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES JET ABRASION (WATER) . GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED.

R001774 DOWN UNDER IN OXFORDSHIRE.
AUTHOR ANON.
TUNNELS AND TUNNELLING
6 (1), 9 AND 11, 1974.
LANGUAGE: ENGLISH

THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON MATERIALS HANDLING SYSTEM IS ALSO PRESENTED. ROCK TYPES REVIEWED INCLUDE CHALK (ROCK) .

R001775 CARRY ON TUNNELLING.
HARDING, H.
TUNNELS AND TUNNELLING
6 (1), 13-7, 1974.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
NORTHERN CONSTRUCTION CO.(J.W.STEWART LTD.)
BRITISH TUNNELING SOCIETY
WORLD BANK MISSION

FUNDING ORGANIZATION(S)
TORONTO,CITY OF,CANADA
LITANI RIVER AUTHORITY,LEBANON

THIS IN-SITU REPORT CONTAINS ORIGINAL AND REVIEW DATA. THE UNDERGROUND OPENINGS DISCUSSED INCLUDE THE COMPLETED EXCAVATION OF THE AWALI TUNNEL (LEBANON) AND THE COMPLETED EXCAVATION OF THE HIGHBURY TUNNEL (VANCOUVER, BRITISH COLUMBIA., CANADA) . THE PROJECTS INVESTIGATED ARE UTILIZED FOR HYDROELECTRIC AND SEWER PURPOSES. THE DRILL AND BLAST (FULL FACE) METHOD AND SHIELD METHOD REPRESENT THE EXCAVATION TECHNIQUES STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES CONVENTIONAL EXPLOSIVE (UNSPECIFIED) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. GEOSTRUCTURAL AND SOIL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON GROUND CONDITIONS AND UNDERGROUND OPENING SUPPORTS AND MATERIALS HANDLING SYSTEM IS ALSO PRESENTED. PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE LIMESTONE .

R001776 ROCK BOLTS AT CHURCHILL FALLS.
WOOD, W. D., JR. VAN RYSWYK, R.
TUNNELS AND TUNNELLING
6 (1), 19, 21 AND 23, 1974.
LANGUAGE: ENGLISH

(CONTINUED)

FUNDING ORGANIZATION(S)
QUEBEC NORTH SHORE AND LABRADOR RAILWAY,CANADA

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE ON GOING EXCAVATION OF THE CHURCHILL FALLS UNDERGROUND CHAMBERS (CANADA) . THE PROJECT INVESTIGATED IS UTILIZED FOR UNDERGROUND POWER STATION PURPOSES. THE DRILL AND BLAST (FULL FACE) METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES CONVENTIONAL EXPLOSIVE (UNSPECIFIED) . PERTINENT INFORMATION ON UNDERGROUND OPENING SUPPORTS IS ALSO PRESENTED. ROCK TYPES REVIEWED INCLUDE GNEISS .

R001777 GRANGEMOUTH TUNNEL SEWER.
HENRY, K.
TUNNELS AND TUNNELLING
6 (1), 25 AND 29, 1974.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
BABTIE,SHAW AND MORTON,CONSULTING ENGINEERS, GLASGOW,SCOTLAND,U.K.

FUNDING ORGANIZATION(S)
GRANGEMOUTH TOWN COUNCIL,SCOTLAND,U.K.

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE COMPLETED EXCAVATION OF THE GRANGEMOUTH SEWER TUNNEL . THE PROJECT INVESTIGATED IS UTILIZED FOR SEWER AND UNDERGROUND PARKING PURPOSES. THE SHIELD METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES JET ABRASION (AIR-MECHANICAL) . SOIL CHARACTERISTICS AS WELL AS SOIL MECHANICAL PROPERTIES FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON GROUND CONDITIONS AND UNDERGROUND OPENING SUPPORTS IS ALSO PRESENTED.

R001778 SUBTERRENE ROCK MELTING DEVICES.
ATLSEIMER, J. H.
TUNNELS AND TUNNELLING
6 (1), 34, 36-7, AND 40-1, 1974.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
LOS ALAMOS SCIENTIFIC LAB.(UNIV.OF CALIFORNIA),NM 87544,USA.

FUNDING ORGANIZATION(S)
NATIONAL SCIENCE FOUNDATION,WASHINGTON,D.C.,USA.

THIS LAB REPORT CONTAINS ORIGINAL DATA. THE PROJECT INVESTIGATED IS UTILIZED FOR EXPERIMENTAL EXCAVATION PURPOSES. THE TBM METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES THERMAL-NUCLEAR (NUCLEAR HEATING) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. TBM EXCAVATION RATE IS ALSO DISCUSSED. ROCK TYPES REVIEWED INCLUDE TUFF .

R001779 INNSBRUCK MINI-TUNNEL.
HAMMER, W.
TUNNELS AND TUNNELLING
6 (1), 44-5, AND 49-52, 1974.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
OBERRANZMEYER,R,COMAUSTRIA

FUNDING ORGANIZATION(S)
INNSBURG,CITY OF,AUSTRIA

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE COMPLETED EXCAVATION OF THE INNSBRUCK TUNNEL (INNSBRUCK, AUSTRIA) . THE PROJECT INVESTIGATED IS UTILIZED FOR CABLE TUNNEL PURPOSES. THE TBM METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES ELECTRICAL ABRASION (HIGH VOLTAGE) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. TBM EXCAVATION RATE IS ALSO DISCUSSED. GEOSTRUCTURAL AND SOIL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED.

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PERTINENT INFORMATION ON GROUND CONDITIONS AND UNDERGROUND OPENING SUPPORTS IS ALSO PRESENTED. PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE BRECCIA AND LIMESTONE .

R001888 PERFORMANCE OF SHOTCRETE LININGS AT THE CLIMAX MINE.
TONNER, R. K. KENDORSKI, F. S.
PROC. RAPID EXCAVATION AND TUNNELING CONF.
2, 1013-26, 1974.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
CLIMAX MOLYBDENUM CO:CLIMAX,CO:USA.

FUNDING ORGANIZATION(S)
CLIMAX MOLYBDENUM CO:CLIMAX,CO:USA.

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE COMPLETED EXCAVATION OF THE CLIMAX MINE (CO., USA) . THE PROJECT INVESTIGATED IS UTILIZED FOR MINE PURPOSES. THE DRILL AND BLAST (FULL FACE) METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES CONVENTIONAL EXPLOSIVE (ANFO) . PERTINENT INFORMATION ON GROUND CONDITIONS AND UNDERGROUND OPENING SUPPORTS IS ALSO PRESENTED.

R001889 COAL MINE SEALANTS.
FALEY, J. E. SIMPSON, P. E.
PROC. RAPID EXCAVATION AND TUNNELING CONF.
2, 1027-49, 1974.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
U.S.BUREAU OF MINES,SPOKANE MINING RESEARCH CENTER, SPOKANE,WA:USA.

FUNDING ORGANIZATION(S)
BUREAU OF MINES,U.S.GOVT.

THIS LAB-IN-SITU REPORT CONTAINS ORIGINAL DATA. THE PROJECT INVESTIGATED IS UTILIZED FOR MINE PURPOSES. GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON GROUND CONDITIONS AND UNDERGROUND OPENING SUPPORTS IS ALSO PRESENTED. ROCK TYPES REVIEWED INCLUDE COAL AND SHALE .

R001890 BORING AT HIGH THRUST AND ITS POTENTIAL IN THE HARD-ROCK MINING INDUSTRY IN SOUTH AFRICA.
WILSON, J. W. GRAHAM, P. C.
PROC. RAPID EXCAVATION AND TUNNELING CONF.
2, 1053-71, 1974.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
ANGLO-AMERICAN CORP.OF SOUTH AFRICA

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE COMPLETED EXCAVATION OF THE SOUTH AFRICAN GOLD MINES (S.AFRICA) . THE PROJECT INVESTIGATED IS UTILIZED FOR MINE PURPOSES. THE RAISE DRIVING (BORING MACHINES) METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY DRILLING EQUIPMENT AND TUNNELING MACHINE CHARACTERISTICS. TBM EXCAVATION RATE IS ALSO DISCUSSED. INFORMATION PERTINENT TO EXCAVATION COST IS GIVEN. GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. THE EXCAVATION CHARACTERISTICS FOR WITWATERSRAND QUARTZITE ARE TREATED. ROCK TYPES REVIEWED INCLUDE QUARTZITE . THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES (LAB) DATA.

R001891 LONG HOLE DROP RAISING.
MEAGHER, F. K.
PROC. RAPID EXCAVATION AND TUNNELING CONF.
2, 1073-82, 1974.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
MORAD MINES LTD.(GECO DIVISION),MANITOUWADGE, ONTARIO,CANADA

(CONTINUED)

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE COMPLETED EXCAVATION OF THE MORAND MINE (ONTARIO, CANADA) . THE PROJECT INVESTIGATED IS UTILIZED FOR MINE PURPOSES. THE DRILL AND BLAST (FULL FACE) METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES CONVENTIONAL EXPLOSIVE (UNSPECIFIED) . THIS DOCUMENT INCORPORATES ADDITIONALLY DRILLING EQUIPMENT AND TUNNELING MACHINE CHARACTERISTICS. GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED.

R001892 LONG VERTICAL SHAFT RAISING IN CANADA.
BROWN, C. P. T.
PROC. RAPID EXCAVATION AND TUNNELING CONF.
2, 1083-92, 1974.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
RAISE CONTRACTING LTD:CANADA

FUNDING ORGANIZATION(S)
DENISON (URANIUM)MINES LTD:CANADA

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE COMPLETED EXCAVATION OF THE DENISON MINES . THE PROJECT INVESTIGATED IS UTILIZED FOR MINE PURPOSES. THE RAISE DRIVING (MECH.PLATFORM) METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES CONVENTIONAL EXPLOSIVE (N.G.) . THIS DOCUMENT INCORPORATES ADDITIONALLY DRILLING EQUIPMENT AND TUNNELING MACHINE CHARACTERISTICS. EXCAVATION ADVANCEMENT RATE IS ALSO DISCUSSED. GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON GROUND CONDITIONS AND UNDERGROUND OPENING SUPPORTS IS ALSO PRESENTED.

R001893 SHAFT SINKING CONSIDERATION AND PROBLEMS.
PROVOST, A. G. GRISWOLD, G. G.
PROC. RAPID EXCAVATION AND TUNNELING CONF.
2, 1095-1113, 1974.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
HARRISON WESTERN CORP:DENVER,CO:USA.

THIS THEORETICAL REPORT CONTAINS REVIEW DATA. THE PROJECT INVESTIGATED IS UTILIZED FOR MINE PURPOSES. THE RAISE DRIVING (BORING MACHINES) METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED.

R001894 CONSTRUCTION OF PORT HURON, MICHIGAN INTAKE SHAFT.
HARTMANN, B. E. PIGGOTT, D. E.
PROC. RAPID EXCAVATION AND TUNNELING CONF.
2, 1201-11, 1974.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
HARTMANN ENGINEERING (GENERAL UNDERGROUND STRUCTURES),CO:USA

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE COMPLETED EXCAVATION OF THE HURON PORT WATER INTAKE SHAFT (USA) . THE PROJECT INVESTIGATED IS UTILIZED FOR HYDROELECTRIC PURPOSES. THE RAISE DRIVING (MECH.PLATFORM) METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. GEOSTRUCTURAL AND SOIL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON UNDERGROUND OPENING SUPPORTS IS ALSO PRESENTED.

R001895 TUNNEL CONSTRUCTION FOR THE SAO PAULO SUBWAY.
AMARAL, L. R. FROBENIUS, P.
PROC. RAPID EXCAVATION AND TUNNELING CONF.
2, 1213-32, 1974.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
PARSONS,BRINCKERHOFF,QUADE AND DOUGLAS,ENGINEERS, NEW YORK AND
SAN FRANCISCO:USA.

FUNDING ORGANIZATION(S)
COMPANHIA DO METROPOLITANO DE SAO PAULO,BRAZIL

(CONTINUED)

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE COMPLETED EXCAVATION OF THE SAO PAULO SUBWAY (BRAZIL) . THE PROJECT INVESTIGATED IS UTILIZED FOR METRO PURPOSES. THE SHIELD METHOD AND TBM METHOD REPRESENT THE EXCAVATION TECHNIQUES STUDIED. THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. TBM EXCAVATION RATE IS ALSO DISCUSSED. SOIL CHARACTERISTICS AS WELL AS SOIL MECHANICAL PROPERTIES FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON GROUND CONDITIONS AND UNDERGROUND OPENING SUPPORTS AND MATERIALS HANDLING SYSTEM IS ALSO PRESENTED.

R001896 DEEP RETAINED SUBWAY EXCAVATIONS IN THE NATION#S CAPITAL.
WEVER, J. H. RIGGSBEE, J. M.
PROC. RAPID EXCAVATION AND TUNNELING CONF.
2, 1233-51, 1974.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
1.BALL,GORDON H:INC:DANVILLE,CA.
2.NORAIR ENGINEERING CORP:WASHINGTON,D.C.
3.SHEA,J.F.CO:INC:WALNUT CREEK,CA.

FUNDING ORGANIZATION(S)
WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY (WAMATA),
WASHINGTON,D.C:USA.

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE COMPLETED EXCAVATION OF THE WASHINGTON METRO PROJECT B-V (WASHINGTON, D.C., USA) . THE PROJECT INVESTIGATED IS UTILIZED FOR METRO PURPOSES. THE CUT AND COVER METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. GEOSTRUCTURAL AND SOIL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON GROUND CONDITIONS AND UNDERGROUND OPENING SUPPORTS IS ALSO PRESENTED.

R001897 INSTRUMENTATION OF TARBELA DAM TUNNELS.
HILLIS, S. F. SZALAY, K. A. O#ROURKE, J. E.
SMITH, D.
PROC. RAPID EXCAVATION AND TUNNELING CONF.
2, 1275-303, 1974.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
TIPPETTS,ABBETT,MCCARTHY,STRATTON (TAMS),NEW YORK, NY:USA.

FUNDING ORGANIZATION(S)
PAKISTAN,WATER AND POWER BOARD AUTHORITY OF:(WAPDA)

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE COMPLETED EXCAVATION OF THE TARBELA DAM TUNNELS (PAKISTAN) . THE PROJECT INVESTIGATED IS UTILIZED FOR HYDROELECTRIC PURPOSES. THE HEADING AND BENCH METHOD AND SHIELD METHOD REPRESENT THE EXCAVATION TECHNIQUES STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES CONVENTIONAL EXPLOSIVE (UNSPECIFIED) . GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON UNDERGROUND OPENING SUPPORTS IS ALSO PRESENTED. PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE LIMESTONE, PHYLLITE AND SCHIST .

R001898 METHODS FOR PREVENTING DECOMPRESSION OF SOFT GROUND DURING SOFT GROUND TUNNELING FOR THE PARIS METRO.
BOUGARD, J. F. JANIN, J.
PROC. RAPID EXCAVATION AND TUNNELING CONF.
2, 1329-48, 1974.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
REGIE AUTONOME DES TRANSPORT PARISIENS (R.A.T.P.), PARIS,FRANCE

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE COMPLETED EXCAVATION OF THE PARIS EXPRESS METRO (PARIS, FRANCE) . THE PROJECT INVESTIGATED IS UTILIZED FOR METRO PURPOSES. GEOSTRUCTURAL AND SOIL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON UNDERGROUND OPENING SUPPORTS IS ALSO PRESENTED. THE EXCAVATION CHARACTERISTICS FOR BEAUCHAMP SAND ARE TREATED. PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE MARL .

R001899 EXCAVATION OF BEAR SWAMP UNDERGROUND POWERHOUSE.
BRADY, J. J.
PROC. RAPID EXCAVATION AND TUNNELING CONF.
2, 1351-66, 1974.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
GATES AND FOX CO:INC.

FUNDING ORGANIZATION(S)
NEW ENGLAND ELECTRIC POWER CO.

THIS IN-SITU REPORT CONTAINS REPUBLISHED DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE COMPLETED EXCAVATION OF THE BEAR SWAMP PROJECT (NEW ENGLAND,, USA) . THE PROJECT INVESTIGATED IS UTILIZED FOR HYDROELECTRIC PURPOSES. THE DRILL AND BLAST (FULL FACE) METHOD, HEADING AND BENCH METHOD, PILOT BORE-CENTER METHOD AND RAISE DRIVING (BORING MACHINES) METHOD REPRESENT THE EXCAVATION TECHNIQUES STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. EXCAVATION ADVANCEMENT RATE IS ALSO DISCUSSED. GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON UNDERGROUND OPENING SUPPORTS IS ALSO PRESENTED. THE EXCAVATION CHARACTERISTICS FOR HOOSACK FORMATION (OR SCHIST) ARE TREATED. ROCK TYPES REVIEWED INCLUDE MARLSTONE .

R001900 ROSSLYN STATION, VIRGINIA: GEOLOGY, EXCAVATION AND SUPPORT OF A LARGE, NEAR SURFACE, HARD ROCK CHAMBER.
BOCK, C. G.
PROC. RAPID EXCAVATION AND TUNNELING CONF.
2, 1373-91, 1974.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
BECHTEL ASSOCIATES,PROFESSIONAL CORP:WASHINGTON,D. C:USA.

FUNDING ORGANIZATION(S)
WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY (WAMATA),
WASHINGTON,D.C:USA.

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE COMPLETED EXCAVATION OF THE BALTIMORE AND OHIO RAILROAD TUNNEL (WV., USA) . THE PROJECT INVESTIGATED IS UTILIZED FOR METRO PURPOSES. THE DRILL AND BLAST (FULL FACE) METHOD AND HEADING AND BENCH METHOD REPRESENT THE EXCAVATION TECHNIQUES STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES CONVENTIONAL EXPLOSIVE (UNSPECIFIED) . THIS DOCUMENT INCORPORATES ADDITIONALLY DRILLING EQUIPMENT AND TUNNELING MACHINE CHARACTERISTICS. EXCAVATION ADVANCEMENT RATE IS ALSO DISCUSSED. GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON UNDERGROUND OPENING SUPPORTS IS ALSO PRESENTED. THE EXCAVATION CHARACTERISTICS FOR CONCROD GRANITE, GREEN RIVER FORMATION, SYKESVILLE FORMATION AND MISSAHICKON FORMATION (OR SCHIST) ARE TREATED. PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE GNEISS . THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES DATA.

R001901 LARGE-SCALE TESTS OF TUNNEL SUPPORTS.
PAUL, S. L. SIESS, C. P. GAYLORD, E. H.
PROC. RAPID EXCAVATION AND TUNNELING CONF.
2, 1395-417, 1974.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
ILLINOIS,UNIVERSITY OF,URBANA,IL:USA

FUNDING ORGANIZATION(S)
FEDERAL RAILROAD ADMINISTRATION,DEPT.OF TRANSPORTATION, WASHINGTON D.C:USA.

THIS LAB-THEORETICAL REPORT CONTAINS REPUBLISHED DATA. PERTINENT INFORMATION ON UNDERGROUND OPENING SUPPORTS IS ALSO PRESENTED.

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R001902 RAPID DECLINE DRIVING IN THE HIGH ARTIC.
PEOPATH, J. S.
PROC. RAPID EXCAVATION AND TUNNELING CONF.
2, 1485-501, 1974.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
GEO-ENGINEERING LABORATORIES,INC.

FUNDING ORGANIZATION(S)
ARVIK MINES LTD;CANADA

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE COMPLETED EXCAVATION OF THE POLARIS PROJECT (LITTLE CORNWALLIS ISLAND, CANADA) . THE PROJECT INVESTIGATED IS UTILIZED FOR MINE PURPOSES. THE DRILL AND BLAST (FULL FACE) METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES CONVENTIONAL EXPLOSIVE (UNSPECIFIED) . THIS DOCUMENT INCORPORATES ADDITIONALLY DRILLING EQUIPMENT AND TUNNELING MACHINE CHARACTERISTICS. TBM EXCAVATION AND EXCAVATION ADVANCEMENT RATES ARE ALSO DISCUSSED. GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON MATERIALS HANDLING SYSTEM IS ALSO PRESENTED. ROCK TYPES REVIEWED INCLUDE LIMESTONE .

R001903 TUNNELING IN A COPPER MINE - PORTENTS OF SUCCESS FROM FAILURE.
TALVENSAARI, R. O.
PROC. RAPID EXCAVATION AND TUNNELING CONF.
2, 1579-98, 1974.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
WHITE PINE COPPER COMPANY,WHITE PINE,MI;USA.

FUNDING ORGANIZATION(S)
WHITE PINE COPPER CO;WHITE PINE,MI;USA.

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE COMPLETED EXCAVATION OF THE WHITE PINE COPPER MINE (MI., USA) . THE PROJECT INVESTIGATED IS UTILIZED FOR MINE PURPOSES. THE PILOT BORE-CENTER METHOD AND TBM METHOD REPRESENT THE EXCAVATION TECHNIQUES STUDIED. THE REPORTED FRAGMENTATION METHODS SERVICING PROJECT EFFORTS INCLUDE MECHANICAL ABRASION (ROTARY) AND MECHANICAL ABRASION (SAW-UNDERCUTTING) . THIS DOCUMENT INCORPORATES ADDITIONALLY DRILLING EQUIPMENT AND TUNNELING MACHINE CHARACTERISTICS. TBM EXCAVATION RATE IS ALSO DISCUSSED. INFORMATION PERTINENT TO EXCAVATION COST IS GIVEN. GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. THE EXCAVATION CHARACTERISTICS FOR NONFSUCH SHALE ARE TREATED. PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE SANDSTONE AND SHALE .

R001904 REPORT ON APPLICATION OF A LARGE EXCAVATOR SHIELD TUNNELING SYSTEM AND PRECAST CONCRETE SEGMENT FINAL LINING FOR THE CASTIGLIONI TUNNEL, ITALY.
TARSITANI, A.
PROC. RAPID EXCAVATION AND TUNNELING CONF.
2, 1631-50, 1974.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
1.ASTALDI
2.DI-PENTA
3.LODIGIANI
4.SOGENE

FUNDING ORGANIZATION(S)
ITALIAN NATIONAL RAILROAD ADMINISTRATION

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE ON GOING EXCAVATION OF THE CASTIGLIONE TUNNEL (PART OF ROME-FLORENCE RAILROAD) (ITALY) . THE PROJECT INVESTIGATED IS UTILIZED FOR RAILWAY PURPOSES. THE SHIELD METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. TBM EXCAVATION AND EXCAVATION ADVANCEMENT RATES ARE ALSO DISCUSSED. GEOSTRUCTURAL AND SOIL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON UNDERGROUND OPENING SUPPORTS AND MATERIALS HANDLING SYSTEM IS ALSO PRESENTED. ROCK TYPES REVIEWED INCLUDE CONGLOMERATE .

(CONTINUED)

R001905 EXCAVATION OF INCLINED SHAFT BY REAMING IN TWO STAGES.
HAMBACH, P.
PROC. RAPID EXCAVATION AND TUNNELING CONF.
2, 1651-63, 1974.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
1.HOCHTIEF LTD;ESSEN,GERMANY
2.NURER CO;GENEVA,SWITZERLAND

FUNDING ORGANIZATION(S)
SCHLUCHSEEWERKE,FREIBURG,GERMANY

THIS IN-SITU REPORT CONTAINS ORIGINAL AND REPUBLISHED DATA. THE PROJECT INVESTIGATED IS UTILIZED FOR HYDROELECTRIC PURPOSES. THE PILOT BORE-CENTER METHOD AND TBM METHOD REPRESENT THE EXCAVATION TECHNIQUES STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. TBM EXCAVATION RATE IS ALSO DISCUSSED. GEOSTRUCTURAL AND SOIL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON GROUND CONDITIONS AND UNDERGROUND OPENING SUPPORTS AND MATERIALS HANDLING SYSTEM IS ALSO PRESENTED. THE EXCAVATION CHARACTERISTICS FOR SCHWARZWALDER GRANITE ARE TREATED. ROCK TYPES REVIEWED INCLUDE GRANITE . THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES (FLD) DATA.

R001906 THE PORT RICHMOND N. Y. PROJECT. THE EXCAVATING SHIELD IN SATURATED, MIXED GLACIAL DEPOSITS.
JACOBY, H. J.
PROC. RAPID EXCAVATION AND TUNNELING CONF.
2, 1665-81, 1974.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
RICHMOND CONSTRUCTORS:
1.CATAPANO,ANDREW CO.INC.
2.GROVE,MACLEAN AND CO.INC.
3.GROW TUNNELING CORP.
4.MORRISON-KNUDSEN CO.INC.

FUNDING ORGANIZATION(S)
NEW YORK CITY,DEPT.OF WATER RESOURCES,NY;USA.

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE ON GOING EXCAVATION OF THE PORT RICHMOND PROJECT (NY., USA) . THE PROJECT INVESTIGATED IS UTILIZED FOR SEWER PURPOSES. THE SHIELD METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY DRILLING EQUIPMENT AND TUNNELING MACHINE CHARACTERISTICS. EXCAVATION ADVANCEMENT RATE IS ALSO DISCUSSED. GEOSTRUCTURAL AND SOIL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON GROUND CONDITIONS AND UNDERGROUND OPENING SUPPORTS AND MATERIALS HANDLING SYSTEM IS ALSO PRESENTED.

R001907 AN INNOVATION IN MACHINE TUNNELING.
JACOBS, J. D.
PROC. RAPID EXCAVATION AND TUNNELING CONF.
2, 1683-96, 1974.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
JACOBS ASSOCIATES,SAN FRANSISCO,CA;USA.

THIS IN-SITU-THEORETICAL REPORT CONTAINS REVIEW DATA. THE SHIELD METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) .

R001908 IMPROVING HARD ROCK TUNNELING THROUGH COMPARISON OF LABORATORY AND FIELD TUNNEL BORING STUDIES.
WANG, F.-D. MILLER, R. OZDEMIR, L.
PROC. RAPID EXCAVATION AND TUNNELING CONF.

(CONTINUED)

2, 1741-57, 1974.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
COLORADO SCHOOL OF MINES,DEPT.OF MINING,GOLDEN,CO: 80401

FUNDING ORGANIZATION(S)
NATIONAL SCIENCE FOUNDATION,WASHINGTON,D.C.:USA.

THIS LAB-IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE ON GOING EXCAVATION OF THE NAST TUNNEL (CO., USA) . THE PROJECT INVESTIGATED IS UTILIZED FOR EXPERIMENTAL EXCAVATION AND IRRIGATION PURPOSES. THE TBM METHOD AND VERTICAL ROTARY METHOD REPRESENT THE EXCAVATION TECHNIQUES STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. ROCK TYPES REVIEWED INCLUDE GRANITE . THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES (FLD) DATA.

R001909 DEVELOPMENT OF A CONCIAL BORING UNIT.
HUG, H. A. HIRICH, W. A.
PROC. RAPID EXCAVATION AND TUNNELING CONF.
2, 1759-75, 1974.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
MILLER,FOSTER ASSOCIATES,INC:135 SECOND AVE: WALTHAM,MA:02154

FUNDING ORGANIZATION(S)
ADVANCED RESEARCH PROJECT AGENCY (ARPA)
NATIONAL SCIENCE FOUNDATION,WASHINGTON,D.C.:USA.
U.S.BUREAU OF MINES

THIS LAB-IN-SITU REPORT CONTAINS ORIGINAL DATA. THE PROJECT INVESTIGATED IS UTILIZED FOR EXPERIMENTAL EXCAVATION PURPOSES. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY DRILLING EQUIPMENT AND TUNNELING MACHINE CHARACTERISTICS. THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES (FLD) DATA.

R001910 ROCK MELTING SUBTERRENES--THEIR ROLE IN FUTURE EXCAVATION TECHNOLOGY.
ROWLEY, J. C. HAROLD, R. J. BANKSTON, C. A. NEUDECKER, J. W.
PROC. RAPID EXCAVATION AND TUNNELING CONF.
2, 1777-96, 1974.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
LOS ALAMOS SCIENTIFIC LAB.(UNIV.OF CALIFORNIA),NM: 87544,USA.

FUNDING ORGANIZATION(S)
NATIONAL SCIENCE FOUNDATION,WASHINGTON,D.C.:USA.

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE PROJECT INVESTIGATED IS UTILIZED FOR DRAINAGE TUNNEL AND EXPERIMENTAL EXCAVATION PURPOSES. THE SUBTERRENE MELTING METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES SUBTERRENE . PERTINENT INFORMATION ON UNDERGROUND OPENING SUPPORTS IS ALSO PRESENTED. PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE ALLUVIUM AND BASALT .

R001911 PLANNING SUBWAYS BY TUNNEL OR CUT-AND-COVER-SOME COST-BENEFIT COMPARISONS.
PROCTOR, R. J. HOFFMAN, G. A.
PROC. RAPID EXCAVATION AND TUNNELING CONF.
1, 51-63, 1974.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
SOUTHERN CALIFORNIA,METROPOLITAN WATER DISTRICT OF

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE PROJECT INVESTIGATED IS UTILIZED FOR WATER SUPPLY TUNNEL PURPOSES. THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. TBM EXCAVATION AND EXCAVATION ADVANCEMENT RATES ARE ALSO DISCUSSED. GEOSTRUCTURAL CHARACTERISTICS FOR THE

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REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON UNDERGROUND OPENING SUPPORTS IS ALSO PRESENTED.

R001912 LINING AND FINISHING EISENHOWER MEMORIAL TUNNEL.
RUEMMELE, W. A.
PROC. RAPID EXCAVATION AND TUNNELING CONF.
1, 153-63, 1974.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
1.BOYLES BROTHERS DRILLING CO.
2.OUGAN GRAHAM CO.INC:SALT LAKE CITY,UT:USA.

THIS LAB-IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE COMPLETED EXCAVATION OF THE EISENHOWER MEMORIAL TUNNEL (ALSO CALLED STRAIGHT CREEK TUNNEL) (CO., USA) . THE PROJECT INVESTIGATED IS UTILIZED FOR HIGHWAY PURPOSES. PERTINENT INFORMATION ON UNDERGROUND OPENING SUPPORTS AND MATERIALS HANDLING SYSTEM IS ALSO PRESENTED.

R001914 ROCK TUNNELLING SYSTEM FOR SMALL CROSS SECTIONS.
BRODBECK, H. W.
PROC. RAPID EXCAVATION AND TUNNELING CONF.
1, 249-61, 1974.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
ATLAS COPCO MASCHINEN AG:SWITZERLAND

FUNDING ORGANIZATION(S)
ATLAS COPCO MASCHINEN AG,SWITZERLAND

THIS LAB-IN-SITU REPORT CONTAINS ORIGINAL DATA. THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. INFORMATION PERTINENT TO EXCAVATION COST IS GIVEN. GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. ROCK TYPES REVIEWED INCLUDE CONGLOMERATE, LIMESTONE AND SANDSTONE . THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES (LAB) DATA.

R001915 SMALL DIAMETER TUNNELS IN MANHATTAN SCHIST.
MC CUSKER, T. G. DIETL, B.
PROC. RAPID EXCAVATION AND TUNNELING CONF.
1, 265-81, 1974.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
PERINI CORP.

FUNDING ORGANIZATION(S)
PERINI CORP.

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE COMPLETED EXCAVATION OF THE NORTH BRANCH INTERCEPTING SEWER TUNNEL (NEW YORK CITY, NY., USA) . THE PROJECT INVESTIGATED IS UTILIZED FOR SEWER PURPOSES. THE DRILL AND BLAST (FULL FACE) METHOD AND TBM METHOD REPRESENT THE EXCAVATION TECHNIQUES STUDIED. THE REPORTED FRAGMENTATION METHODS SERVICING PROJECT EFFORTS INCLUDE CONVENTIONAL EXPLOSIVE (UNSPECIFIED) AND MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. TBM EXCAVATION RATE IS ALSO DISCUSSED. GEOSTRUCTURAL AND SOIL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON MATERIALS HANDLING SYSTEM IS ALSO PRESENTED. THE EXCAVATION CHARACTERISTICS FOR INWOOD MARBLE (IN NY.CITY GROUP) AND MANHATTAN SCHIST ARE TREATED. ROCK TYPES REVIEWED INCLUDE CLASTICS, MARBLE AND SCHIST .

R001916 HENDERSON TUNNEL HAULAGE AND MATERIALS HANDLING.
OPITZ, E. H.
PROC. RAPID EXCAVATION AND TUNNELING CONF.
1, 445-56, 1974.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
DRAVO CORP.(OR CO.),U.S.A.

FUNDING ORGANIZATION(S)
AMAX,USA.

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THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE ON GOING EXCAVATION OF THE HENDERSON TUNNEL (CO., USA) . THE PROJECT INVESTIGATED IS UTILIZED FOR MINE PURPOSES. THE DRILL AND BLAST (FULL FACE) METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON UNDERGROUND OPENING SUPPORTS AND MATERIALS HANDLING SYSTEM IS ALSO PRESENTED. THE EXCAVATION CHARACTERISTICS FOR IDAHO SPRINGS FORMATION AND SILVER PLUME GRANITE ARE TREATED. ROCK TYPES REVIEWED INCLUDE GRANITE .

R001917 MATERIAL HANDLING CONSIDERATIONS IN BORED TUNNELS.
FILLIP, N. M.
PROC. RAPID EXCAVATION AND TUNNELING CONF.
1, 457-79, 1974.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
BECHTEL ASSOCIATES,PROFESSIONAL CORP;WASHINGTON,D.C;USA.

THIS THEORETICAL REPORT CONTAINS REVIEW DATA. THE UNDERGROUND OPENINGS DISCUSSED INCLUDE THE COMPLETED EXCAVATION OF THE CEN.EUROPEAN RESEARCH NUCLEAIRE (CERN) TUNNEL (SWITZERLAND), THE COMPLETED EXCAVATION OF THE EASTERN SUBURBS TUNNELS (SYDNEY, AUSTRALIA), THE COMPLETED EXCAVATION OF THE HALIFAX TUNNEL (NOVA SCOTIA, CANADA) AND THE COMPLETED EXCAVATION OF THE WASHINGTON METRO PROJECT B-V (WASHINGTON, D.C., USA) THE PROJECTS INVESTIGATED ARE UTILIZED FOR EXPERIMENTAL EXCAVATION AND METRO PURPOSES. THE TBM METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY AND DRAG) . GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON MATERIALS HANDLING SYSTEM IS ALSO PRESENTED. ROCK TYPES REVIEWED INCLUDE GRAYWACKE, MUDSTONE AND SANDSTONE . THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES (LAB) DATA.

R001918 CONTINUOUS SPIRAL BLAST TUNNELING.
PETERSON, C. R. HERRICK, J.
PROC. RAPID EXCAVATION AND TUNNELING CONF.
1, 785-804, 1974.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
RAPIDEX INC.

FUNDING ORGANIZATION(S)
U.S.GOVT;DEPT.OF TRANSPORTATION

THIS LAB-IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE COMPLETED EXCAVATION OF THE WHITE PINE COPPER MINE (MI., USA) . THE PROJECT INVESTIGATED IS UTILIZED FOR EXPERIMENTAL EXCAVATION PURPOSES. THE TBM METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. EXCAVATION ADVANCEMENT RATE IS ALSO DISCUSSED. GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES (LAB) DATA.

R001919 ROCK DISINTEGRATION TESTS OF A WATER CANNON.
COOLEY, W. C.
PROC. RAPID EXCAVATION AND TUNNELING CONF.
1, 805-23, 1974.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
TERRASPACE,INC;304 N.STONESTREET AVE;ROCKVILLE,MD. 20850;USA

FUNDING ORGANIZATION(S)
FEDERAL RAILROAD ADMINISTRATION,DEPT.OF TRANSPORTATION, WASHINGTON D.C;USA.

THIS LAB-IN-SITU REPORT CONTAINS ORIGINAL DATA. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES IMPACT ABRASION (WATER CANNON, INTERMITTANT IMPACT . GEOSTRUCTURAL CHARACTERISTICS

(CONTINUED)

FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. THE EXCAVATION CHARACTERISTICS FOR BARRE GRANITE AND INDIANA LIMESTONE ARE TREATED. PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE GNEISS, GRANITE AND LIMESTONE THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES (LAB) DATA.

R001920 UNDERGROUND TESTS OF THE REAM METHOD OF ROCK FRAGMENTATION FOR HIGH-SPEED TUNNELING.
LUNDQUIST, R. G.
PROC. RAPID EXCAVATION AND TUNNELING CONF.
1, 825-40, 1974.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
PHYSICS INTERNATIONAL CO.

FUNDING ORGANIZATION(S)
ADVANCED RESEARCH PROJECT AGENCY (ARPA)

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE ON GOING EXCAVATION OF THE HOPE VALLEY TUNNEL (CA., USA) . THE PROJECT INVESTIGATED IS UTILIZED FOR EXPERIMENTAL EXCAVATION PURPOSES. THE DRILLING METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES IMPACT ABRASION (PROJECTILE, INTERMITTANT IMPACT) . GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. ROCK TYPES REVIEWED INCLUDE GRANODIORITE . THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES (LAB) DATA.

R001921 THE APPLICATION OF WIRE SAWS TO UNDERGROUND EXCAVATION.
ZINK, G.
PROC. RAPID EXCAVATION AND TUNNELING CONF.
1, 841-57, 1974.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
COLORADO SCHOOL OF MINES,DEPT.OF MINING,GOLDEN,CO; 80401

FUNDING ORGANIZATION(S)
U.S.ARMY CORPS OF ENGINEERS

THIS IN-SITU AND THEORETICAL REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE COMPLETED EXCAVATION OF THE FORT RANDELL DAM TUNNELS (MO., USA) . THE PROJECT INVESTIGATED IS UTILIZED FOR EXPERIMENTAL EXCAVATION AND OUTLET (DAMS) PURPOSES. THE DRILL AND BLAST (LINE DRILLED) METHOD AND SAWING METHOD REPRESENT THE EXCAVATION TECHNIQUES STUDIED. THE REPORTED FRAGMENTATION METHODS SERVICING PROJECT EFFORTS INCLUDE CONVENTIONAL EXPLOSIVE (UNSPECIFIED) AND MECHANICAL ABRASION (ROTARY) . PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE CHALK (ROCK), GRANITE, LIMESTONE, MARBLE, METABOLITE AND TRAVERTINE (ROCK) .

R001922 APPLICATION OF BOOM-TYPE EXCAVATORS.
KOGELMANN, W. J.
PROC. RAPID EXCAVATION AND TUNNELING CONF.
1, 875-94, 1974.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
ALPINE EQUIPMENT CORP;USA.

THIS IN-SITU-THEORETICAL REPORT CONTAINS REVIEW DATA. THE UNDERGROUND OPENINGS DISCUSSED INCLUDE THE COMPLETED EXCAVATION OF THE GRAY NO,50;COAL MINE (WV., USA), THE COMPLETED EXCAVATION OF THE LENGEDE-BROISTEDT IRON ORE MINE AND THE COMPLETED EXCAVATION OF THE RHEINPREUSSEN AND PATTBERG COAL MINES (RHEINLAND, GERMANY) . THE PROJECTS INVESTIGATED ARE UTILIZED FOR MINE PURPOSES. THE TBM METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY AND DRAG) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. EXCAVATION ADVANCEMENT RATE IS ALSO DISCUSSED. GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON UNDERGROUND OPENING SUPPORTS AND MATERIALS HANDLING SYSTEM IS ALSO PRESENTED. PETROGRAPHY AND ROCK TYPES

(CONTINUED)

REVIEWED INCLUDE LIMONITE, SANDSTONE AND SHALE . THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES (LAB) DATA.

R001923 MINING HARD ROCK ORES WITH A FIXED DRUM CONTINUOUS MINER.
FIFE, W. E.
PROC. RAPID EXCAVATION AND TUNNELING CONF.
1, 895-913, 1974.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
JEFFREY MINING MACHINERY CO:COLUMBUS,OH:USA.

FUNDING ORGANIZATION(S)
JEFFREY MINING MACHINERY CO:USA.

THIS IN-SITU-THEORETICAL REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENINGS DISCUSSED INCLUDE THE COMPLETED EXCAVATION OF THE AMELIE POTASH MINE (N.FRANCE) AND THE COMPLETED EXCAVATION OF THE SERROUVILLE MINE (FRANCE) . THE PROJECTS INVESTIGATED ARE UTILIZED FOR MINE PURPOSES. THE MULTI DRIFT METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON MATERIALS HANDLING SYSTEM IS ALSO PRESENTED. ROCK TYPES REVIEWED INCLUDE IRON ORE AND POTASH . THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES (LAB) DATA.

R001934 A PILOT SCALE MACHINE FOR TUNNEL BORING RESEARCH.
HIGNETT, H. J. HOWARD, T. R.
TRANSPORT AND ROAD RESEARCH LAB., CROWTHORNE, BERKSHIRE
21PP., 1974.
(TRRL-632)
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
DEPT.OF ENVIRONMENT,TRANSPORT AND ROAD RESEARCH LAB.OF,BERKSHIRE, U.K.

THIS LAB REPORT CONTAINS ORIGINAL DATA. THE PROJECT INVESTIGATED IS UTILIZED FOR EXPERIMENTAL EXCAVATION PURPOSES. THE PILOT BORE-CENTER METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY AND DRAG) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. TBM EXCAVATION RATE IS ALSO DISCUSSED. GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. ROCK TYPES REVIEWED INCLUDE CHALK (MINERAL) . THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES (LAB) DATA.

R001935 ALPINE MINER AM F6-A, CUTTER LOADER AND TUNNELING MACHINE.
AUTHOR ANON.
VEREINIGTE OSTERREICHISCHE EISEN UND STAHLWERKE, ALPINE MONTAN AKTIENGESELLSCHAFT
29PP., 1974.
LANGUAGE: GERMAN

PERFORMING ORGANIZATION(S)
VEREINIGTE OSTERREICHISCHE EISEN-UND STAHLWERKE-ALPINE,MONTAN,AG:
AUSTRIA

FUNDING ORGANIZATION(S)
VEREINIGTE OSTERREICHISCHE EISEN-UND STAHLWERKE-ALPINE MONTAN AG., AUSTRIA

THIS IN-SITU REPORT CONTAINS ABSTRACTED ONLY DATA. THE PROJECT INVESTIGATED IS UTILIZED FOR HIGHWAY, MINE, RAILWAY AND UNSPECIFIED PURPOSES. THE TBM METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) . TBM EXCAVATION RATE IS ALSO DISCUSSED. GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON UNDERGROUND OPENING SUPPORTS AND MATERIALS HANDLING SYSTEM IS ALSO PRESENTED. PETROGRAPHY AND ROCK TYPES

(CONTINUED)

REVIEWED INCLUDE CLAYSTONE, COAL, CONGLOMERATE, GYPSUM (ROCK), IRON ORE, LIGNITE, PHOSPHORITE (ROCK), SANDSTONE AND TUFF . THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES (LAB) DATA.

R001936 ALPINE MINER AM 50 CONTINUOUS MINER AND TUNNELING MACHINE.
AUTHOR ANON.
VOEST-ALPINE, VEREINIGTE OSTERREICHISCHE EISEN-UND STAHLWERKE, ALPINE MONTAN AKTIENGESELLSCHAFT
20PP., 1974.
LANGUAGE: GERMAN

PERFORMING ORGANIZATION(S)
VEREINIGTE OSTERREICHISCHE EISEN-UND STAHLWERKE-ALPINE,MONTAN,AG:
AUSTRIA

FUNDING ORGANIZATION(S)
VEREINIGTE OSTERREICHISCHE EISEN-UND STAHLWERKE-ALPINE MONTAN AG., AUSTRIA

THIS IN-SITU REPORT CONTAINS ABSTRACTED ONLY DATA. THE PROJECT INVESTIGATED IS UTILIZED FOR MINE AND UNSPECIFIED PURPOSES. THE TBM METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON UNDERGROUND OPENING SUPPORTS AND MATERIALS HANDLING SYSTEM IS ALSO PRESENTED. PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE ANHYDRITE (ROCK), COAL, IRON ORE, PHOSPHORITE (ROCK) AND SANDSTONE . THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES (LAB) DATA.

R001941 TUNNELING, THE STATE OF THE ART.
MAYO, R. S. ADAIR, T. JENNY, R. J.
MAYO AND ASSOCIATES, LANCASTER, PA.
271PP., 1968.
(PB-178 036)
LANGUAGE: ENGLISH

FUNDING ORGANIZATION(S)
MUNICH,CITY OF,MUNICH,GERMANY.

THIS IN-SITU REPORT CONTAINS REVIEW DATA. THE UNDERGROUND OPENINGS DISCUSSED INCLUDE GREATER LONDON COUNCIL STORM WATER RELIEF SEWER (U.K.), THE COMPLETED EXCAVATION OF THE LT.WILLIAM F.CALLAHAN JR. TUNNEL (BOSTON, MA., USA), THE COMPLETED EXCAVATION OF THE MONTREAL METRO (CANADA), THE ON GOING EXCAVATION OF THE MUNICH RAPID TRANSIT LINE (GERMANY), THE ON GOING EXCAVATION OF THE PARIS EXPRESS METRO (PARIS, FRANCE), THE ON GOING EXCAVATION OF THE RELIEF SEWER TUNNEL (WASHINGTON, D.C., USA), THE COMPLETED EXCAVATION OF THE RICHMOND WATER TUNNEL (NEW YORK, NY., USA), THE COMPLETED EXCAVATION OF THE TORONTO SUBWAY TUNNELS (TORONTO, ONTARIO, CANADA) AND THE COMPLETED EXCAVATION OF THE VICTORIA LINE TUNNEL (LONDON, ENGLAND, U.K.) . THE PROJECTS INVESTIGATED ARE UTILIZED FOR HIGHWAY, METRO, SEWER AND WATER SUPPLY TUNNEL PURPOSES. THE DRILL AND BLAST (FULL FACE) METHOD, HEADING AND BENCH METHOD, SHIELD METHOD AND TBM METHOD REPRESENT THE EXCAVATION TECHNIQUES STUDIED. THE REPORTED FRAGMENTATION METHODS SERVICING PROJECT EFFORTS INCLUDE CONVENTIONAL EXPLOSIVE (ANFO), CONVENTIONAL EXPLOSIVE (UNSPECIFIED) AND MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. TBM EXCAVATION RATE IS ALSO DISCUSSED. GEOSTRUCTURAL AND SOIL CHARACTERISTICS AS WELL AS SOIL MECHANICAL PROPERTIES FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON GROUND CONDITIONS AND UNDERGROUND OPENING SUPPORTS AND MATERIALS HANDLING SYSTEM IS ALSO PRESENTED. ROCK TYPES REVIEWED INCLUDE LIMESTONE, SCHIST AND SLATE . THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES (LAB) DATA.

R001942 ROCK TUNNELING WITH HIGH SPEED WATER JETS UTILIZING CAVITATION DAMAGE.
KOHL, R. E.
HYDRONAUTICS, INC., LAUREL, MD.
52PP., 1968.

(CONTINUED)

(PB-179 077)
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
HYDRONAUTICS INC;USA.

FUNDING ORGANIZATION(S)
DEPT.OF TRANSPORTATION OFFICE OF HIGH SPEED GROUND TRANSPORTATION WASHINGTON,D.C;USA.

THIS LAB REPORT CONTAINS ORIGINAL DATA. THE PROJECT INVESTIGATED IS UTILIZED FOR EXPERIMENTAL EXCAVATION PURPOSES. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES JET ABRASION (WATER) . ROCK TYPES REVIEWED INCLUDE GRANITE, LIMESTONE, MARBLE, SERPENTINE AND SHALE . THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES (LAB) DATA.

R001944 FEASIBILITY OF FLAME-JET TUNNELING. VOLUME II. SYSTEMS ANALYSIS AND EXPERIMENTAL INVESTIGATIONS.
UNITED AIRCRAFT CORP.
UNITED AIRCRAFT CORP., RESEARCH LABS., EAST HARTFORD CONN.
380PP., 1968.
(PB-178 199, UACRL-G910560-10, VOL. 2)
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
UNITED AIRCRAFT RESEARCH LAB.AND BROWNING ENGINEERING CORP.

FUNDING ORGANIZATION(S)
DEPT.OF TRANSPORTATION OFFICE OF HIGH SPEED GROUND TRANSPORTATION WASHINGTON,D.C;USA.

THIS LAB-THEORETICAL REPORT CONTAINS ORIGINAL DATA. THE PROJECT INVESTIGATED IS UTILIZED FOR EXPERIMENTAL EXCAVATION PURPOSES. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES JET ABRASION (FLAME) .

R001949 THE ELECTROHYDRAULIC EFFECT: POTENTIAL APPLICATION IN ROCK FRAGMENTATION.
KUTTER, H. K.
BUREAU OF MINES, WASHINGTON, D. C.
40PP., 1969.
(PB-188 585, BM-RI-7317)
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
U.S.BUREAU OF MINES,MINNEAPOLIS,MN;USA.

FUNDING ORGANIZATION(S)
U.S.BUREAU OF MINES

THIS LAB REPORT CONTAINS ORIGINAL DATA. THE PROJECT INVESTIGATED IS UTILIZED FOR EXPERIMENTAL EXCAVATION PURPOSES. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES IMPACT ABRASION (ELECTROHYDRAULIC) . GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. THE EXCAVATION CHARACTERISTICS FOR HOLSTON MARBLE (LIMESTONE OR FORMATION)(=TENNESSEE MARBLE) AND ST.CLOUD(GRAY)GRANODIORITE (=CHARCOAL GREY GRANITE) ARE TREATED. ROCK TYPES REVIEWED INCLUDE BASALT, GRANITE, LIMESTONE, MARBLE AND SLATE .

R001950 EXPERIMENTAL CUTTING COMPONENTS, NEW METHODS OF CUTTING COAL AND ROCK.
OSUCH, A.
BUREAU OF MINES, WASHINGTON, D. C.
27PP., 1969.
(PB-190 323T)
LANGUAGE: ENGLISH

THIS LAB-IN-SITU AND LAB REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE COMPLETED EXCAVATION OF THE SZOMBIERKI MINE (POLAND) THE PROJECT INVESTIGATED IS UTILIZED FOR EXPERIMENTAL EXCAVATION PURPOSES. THE DRILLING METHOD AND TBM METHOD REPRESENT THE EXCAVATION TECHNIQUES STUDIED. THE REPORTED FRAGMENTATION METHODS SERVICING PROJECT EFFORTS INCLUDE MECHANICAL ABRASION (ROTARY) AND MECHANICAL ABRASION (UNSPECIFIED) . THIS DOCUMENT INCORPORATES ADDITIONALLY DRILLING EQUIPMENT AND TUNNELING MACHINE CHARACTERISTICS. EXCAVATION ADVANCEMENT RATE IS ALSO DISCUSSED. INFORMATION PERTINENT TO EXCAVATION COST IS GIVEN. PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE COAL, IRON ORE, MUDSTONE, SANDSTONE AND SHALE .

R001952 FORMATION OF UNDERGROUND CAVITIES BY THE USE OF EXPLOSIVES.
DOBINA, A. S. EVSTROPOV, N. A.
BUREAU OF RECLAMATION, DENVER, COLORADO
16PP., 1969.
(ENGLISH TRANSLATION OF TRANSPORTNOE STROITEL'STVO, , 4), 47-9, 1966; FOR ORIGINAL SEE R1951)
(PB-183 293T, TRANS-800)
LANGUAGE: ENGLISH

THIS IN-SITU-THEORETICAL REPORT CONTAINS ORIGINAL DATA. THE PROJECT INVESTIGATED IS UTILIZED FOR EXPERIMENTAL EXCAVATION PURPOSES. THE DRILL AND BLAST (OTHER THAN FULL FACE) METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES CONVENTIONAL EXPLOSIVE (TNT) . GEOSTRUCTURAL AND SOIL CHARACTERISTICS AS WELL AS SOIL MECHANICAL PROPERTIES FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED.

R001957 CONCEPTUAL DESIGN OF A CORING SUBTERRENE GEOPROSPECTOR.
NEUDECKER, J. W.
LOS ALAMOS SCIENTIFIC LAB., UNIV. OF CALIFORNIA, LOS ALAMOS, N. MEXICO
14PP., 1974.
(LA-5517-MS)
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
LOS ALAMOS SCIENTIFIC LAB.(UNIV.OF CALIFORNIA),NM; 87544,USA.

FUNDING ORGANIZATION(S)
ATOMIC ENERGY COMMISSION

THIS LAB REPORT CONTAINS ORIGINAL DATA. THE PROJECT INVESTIGATED IS UTILIZED FOR EXPERIMENTAL EXCAVATION PURPOSES. THE FULL FACE METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES SUBTERRENE . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. TBM EXCAVATION RATE IS ALSO DISCUSSED. PERTINENT INFORMATION ON UNDERGROUND OPENING SUPPORTS IS ALSO PRESENTED.

R001958 DEVELOPMENT OF A MOBILE ROCK-MELTING SUBTERRENE FIELD UNIT FOR UNIVERSAL EXTRUDING PENETRATORS.
GRIGGS, J. E.
LOS ALAMOS SCIENTIFIC LAB., UNIV. OF CALIFORNIA, LOS ALAMOS, N. MEXICO
8PP., 1974.
(LA-5573-MS)
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
LOS ALAMOS SCIENTIFIC LAB.(UNIV.OF CALIFORNIA),NM; 87544,USA.

FUNDING ORGANIZATION(S)
ATOMIC ENERGY COMMISSION

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE PROJECT INVESTIGATED IS UTILIZED FOR EXPERIMENTAL EXCAVATION PURPOSES. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES SUBTERRENE

R001974 THE SHIN KANMON CONNECTION.
BROWN, R. L.
TUNNELS AND TUNNELLING
7 (1), 37, 39, AND 41, 1975.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
JAPANESE NATIONAL RAILWAYS,JAPAN

FUNDING ORGANIZATION(S)
JAPANESE NATIONAL RAILWAYS

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE COMPLETED EXCAVATION OF THE SHIN KANMON CONNECTION (JAPAN) . THE PROJECT INVESTIGATED IS UTILIZED FOR RAILWAY PURPOSES. THE CUT AND COVER METHOD AND DRILL AND BLAST (FULL FACE) METHOD REPRESENT THE EXCAVATION TECHNIQUES STUDIED. THE REPORTED FRAGMENTATION METHOD

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SERVICING PROJECT EFFORTS INCLUDES CONVENTIONAL EXPLOSIVE (UNSPECIFIED) . INFORMATION PERTINENT TO EXCAVATION COST IS GIVEN. GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON UNDERGROUND OPENING SUPPORTS IS ALSO PRESENTED.

R001975 SOIL MELTING A PRACTICAL TRIAL.
WILLIAMS, R. E.
TUNNELS AND TUNNELLING
7 (1), 44-5, 1975.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
CALIFORNIA,UNIVERSITY OF,LOS ANGELES,CA:USA

FUNDING ORGANIZATION(S)
NATIONAL SCIENCE FOUNDATION,WASHINGTON,D.C.:USA.

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE PROJECT INVESTIGATED IS UTILIZED FOR EXPERIMENTAL EXCAVATION PURPOSES. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES SUBTERRENE . THIS DOCUMENT INCORPORATES ADDITIONALLY DRILLING EQUIPMENT CHARACTERISTICS. GEOSTRUCTURAL AND SOIL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON UNDERGROUND OPENING SUPPORTS IS ALSO PRESENTED.

R001976 UNDERGROUND ROCKET.
AUTHOR ANON.
TUNNELS AND TUNNELLING
7 (1), 73, 1975.
LANGUAGE: ENGLISH

THIS LAB-IN-SITU REPORT CONTAINS REVIEW DATA. THE PROJECT INVESTIGATED IS UTILIZED FOR CABLE TUNNEL PURPOSES. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES IMPACT ABRASION (ROCKET EXHAUST AND DRILL) . THIS DOCUMENT INCORPORATES ADDITIONALLY DRILLING EQUIPMENT AND TUNNELING MACHINE CHARACTERISTICS. GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED.

R001977 FOCUSED LASER BEAMS TO ASSIST ROCK EXCAVATION.
JUREWICZ, R. R. GREENWALD, L. E.
BROWN, C. O.
UNITED AIRCRAFT RESEARCH LAB., EAST HARTFORD, CONN. CONNECTICUT
73PP., 1974.
(UARL-M-971543-11, FRA-ORD AND D-75-20)
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
UNITED AIRCRAFT RESEARCH LAB:E.HARTFORD,CT:USA.

FUNDING ORGANIZATION(S)
FEDERAL RAILROAD ADMINISTRATION,DEPT.OF TRANSPORTATION, WASHINGTON D.C:USA.

THIS LAB REPORT CONTAINS ORIGINAL DATA. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES THERMAL-RADIANT (COHERENT LIGHT-LASER) . GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. THE EXCAVATION CHARACTERISTICS FOR BARRE GRANITE AND SIOUX QUARTZITE (=JASPER QUARTZITE) ARE TREATED. PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE DIABASE, GRANITE AND QUARTZITE . THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES (LAB) DATA.

R001979 TUNNELLING UNDER MANCHESTER.
COLLINS, S. P.
TUNNELS AND TUNNELLING
6 (5), 30-3, 1974.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
NUTTAL,EDMUND LTD:U.K.

FUNDING ORGANIZATION(S)
BRITISH TELECOMMUNICATIONS HEADQUARTERS, DEVELOPMENT DEPT. OF (DEVELOPMENT DEPT.)

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE COMPLETED EXCAVATION OF THE POST OFFICE COMMUNICATIONS TUNNELS (MANCHESTER, U.K.) . THE PROJECT INVESTIGATED IS

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UTILIZED FOR CABLE TUNNEL PURPOSES. THE DRILL AND BLAST (FULL FACE) METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHODS SERVICING PROJECT EFFORTS INCLUDE CONVENTIONAL EXPLOSIVE (AMMON GELIGINITE) AND JET ABRASION (AIR-MECHANICAL) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. GEOSTRUCTURAL AND SOIL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON GROUND CONDITIONS AND UNDERGROUND OPENING SUPPORTS AND MATERIALS HANDLING SYSTEM IS ALSO PRESENTED. THE EXCAVATION CHARACTERISTICS FOR BUNTER SANDSTONE ARE TREATED.

R001980 CRYOGENIC TREATMENT OF SHAFTS AND TUNNELS.
HARRIS, J. S.
TUNNELS AND TUNNELLING
6 (5), 69-70, 1974.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
MOODIE,KINNEAR AND CO.LTD:U.K.
MOWLEM,JOHN AND CO.LTD:SCOTLAND,U.K.

FUNDING ORGANIZATION(S)
EDINBURGH CORP:SCOTLAND,U.K.

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE COMPLETED EXCAVATION OF THE CRAIGENTINNY TUNNEL (SCOTLAND, U.K.) . THE PROJECT INVESTIGATED IS UTILIZED FOR SEWER PURPOSES. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES JET ABRASION (AIR-MECHANICAL) . GEOSTRUCTURAL AND SOIL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON GROUND CONDITIONS AND UNDERGROUND OPENING SUPPORTS IS ALSO PRESENTED.

R001981 OTTAWA SEWER PROJECT.
BRICKLE, E.
TUNNELS AND TUNNELLING
6 (5), 77-9, 1974.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
SCHWENGER CONSTRUCTION CO:OTTAWA,CANADA

FUNDING ORGANIZATION(S)
OTTAWA,REGIONAL MUNICIPALITY OF,CARLETON WORKS DEPT.

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE ON GOING EXCAVATION OF THE OTTAWA SEWER PROJECT (OTTAWA, ONTARIO, CANADA) . THE PROJECT INVESTIGATED IS UTILIZED FOR SEWER PURPOSES. THE TBM METHOD REPRESENT THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY DRILLING EQUIPMENT AND TUNNELING MACHINE CHARACTERISTICS. TBM EXCAVATION RATE IS ALSO DISCUSSED. GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON GROUND CONDITIONS AND UNDERGROUND OPENING SUPPORTS AND MATERIALS HANDLING SYSTEM IS ALSO PRESENTED. PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE SHALE . THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES (LAB) DATA.

R001982 NEW BRITISH TUNNELLER TO CUT ITS TEETH IN COAL.
AUTHOR ANON.
TUNNELS AND TUNNELLING
6 (6), 11-3, 1974.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
THYSSEN (GREAT BRITAIN)LTD.

THIS IN-SITU REPORT CONTAINS REVIEW DATA. THE PROJECT INVESTIGATED IS UTILIZED FOR MINE PURPOSES. THE TBM METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS.

R001983 GROUND BREAKER ACTION.
AUTHOR ANON.

(CONTINUED)

TUNNELS AND TUNNELLING
6 (6), 13, 1974.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
MCODIE,KINNEAR AND CO.LTD:U.K.

THIS IN-SITU REPORT CONTAINS ABSTRACTED ONLY DATA. THE SHIELD METHOD AND TBM METHOD REPRESENT THE EXCAVATION TECHNIQUES STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS.

R001984 PARTIAL FACE PROTOTYPE AT STOKE-ON-TRENT.
LEENEY, J. G.
TUNNELS AND TUNNELLING
6 (6), 20-3, 1974.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
LEONARD FAIRCLOUGH LTD:BUCHAN DIVISION OF,U.K.

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE PROJECT INVESTIGATED IS UTILIZED FOR SEWER PURPOSES. THE PARTIAL FACE TUNNEL MACHINE METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. EXCAVATION ADVANCEMENT RATE IS ALSO DISCUSSED. SOIL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON GROUND CONDITIONS AND MATERIALS HANDLING SYSTEM IS ALSO PRESENTED. ROCK TYPES REVIEWED INCLUDE MARL .

R001985 THE RITSEM STORY.
GOSSELIN, C.
TUNNELS AND TUNNELLING
6 (6), 42-3, 1974.
LANGUAGE: ENGLISH

FUNDING ORGANIZATION(S)
SWEDISH POWER BOARD,SWEDEN

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE ON GOING EXCAVATION OF THE RITSEM POWER STATION TUNNEL (RITSEM, SWEDEN) . THE PROJECT INVESTIGATED IS UTILIZED FOR HYDROELECTRIC PURPOSES. THE HEADING AND BENCH METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES CONVENTIONAL EXPLOSIVE (UNSPECIFIED) . THIS DOCUMENT INCORPORATES ADDITIONALLY DRILLING EQUIPMENT CHARACTERISTICS. EXCAVATION ADVANCEMENT RATE IS ALSO DISCUSSED. GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON UNDERGROUND OPENING SUPPORTS IS ALSO PRESENTED. PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE MYLONITE (ROCK) AND GNEISS .

R001986 RENFREW MOTORWAY SEWER.
MC LEAN, R. D.
TUNNELS AND TUNNELLING
6 (6), 57-9, 1974.
LANGUAGE: ENGLISH

FUNDING ORGANIZATION(S)
GLASGOW CORP:U.K.

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE PROJECT INVESTIGATED IS UTILIZED FOR SEWER PURPOSES. THE DRILL AND BLAST (FULL FACE) METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES CONVENTIONAL EXPLOSIVE (UNSPECIFIED) . GEOSTRUCTURAL AND SOIL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON GROUND CONDITIONS AND UNDERGROUND OPENING SUPPORTS IS ALSO PRESENTED. PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE SANDSTONE .

R001987 CHINNOR TUNNELLING TRIALS - BACKGROUND AND PROGRESS.
HIGNETT, H. J. BODEN, J. B.
TUNNELS AND TUNNELLING

(CONTINUED)

6 (6), 65-70, 1974.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
DEPT.OF ENVIRONMENT,TRANSPORT AND ROAD RESEARCH LAB.OF,BERKSHIRE, U.K.

THIS IN-SITU REPORT CONTAINS REPUBLISHED DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE ON GOING EXCAVATION OF THE CHINNOR TUNNEL (CHINNOR, U.K.) . THE PROJECT INVESTIGATED IS UTILIZED FOR EXPERIMENTAL EXCAVATION PURPOSES. THE TBM METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON UNDERGROUND OPENING SUPPORTS IS ALSO PRESENTED. ROCK TYPES REVIEWED INCLUDE CHALK (MINERAL) .

R001988 PERFORMANCE AND NOISE SUPPRESSION TESTS OF A WATER CANNON.
COOLEY, W. C.
DEPT. OF TRANSPORTATION, FEDERAL RAILROAD ADMINISTRATION, WASHINGTON, D. C.
36PP., 1974.
(FRA-ORD-D-75-9)
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
TERRASPACE,INC:304 N.STONESTREET AVE:ROCKVILLE,MD. 20850:USA

FUNDING ORGANIZATION(S)
U.S.GOVT:DEPT.OF TRANSPORTATION

THIS LAB REPORT CONTAINS ORIGINAL DATA. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES JET ABRASION (WATER CANNON) . GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. THE EXCAVATION CHARACTERISTICS FOR BARRE GRANITE ARE TREATED. ROCK TYPES REVIEWED INCLUDE GRANITE .

R001989 THERMAL-MECHANICAL FRAGMENTATION-A PROMISING METHOD FOR HARD-ROCK EXCAVATION.
CLARK, G. B.
TUNNELING TECHNOLOGY NEWSLETTER
(6), 4-11, 1974.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
MISSOURI,UNIVERSITY OF,ROLLA,MO:USA

FUNDING ORGANIZATION(S)
ADVANCED RESEARCH PROJECT AGENCY (ARPA)

THIS LAB-IN-SITU REPORT CONTAINS REPUBLISHED DATA. THE PROJECT INVESTIGATED IS UTILIZED FOR EXPERIMENTAL EXCAVATION PURPOSES. THE DRILLING AND THERMAL FRACTURING METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES THERMAL-ELECTRICAL (TRANSFERRED ARC METHODS, CARBON ARC) . GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. ROCK TYPES REVIEWED INCLUDE GRANITE .

R001991 THERMOHYDRAULIC ROCK DISINTEGRATION-THEORETICAL ANALYSIS OF ROCK CUTTING BY COMBINED THERMAL WEAKENING AND HIGH-SPEED WATER JET IMPACT.
RINEY, T. D.
SYSTEMS, SCIENCE AND SOFTWARE, LA JOLLA, CALIF.
242PP., 1974.
(SSS-R-75-2507)
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
SYSTEMS,SCIENCE AND SOFTWARE,LA JOLLA,CA:USA.

FUNDING ORGANIZATION(S)
NATIONAL SCIENCE FOUNDATION,WASHINGTON,D.C.:USA.

THIS THEORETICAL REPORT CONTAINS ORIGINAL DATA. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES JET ABRASION (WATER) . GEOSTRUCTURAL

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CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. THE EXCAVATION CHARACTERISTICS FOR ST.CLOUD(GRAY)GRANODIORITE (=CHARCOAL GREY GRANITE) ARE TREATED. PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE GRANITE . THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES DATA.

R001993 THE BRETBY TUNNELLING MACHINE.
HAY, J. D. HUGHES, H. M. WRATHALL, R. W.
PROC. INST. CIVIL ENG.
30, 649-74, 1965.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
NATIONAL COAL BOARD,U.K.

FUNDING ORGANIZATION(S)
NATIONAL COAL BOARD,U.K.

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE COMPLETED EXCAVATION OF THE BREEDON LIMESTONE QUARRY TUNNEL (LEICESTERSHIRE, OK) . THE PROJECT INVESTIGATED IS UTILIZED FOR EXPERIMENTAL EXCAVATION PURPOSES. THE TBM METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. TBM EXCAVATION RATE IS ALSO DISCUSSED. GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE LIMESTONE . THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES (LAB) DATA.

R002049 CUTTING ROCK WITH WATER JETS.
HARRIS, H. D. MELLOR, M.
INT. J. ROCK MECH. MIN. SCI.
11 (9), 343-58, 1974.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
NATIONAL RESEARCH COUNCIL OF CANADA,OTTAWA,CANADA

THIS LAB REPORT CONTAINS ORIGINAL DATA. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES JET ABRASION (WATER CANNON, CONTINUOUS IMPACT) . GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. THE EXCAVATION CHARACTERISTICS FOR BARRE GRANITE, BEREA SANDSTONE AND INDIANA LIMESTONE ARE TREATED. PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE GRANITE, LIMESTONE AND SANDSTONE . THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES (LAB) DATA.

R002050 A ROTATING WATER JET DEVICE AND DATA ON ITS USE FOR SLOTTING BEREA SANDSTONE.
HARRIS, H. D. BRIERLEY, W. H.
INT. J. ROCK MECH. MIN. SCI.
11 (9), 359-66, 1974.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
NATIONAL RESEARCH COUNCIL OF CANADA,OTTAWA,CANADA

THIS LAB REPORT CONTAINS ORIGINAL DATA. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES JET ABRASION (WATER CANNON, CONTINUOUS IMPACT) . GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. THE EXCAVATION CHARACTERISTICS FOR BEREA SANDSTONE ARE TREATED. PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE SANDSTONE . THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES (LAB) DATA.

R002054 GROUND VIBRATIONS FROM TUNNEL BLASTING IN GRANITE.
OLSON, J. J. FOGELSON, D. E. DICK, R. A.
HENDRICKSON, A. D.
U. S. BUREAU OF MINES, PITTSBURGH, PA.
25PP., 1972.
(BM-RI-7653)
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
U.S.ARMY CORPS OF ENGINEERS

FUNDING ORGANIZATION(S)
UNITED STATES GOVT.

(CONTINUED)

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE COMPLETED EXCAVATION OF THE NORAD UNDERGROUND COMPLEX (COLORADO SPRINGS, CO., USA) . THE PROJECT INVESTIGATED IS UTILIZED FOR MILITARY INSTALLATION PURPOSES. THE DRILL AND BLAST (FULL FACE) METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES CONVENTIONAL EXPLOSIVE (UNSPECIFIED) . THIS DOCUMENT INCORPORATES ADDITIONALLY DRILLING EQUIPMENT CHARACTERISTICS. GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. THE EXCAVATION CHARACTERISTICS FOR PIKES PEAK GRANITE ARE TREATED. PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE GRANITE . THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES (LAB) DATA.

R002056 EFFECTS OF TYPE OF CUT, DELAY, AND EXPLOSIVE ON UNDERGROUND BLASTING IN FROZEN GRAVEL.
DICK, R. A.
U. S. BUREAU OF MINES, PITTSBURGH, PA.
17PP., 1970.
(BM-RI-7356)
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
U.S.BUREAU OF MINES,MINNEAPOLIS,MN;USA.

FUNDING ORGANIZATION(S)
U.S.ARMY COLD REGIONS RESEARCH AND ENGINEERING LAB. (CRREL)

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE COMPLETED EXCAVATION OF THE CRREL EXPERIMENTAL TUNNEL (FOX, AK., USA) . THE PROJECT INVESTIGATED IS UTILIZED FOR EXPERIMENTAL EXCAVATION PURPOSES. THE DRILL AND BLAST (FULL FACE) METHOD AND TBM METHOD REPRESENT THE EXCAVATION TECHNIQUES STUDIED. THE REPORTED FRAGMENTATION METHODS SERVICING PROJECT EFFORTS INCLUDE CONVENTIONAL EXPLOSIVE (UNSPECIFIED) AND MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. GEOSTRUCTURAL AND SOIL CHARACTERISTICS AS WELL AS SOIL MECHANICAL PROPERTIES FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. THE EXCAVATION CHARACTERISTICS FOR BIRCH CREEK SCHIST ARE TREATED. PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE SCHIST .

R002060 DRILLABILITY STUDIES PERCUSSIVE DRILLING IN THE FIELD.
SCHMIDT, R. L.
U. S. BUREAU OF MINES, PITTSBURGH, PA.
31PP., 1972.
(BM-RI-7684)
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
U.S.BUREAU OF MINES,MINNEAPOLIS,MN;USA.

FUNDING ORGANIZATION(S)
U.S.BUREAU OF MINES

THIS IN-SITU-THEORETICAL REPORT CONTAINS ORIGINAL DATA. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (PERCUSSION) . THIS DOCUMENT INCORPORATES ADDITIONALLY DRILLING EQUIPMENT CHARACTERISTICS. EXCAVATION ADVANCEMENT RATE IS ALSO DISCUSSED. GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. THE EXCAVATION CHARACTERISTICS FOR BAD RIVER DOLOMITE, BIWABIK IRON FORMATION, DRESSER BASALT, DULUTH GABBRO, NEGAUNEE IRON-FORMATION, ONEOTA DOLOMITE (OR DOLOMITE MEMBER), RIB HILL QUARTZITE, ROCKVILLE QUARTZ MONZONITE, SIOUX QUARTZITE (=JASPER QUARTZITE), ST.CLOUD(GRAY)GRANODIORITE (=CHARCOAL GREY GRANITE) AND WARMAN QUARTZ MONZONITE ARE TREATED. PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE ANORTHOSITE, BASALT, DIABASE, DOLOMITE (ROCK), GABBRO, GNEISS, GRANITE, GRANODIORITE, IRON ORE, LIMESTONE, MARBLE, MONZONITE, PEGMATITE, QUARTZITE, SANDSTONE, TACONITE, TRAP AND TUFF . THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES (LAB) DATA.

R002061 CRATER SCALING IN GRANITE FOR SMALL CHARGES.
D'ANDREA, D. V. FISCHER, R. L.
HENDRICKSON, A. D.

(CONTINUED)

U. S. BUREAU OF MINES, PITTSBURGH, PA.
28PP., 1970.
(BM-RI-7409)
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
U.S.BUREAU OF MINES,MINNEAPOLIS,MN:USA.

FUNDING ORGANIZATION(S)
U.S.BUREAU OF MINES

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE PROJECT INVESTIGATED IS UTILIZED FOR EXPERIMENTAL EXCAVATION PURPOSES. THE TRENCH METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES CONVENTIONAL EXPLOSIVE (UNSPECIFIED) . PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE GRANITE . THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES DATA.

R002062 MINE ROOF VIBRATIONS FROM UNDERGROUND BLASTS.
OLSON, J. J. DICK, R. A. CONDON, J. L.
HENDRICKSON, A. D. FOGELSON, D. E.
U. S. BUREAU OF MINES, PITTSBURGH, PA.
55PP., 1970.
(BM-RI-7330)
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
U.S.BUREAU OF MINES,MINNEAPOLIS,MN:USA.

FUNDING ORGANIZATION(S)
U.S.BUREAU OF MINES

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE PROJECT INVESTIGATED IS UTILIZED FOR MINE PURPOSES. THE DRILL AND BLAST (FULL FACE) METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES CONVENTIONAL EXPLOSIVE (UNSPECIFIED) .

R002063 MINE ROOF VIBRATIONS FROM PRODUCTION BLASTS,
SHULLSBURG MINE, SHULLSBURG, WIS.
OLSON, J. J. DICK, R. A. FOGELSON, D. E.
FLETCHER, L. R.
U. S. BUREAU OF MINES, PITTSBURGH, PA.
35PP., 1970.
(BM-RI-7462)
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
U.S.BUREAU OF MINES,MINNEAPOLIS,MN:USA.

FUNDING ORGANIZATION(S)
U.S.BUREAU OF MINES

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE COMPLETED EXCAVATION OF THE EAGLE-PICHER INDUSTRIES SHULLSBURG MINE . THE PROJECT INVESTIGATED IS UTILIZED FOR MINE PURPOSES. THE DRILL AND BLAST (FULL FACE) METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES CONVENTIONAL EXPLOSIVE (UNSPECIFIED) . ROCK TYPES REVIEWED INCLUDE GLASS (ROCK) AND LIMESTONE . THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES (LAB) DATA.

R002064 PREDICTION OF PENETRATION RATE FOR PERCUSSIVE DRILLING.
SELIM, A. A. BRUCE, W. E.
U. S. BUREAU OF MINES, PITTSBURGH, PA.
21PP., 1970.
(BM-RI-7396)
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
U.S.B.M:TWIN CITIES MINING RESEARCH CENTER, MINNEAPOLIS,MN:USA.

FUNDING ORGANIZATION(S)
BUREAU OF MINES,U.S.GOVT.

THIS LAB-THEORETICAL REPORT CONTAINS ORIGINAL DATA. THE PROJECT INVESTIGATED IS UTILIZED FOR EXPERIMENTAL EXCAVATION PURPOSES. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) . GEOSTRUCTURAL CHARACTERISTICS FOR

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THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. THE EXCAVATION CHARACTERISTICS FOR BIWABIK IRON FORMATION, DRESSER BASALT, KASOTA SANDSTONE, MORTON GRANITE GENISS (OR QUARTZ MONZONITE GENISS), ROCKVILLE QUARTZ MONZONITE, SIOUX QUARTZITE (=JASPER QUARTZITE) AND ST.CLOUD(GRAY)GRANODIORITE (=CHARCOAL GREY GRANITE) ARE TREATED. ROCK TYPES REVIEWED INCLUDE BASALT, GRANITE, QUARTZITE, SANDSTONE AND TACONITE . THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES (LAB) DATA.

R002066 TUNNEL BORING TECHNOLOGY: DISK CUTTER EXPERIMENTS IN SEDIMENTARY AND METAMORPHIC ROCKS.
MORRELL, R. J. BRUCE, W. E. LARSON, D. A.
U. S. BUREAU OF MINES, PITTSBURGH, PA.
32PP., 1970.
(BM-RI-7410)
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
U.S.B.M:TWIN CITIES MINING RESEARCH CENTER, MINNEAPOLIS,MN:USA.

FUNDING ORGANIZATION(S)
BUREAU OF MINES.U.S.GOVT.

THIS LAB-THEORETICAL REPORT CONTAINS ORIGINAL DATA. THE PROJECT INVESTIGATED IS UTILIZED FOR EXPERIMENTAL EXCAVATION PURPOSES. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) . GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. THE EXCAVATION CHARACTERISTICS FOR HOLSTON MARBLE (LIMESTONE OR FORMATION)(=TENNESSEE MARBLE), KASOTA SANDSTONE, MANISTIQUE DOLOMITE (OR FORMATION) AND SALEM LIMESTONE ARE TREATED. ROCK TYPES REVIEWED INCLUDE DOLOMITE (ROCK), LIMESTONE, MARBLE AND SANDSTONE . THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES (LAB) DATA.

R002069 TUNNEL BORING TECHNOLOGY: DISK CUTTER EXPERIMENTS IN METAMORPHIC AND INGEOUS ROCKS.
MORRELL, R. J. LARSON, D. A.
U. S. BUREAU OF MINES, PITTSBURGH, PA.
50PP., 1974.
(BM-RI-7961)
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
U.S.BUREAU OF MINES,MINNEAPOLIS,MN:USA.

FUNDING ORGANIZATION(S)
U.S.BUREAU OF MINES

THIS LAB REPORT CONTAINS ORIGINAL DATA. THE PROJECT INVESTIGATED IS UTILIZED FOR EXPERIMENTAL EXCAVATION PURPOSES. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. THE EXCAVATION CHARACTERISTICS FOR DRESSER BASALT, LAC DU BONNET QUARTZ MONZONITE, SIOUX QUARTZITE (=JASPER QUARTZITE) AND ST.CLOUD(GRAY)GRANODIORITE (=CHARCOAL GREY GRANITE) ARE TREATED. PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE BASALT, GRANODIORITE, MONZONITE AND QUARTZITE . THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES (LAB) DATA.

R002073 DATA FOR THE CUTTING OF VERMONT MARBLE WITH CONTINUOUS WATER JETS.
HARRIS, H. D.
INT. J. ROCK MECH. MIN. SCI.
12 (2), 27-31, 1975.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
NATIONAL RESEARCH COUNCIL OF CANADA,OTTAWA,CANADA

THIS LAB REPORT CONTAINS ORIGINAL DATA. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES JET ABRASION (WATER CANNON, CONTINUOUS IMPACT) . GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. THE EXCAVATION CHARACTERISTICS FOR VERMONT MARBLE ARE TREATED. ROCK TYPES REVIEWED INCLUDE MARBLE . THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES (LAB) DATA.

R002077 UNDERWATER SHOCKS DEAL CRUSHING BLOW.
AUTHOR ANON.
IND. RES.
17 (5), 18 AND 20, 1975.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
U.K.ATOMIC ENERGY AUTHORITY,HARWELL,U.K.

THIS LAB-IN-SITU REPORT CONTAINS REVIEW DATA. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES IMPACT ABRASION (ELECTROHYDRAULIC) . ROCK TYPES REVIEWED INCLUDE QUARTZ .

R002078 PROBLEMS IN SHAFT-SINKING.
LANCASTER-JONES, P. F. F.
TUNNELS AND TUNNELLING
7 (4), 26-8, 1975.
LANGUAGE: ENGLISH

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE COMPLETED EXCAVATION OF THE NO.5 SHAFT, VAN DYK (WITWATERSRAND, S.AFRICA) . THE PROJECT INVESTIGATED IS UTILIZED FOR MINE PURPOSES. THE DRILL AND BLAST (FULL FACE) METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES CONVENTIONAL EXPLOSIVE (UNSPECIFIED) . GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON GROUND CONDITIONS AND UNDERGROUND OPENING SUPPORTS AND MATERIALS HANDLING SYSTEM IS ALSO PRESENTED. THE EXCAVATION CHARACTERISTICS FOR WITWATERSRAND QUARTZITE ARE TREATED. ROCK TYPES REVIEWED INCLUDE QUARTZITE .

R002080 UNDER THE TYNE AGAIN.
HARLE, B. A. O'ROURKE, O. I.
TUNNELS AND TUNNELLING
7 (4), 66-70, 1975.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
BRAND,CHARLES AND SON LTD:LONDON,U.K.

FUNDING ORGANIZATION(S)
NORTHUMBRIAN WATER AUTHORITY,U.K.

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE COMPLETED EXCAVATION OF THE TYNE SIPHON SEWER TUNNEL (U.K.) . THE PROJECT INVESTIGATED IS UTILIZED FOR SEWER PURPOSES. THE CAISSON METHOD, DRILL AND BLAST (FULL FACE) METHOD AND SHIELD METHOD REPRESENT THE EXCAVATION TECHNIQUES STUDIED. THE REPORTED FRAGMENTATION METHODS SERVICING PROJECT EFFORTS INCLUDE CONVENTIONAL EXPLOSIVE (UNSPECIFIED), JET ABRASION (WATER-MECHANICAL) AND MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. GEOSTRUCTURAL AND SOIL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON GROUND CONDITIONS AND UNDERGROUND OPENING SUPPORTS IS ALSO PRESENTED.

R002083 EXPERIMENTS IN HYDRAULIC ROCK CUTTING.
HURLBURT, G. H. CROW, S. C. LADE, P. V.
INT. J. ROCK MECH. MIN. SCI.
12 (F), 203-12, 1975.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
CALIFORNIA,UNIVERSITY OF,SCHOOL OF ENGINEERING AND APPLIED
SCIENCE,LOS ANGELES,CA.

FUNDING ORGANIZATION(S)
NATIONAL SCIENCE FOUNDATION,WASHINGTON,D.C.:USA.

THIS LAB REPORT CONTAINS ORIGINAL DATA. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES JET ABRASION (WATER CANNON, CONTINUOUS IMPACT) . GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. THE EXCAVATION CHARACTERISTICS FOR BEREA SANDSTONE AND WILKESON FORMATION (IN PUGET GROUP) ARE TREATED. PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE GRANITE AND SANDSTONE . THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES (LAB) DATA.

R002182 MOLE WITH WATER JETS CHEWS UP GRANITE WITH EASE.
AUTHOR ANON.
ENG. NEWS-REC.
10, 1975.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
FLOW RESEARCH INC:KENT,WA:USA.

FUNDING ORGANIZATION(S)
NATIONAL SCIENCE FOUNDATION AND U.S.BUREAU OF MINES

THIS LAB-IN-SITU REPORT CONTAINS REVIEW DATA. THE PROJECT INVESTIGATED IS UTILIZED FOR EXPERIMENTAL EXCAVATION PURPOSES. THE TBM METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY AND WATER JET) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. TBM EXCAVATION RATE IS ALSO DISCUSSED. ROCK TYPES REVIEWED INCLUDE GRANITE . THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES (LAB) DATA.

R002188 UTILITY TRENCH AT SEA-TAC AIRPORT.
AUTHOR ANON.
WEST. CONSTR.
44 (7), 60, 62, 1969.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
KIEWIT,PETERSONS CO.

THIS IN-SITU REPORT CONTAINS REVIEW DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE ON GOING EXCAVATION OF THE UTILITY TUNNEL, SEATTLE-TACOMA INTERNATIONAL AIRPORT (SEATTLE, WA, USA) . THE PROJECT INVESTIGATED IS UTILIZED FOR ACCESS TUNNEL (OTHER THAN SHAFTS AND AUDITS TO MAIN TUNNELS)) AND UTILITY TUNNEL PURPOSES. THE COMPRESSED AIR METHOD AND CUT AND COVER METHOD REPRESENT THE EXCAVATION TECHNIQUES STUDIED. PERTINENT INFORMATION ON UNDERGROUND OPENING SUPPORTS AND MATERIALS HANDLING SYSTEM IS ALSO PRESENTED.

R002208 KEMANO PENSTOCK TUNNEL LINER BACKFILLED WITH PREPACKED CONCRETE.
DAVIS, R. E., JR. JOHNSON, G. D.
WENDELL, G. E.
J. AMER. CONCR. INST.
52, 287-308, 1955.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
MORRISON-KNUDSON CO.OF CANADA LTD.

FUNDING ORGANIZATION(S)
ALUMINIUM COMPANY OF CANADA

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE COMPLETED EXCAVATION OF THE PENSTOCK TUNNEL, KEMANO SCHEME (KEMANO, BRITISH COLUMBIA, CANADA) . THE PROJECT INVESTIGATED IS UTILIZED FOR HYDROELECTRIC PURPOSES. THE DRILL AND BLAST (FULL FACE) METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES CONVENTIONAL EXPLOSIVE (DYNAMITE) . PERTINENT INFORMATION ON UNDERGROUND OPENING SUPPORTS IS ALSO PRESENTED.

R002211 WORLD'S LARGEST UNDERGROUND POWER PLANT.
WISE, L. L.
ENG. NEWS-REC.
149, 31-6, 1952.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
MORRISON-KNUDSON CO.OF CANADA LTD.

FUNDING ORGANIZATION(S)
ALUMINIUM COMPANY OF CANADA

THIS IN-SITU REPORT CONTAINS REVIEW DATA. THE UNDERGROUND OPENINGS DISCUSSED INCLUDE THE ON GOING EXCAVATION OF THE ACCESS TUNNEL, UNDERGROUND POWER HOUSE, KEMANO SCHEME (KEMANO, BRITISH COLUMBIA, CANADA), THE ON GOING EXCAVATION OF THE BYPASS TUNNEL, UNDERGROUND POWER HOUSE, KEMANO SCHEME

(CONTINUED)

(KEMANO, BRITISH COLUMBIA, CANADA), THE ON GOING EXCAVATION OF THE EXPLORATORY TUNNEL FOR UNDERGROUND POWER HOUSE, KEMANO SCHEME, (KEMANO, BRITISH COLUMBIA, CANADA), THE ON GOING EXCAVATION OF THE FIRST TRANSVERSE DRIFT, UNDERGROUND POWER HOUSE, KEMANO SCHEME, (KEMANO, BRITISH COLUMBIA, CANADA), THE ON GOING EXCAVATION OF THE PENSTOCK TUNNEL, KEMANO SCHEME (KEMANO, BRITISH COLUMBIA, CANADA), THE ON GOING EXCAVATION OF THE POWER TUNNEL, KEMANO SCHEME (KEMANO, BRITISH COLUMBIA, CANADA), THE ON GOING EXCAVATION OF THE SECOND TRANSVERSE DRIFT, UNDERGROUND POWER HOUSE, KEMANO SCHEME, (KEMANO, BRITISH COLUMBIA, CANADA), THE ON GOING EXCAVATION OF THE TAILRACE TUNNEL, UNDERGROUND POWER HOUSE, KEMANO SCHEME (KEMANO, BRITISH COLUMBIA, CANADA), THE ON GOING EXCAVATION OF THE UNDERGROUND POWER HOUSE, KEMANO SCHEME, (KEMANO, BRITISH COLUMBIA, CANADA), THE ON GOING EXCAVATION OF THE UNIT PENSTOCK TUNNELS, KEMANO SCHEME (KEMANO, BRITISH COLUMBIA, CANADA), THE ON GOING EXCAVATION OF THE UNIT TAILRACE TUNNELS, KEMANO SCHEME (KEMANO, BRITISH COLUMBIA, CANADA) AND THE ON GOING EXCAVATION OF THE VALVE CHAMBER TUNNEL, UNDERGROUND POWER HOUSE, KEMANO SCHEME, (KEMANO, BRITISH COLUMBIA, CANADA) . THE PROJECTS INVESTIGATED ARE UTILIZED FOR EXPLORATORY TUNNEL AND HYDROELECTRIC PURPOSES. THE DRILL AND BLAST (FULL FACE) METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES CONVENTIONAL EXPLOSIVE (DYNAMITE) . THIS DOCUMENT INCORPORATES ADDITIONALLY DRILLING EQUIPMENT CHARACTERISTICS. EXCAVATION ADVANCEMENT RATE IS ALSO DISCUSSED. PERTINENT INFORMATION ON UNDERGROUND OPENING SUPPORTS AND MATERIALS HANDLING SYSTEM IS ALSO PRESENTED. PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE DIORITE .

R002216 THE BENTONITE TUNNELLING MACHINE.
BARTLETT, J. V. BIGGART, A. R.
TRIGGS, R. L.
PROC. INST. CIVIL ENG.
54 (PT. 1), 605-24, 1973.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
NUTTAL,ED,LTD;LONDON,U.K.

FUNDING ORGANIZATION(S)
LONDON TRANSPORT EXECUTIVE AND NATIONAL RESEARCH DEVELOPMENT CORP;LONDON,U.K.

THIS LAB-IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE COMPLETED EXCAVATION OF THE NEW CROSS TUNNEL (U.K.) . THE PROJECT INVESTIGATED IS UTILIZED FOR EXPERIMENTAL EXCAVATION PURPOSES. THE SHIELD (USING SLURRY) METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. TBM EXCAVATION RATE IS ALSO DISCUSSED. GEOSTRUCTURAL AND SOIL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON UNDERGROUND OPENING SUPPORTS AND MATERIALS HANDLING SYSTEM IS ALSO PRESENTED.

R002403 WORLD'S LONGEST ALIMAK RAISE.
AUTHOR ANON.
CAN. MINING J.
93 (11), 69, 1972.
LANGUAGE:ENGLISH

PERFORMING ORGANIZATION(S)
ASTRUP AND AUBERT A/S,OSLO,NORWAY

THIS IN-SITU REPORT CONTAINS ABSTRACTED ONLY DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE COMPLETED EXCAVATION OF THE BORGUND WATER POWER PLANT, PENSTOCK FOR (LAERDALSELVEN, , NORWAY) . THE PROJECT INVESTIGATED IS UTILIZED FOR HYDROELECTRIC PURPOSES. THE DRILL AND BLAST (OTHER THAN FULL FACE) METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES CONVENTIONAL EXPLOSIVE (UNSPECIFIED) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS.

R002409 UNDERGROUND HYDRO PLANT BOOSTS.
JOHANSON, E. A.

(CONTINUED)

ELEC. WORLD
139, 130-3, 1953.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
RIO DE JANEIRO TRAMWAY,LIGHT AND POWER CO., BRAZIL

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENINGS DISCUSSED INCLUDE THE ON GOING EXCAVATION OF THE PARAIBA-PIRAI PROJECT., FORCACAVA UNDERGRCUND POWER STATION INLET TUNNEL (FORCACAVA, BRAZIL), THE ON GOING EXCAVATION OF THE PARAIBA-PIRAI PROJECT., FORCACAVA UNDERGROUND POWER STATION (FORCACAVA, BRAZIL) AND THE ON GOING EXCAVATION OF THE PARAIBA-PIRAI PROJECT., FORCACAVA UNDERGROUND POWER STATION ACCESS TUNNEL (FORCACAVA, BRAZIL) . THE PROJECTS INVESTIGATED ARE UTILIZED FOR ACCESS TUNNEL (SHAFTS AND ADITS TO MAIN OPENING), HYDROELECTRIC AND UNDERGROUND POWER STATION PURPOSES. THE UNSPECIFIED METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED.

R002414 CLIFF CLIMBER PROTECTS A POWERPLANT.
AUTHOR ANON.
ENG. NEWS-REC.
28, 1968.
LANGUAGE:ENGLISH

PERFORMING ORGANIZATION(S)
DESOURDY CONSTRUCTION LTD;MONTREAL,CANADA

FUNDING ORGANIZATION(S)
TWIN FALLS POWER CORP.,LTD;CANADA

THIS IN-SITU REPORT CONTAINS ABSTRACTED ONLY DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE COMPLETED EXCAVATION OF THE TWIN FALLS POWER PROJECT, PENSTOCK OF (CENTRAL LABRADOR, CANADA) . THE PROJECT INVESTIGATED IS UTILIZED FOR HYDROELECTRIC PURPOSES. THE DRILL AND BLAST (OTHER THAN FULL FACE) METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES CONVENTIONAL EXPLOSIVE (FORCITE) . PERTINENT INFORMATION ON UNDERGROUND OPENING SUPPORTS AND MATERIALS HANDLING SYSTEM IS ALSO PRESENTED. PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE GNEISS .

R002477 PILOT BORE IS TEST ARENA FOR WORLD'S LONGEST RAILWAY TUNNEL.
AUTHOR ANON.
ENG. NEWS-REC.
184 (20), 30-1, 1970.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
JAPAN RAILWAY CONSTRUCTION PUBLIC CORP;SEIKAN TUNNEL RESEARCH OFFICE,TOKYO,JAPAN

THIS IN-SITU REPORT CONTAINS ABSTRACTED ONLY DATA. THE UNDERGROUND OPENINGS DISCUSSED INCLUDE THE ON GOING EXCAVATION OF THE BRANCH TUNNELS FROM PILOT BORE, HOKKAIDO END, HONSHU-HOKKAIDO RAILWAY CONNECTION (ALSO CALLED SEIKAN UNDERSEA TUNNEL) (JAPAN), THE COMPLETED EXCAVATION OF THE INCLINED SHAFT FOR SEIKAN UNDERSEA TUNNEL, HONSHU SIDE (JAPAN), THE COMPLETED EXCAVATION OF THE INCLINED SHAFT FOR SEIKAN UNDERSEA TUNNEL, HOKKAIDO SIDE (JAPAN), THE ON GOING EXCAVATION OF THE PILOT TUNNELS FOR HONSHU-HOKKAIDO RAILWAY CONNECTION (ALSO CALLED SEIKAN UNDERSEA TUNNEL) (JAPAN), THE ON GOING EXCAVATION OF THE PILOT TUNNEL FOR HONSHU-HOKKAIDO RAILWAY CONNECTION (ALSO CALLED SEIKAN UNDERSEA TUNNEL), HONSHU SIDE (JAPAN), THE ON GOING EXCAVATION OF THE PILOT TUNNEL FOR HONSHU-HOKKAIDO RAILWAY CONNECTION (ALSO CALLED SEIKAN UNDERSEA TUNNEL), HOKKAIDO SIDE (JAPAN), THE ON GOING EXCAVATION OF THE SERVICE TUNNEL, SEIKAN UNDERSEA TUNNEL (JAPAN) AND THE ON GOING EXCAVATION OF THE SIDE TRACK TUNNEL, HOKKAIDO SIDE FOR HONSHU-HOKKAIDO RAILWAY CONNECTION (ALSO CALLED SEIKAN UNDERSEA TUNNEL) (JAPAN) . THE PROJECTS INVESTIGATED ARE UTILIZED FOR ACCESS TUNNEL (SHAFTS AND ADITS TO MAIN OPENING), EXPLORATORY TUNNEL AND SERVICE TUNNEL PURPOSES. THE TBM METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. TBM EXCAVATION RATE IS ALSO DISCUSSED. GEOSTRUCTURAL CHARACTERISTICS FOR THE

(CONTINUED)

REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON GROUND CONDITIONS AND MATERIALS HANDLING SYSTEM IS ALSO PRESENTED. PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE ANDESITE AND VOLCANICS . THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES (LAB) DATA.

R002537 NEW POWERFUL RAISE BORERS.
AUTHOR ANON.
MINING MAG.
130 (4), 299-301, 1974.
LANGUAGE: ENGLISH

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE COMPLETED EXCAVATION OF THE TEST RAISE-SUDBURY MINE (INCO), (SUDBURY, ONTARIO, CANADA) . THE PROJECT INVESTIGATED IS UTILIZED FOR EXPERIMENTAL EXCAVATION PURPOSES. THE RAISE DRIVING (BORING MACHINES) METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) .

R002534 AN EFFICIENT RIPPING OPERATION AT MONKTONHALL.
AUTHOR ANON.
MINE QUARRY
3 (6), 9, 1974.
LANGUAGE: ENGLISH

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE ON GOING EXCAVATION OF THE NO.1 SOUTH FACE-STAIRHEAD SEAM, MONKTONHALL COLLIERY (SCOTLAND, U.K.) . THE PROJECT INVESTIGATED IS UTILIZED FOR MINE PURPOSES. THE DRILL AND BLAST (FULL FACE) METHOD AND LONGWALL CUTTING MACHINE METHOD REPRESENT THE EXCAVATION TECHNIQUES STUDIED. THE REPORTED FRAGMENTATION METHODS SERVICING PROJECT EFFORTS INCLUDE CONVENTIONAL EXPLOSIVE (UNSPECIFIED) AND MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. PERTINENT INFORMATION ON MATERIALS HANDLING SYSTEM IS ALSO PRESENTED.

R002579 DRIVING LONGEST VERTICAL RAISE.
AUTHOR ANON.
WORLD MINING
27 (10), 59, 1974.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
RAISE CONTRACTING LTD:CANADA

FUNDING ORGANIZATION(S)
DENISON (URANIUM)MINES LTD:CANADA

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE COMPLETED EXCAVATION OF THE VERTICAL AIRWAY, DENISON MINE (ROMAN ISLAND, QUIRKE LAKE, ONTARIO, CANADA) . THE PROJECT INVESTIGATED IS UTILIZED FOR PILOT BORE AND VENTILATION PURPOSES. THE DRILL AND BLAST (FULL FACE) METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES CONVENTIONAL EXPLOSIVE (POWERMEX-C) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS.

R002631 GIANT MOLE SPEEDS MANGLA'S FIVE DIVERSION TUNNELS.
HARDER, P. B.
ROADS STREETS
69, 72, 81-2, 1965.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
MANGLA DAM CONTRACTORS
1.ATKINSON,GUY F., COMPANY
2.CHICAGO BRIDGE AND IRON CO.,
3.GROVES,S.J.,AND SONS
4.HARNEY,CHARLES J., COMPANY
5.LANGENFELDER,C.J.,AND SON
6.OSTRANDER CONSTRUCTION COMPANY
7.TRIPPEER,R.A.,COMPANY
8.WALSH CONSTRUCTION COMPANY

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENINGS DISCUSSED INCLUDE THE ON GOING EXCAVATION OF THE MANGLA DAM PROJECT., DIVERSION TUNNELS (PAKISTAN) AND THE ON GOING EXCAVATION OF THE SEATTLE INTERCEPTOR SEWER (SEATTLE, WA, U.S.A.) . THE

(CONTINUED)

PROJECTS INVESTIGATED ARE UTILIZED FOR DIVERSION TUNNEL AND HYDROELECTRIC PURPOSES. THE TBM METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. PERTINENT INFORMATION ON UNDERGROUND OPENING SUPPORTS IS ALSO PRESENTED.

R002632 SOVIET SHAFT BORER HAS UNIQUE HEAD.
SHAVKUN, B.
ENG. MINING J.
160 (8), 89-90, 1959.
LANGUAGE:ENGLISH

THIS IN-SITU AND LAB REPORT CONTAINS ABSTRACTED ONLY DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE ON GOING EXCAVATION OF THE SARANSKAYA MINE NO.122 (USSR) . THE PROJECT INVESTIGATED IS UTILIZED FOR EXPERIMENTAL EXCAVATION AND MINE PURPOSES. THE TBM METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. TBM EXCAVATION RATE IS ALSO DISCUSSED. GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON MATERIALS HANDLING SYSTEM IS ALSO PRESENTED. THE EXCAVATION CHARACTERISTICS FOR URAL LIMESTONE ARE TREATED. PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE LIMESTONE . THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES (LAB) DATA.

R002646 FIRST UNDERGROUND POWER PLANT.
AUTHOR ANON.
ENG. NEWS-REC.
147, 38, 1951.
LANGUAGE:ENGLISH

THIS IN-SITU REPORT CONTAINS ABSTRACTED ONLY DATA. THE UNDERGROUND OPENINGS DISCUSSED INCLUDE THE COMPLETED EXCAVATION OF THE SNOQUALMIE FALLS UNDERGROUND POWER HOUSE(WA., USA) AND THE COMPLETED EXCAVATION OF THE TAILRACE TUNNEL, SNOQUALMIE FALLS U THE PROJECTS INVESTIGATED ARE UTILIZED FOR HYDROELECTRIC PURPOSES. ROCK TYPES REVIEWED INCLUDE ROCK (UNSPECIFIED) .

R002649 THE CANON DEL PATO HYDROELECTRIC PROJECT, PERU HARNESSES A PLUNGING RIVER.
AUTHOR ANON.
ENG. NEWS-REC.
157, 51-48 1956.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
1.CORPORATION PERUANA DEL SANTA:PERU
2.SOCIETE D'EXPLOITATIONS INDUSTRIELLES:FRANCE

THIS IN-SITU REFORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENINGS DISCUSSED INCLUDE THE ON GOING EXCAVATION OF THE CANON DEL PATO HYDROELECTRIC PROJECT., MAIN TUNNEL (HUALLANCA, PERU), THE ON GOING EXCAVATION OF THE CANON DEL PATO HYDROELECTRIC PROJECT., POWER SHAFTS (HUALLANCA, PERU), THE ON GOING EXCAVATION OF THE CANON DEL PATO HYDROELECTRIC PROJECT., UNDERGROUND POWERHOUSE (HUALLANCA, PERU) AND THE ON GOING EXCAVATION OF THE CANON DEL PATO HYDROELECTRIC PROJECT., TAILRACE TUNNEL (HUALLANCA, PERU) . THE PROJECTS INVESTIGATED ARE UTILIZED FOR HYDROELECTRIC, OUTLET (DAMS) AND UNDERGROUND POWER STATION PURPOSES. THE UNSPECIFIED METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. PERTINENT INFORMATION ON UNDERGROUND OPENING SUPPORTS IS ALSO PRESENTED. ROCK TYPES REVIEWED INCLUDE GRANITE .

R002694 STOPE BORING TECHNIQUE IN SOUTH AFRICAN GOLD MINING.
AUTHOR ANON.
MINING MAG.
132 (3), 206-7, 1975.
LANGUAGE:ENGLISH

FUNDING ORGANIZATION(S)
RAND MINES LTD:S.AFRICA

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE ON GOING EXCAVATION OF THE WEST DRIEFONTEIN MINE (W.RAND,

(CONTINUED)

S.AFRICA) . THE PROJECT INVESTIGATED IS UTILIZED FOR MINE PURPOSES. THE RAISE DRIVING (BORING MACHINES) METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) .

R002730 MOLE TUNNELING RESEARCH ADVOCATED.
AUTHOR ANON.
CIVIL ENG.
48-9, 1967.
LANGUAGE:ENGLISH

PERFORMING ORGANIZATION(S)
FENIX AND SCISSON INC., TULSA,OK

FUNDING ORGANIZATION(S)
U.S.BUREAU OF RECLAMATION

THIS IN-SITU REPORT CONTAINS REVIEW DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE COMPLETED EXCAVATION OF THE NAVAJO IRRIGATION PROJECT (NM., USA) . THE PROJECT INVESTIGATED IS UTILIZED FOR IRRIGATION PURPOSES. THE TBM METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS.

R002779 THE DEVELOPMENTAL CHALLENGE AT NICE.
LIAUTAUD, M.
TUNNELS AND TUNNELLING
8 (2), 8-10, 1976.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
NICE,CITY OF AND ESIP,NICE,FRANCE

FUNDING ORGANIZATION(S)
NICE,CITY OF,NICE,FRANCE

THIS IN-SITU-THEORETICAL REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE PROPOSED EXCAVATION OF THE HIGHWAY TUNNELS, NORTH AND SOUTH URBAN MOTORWAYS (NICE, FRANCE) . THE PROJECT INVESTIGATED IS UTILIZED FOR TWIN HIGHWAY PURPOSES. THE UNSPECIFIED METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED.

R002780 BREAKTHROUGH IMMINENT AT ST. GOTTHARD.
NCONE, T.
TUNNELS AND TUNNELLING
8 (2), 14-6, 1976.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
ST.GOTTHARD (N.SECTION) CONSORTIUM
1.HAU AG,ERSTFELD
2.HATT-HALLER,AG HEINR,ZURICH
3.SCHAFIR AND MUGGLIN AG,LIESTAL
4.SUBALPANIA SA (G TORNO AND CIE SA),LUGANO
6.VALENTIN SICHER AG,GURTNELLEN
7.ZSCHOKKE,AG CONRAD,ZURICH
8.ZUBLIN,ED,AND CIE AG,ZURICH

FUNDING ORGANIZATION(S)
FEDERAL BUREAU FOR ROADS AND WATERWORKS,SWITZERLAND

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENINGS DISCUSSED INCLUDE THE COMPLETED EXCAVATION OF THE BAZBERG INCLINED SHAFT FOR ST.GOTTHARD TUNNEL (SWITZERLAND), THE COMPLETED EXCAVATION OF THE SAFETY TUNNEL (N.SECTION) OF ST. GOTTHARD TUNNEL (SWITZERLAND), THE COMPLETED EXCAVATION OF THE SAFETY TUNNEL (S.SECTION) OF ST.GOTTHARD TUNNEL (SWITZERLAND), THE ON GOING EXCAVATION OF THE ST. GOTTHARD TUNNEL (SWITZERLAND-ITALY) AND ST. GOTTHARD TUNNEL (NORTH HEADING) (SWITZERLAND) . THE PROJECTS INVESTIGATED ARE UTILIZED FOR SAFETY, TWIN HIGHWAY AND VENTILATION PURPOSES. THE DRILL AND BLAST (FULL FACE) METHOD AND SHIELD METHOD REPRESENT THE EXCAVATION TECHNIQUES STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES CONVENTIONAL EXPLOSIVE (UNSPECIFIED) . GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON UNDERGROUND OPENING SUPPORTS AND MATERIALS HANDLING SYSTEM IS ALSO PRESENTED. PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE GNEISS, GRANITE AND PARAGNEISS .

R002781 SNOWDONIA POWERHOUSE.
NEALE, P.
TUNNELS AND TUNNELLING
8 (2), 20-2, 1976.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
THYSSEN (GREAT BRITAIN)LTD.
HOWLEM (SCOTLAND) LTD;U.K.
1.BRAND,ALFRED
2.MCALPINE,CHARLES
3.ZSCHOKKE,CONRAD

FUNDING ORGANIZATION(S)
CENTRAL ELECTRICITY GENERATING BOARD,U.K.

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENINGS DISCUSSED INCLUDE THE COMPLETED EXCAVATION OF THE ACCESS TUNNEL, DINORWIC PROJECT (SNOWDONIA, WALES, U.K.), THE PROPOSED EXCAVATION OF THE DIVERSION TUNNEL, DINORWIC PROJECT (SNOWDONIA, WALES, U.K.), THE ON GOING EXCAVATION OF THE HIGH PRESSURE TUNNEL, DINORWIC PROJECT (SNOWDONIA, WALES, U.K.), THE ON GOING EXCAVATION OF THE LOW PRESSURE TUNNEL, DINORWIC PROJECT (SNOWDONIA, WALES, U.K.), THE ON GOING EXCAVATION OF THE MACHINE HALL, DINORWIC PROJECT (SNOWDONIA, WALES, U.K.), THE PROPOSED EXCAVATION OF THE OUTFALL TUNNELS, DINORWIC PROJECT (SNOWDONIA, WALES, U.K.), THE PROPOSED EXCAVATION OF THE PENSTOCK TUNNELS, DINORWIC PROJECT (SNOWDONIA, WALES, U.K.), THE ON GOING EXCAVATION OF THE PLANT TUNNEL, DINORWIC PROJECT(SNOWDONIA, WALES, U.K.), THE PROPOSED EXCAVATION OF THE SURGE SHAFT, DINORWIC PROJECT (SNOWDONIA, WALES, U.K.), THE PROPOSED EXCAVATION OF THE TAILRACE TUNNELS, DINORWIC PROJECT (SNOWDONIA, WALES, U.K.), THE ON GOING EXCAVATION OF THE TRANSFORMER HALL, DINORWIC PROJECT (SNOWDONIA, WALES, U.K.), THE ON GOING EXCAVATION OF THE VENTILATION SHAFT, DINORWIC PROJECT (SNOWDONIA, WALES, U.K.) AND THE ON GOING EXCAVATION OF THE VERTICAL HIGH PRESSURE SHAFT, DINORWIC PROJECT (SNOWDONIA, WALES, U.K.) . THE PROJECTS INVESTIGATED ARE UTILIZED FOR FOUNDATION TREATMENT PURPOSES. THE DRILL AND BLAST (FULL FACE) METHOD AND PILOT BORE-CENTER METHOD REPRESENT THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES CONVENTIONAL EXPLOSIVE (UNSPECIFIED) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. TBM EXCAVATION RATE IS ALSO DISCUSSED. PERTINENT INFORMATION ON UNDERGROUND OPENING SUPPORTS AND MATERIALS HANDLING SYSTEM IS ALSO PRESENTED. ROCK TYPES REVIEWED INCLUDE SLATE .

R002782 BOULBY IN FULL SWING THIS YEAR.
SALTER, T.
TUNNELS AND TUNNELLING
8 (2), 26-7, 1976.
LANGUAGE: ENGLISH

FUNDING ORGANIZATION(S)
CLEVELAND POTASH LTD;YORKSHIRE,U.K.

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENINGS DISCUSSED INCLUDE THE ON GOING EXCAVATION OF THE BOULBY MINE (CLEVELAND POTASH LTD.) (BOULBY, YORKSHIRE, UK), THE COMPLETED EXCAVATION OF THE BOULBY POTASH MINE, SHAFT NO.1 (BOULBY, YORKSHIRE, U.K.) AND THE COMPLETED EXCAVATION OF THE BOULBY POTASH MINE, SHAFT NO.2 (BOULBY, YORKSHIRE, U.K.) . THE PROJECTS INVESTIGATED ARE UTILIZED FOR MINE PURPOSES. THE DRILL AND BLAST (FULL FACE) METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES CONVENTIONAL EXPLOSIVE (UNSPECIFIED) . GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON GROUND CONDITIONS AND UNDERGROUND OPENING SUPPORTS AND MATERIALS HANDLING SYSTEM IS ALSO PRESENTED. THE EXCAVATION CHARACTERISTICS FOR BUNTER SANDSTONE, KEUPER MARL FORMATION, LIAS SHALE AND PERMIAN EVAPORITE FORMATION ARE TREATED. ROCK TYPES REVIEWED INCLUDE MARL, POTASH, SANDSTONE AND SHALE .

R002783 KIELDER WELL UNDER WAY.
NEALE, P.
TUNNELS AND TUNNELLING

(CONTINUED)

8 (2), 34-5, 1976.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
TYNE TEES TUNNELING CONSORTIUM (TTT)
1.HARESEL,C;STUTTGART
2.MONK,A AND CO;WARRINGTON
3.SWISS ALUMINUM MINING (UK) LTD.
4.ZUBLIN,E.D.,AG,STUTTGART

FUNDING ORGANIZATION(S)
NORTHUMBRIAN WATER AUTHORITY,U.K.

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENINGS DISCUSSED INCLUDE THE PROPOSED EXCAVATION OF THE AIR SHAFT, NORTHERN TUNNEL, KIELDER WATER SCHEME (SHERBERRY, ENGLAND, U.K.), THE COMPLETED EXCAVATION OF THE NORTHERN TUNNEL, KIELDER WATER SCHEME (U.K.), THE PROPOSED EXCAVATION OF THE NORTHERN TUNNEL, KIELDER WATER SCHEME (U.K.), THE COMPLETED EXCAVATION OF THE SOUTHERN TUNNEL, KIELDER WATER SCHEME (U.K.) AND THE ON GOING EXCAVATION OF THE SOUTHERN TUNNEL, KIELDER WATER SCHEME (U.K.) . THE PROJECTS INVESTIGATED ARE UTILIZED FOR VENTILATION AND WATER SUPPLY TUNNEL PURPOSES. THE DRILL AND BLAST (FULL FACE) METHOD AND TBM METHOD REPRESENT THE EXCAVATION TECHNIQUES STUDIED. THE REPORTED FRAGMENTATION METHODS SERVICING PROJECT EFFORTS INCLUDE CONVENTIONAL EXPLOSIVE (UNSPECIFIED) AND MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON UNDERGROUND OPENING SUPPORTS AND MATERIALS HANDLING SYSTEM IS ALSO PRESENTED. ROCK TYPES REVIEWED INCLUDE COAL, LIMESTONE, MUDSTONE AND SANDSTONE .

R002784 BREAKTHROUGH ON THE MAJES PROJECT.
AUTHOR ANON.
TUNNELS AND TUNNELLING
8 (1), 20, 1976.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
MAJES CONSORTIUM
1.AB SKANSKA CEMENTJUTERIET,SWEDEN
2.CONCORD CONSTRUCTION LTD;SOUTH AFRICA
3.ENTRECANALES Y TRAVERA SA,SPAIN
4.MACOM
6.TARMAC CONSTRUCTION LTD;U.K.
7.THE FOUNDATION CO. OF CANADA LTD;CANADA

FUNDING ORGANIZATION(S)
GOVT.OF PERU,DIRECCION EJECTIVE DEL PROYEETE ESPECIAL MAJES

THIS IN-SITU REPORT CONTAINS REVIEW DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE ON GOING EXCAVATION OF THE TUNNELS OF THE MAJES PROJECT (PERU) . THE PROJECT INVESTIGATED IS UTILIZED FOR IRRIGATION PURPOSES. PERTINENT INFORMATION ON MATERIALS HANDLING SYSTEM IS ALSO PRESENTED.

R002785 A $10 MILLION TUNNEL NEARS COMPLETION.
AUTHOR ANON.
TUNNELS AND TUNNELLING
8 (1), 20-1, 1976.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
PEARSON BRIDGE (NSW) PRIVATE LTD;AUSTRALIA

FUNDING ORGANIZATION(S)
NEW SOUTH WALES,DEPT.OF MAIN ROADS,AUSTRALIA

THIS IN-SITU REPORT CONTAINS REVIEW DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE ON GOING EXCAVATION OF THE KINGS CROSS TUNNEL (SYDNEY, NSW., AUSTRALIA) . THE PROJECT INVESTIGATED IS UTILIZED FOR TWIN HIGHWAY PURPOSES. THE CUT AND COVER METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED.

R002786 WORKING WELL AT ARLBERG.
AUTHOR ANON.
TUNNELS AND TUNNELLING
8 (1), 21, 1976.
LANGUAGE: ENGLISH

(CONTINUED)

PERFORMING ORGANIZATION(S)
1.IL-BAU,SPITTAL/DRAU
2.INNERERER AND MAYER,INNSBRUCK
3.OBERANZMEYER,RIINNSBRUCK
4.SORAVIA,SPITTAL/DRAU
1.IL-BAU,SPITTAL/DRAU
2.INNERERER AND MAYER,INNSBRUCK
3.OBERANZMEYER,RIINNSBRUCK
4.SIK AND COMPANY,LEOBEN
5.SORAVIA,SPITTAL/DRAU
1.HINTEREGGER,SALZBURG/BREGENZ
2.JAGER,SCHRUNS
3.MAYRECER AND KRAUS,SALZBURG
4.PORR,VIENNA
5.RELLA,VIENNA
6.UNION-BAU,VIENNA
7.UNIVERSALE,VIENNA
1.OEILMANN AND HANIEL,DORTMUND
2.GERHAROT AND KOENIG,ESSEN
3.PORR,VIENNA
4.UNIVERSALE,VIENNA

THIS IN-SITU REPORT CONTAINS REVIEW DATA. THE UNDERGROUND OPENINGS DISCUSSED INCLUDE THE ON GOING EXCAVATION OF THE ALBERG TUNNEL (EASTERN SECTION) (AUSTRIA), THE ON GOING EXCAVATION OF THE ALBERG TUNNEL (WESTERN SECTION) (AUSTRIA), THE ON GOING EXCAVATION OF THE ALBONA SHAFT OF ALBERG TUNNEL (AUSTRIA) AND THE COMPLETED EXCAVATION OF THE HAIENWASEN SHAFT OF ALBERG TUNNEL (AUSTRIA) . THE PROJECTS INVESTIGATED ARE UTILIZED FOR TWIN HIGHWAY PURPOSES. THE DRILL AND BLAST (FULL FACE) METHOD, HEADING AND BENCH METHOD AND PILOT BORE-CROWN METHOD REPRESENT THE EXCAVATION TECHNIQUES STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES CONVENTIONAL EXPLOSIVE (UNSPECIFIED) . THIS DOCUMENT INCORPORATES ADDITIONALLY DRILLING EQUIPMENT AND TUNNELING MACHINE CHARACTERISTICS. PERTINENT INFORMATION ON MATERIALS HANDLING SYSTEM IS ALSO PRESENTED.

R002787 GROUND FREEZING AT GRAIN.
AUTHOR ANON.
TUNNELS AND TUNNELLING
8 (1), 23-4, 1976.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
LAING,JOHN CONSTRUCTION LTD;U.K.

FUNDING ORGANIZATION(S)
CENTRAL ELECTRICITY GENERATING BOARD,U.K.

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENINGS DISCUSSED INCLUDE THE COMPLETED EXCAVATION OF THE COOLING WATER INTAKE TUNNEL NO.1, ISLE OF GRAIN POWER STATION (U.K.) AND THE COMPLETED EXCAVATION OF THE COOLING WATER INTAKE TUNNEL NO.2, ISLE OF GRAIN POWER STATION (U.K.) . THE PROJECTS INVESTIGATED ARE UTILIZED FOR WATER CONVEYANCE (OTHER THAN WATER SUPPLY) PURPOSES. THE SHIELD METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. TBM EXCAVATION RATE IS ALSO DISCUSSED. GEOSTRUCTURAL AND SOIL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON GROUND CONDITIONS AND UNDERGROUND OPENING SUPPORTS IS ALSO PRESENTED.

R002788 IMMERSED-TUBES AND THE TEES.
CULVERWELL, D. R.
TUNNELS AND TUNNELLING
8 (1), 27-31, 1976.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
FREEMAN FOX AND PARTNERS,U.K.

FUNDING ORGANIZATION(S)
CLEVELAND COUNTY COUNCIL,U.K.

THIS IN-SITU-THEORETICAL AND IN-SITU REPORT CONTAINS ORIGINAL AND REVIEW DATA. THE UNDERGROUND OPENINGS DISCUSSED INCLUDE THE COMPLETED EXCAVATION OF THE BALTIMORE HARBOUR TUNNEL (BALTIMORE, MD., USA), THE COMPLETED EXCAVATION OF THE BALTIMORE CHANNEL TUNNEL (CHESAPEAKE BAY, VA., USA), THE COMPLETED EXCAVATION

(CONTINUED)

OF THE BANKHEAD TUNNEL (AL., USA), THE COMPLETED EXCAVATION OF THE BAYTOWN TUNNEL (TX., USA), THE COMPLETED EXCAVATION OF THE BAY AREA RAPID TRANSIT PROJECT (BART) (SECTION UNSPECIFIED) (SAN FRANCISCO, CA., USA), THE COMPLETED EXCAVATION OF THE BENELUX TUNNEL (ROTTERDAM, NETHERLANDS), THE COMPLETED EXCAVATION OF THE CODEN TUNNEL (AMSTERDAM, NETHERLANDS), THE COMPLETED EXCAVATION OF THE CROSS-HARBOUR TUNNEL (HONGKONG), THE COMPLETED EXCAVATION OF THE DEAS ISLAND TUNNEL (VANCOUVER, BRITISH COLUMBIA,, CANADA), THE COMPLETED EXCAVATION OF THE DETROIT-WINDSOR TUNNEL (USA-CANADA), THE COMPLETED EXCAVATION OF THE DETROIT RIVER TUNNEL (MICHIGAN-ONTARIO, USA-CANADA), THE COMPLETED EXCAVATION OF THE EAST 63RD STREET TUNNEL (NEW YORK, NY., USA), THE COMPLETED EXCAVATION OF THE ELBE TUNNEL (HAMBURG, W.GERMANY), THE COMPLETED EXCAVATION OF THE ELIZABETH RIVER TUNNEL (2ND) (VA., USA), THE COMPLETED EXCAVATION OF THE ELIZABETH RIVER TUNNEL (1ST) (VA., USA), THE COMPLETED EXCAVATION OF THE FREIDRICHSHAFEN TUNNEL (BERLIN, GERMANY), THE COMPLETED EXCAVATION OF THE HAMPTON ROADS TUNNEL (VA., USA), THE COMPLETED EXCAVATION OF THE HARLEM RIVER TUNNEL (NEW YORK, NY., USA.), THE COMPLETED EXCAVATION OF THE HAVANA TUNNEL (HAVANA, CUBA), THE COMPLETED EXCAVATION OF THE HEINENOORD TUNNEL (BARENDRECHT, NETHERLANDS), THE COMPLETED EXCAVATION OF THE IJ RIVER TUNNEL (AMSTERDAM, HOLLAND, NETHERLANDS), THE COMPLETED EXCAVATION OF THE I-10 MOBILE RIVER TUNNEL (ALABAMA, USA), THE COMPLETED EXCAVATION OF THE KEIHINICANAL) TUNNEL, (KAWASAKI, JAPAN), THE COMPLETED EXCAVATION OF THE LAFONTAINE BRIDGE TUNNEL (ALSO CALLED LOUIS-HIPPOLYTE OR BOUCHERVILLE TUNNEL) (MONTREAL, QUEBEC, CON.) BOUCHERVILLE TUNNEL) (MONTREAL, QUEBEC, CANADA), THE COMPLETED EXCAVATION OF THE LIMFJORD TUNNEL (ARLBORG THE COMPLETED EXCAVATION OF THE MAAS TUNNEL (ROTTERDAM, HOLLAND, NETHERLANDS), THE COMPLETED EXCAVATION OF THE PARANA (HERMANDIAS) TUNNEL (ARGENTINA), THE COMPLETED EXCAVATION OF THE POSEY TUNNEL (ALSO CALLED OAKLAND-ALAMEDA TUNNEL) (CA., USA.), THE COMPLETED EXCAVATION OF THE RENDSBURG TUNNEL (W.GERMANY), THE COMPLETED EXCAVATION OF THE ROTTERDAM METRO TUNNEL (ROTTERDAM, NETHERLANDS), THE COMPLETED EXCAVATION OF THE SCHELDE TUNNEL (ALSO CALLED SCHELDT E3 OR J.F.K.TUNNEL) (ANTWERP, , BELGIUM), THE COMPLETED EXCAVATION OF THE STATE STREET TUNNEL (IL., USA.), THE PROPOSED EXCAVATION OF THE TEES TUNNEL (ALSO CALLED KIELDER TUNNELS) (U.K.), THE COMPLETED EXCAVATION OF THE THIMBLE SHOAL TUNNEL (CHESAPEAKE BAY, VA., USA), THE COMPLETED EXCAVATION OF THE TINGSTAD TUNNEL (GOTHENBURG, SWEDEN), THE COMPLETED EXCAVATION OF THE VIEUX-PORT TUNNEL (MARSEILLES, FRANCE), THE COMPLETED EXCAVATION OF THE WANGAN SEN TUNNEL (TOKYO, JAPAN), THE COMPLETED EXCAVATION OF THE WASHBURN TUNNEL (TX., USA.) AND THE COMPLETED EXCAVATION OF THE WEBSTER STREET TUNNEL (CA., USA.) (OAKLAND, CA., USA) . THE PROJECTS INVESTIGATED ARE UTILIZED FOR COMPOSITE: RAILWAY-HIGHWAY, HIGHWAY, METRO, PEDESTRIAN TUNNEL, RAILWAY AND TWIN HIGHWAY PURPOSES. THE IMMERSED TUBE (PRE-STRESSED CONCRETE BOX) METHOD, IMMERSED TUBE (REINFORCED CONCRETE BOX) METHOD AND STEEL SHELL METHOD REPRESENT THE EXCAVATION TECHNIQUES STUDIED. PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE MARL .

R002789 EARLY HISTORY OF SAPPER TUNNELLING.
CLIFFORD, N. D.
TUNNELS AND TUNNELLING
8 (1), 53-7, 1976.
LANGUAGE: ENGLISH

THIS IN-SITU REPORT CONTAINS REVIEW DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE ABANDONED EXCAVATION OF THE ENGLISH CHANNEL TUNNEL (U.K.) . THE PROJECT INVESTIGATED IS UTILIZED FOR VEHICULAR TUNNEL (UNSPECIFIED) PURPOSES. THE TBM METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. TBM EXCAVATION RATE IS ALSO DISCUSSED. ROCK TYPES REVIEWED INCLUDE CHALK (ROCK) .

R002792 FAST FINISH FOR DUBAI TUNNEL.
WALFORD, D.
TUNNELS AND TUNNELLING

(CONTINUED)

8 (3), 22-3, 1976.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
CONSTAIN CIVIL ENGINEERING LTD.

FUNDING ORGANIZATION(S)
RULER OF DUBAI,DUBAI

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE COMPLETED EXCAVATION OF THE DUBAI TUNNEL (DUBAI, DUBAI) . THE PROJECT INVESTIGATED IS UTILIZED FOR COMPOSITE: HIGHWAY-PEDESTRIAN PURPOSES. THE IMMERSED TUBE (REINFORCED CONCRETE BOX) METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED.

R002794 INNOVATIONS AT SEIKAN.
TUNNELS AND TUNNELLING
8 (3), 47-50, 1976.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
1.NAZAMAGUMI LTD.
2.MAEDA CONSTRUCTION CO.
3.TAISEI CORP.
1.KAJIMA CORP.
2.KUMAGAIGUMI CO.LTD.
3.TEKKEN KENSETU CO.LTD.
1.AOKI CONSTRUCTION LTD.
3.NISHIMATSU CONSTRUCTION CO.LTD.
4.OHBAYASHI-GUMI LTD.
5.OKUMURA CORP.
5.PENTA-OCEAN CONSTRUCTION CO.LTD.
6.SHIMIZU CONSTRUCTION CO.LTD.
1.FUJITA CORP.
2.MISUI CONSTRUCTION CO.LTD.
3.SATO KOGYO CO.LTD.
4.THE ZENITAKA CORP.
5.TOBISHIMA CONSTRUCTION CO.LTD.

FUNDING ORGANIZATION(S)
JAPAN RAILWAY CONSTRUCTION PUBLIC CORP:JAPAN

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENINGS DISCUSSED INCLUDE THE COMPLETED EXCAVATION OF THE INCLINED SHAFT FOR SEIKAN UNDERSEA TUNNEL, HONSHU SIDE (JAPAN), THE COMPLETED EXCAVATION OF THE INCLINED SHAFT FOR SEIKAN UNDERSEA TUNNEL, HOKKAIDO SIDE (JAPAN), THE ON GOING EXCAVATION OF THE PILOT TUNNELS FOR HONSHU-HOKKAIDO RAILWAY CONNECTION (ALSO CALLED SEIKAN UNDERSEA TUNNEL) (JAPAN), THE ON GOING EXCAVATION OF THE SEIKAN RAILWAY TUNNEL (JAPAN), THE ON GOING EXCAVATION OF THE SERVICE TUNNEL, SEIKAN UNDERSEA TUNNEL (JAPAN), THE COMPLETED EXCAVATION OF THE VERTICAL SHAFT FOR SEIKAN UNDERSEA TUNNEL, HONSHU SIDE (JAPAN) AND THE COMPLETED EXCAVATION OF THE VERTICAL SHAFT FOR SEIKAN UNDERSEA TUNNEL, HOKKAIDO SIDE (JAPAN) . THE PROJECTS INVESTIGATED ARE UTILIZED FOR COMBINATION (EXPLORATION-VENTILATION-SAFETY-DRAINAGE) TUNNEL, EXPLORATORY TUNNEL AND RAILWAY PURPOSES. THE DRILL AND BLAST (FULL FACE) METHOD, HEADING AND BENCH METHOD AND TBM METHOD REPRESENT THE EXCAVATION TECHNIQUES STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDE CONVENTIONAL EXPLOSIVE (UNSPECIFIED) AND MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. TBM EXCAVATION RATE IS ALSO DISCUSSED. GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED.

R002795 EARLY HISTORY OF SAPPER TUNNELLING.
CLIFFORD, N. D.
TUNNELS AND TUNNELLING
8 (3), 83-7, 1976.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
SAPPERS,BRITISH ARMY,U.K.

FUNDING ORGANIZATION(S)
BRITISH ARMY,U.K.

THIS IN-SITU REPORT CONTAINS REVIEW DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE COMPLETED EXCAVATION OF THE TUNNELS AND CHAMBERS IN THE ROCK (GIBRALTAR) . THE PROJECT INVESTIGATED IS UTILIZED

(CONTINUED)

FOR MILITARY INSTALLATION PURPOSES. THE DRILLING METHOD AND DRILL AND BLAST (FULL FACE) METHOD REPRESENT THE EXCAVATION TECHNIQUES STUDIED. THE REPORTED FRAGMENTATION METHODS SERVICING PROJECT EFFORTS INCLUDE CONVENTIONAL EXPLOSIVE (UNSPECIFIED) AND QUICK LIME .

R002797 NEW FACE FOR PIPES.
LORANT, M.
TUNNELS AND TUNNELLING
8 (3), 124-5, 1976.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
AMERICAN PIPE AND CONSTRUCTION CO:CENTRILINE DIVISION OF

FUNDING ORGANIZATION(S)
AMERICAN PIPE AND CONSTRUCTION CO:CENTRILINE DIVISION OF

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. PERTINENT INFORMATION ON UNDERGROUND OPENING SUPPORTS IS ALSO PRESENTED.

R002758 GAS STORAGE IN MINED CAVERNS.
WITHERSPOON, P. A. LINDBLOM, U.
MORFELDT, C. O. JANELID, I.
UNDERGROUND SPACE
1 (1), 35-43, 1976.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
CALIFORNIA,UNIVERSITY OF,USA:MAGCONSULT AB, STOCKHOLM AND ROYAL INSTITUTE OF TECHNOLOGY,STOCKHOLM,SWEDEN

THIS THEORETICAL REPORT CONTAINS ORIGINAL DATA. THE PROJECT INVESTIGATED IS UTILIZED FOR GAS STORAGE PURPOSES. THE DRILL AND BLAST (FULL FACE) METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES CONVENTIONAL EXPLOSIVE (UNSPECIFIED) . INFORMATION PERTINENT TO EXCAVATION COST IS GIVEN.

R002759 THE RIVER LAR MULTIPURPOSE PROJECT IN IRAN.
HARWICK, R.
WATER POWER
27 (4), 133-41, 1975.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
RIVER LAR PROJECT-LAR(UPPER)DIVERSION WORKS CONTRACT
1.HEITKAMP GMBH:WEST GERMANY
2.HUTA-HEGERFELD AG:WEST GERMANY
3.STOHR,KARL,KG:WEST GERMANY
RIVER LAR PROJECT-DAM AND ASSOCIATED WORKS CONTRACT
1.IMPREDILO SPA,ITALY
2.TESSA CO,IRAN

FUNDING ORGANIZATION(S)
TEHRAN REGIONAL WATER BOARD

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENINGS DISCUSSED INCLUDE THE ON GOING EXCAVATION OF THE RIVER LAR PROJECT., LAR-KALAN DIVERSION TUNNEL (LAR-KALAN, IRAN), THE ON GOING EXCAVATION OF THE RIVER LAR PROJECT., GROUTING GALLERIES (LAR RIVER VALLEY, IRAN), THE ON GOING EXCAVATION OF THE RIVER LAR PROJECT., SPILLWAY INTAKE SHAFT (LAR RIVER VALLEY, IRAN), THE ON GOING EXCAVATION OF THE RIVER LAR PROJECT., SPILLWAY TUNNEL (LAR RIVER VALLEY, IRAN), THE ON GOING EXCAVATION OF THE RIVER LAR PROJECT., IRRIGATION OUTLET WORKS INLET (LAR RIVER VALLEY , IRAN), THE ON GOING EXCAVATION OF THE RIVER LAR PROJECT., IRRIGATION OUTLET WORKS CONTROL SHAFT (LAR RIVER VALLEY, IRAN), THE ON GOING EXCAVATION OF THE RIVER LAR PROJECT., IRRIGATION OUTLET WORKS STILLING SHAFT (LAR RIVER VALLEY, IRAN), THE ON GOING EXCAVATION OF THE RIVER LAR PROJECT., IRRIGATION OUTLET WORKS TUNNEL (LAR RIVER VALLEY , IRAN), THE ON GOING EXCAVATION OF THE RIVER LAR PROJECT., LAR-KALAN DIVERSION TUNNEL LOWER INTAKE (LAR-KALAN, IRAN), THE ON GOING EXCAVATION OF THE RIVER LAR PROJECT., LAR-KALAN DIVERSION TUNNEL UPPER INTAKE (LAR-KALAN, IRAN), THE ON GOING EXCAVATION OF THE RIVER LAR PROJECT., LAR-KALAN DIVERSION TUNNEL CONTROL SHAFT (LAR-KALAN, IRAN), THE ON GOING

(CONTINUED)

EXCAVATION OF THE RIVER LAR PROJECT., KALAN SURGE SHAFT (KALAN, IRAN), THE ON GOING EXCAVATION OF THE RIVER LAR PROJECT., KALAN VALVE CHAMBER (KALAN, IRAN), THE ON GOING EXCAVATION OF THE RIVER LAR PROJECT., KALAN EMBEDDED PENSTOCK (KALAN, IRAN), THE ON GOING EXCAVATION OF THE RIVER LAR PROJECT., KALAN FREE-STANDING PENSTOCK(IN TUNNEL) (KALAN, IRAN) AND THE ON GOING EXCAVATION OF THE RIVER LAR PROJECT., KALAN PENSTOCK(BURIED IN CULVERT) (KALAN, IRAN) . THE PROJECTS INVESTIGATED ARE UTILIZED FOR DIVERSION TUNNEL, GROUTING GALLERY, IRRIGATION AND SPILLWAY TUNNEL PURPOSES. THE DRILL AND BLAST (FULL FACE) METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES CONVENTIONAL EXPLOSIVE (UNSPECIFIED) . GEOSTRUCTURAL AND SOIL CHARACTERISTICS AS WELL AS SOIL MECHANICAL PROPERTIES FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON GROUND CONDITIONS AND UNDERGROUND OPENING SUPPORTS IS ALSO PRESENTED. THE EXCAVATION CHARACTERISTICS FOR GREEN BEDS, LARANA DALICHAI LIMESTONE, SHEMSHAK FORMATION AND ZIARAT CONGLOMERATE ARE TREATED. PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE CONGLOMERATE, DIORITE, LIMESTONE, MUDSTONE, PORPHYRY, SANDSTONE, SHALE AND SYENITE .

R002800 MEASURES TO REPAIR DAMAGE AT TARBELA AFTER TUNNEL COLLAPSE.
AUTHOR ANON.
WATER POWER
27 (1), 34-6, 1975.
LANGUAGE:ENGLISH

FUNDING ORGANIZATION(S)
PAKISTAN,WATER AND POWER BOARD AUTHORITY OF:(WAPDA)

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENINGS DISCUSSED INCLUDE THE COMPLETED EXCAVATION OF THE TARBELA DAM PROJECT, POWER TUNNELS (PAKISTAN) AND THE COMPLETED EXCAVATION OF THE TARBELA DAM PROJECT, IRRIGATION TUNNELS (PAKISTAN) . THE PROJECTS INVESTIGATED ARE UTILIZED FOR HYDROELECTRIC AND IRRIGATION PURPOSES.

R002813 44 MILES OF TUNNELLING FOR GIANT MAJES PLAIN PROJECT.
AUTHOR ANON.
TUNNELS AND TUNNELLING
7 (2), 11, 1975.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
MAJES CONSORTIUM
1.AB SKANSKA CEMENTJUTERIET,SWEDEN
2.CONCOFO CONSTRUCTION LTD:SOUTH AFRICA
3.ENTRECANALES Y TRAVERA SA,SPAIN
4.MACOM
6.TARMAC CONSTRUCTION LTD:U.K.
7.THE FOUNDATION CO. OF CANADA LTD:CANADA

THIS IN-SITU REPORT CONTAINS REVIEW DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE PROPOSED EXCAVATION OF THE TUNNELS OF THE MAJES PROJECT (PERU) . THE PROJECT INVESTIGATED IS UTILIZED FOR COMPOSITE: IRRIGATION-HYDROELECTRIC POWER PURPOSES. THE DRILL AND BLAST (FULL FACE) METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES CONVENTIONAL EXPLOSIVE (UNSPECIFIED) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE CONGLOMERATE, LIMESTONE, MUDSTONE, PORPHYRY, SANDSTONE AND SHALE .

R002814 BIG ROCK DRILLING OPERATION FOR CANADIAN POWER COMPLEX.
AUTHOR ANON.
TUNNELS AND TUNNELLING
7 (2), 13, 1975.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
MANMIX LTD:CALGARY,ALBERTA,CANADA

THIS IN-SITU REPORT CONTAINS REVIEW DATA. THE UNDERGROUND OPENINGS DISCUSSED INCLUDE THE ON GOING EXCAVATION OF THE MICA DAM PROJECT, UNDERGROUND POWER HOUSE (BRITISH COLUMBIA, CANADA), THE ON GOING

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EXCAVATION OF THE MICA DAM PROJECT, TAILRACE TUNNELS (BRITISH COLUMBIA, CANADA), THE ON GOING EXCAVATION OF THE MICA DAM PROJECT, PENSTOCK TUNNELS (BRITISH COLUMBIA, CANADA), THE ON GOING EXCAVATION OF THE MICA DAM PROJECT, UNDERGROUND TRANSFORMER CHAMBER (BRITISH COLUMBIA, CANADA), THE ON GOING EXCAVATION OF THE MICA DAM PROJECT, MANIFOLD TUNNELS (BRITISH COLUMBIA, CANADA), THE ON GOING EXCAVATION OF THE MICA DAM PROJECT, DRAFT TUBE TUNNELS (BRITISH COLUMBIA, CANADA), THE ON GOING EXCAVATION OF THE MICA DAM PROJECT, DRAFT TUBE GALLERY (BRITISH COLUMBIA, CANADA), THE ON GOING EXCAVATION OF THE MICA DAM PROJECT, ACCESS TUNNELS (BRITISH COLUMBIA, CANADA), THE ON GOING EXCAVATION OF THE MICA DAM PROJECT, AIR SUPPLY TUNNELS (BRITISH COLUMBIA, CANADA), THE ON GOING EXCAVATION OF THE MICA DAM PROJECT, DRAINAGE TUNNELS (BRITISH COLUMBIA, CANADA) AND THE ON GOING EXCAVATION OF THE MICA DAM PROJECT, ELEVATOR SHAFT (BRITISH COLUMBIA, CANADA) . THE PROJECTS INVESTIGATED ARE UTILIZED FOR ACCESS TUNNEL (SHAFTS AND ADITS TO MAIN OPENING), DRAINAGE AND INSPECTION (DAM OR UNDERGROUND) AND VENTILATION PURPOSES. THE DRILL AND BLAST (FULL FACE) METHOD AND HEADING AND BENCH METHOD REPRESENT THE EXCAVATION TECHNIQUES STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES CONVENTIONAL EXPLOSIVE (UNSPECIFIED) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON UNDERGROUND OPENING SUPPORTS IS ALSO PRESENTED. PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE FULGURITES AND SCHIST .

R002815 GROUND FREEZING USED ON RENFREW MOTORWAY SEWER.
AUTHOR ANON.
TUNNELS AND TUNNELLING
7 (2), 15, 1975.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
FORAKY LTD.OF COLWICK,NOTTINGHAM,U.K.

THIS IN-SITU REPORT CONTAINS REVIEW DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE ON GOING EXCAVATION OF THE RENFREW MOTORWAY SEWER (U.K.) . THE PROJECT INVESTIGATED IS UTILIZED FOR SEWER PURPOSES. GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON UNDERGROUND OPENING SUPPORTS IS ALSO PRESENTED.

R002816 LONGEST MINI-TUNNEL DRIVE COMPLETED UNDER M4 WOKINGHAM INTERCHANGE.
AUTHOR ANON.
TUNNELS AND TUNNELLING
7 (2), 15, 1975.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
MOLESMITH TUNNELS,U.K.

THIS IN-SITU REPORT CONTAINS REVIEW DATA. THE PROJECT INVESTIGATED IS UTILIZED FOR SEWER PURPOSES. THE TBM METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. SOIL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED.

R002817 PROGRESS ON THE SECOND DARTFORD TUNNEL.
TEMPLE, M. A.
TUNNELS AND TUNNELLING
7 (2), 16-7, 1975.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
BEATTY,BALFOUR AND CO.LTD;U.K.

FUNDING ORGANIZATION(S)
ESSEX AND KENT COUNTY COUNCILS,U.K.

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENINGS DISCUSSED INCLUDE THE COMPLETED EXCAVATION OF THE PILOT TUNNEL FOR SECOND DARTFORD TUNNEL (U.K.) AND THE ON GOING EXCAVATION OF THE SECOND DARTFORD TUNNEL (UK) . THE PROJECTS INVESTIGATED ARE UTILIZED FOR EXPLORATORY TUNNEL AND

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TWIN HIGHWAY PURPOSES. THE CUT AND COVER METHOD AND MECHANICAL EXCAVATOR METHOD REPRESENT THE EXCAVATION TECHNIQUES STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. PERTINENT INFORMATION ON UNDERGROUND OPENING SUPPORTS IS ALSO PRESENTED.

R002819 BRENT CROSS UNDERPASS TUNNELS.
BENNETT, H.
TUNNELS AND TUNNELLING
7 (2), 44-5, 1975.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
CEMENTATIONS PROJECTS LTD;U.K.

FUNDING ORGANIZATION(S)
1.BARNET,LONDON BORDUGH OF,U.K.
2.HAMMERSON GROUP,U.K.

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENINGS DISCUSSED INCLUDE THE ON GOING EXCAVATION OF THE BRENT CROSS UNDERPASS, NORTH TUNNEL (LONDON, ENGLAND, U.K.) AND THE ON GOING EXCAVATION OF THE BRENT CROSS UNDERPASS, SOUTH TUNNEL (LONDON, ENGLAND, U.K.) . THE PROJECTS INVESTIGATED ARE UTILIZED FOR TWIN HIGHWAY PURPOSES. THE CUT AND COVER METHOD AND HYDRAULIC FRAGMENTATION METHOD REPRESENT THE EXCAVATION TECHNIQUES STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES CONVENTIONAL EXPLOSIVE (N.G.) . GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON UNDERGROUND OPENING SUPPORTS IS ALSO PRESENTED.

R002820 TUNNEL LININGS: COMPARATIVE DESIGNS AND COSTS.
VON DER AU, I.
TUNNELS AND TUNNELLING
7 (2), 48-57, 1975.
LANGUAGE: ENGLISH

THIS IN-SITU-THEORETICAL REPORT CONTAINS ORIGINAL DATA. GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON UNDERGROUND OPENING SUPPORTS IS ALSO PRESENTED. THE EXCAVATION CHARACTERISTICS FOR HUNSRUCK SLATE ARE TREATED. PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE SLATE .

R002821 SEELISBERG MOTORWAY TUNNEL.
HONE, A.
TUNNELS AND TUNNELLING
7 (2), 63-6, 1975.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
MARTI AG,BERN,SWITZERLAND

FUNDING ORGANIZATION(S)
SWITZERLAND,GOVT.OF.

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENINGS DISCUSSED INCLUDE THE COMPLETED EXCAVATION OF THE ACCESS TUNNEL FOR SEELISBERG MOTORWAY TUNNEL (SEELISBERG) SWITZERLAND), THE ON GOING EXCAVATION OF THE SEELISBERG MOTORWAY TUNNEL (SEELISBERG, SWITZERLAND) AND THE ON GOING EXCAVATION OF THE SEELISBERG MOTORWAY TUNNEL (BUEL OR SOUTH SECTION), (SEELISBERG, SWITZERLAND) . THE PROJECTS INVESTIGATED ARE UTILIZED FOR ACCESS TUNNEL (SHAFTS AND ADITS TO MAIN OPENING) AND TWIN HIGHWAY PURPOSES. THE DRILL AND BLAST (FULL FACE) METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES CONVENTIONAL EXPLOSIVE (UNSPECIFIED) . THIS DOCUMENT INCORPORATES ADDITIONALLY DRILLING EQUIPMENT AND TUNNELING MACHINE CHARACTERISTICS. EXCAVATION ADVANCEMENT RATE IS ALSO DISCUSSED. PERTINENT INFORMATION ON GROUND CONDITIONS AND UNDERGROUND OPENING SUPPORTS AND MATERIALS HANDLING SYSTEM IS ALSO PRESENTED. PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE LIMESTONE . THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES (LAB) DATA.

R002822 PROGRESS ON THE EMPHINGHAM RESERVOIR TUNNELS.
COLE, R. G. SCHOFIELD, R. J.

(CONTINUED)

TUNNELS AND TUNNELLING
7 (2), 73-8, 1975.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
NUTTAL,EDMUND LTD:U.K.

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENINGS DISCUSSED INCLUDE THE COMPLETED EXCAVATION OF THE EMPINGHAM RESERVOIR PROJECT, TUNNEL A (WANSFORD-WOTHORPE, U.K.), THE ON GOING EXCAVATION OF THE EMPINGHAM RESERVOIR PROJECT, TUNNEL B (TINWELL-EMPINGHAM, U.K.), THE COMPLETED EXCAVATION OF THE EMPINGHAM RESERVOIR PROJECT, SHAFT NO.1 (WANSFORD, U.K.), THE COMPLETED EXCAVATION OF THE EMPINGHAM RESERVOIR PROJECT, SHAFT NO.3 (WOTHORPE, U.K.), THE COMPLETED EXCAVATION OF THE EMPINGHAM RESERVOIR PROJECT, SHAFT NO.4 (TINWELL, U.K.) AND THE COMPLETED EXCAVATION OF THE EMPINGHAM RESERVOIR PROJECT, SHAFT NO.6 (EMPINGHAM, U.K.) . THE PROJECTS INVESTIGATED ARE UTILIZED FOR PUMP STORAGE PURPOSES. THE TBM METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. GEOSTRUCTURAL CHARACTERISTICS AS WELL AS SOIL MECHANICAL PROPERTIES FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON GROUND CONDITIONS AND UNDERGROUND OPENING SUPPORTS IS ALSO PRESENTED. THE EXCAVATION CHARACTERISTICS FOR UPPER LIAS CLAY ARE TREATED. PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE CLAYSTONE .

R002823 CUT AND COVER AT DUBAI CREEK.
WALFORD, D.
TUNNELS AND TUNNELLING
7 (2), 53, 1975.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
CONSTAIN CIVIL ENGINEERING LTD.

FUNDING ORGANIZATION(S)
RULER OF DUBAI,DUBAI

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE ON-GOING EXCAVATION OF THE DUBAI TUNNEL (DUBAI, DUBAI) . THE PROJECT INVESTIGATED IS UTILIZED FOR COMPOSITE: HIGHWAY-PEDESTRIAN PURPOSES. THE MECHANICAL EXCAVATOR METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED.

R002824 CHANNEL TUNNEL PILOT DRIVE COMPLETED.
AUTHOR ANON.
TUNNELS AND TUNNELLING
7 (3), 10, 1975.
LANGUAGE: ENGLISH

FUNDING ORGANIZATION(S)
U.K. GOVT:DEPT. OF ENVIRONMENT

THIS IN-SITU REPORT CONTAINS REVIEW DATA. THE UNDERGROUND OPENINGS DISCUSSED INCLUDE THE ABANDONED EXCAVATION OF THE ACCESS TUNNEL FOR THE ENGLISH CHANNEL TUNNEL (U.K.) AND THE ABANDONED EXCAVATION OF THE SERVICE TUNNEL FOR THE ENGLISH CHANNEL TUNNEL (U.K.) . THE PROJECTS INVESTIGATED ARE UTILIZED FOR ACCESS TUNNEL (SHAFTS AND ADITS TO MAIN OPENING) AND SERVICE TUNNEL PURPOSES. THE TBM METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. PERTINENT INFORMATION ON UNDERGROUND OPENING SUPPORTS IS ALSO PRESENTED.

R002825 DINORWIC VENTILATION SHAFT WORK BEGINS.
AUTHOR ANON.
TUNNELS AND TUNNELLING
7 (3), 10, 1975.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
THYSSEN (GREAT BRITAIN)LTD.

FUNDING ORGANIZATION(S)
CENTRAL ELECTRICITY GENERATING BOARD,U.K.

(CONTINUED)

THIS IN-SITU REPORT CONTAINS REPUBLISHED AND REVIEW DATA. THE UNDERGROUND OPENINGS DISCUSSED INCLUDE THE COMPLETED EXCAVATION OF THE BOULBY POTASH MINE, SHAFT NO.1 (BOULBY, YORKSHIRE, U.K.), THE COMPLETED EXCAVATION OF THE BOULBY POTASH MINE, SHAFT NO.2 (BOULBY, YORKSHIRE, U.K.) AND THE ON GOING EXCAVATION OF THE VENTILATION SHAFT, DINORWIC PROJECT (SNOWDONIA, WALES, U.K.) . THE PROJECTS INVESTIGATED ARE UTILIZED FOR MINE AND VENTILATION PURPOSES. THE DRILL AND BLAST (FULL FACE) METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES CONVENTIONAL EXPLOSIVE (AMMON GELIGINITE) . PERTINENT INFORMATION ON UNDERGROUND OPENING SUPPORTS AND MATERIALS HANDLING SYSTEM IS ALSO PRESENTED. ROCK TYPES REVIEWED INCLUDE SLATE .

R002826 CHINNOR TRIALS-THE CONCLUSION.
AUTHOR ANON.
TUNNELS AND TUNNELLING
7 (3), 11, 1975.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
MCALPINES,SIR ROBERTS SONS LTD.

FUNDING ORGANIZATION(S)
TRANSPORT AND ROAD RESEARCH LABORATORY,TUNNEL DIVISION,U.K.

THIS IN-SITU REPORT CONTAINS REVIEW DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE COMPLETED EXCAVATION OF THE CHINNOR TUNNEL (CHINNOR, U.K.) . THE PROJECT INVESTIGATED IS UTILIZED FOR EXPERIMENTAL EXCAVATION PURPOSES. THE TBM METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON UNDERGROUND OPENING SUPPORTS IS ALSO PRESENTED. ROCK TYPES REVIEWED INCLUDE CHALK (ROCK) . THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES DATA.

R002827 TUNNELLING IN THE NORTH.
AUTHOR ANON.
TUNNELS AND TUNNELLING
7 (3), 13, 1975.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
THYSSEN (GREAT BRITAIN)LTD.

FUNDING ORGANIZATION(S)
NORTHUMBRIAN WATER AUTHORITY,U.K.
1.BUILDING RESEARCH ESTABLISHMENT,U.K.
2.NORTHUMBRIA WATER AUTHORITY,U.K.
3.WATER RESEARCH COUNCIL,U.K.

THIS IN-SITU REPORT CONTAINS REVIEW DATA. THE UNDERGROUND OPENINGS DISCUSSED INCLUDE THE COMPLETED EXCAVATION OF THE EMPINGHAM RESERVOIR PROJECT, SHAFT NO.1 (WANSFORD, U.K.) AND THE PROPOSED EXCAVATION OF THE KIELDER TUNNEL (U.K.) . THE PROJECTS INVESTIGATED ARE UTILIZED FOR EXPERIMENTAL EXCAVATION AND WATER SUPPLY TUNNEL PURPOSES. THE DRILL AND BLAST (FULL FACE) METHOD AND TBM METHOD REPRESENT THE EXCAVATION TECHNIQUES STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDE CONVENTIONAL EXPLOSIVE (UNSPECIFIED) AND MECHANICAL ABRASION (ROTARY) . PERTINENT INFORMATION ON UNDERGROUND OPENING SUPPORTS IS ALSO PRESENTED. ROCK TYPES REVIEWED INCLUDE LIMESTONE, MUDSTONE AND SANDSTONE .

R002828 BILL FOR HONG KONG RAILWAY.
AUTHOR ANON.
TUNNELS AND TUNNELLING
7 (3), 13, 1975.
LANGUAGE: ENGLISH

THIS IN-SITU REPORT CONTAINS REVIEW DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE PROPOSED EXCAVATION OF THE HONG KONG UNDERGROUND RAILWAY TUNNEL (HONG KONG) . THE PROJECT INVESTIGATED IS UTILIZED FOR RAILWAY PURPOSES.

R002829 MAJOR ROAD TUNNEL PROPOSED FOR SOUTH AFRICA.
AUTHOR ANON.
TUNNELS AND TUNNELLING
7 (3), 13, 1975.
LANGUAGE: ENGLISH

THE UNDERGROUND OPENING DISCUSSED INCLUDES THE PROPOSED EXCAVATION OF THE DU TOITSKLOOF ROAD TUNNEL (DU TOITSKLOOF, W.CAPE PROVINCE, SOUTH AFRICA) . THE PROJECT INVESTIGATED IS UTILIZED FOR HIGHWAY AND PILOT BORE PURPOSES. GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. THE EXCAVATION CHARACTERISTICS FOR CAPE GRANITE AND TABLE MOUNTAIN SANDSTONE ARE TREATED. PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE GNEISS, GRANITE, SANDSTONE AND SHALE .

R002831 CHANNEL TUNNEL-END OF AN ERA.
JACOMB-HOOD, E. W.
TUNNELS AND TUNNELLING
7 (3), 21-3, 1975.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
1.ATKINSON,GUY F.
2.BEATTY,BALFOUR
3.CROSS CHANNEL CONTRACTORS
4.NUTTAL,EDMUND

FUNDING ORGANIZATION(S)
BRITISH CHANNEL TUNNEL CO:U.K.

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENINGS DISCUSSED INCLUDE THE ABANDONED EXCAVATION OF THE BEAUMONT ABBOTSCLIFF TUNNEL (ABBOTSCLIFF, KENT, U.K.), THE ABANDONED EXCAVATION OF THE BEAUMONT ENGLISH CHANNEL TUNNEL (KENT, U.K.), THE COMPLETED EXCAVATION OF THE CROSS ADIT, ENGLISH CHANNEL TUNNEL (KENT, U.K.), THE ABANDONED EXCAVATION OF THE SERVICE TUNNEL FOR THE ENGLISH CHANNEL TUNNEL (DOVER, KENT, U.K.) AND THE COMPLETED EXCAVATION OF THE SHAFT FOR THE BEAUMONT ENGLISH CHANNEL TUNNEL (SHAKESPEARE CLIFF, KENT, U.K.) . THE PROJECTS INVESTIGATED ARE UTILIZED FOR ACCESS-INSTRUMENTATION, ACCESS TUNNEL (SHAFTS AND ADITS TO MAIN OPENING), SERVICE TUNNEL AND UNSPECIFIED PURPOSES. THE TBM METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. PERTINENT INFORMATION ON GROUND CONDITIONS AND UNDERGROUND OPENING SUPPORTS AND MATERIALS HANDLING SYSTEM IS ALSO PRESENTED. ROCK TYPES REVIEWED INCLUDE CHALK (ROCK) .

R002832 EXTENDING THE PARIS METRO.
BOUGARD, J. F.
TUNNELS AND TUNNELLING
7 (3), 43-8, 1975.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
REGIE AUTONOME DES TRANSPORT PARISIENS (R.A.T.P.),
PARIS,FRANCE

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENINGS DISCUSSED INCLUDE THE COMPLETED EXCAVATION OF THE PARIS METRO SYSTEM, TUNNEL OF THE CHATELET-GARE DE LYON SECTION(PARIS, FRANCE), THE COMPLETED EXCAVATION OF THE PARIS METRO SYSTEM, SECTION 18C OF GARE DE LYON-NATIONAL TUNNEL(PARIS, FRANCE), THE COMPLETED EXCAVATION OF THE PARIS METRO SYSTEM, TUNNEL FOR EXTENSION OF LINE 13 (PARIS, FRANCE), THE COMPLETED EXCAVATION OF THE PARIS METRO SYSTEM, TUNNEL FOR JUNCTION OF LINES 13 AND 14 (PARIS, FRANCE) AND THE COMPLETED EXCAVATION OF THE PARIS METRO SYSTEM, EXTENSION OF LINE 14 (PARIS, FRANCE) . THE PROJECTS INVESTIGATED ARE UTILIZED FOR METRO PURPOSES. THE CUT AND COVER (PRECAST SEGMENTED CONCRETE BOX) METHOD, SHIELD METHOD, TBM METHOD AND UNSPECIFIED METHOD REPRESENT THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHODS SERVICING PROJECT EFFORTS INCLUDE MECHANICAL ABRASION (ROTARY) AND UNSPECIFIED . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. TBM EXCAVATION RATE IS ALSO DISCUSSED. GEOSTRUCTURAL AND SOIL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON GROUND CONDITIONS AND UNDERGROUND OPENING SUPPORTS

(CONTINUED)

AND MATERIALS HANDLING SYSTEM IS ALSO PRESENTED. THE EXCAVATION CHARACTERISTICS FOR BEAUCHAMP SAND ARE TREATED. ROCK TYPES REVIEWED INCLUDE LIMESTONE AND MARL .

R002834 TUNNELS IN MINING AND CIVIL ENGINEERING - COMMON GROUND.
BODEN, B. WEST, G. HARRAD, C. J.
TUNNELS AND TUNNELLING
7 (3), 60-7, 1975.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
EDMONTON,CITY OF, ALBERTA,CANADA

FUNDING ORGANIZATION(S)
BIRMINGHAM,SURVEYOR AND PLANNING OFFICE OF,U.K.

THIS IN-SITU REPORT CONTAINS REVIEW DATA. THE UNDERGROUND OPENINGS DISCUSSED INCLUDE THE ON GOING EXCAVATION OF THE CHINNOR TUNNEL (CHINNOR, U.K.) AND THE PROPOSED EXCAVATION OF THE DAWDON COLLIERY (DURHAM, U.K.) . THE PROJECTS INVESTIGATED ARE UTILIZED FOR EFFLUENT OUTFALL (OTHER THAN SEWERAGE), EXPERIMENTAL EXCAVATION, MINE, RAILWAY AND SEWER PURPOSES. THE TBM METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. TBM EXCAVATION RATE IS ALSO DISCUSSED. PERTINENT INFORMATION ON MATERIALS HANDLING SYSTEM IS ALSO PRESENTED. ROCK TYPES REVIEWED INCLUDE COAL, LIMESTONE, MARL, MUDSTONE, SANDSTONE AND SILTSTONE . THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES (LAB) DATA.

R002835 NURNBERG UNDERGROUND.
MULLER, F.
TUNNELS AND TUNNELLING
7 (3), 75-9, 1975.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
ARGE HOCHTIEF AG/KUNZ AND CO.

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENINGS DISCUSSED INCLUDE THE PROPOSED EXCAVATION OF THE SHAFTS FOR THE NURNBERG-LANGWASER UNDERGROUND (W.GERMANY) AND THE PROPOSED EXCAVATION OF THE TUNNELS FOR THE NURNBERG-LANGWASER UNDERGROUND (W.GERMANY) . THE PROJECTS INVESTIGATED ARE UTILIZED FOR RAILWAY PURPOSES. THE SHIELD METHOD AND TBM METHOD REPRESENT THE EXCAVATION TECHNIQUES STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. GEOSTRUCTURAL AND SOIL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON GROUND CONDITIONS AND UNDERGROUND OPENING SUPPORTS IS ALSO PRESENTED. THE EXCAVATION CHARACTERISTICS FOR KEUPER SANDSTONE ARE TREATED. ROCK TYPES REVIEWED INCLUDE SANDSTONE .

R002836 TUNNEL LININGS: COMPARATIVE DESIGNS AND COSTS.
VON DER AU, I.
TUNNELS AND TUNNELLING
7 (3), 88-94, 1975.
LANGUAGE: ENGLISH

THIS IN-SITU-THEORETICAL REPORT CONTAINS ORIGINAL DATA. GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON UNDERGROUND OPENING SUPPORTS IS ALSO PRESENTED. THE EXCAVATION CHARACTERISTICS FOR HUNSRUCK SLATE ARE TREATED. PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE SLATE .

R002837 DARTFORD DRIVE BEGINS.
AUTHOR ANON.
TUNNELS AND TUNNELLING
7 (5), 13, 1975.
LANGUAGE: ENGLISH

THIS IN-SITU REPORT CONTAINS REVIEW DATA. THE UNDERGROUND OPENINGS DISCUSSED INCLUDE THE ON GOING EXCAVATION OF THE DARTFORD TUNNEL (ESSEX END) (DARTFORD, ENGLAND, U.K.) AND THE ON GOING EXCAVATION

(CONTINUED)

OF THE DARTFORD TUNNEL (KENT END) (DARTFORD, ENGLAND, U.K.) . THE PROJECTS INVESTIGATED ARE UTILIZED FOR UNSPECIFIED PURPOSES. THE MANUAL METHOD AND SHIELD METHOD REPRESENT THE EXCAVATION TECHNIQUES STUDIED. THE REPORTED FRAGMENTATION METHODS SERVICING PROJECT EFFORTS INCLUDE HAND MINING AND MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. GEOSTRUCTURAL AND SOIL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON MATERIALS HANDLING SYSTEM IS ALSO PRESENTED. ROCK TYPES REVIEWED INCLUDE CHALK (ROCK) .

R002838 DINORWIC TO START WITH A CLEAN SLATE.
AUTHOR ANON.
TUNNELS AND TUNNELLING
7 (5), 23-4, 1975.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
NOWLEM,JOHN AND CO.LTD.

FUNDING ORGANIZATION(S)
CENTRAL ELECTRICITY GENERATING BOARD,U.K.

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENINGS DISCUSSED INCLUDE THE ON GOING EXCAVATION OF THE PLANT TUNNEL, DINORWIC PROJECT(SNOWDONIA, WALES, U.K.) AND THE ON GOING EXCAVATION OF THE VENTILATION SHAFT, DINORWIC PROJECT (SNOWDONIA, WALES, U.K.) . THE PROJECTS INVESTIGATED ARE UTILIZED FOR ACCESS TUNNEL (SHAFTS AND ADITS TO MAIN OPENING), EXPLORATORY-CUM-ACCESS AND VENTILATION PURPOSES. THE DRILL AND BLAST (FULL FACE) METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES CONVENTIONAL EXPLOSIVE (UNSPECIFIED) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERTSTICS. GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON UNDERGROUND OPENING SUPPORTS IS ALSO PRESENTED. ROCK TYPES REVIEWED INCLUDE SLATE .

R002840 PROBLEMS MULTIPLY UNDER MELBOURNE.
AUTHOR ANON.
TUNNELS AND TUNNELLING
7 (5), 25, 1975.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
1.CONNELL,JOHN AND ASSOCIATES,AUSTRALIA
2.HATCH ASSOCIATES,CANADA
3.JACOBS ASSOCIATES,SAN FRANSISCO,USA
4.MOTT,HAY AND ANDERSON,U.K.

FUNDING ORGANIZATION(S)
MELBOURNE UNDERGROUND RAIL LOOP AUTHORITY (MURLA),
MELBOURNE,
AUSTRALIA

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE ON GOING EXCAVATION OF THE TUNNELS FOR MELBOURNE LOOP RAILWAY (MELBOURNE, AUSTRALIA) . THE PROJECT INVESTIGATED IS UTILIZED FOR MINE PURPOSES. THE TBM METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. TBM EXCAVATION RATE IS ALSO DISCUSSED. GEOSTRUCTURAL AND SOIL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON UNDERGROUND OPENING SUPPORTS IS ALSO PRESENTED. THE EXCAVATION CHARACTERISTICS FOR HERRIBEE FORMATION ARE TREATED. PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE BASALT AND SILTSTONE .

R002842 INSTRUMENTATION AND MONITORING.
HUDSON, J. A. PRIEST, S.
TUNNELS AND TUNNELLING
7 (5), 64-70, 1975.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
DEPT.OF ENVIRONMENT,TRANSPORT AND ROAD RESEARCH
LAB.OF,BERKSHIRE,
U.K.

(CONTINUED)

THIS IN-SITU-THEORETICAL REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENINGS DISCUSSED INCLUDE THE COMPLETED EXCAVATION OF THE CHINNOR TUNNEL (CHINNOR, U.K.) AND THE COMPLETED EXCAVATION OF THE EXPERIMENTAL SHAFT FOR CHINNOR TUNNEL (CHINNOR, U.K.) . THE PROJECTS INVESTIGATED ARE UTILIZED FOR EXPERIMENTAL EXCAVATION PURPOSES. THE TBM METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. PERTINENT INFORMATION ON UNDERGROUND OPENING SUPPORTS IS ALSO PRESENTED. ROCK TYPES REVIEWED INCLUDE CHALK (ROCK) . THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES (LAB) DATA.

R002843 CHITRAL TUNNEL WORK BEGINS.
AUTHOR ANON.
TUNNELS AND TUNNELLING
7 (6), 15, 1975.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
LOWARI TUNNEL ORGANIZATION,PAKISTAN

THIS IN-SITU REPORT CONTAINS REVIEW DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE PROPOSED EXCAVATION OF THE CHITRAL TUNNEL (DIR, PAKISTAN) . THE PROJECT INVESTIGATED IS UTILIZED FOR HIGHWAY PURPOSES.

R002844 3 1/2 M DRIFT CONTRACT.
AUTHOR ANON.
TUNNELS AND TUNNELLING
7 (6), 15, 1975.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
1.THE CEMENTATION CO.(NEW ZEALAND) LTD.
2.M/S GREEN AND MCCHALLIL (CONTRACTORS) LTD.

FUNDING ORGANIZATION(S)
NEW ZEALAND GOVT;MINISTRY OF MINES

THIS IN-SITU REPORT CONTAINS REVIEW DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE PROPOSED EXCAVATION OF THE INCLINED DRIFTS, HUNTLY COLLIERY (HAMILTON, NEW ZEALAND) . THE PROJECT INVESTIGATED IS UTILIZED FOR MINE PURPOSES. THE SHIELD METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. GEOSTRUCTURAL AND SOIL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. ROCK TYPES REVIEWED INCLUDE ALLUVIUM .

R002845 CONTRACTORS PREPARE FOR HONG KONG START.
AUTHOR ANON.
TUNNELS AND TUNNELLING
7 (6), 15, 1975.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
1.GAMMON (HONG KONG) LTD.
2.HOCHTIEF,GERMANY
3.KUMAGAI GUMI CO.LTD;JAPAN
4.SENTAB,SWEDEN
5.SOCIETE FRANCAISE D'ENTERPRISE DRAGAGES,FRANCE

FUNDING ORGANIZATION(S)
HONG KONG MASS TRANSIT RAILWAY CORP;HONG KONG

THIS IN-SITU REPORT CONTAINS REVIEW DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE PROPOSED EXCAVATION OF THE HONG KONG UNDERGROUND RAILWAY TUNNEL (HONG KONG) . THE PROJECT INVESTIGATED IS UTILIZED FOR RAILWAY PURPOSES.

R002846 PORTOBELLO LONG SEA SEWAGE OUTFALL TUNNEL.
AUTHOR ANON.
TUNNELS AND TUNNELLING
7 (6), 23-4, 1975.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
MODDIE,KINNEAR (1973) LTD;U.K.

(CONTINUED)

FUNDING ORGANIZATION(S)
WEST SUSSEX DRAINAGE DIVISION,SOUTHERN WATER AUTHORITY,U.K.

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENINGS DISCUSSED INCLUDE THE COMPLETED EXCAVATION OF THE ACCESS SHAFT TO PORTOBELLO SEWAGE TUNNEL (PORTOBELLO, SUSSEX, U.K.), THE COMPLETED EXCAVATION OF THE PORTOBELLO LONG SEA SEWAGE OUTFALL TUNNEL (PORTOBELLO, SUSSEX, U.K.) AND THE PROPOSED EXCAVATION OF THE PORTOBELLO LONG SEA SEWAGE OUTFALL TUNNEL (PORTOBELLO, SUSSEX, U.K.) . THE PROJECTS INVESTIGATED ARE UTILIZED FOR ACCESS TUNNEL (SHAFTS AND ADITS TO MAIN OPENING) AND SEWER PURPOSES. THE SHIELD METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES HAND MINING . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. TBM EXCAVATION RATE IS ALSO DISCUSSED. PERTINENT INFORMATION ON GROUND CONDITIONS AND UNDERGROUND OPENING SUPPORTS IS ALSO PRESENTED. PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE CHALK (ROCK) . THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES DATA.

R002847 DOUBLE DEMAG AT KIELDER.
AUTHOR ANON.
TUNNELS AND TUNNELLING
7 (6), 24-5, 1975.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
THYSSEN (GREAT BRITAIN)LTD.
TYNE TEES TUNNELING CONSORTIUM (TTT)
1,BARESEL,C:STUTTGART
2,MONK,A AND CO:WARRINGTON
3,SWISS ALUMINUM MINING (UK) LTD.
5,ZUBLIN,ED.AG,STUTTGART

FUNDING ORGANIZATION(S)
NORTHUMBRIAN WATER AUTHORITY,U.K.

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENINGS DISCUSSED INCLUDE THE COMPLETED EXCAVATION OF THE EXPERIMENTAL TUNNEL FOR KIELDER TUNNEL (ROGERLY QUARRY, FROSTERLY) U.K.) AND THE PROPOSED EXCAVATION OF THE TEES TUNNEL (ALSO CALLED KIELDER TUNNELS) (U.K.) . THE PROJECTS INVESTIGATED ARE UTILIZED FOR EXPERIMENTAL EXCAVATION AND WATER SUPPLY TUNNEL PURPOSES. THE DRILL AND BLAST (FULL FACE) METHOD AND TBM METHOD REPRESENT THE EXCAVATION TECHNIQUES STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDE CONVENTIONAL EXPLOSIVE (UNSPECIFIED) AND MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON UNDERGROUND OPENING SUPPORTS IS ALSO PRESENTED. ROCK TYPES REVIEWED INCLUDE LIMESTONE, MUDSTONE AND SANDSTONE .

R002848 WASHINGTON METRO - MIXED GROUND UNDER THE ARCHIVES.
AUTHOR ANON.
TUNNELS AND TUNNELLING
7 (6), 25, 1975.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
SATO KOHGYO,JAPAN

FUNDING ORGANIZATION(S)
WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY (WAMATA),
WASHINGTON,D.C:USA.

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENINGS DISCUSSED INCLUDE THE COMPLETED EXCAVATION OF THE EMPINGHAM RESERVOIR PROJECT, SHAFT NO.6 (EMPINGHAM, U.K.), THE COMPLETED EXCAVATION OF THE WASHINGTON METRO, ARCHIVES STATION SEC.F 1-8, WEST TUBE, S.END (WASHINGTON, D.C., USA), THE COMPLETED EXCAVATION OF THE WASHINGTON METRO, ARCHIVES STATION SEC.F 1-8, EAST TUBE, N.END (WASHINGTON, D.C., USA), THE COMPLETED EXCAVATION OF THE WASHINGTON METRO, ARCHIVES STATION SEC.F 1-8, WEST TUBE, N.END (WASHINGTON, D.C., USA) AND THE COMPLETED EXCAVATION OF THE WASHINGTON METRO, ARCHIVES STATION SEC.F 1-8, EAST TUBE, S.END

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(WASHINGTON, D.C., USA) . THE PROJECTS INVESTIGATED ARE UTILIZED FOR METRO PURPOSES. THE SHIELD METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHODS SERVICING PROJECT EFFORTS INCLUDE HAND MINING, MECHANICAL ABRASION (PERCUSSION) AND MECHANICAL ABRASION (PERCUSSION AND DRAG) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. EXCAVATION ADVANCEMENT RATE IS ALSO DISCUSSED. GEOSTRUCTURAL AND SOIL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON UNDERGROUND OPENING SUPPORTS AND MATERIALS HANDLING SYSTEM IS ALSO PRESENTED.

R002850 HYDRAULIC DRILLS SPEED THE WAY.
AUTHOR ANON.
TUNNELS AND TUNNELLING
7 (6), 34-6, 1975.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
1,CONSTRUZIONI STRADALI E CIVILI S A:LUGANO
2,EVEQUOZ S A:PONT-DE-LA-MORGES
3,GEBR ARNOLD A G,BURGLEN
4,GEBR BONETTI A G,ANDERMATT
5,SAVRO,S A:SION
1,FIRMA SCHMALZ A G,BERN
2,KOPP A G,LUCERNE
3,SOCOSA S A:LAUSANNE
1,LOCHER AND CIE AG
2,LOSINGER AG
3,MURER AG
4,PRADER AG
5,REIFLER AND GUGGISBERG ING AG
LOSINGER AG,SWITZERLAND
TIEFBAU,BRUNDUND AG,BASEL,SWITZERLAND

FUNDING ORGANIZATION(S)
SWITZERLAND,GOVT.OF.
KRAFTWERKE OBERHASLI,SWITZERLAND
GAS AND WATER DEPT:BASEL,SWITZERLAND

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENINGS DISCUSSED INCLUDE THE COMPLETED EXCAVATION OF THE BASEL UTILITY TUNNEL (BASEL, SWITZERLAND), THE COMPLETED EXCAVATION OF THE END SHAFTS, BASEL UTILITY TUNNEL (BASEL, SWITZERLAND), THE ON GOING EXCAVATION OF THE FURKA TUNNEL (OBERWALD END) (ANDERMATT-BRIG, SWITZERLAND), THE ON GOING EXCAVATION OF THE FURKA TUNNEL (REALP END) (ANDERMATT-BRIG, SWITZERLAND), THE PROPOSED EXCAVATION OF THE HEADRACE TUNNEL, GRIMSELII EAST PUMPED STORAGE POWER PROJECT (GRIMSEL, SWITZERLAND), THE PROPOSED EXCAVATION OF THE PENSTOCK TUNNEL, GRIMSEL II EAST PUMPED STORAGE POWER PROJECT (GRIMSEL, SWITZERLAND), THE ON GOING EXCAVATION OF THE RUGEN HIGHWAY TUNNEL (RUGEN, SWITZERLAND) AND THE PROPOSED EXCAVATION OF THE SURGE CHAMBER, GRIMSEL II EAST PUMPED STORAGE POWER PROJECT (GRIMSEL, SWITZERLAND) . THE PROJECTS INVESTIGATED ARE UTILIZED FOR ACCESS TUNNEL (SHAFTS AND ADITS TO MAIN OPENING), PUMP STORAGE, RAILWAY, TWIN HIGHWAY, UTILITY TUNNEL AND VEHICULAR TUNNEL (UNSPECIFIED) PURPOSES. THE DRILL AND BLAST (FULL FACE) METHOD, MECHANICAL EXCAVATOR METHOD AND TBM METHOD REPRESENT THE EXCAVATION TECHNIQUES STUDIED. THE REPORTED FRAGMENTATION METHODS SERVICING PROJECT EFFORTS INCLUDE CONVENTIONAL EXPLOSIVE (UNSPECIFIED), MECHANICAL ABRASION (ROTARY) AND MECHANICAL ABRASION (PERCUSSION AND DRAG) . THIS DOCUMENT INCORPORATES ADDITIONALLY DRILLING EQUIPMENT AND TUNNELING MACHINE CHARACTERISTICS. TBM EXCAVATION RATE IS ALSO DISCUSSED. SOIL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON GROUND CONDITIONS AND UNDERGROUND OPENING SUPPORTS AND MATERIALS HANDLING SYSTEM IS ALSO PRESENTED. ROCK TYPES REVIEWED INCLUDE LIMESTONE .

R002851 PROBLEMS OF TUNNELLING IN CHALK.
HASWELL, C. K.
TUNNELS AND TUNNELLING
7 (6), 40-3, 1975.
LANGUAGE: ENGLISH

FUNDING ORGANIZATION(S)
CENTRAL ELECTRICITY GENERATING BOARD,U.K.

(CONTINUED)

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENINGS DISCUSSED INCLUDE THE COMPLETED EXCAVATION OF THE NEW CROSS TUNNEL (U.K.), THE COMPLETED EXCAVATION OF THE SHAFT FOR THAMES CABLE TUNNEL (TILBURY, LONDON, U.K.), THE COMPLETED EXCAVATION OF THE SHAFT FOR THAMES CABLE TUNNEL (GRAVESEND, LONDON, U.K.), THE COMPLETED EXCAVATION OF THE SHAFT FOR PECKHAM CABLE TUNNEL (PECKHAM, LONDON, U.K.) AND THE COMPLETED EXCAVATION OF THE THAMES CABLE TUNNEL (TILBURY-GRAVESEND, LONDON, U.K.) . THE PROJECTS INVESTIGATED ARE UTILIZED FOR ACCESS TUNNEL (SHAFTS AND ADITS TO MAIN OPENING), ACCESS TUNNEL (OTHER THAN SHAFTS AND AUDITS TO MAIN TUNNELS)) AND CABLE TUNNEL PURPOSES. THE COMPRESSED AIR METHOD AND TBM METHOD REPRESENT THE EXCAVATION TECHNIQUES STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON GROUND CONDITIONS AND UNDERGROUND OPENING SUPPORTS IS ALSO PRESENTED. PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE CHALK (ROCK) . THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES (LAB) DATA.

R002852 INVESTIGATIONS FOR THE ABERDEEN TUNNEL.
CHAPPELL, B. A. TONGE, W. A.
TUNNELS AND TUNNELLING
7 (6), 52-4, 1975.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
MAUNSELL GEOTECHNICAL SERVICES,MELBOURNE,AUSTRALIA

THIS LAB-IN-SITU AND LAB REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENINGS DISCUSSED INCLUDE THE PROPOSED EXCAVATION OF THE ABERDEEN TUNNEL (HONG KONG-KOWLOON, HONG KONG) AND THE COMPLETED EXCAVATION OF THE PILOT TUNNEL FOR ABERDEEN TUNNEL (HONG KONG) . THE PROJECTS INVESTIGATED ARE UTILIZED FOR EXPLORATORY TUNNEL AND TWIN HIGHWAY PURPOSES. PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE GRANITE, MONZONITE, RHYOLITE AND VOLCANICS . THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES (LAB) DATA.

R002853 GETTING IT RIGHT AT GATHRIGHT.
AUTHOR ANON.
TUNNELS AND TUNNELLING
7 (6), 57, 1975.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
KEMPER FRONTIER CONSTRUCTORS,LOS ANGELES,CA:USA

FUNDING ORGANIZATION(S)
U.S.ARMY CORPS OF ENGINEERS

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENINGS DISCUSSED INCLUDE THE PROPOSED EXCAVATION OF THE DRAINAGE AND INSPECTION GALLERIES, GATHRIGHT DAM (COVINGTON, VA., USA), THE COMPLETED EXCAVATION OF THE SHAFT FOR CUTOFF WALL TUNNEL, GATHRIGHT DAM (COVINGTON, VA., USA) AND THE ON GOING EXCAVATION OF THE TUNNEL FOR CUTOFF WALL, GATHRIGHT DAM(COVINGTON, VA., USA) . THE PROJECTS INVESTIGATED ARE UTILIZED FOR DRAINAGE AND INSPECTION (DAM OR U FOUNDATION TREATMENT PURPOSES. THE DRILL AND BLAST (FULL FACE) METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES CONVENTIONAL EXPLOSIVE (TOVEX 100) . THIS DOCUMENT INCORPORATES ADDITIONALLY DRILLING EQUIPMENT AND TUNNELING MACHINE CHARACTERISTICS. TBM EXCAVATION AND EXCAVATION ADVANCEMENT RATES ARE ALSO DISCUSSED. GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON GROUND CONDITIONS AND UNDERGROUND OPENING SUPPORTS AND MATERIALS HANDLING SYSTEM IS ALSO PRESENTED. PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE LIMESTONE .

R002908 SEGMENTED CONCRETE LINEAR STUDY.
BIRKMYER, J.
FIRST ANNUAL CONF. ON DOT RESEARCH AND DEVELOPMENT IN TUNNELING TECHNOLOGY
18-2, 1975.

(CONTINUED)

(DOT-TST-75-136)
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
BECHTEL INC:50,BEALE ST:SAN FRANSISCO,CA:94119

FUNDING ORGANIZATION(S)
U.S.GOVT:DEPT.OF TRANSPORTATION

THIS THEORETICAL REPORT CONTAINS ABSTRACTED ONLY DATA. GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON GROUND CONDITIONS AND UNDERGROUND OPENING SUPPORTS IS ALSO PRESENTED.

R002909 STAND UP TIME OF TUNNELS IN SQUEEZING GROUND.
BREKKE, T. L. FINNIE, I. MITCHELL, J. K.
TAYLOR, R. L.
FIRST ANNUAL CONF. ON DOT RESEARCH AND DEVELOPMENT IN TUNNELING TECHNOLOGY
22-3, 1975.
(DOT-TST-75-136)
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
UNIVERSITY OF CALIFORNIA,BERKELEY,COLLEGE OF ENGINEERING

FUNDING ORGANIZATION(S)
U.S.GOVT:DEPT.OF TRANSPORTATION

THIS THEORETICAL REPORT CONTAINS ABSTRACTED ONLY DATA. PERTINENT INFORMATION ON GROUND CONDITIONS IS ALSO PRESENTED.

R002910 HYDRAULIC TRANSPORTATION AND SOLIDS SEPARATION OF EXCAVATED MATERIALS IN TUNNELS.
NELSON, C. YAROLEY, D.
FIRST ANNUAL CONF. ON DOT RESEARCH AND DEVELOPMENT IN TUNNELING TECHNOLOGY
24-5, 1975.
(DOT-TST-75-136)
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
UNIVERSITY OF MINNESOTA,DEPT.OF CIVIL AND MINERAL ENGINEERING

FUNDING ORGANIZATION(S)
U.S.GOVT:DEPT.OF TRANSPORTATION

THIS THEORETICAL REPORT CONTAINS ABSTRACTED ONLY DATA. GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON MATERIALS HANDLING SYSTEM IS ALSO PRESENTED. THE EXCAVATION CHARACTERISTICS FOR ST. PETERS SANDSTONE ARE TREATED. ROCK TYPES REVIEWED INCLUDE SANDSTONE .

R002911 EXPERIMENTAL VERIFICATION OF A PNEUMATIC TRANSPORT SYSTEM FOR THE RAPID EXCAVATION OF TUNNELS.
FADDICK, R. R. MARTIN, J. W.
FIRST ANNUAL CONF. ON DOT RESEARCH AND DEVELOPMENT IN TUNNELING TECHNOLOGY
26-30, 1975.
(DOT-TST-75-136)
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
COLORADO SCHOOL OF MINES,DEPT.OF MINING,GOLDEN,CO: 80401

FUNDING ORGANIZATION(S)
U.S.GOVT:DEPT.OF TRANSPORTATION

THIS IN-SITU-THEORETICAL REPORT CONTAINS ABSTRACTED ONLY DATA. PERTINENT INFORMATION ON MATERIALS HANDLING SYSTEM IS ALSO PRESENTED.

R002912 DEVELOPMENT OF RATIONAL DESIGN METHODOLOGY FOR SOFT GROUND GROUTED TUNNELS.
CLOUGH, G. W.
FIRST ANNUAL CONF. ON DOT RESEARCH AND DEVELOPMENT IN TUNNELING TECHNOLOGY
31-2, 1975.
(DOT-TST-75-136)
LANGUAGE: ENGLISH

(CONTINUED)

PERFORMING ORGANIZATION(S)
STANFORD UNIVERSITY,STANFORD,CA.94305

FUNDING ORGANIZATION(S)
U.S.GOVT;DEPT.OF TRANSPORTATION

THIS LAB-IN-SITU-THEORETICAL REPORT CONTAINS ABSTRACTED ONLY DATA. SOIL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED.

R002913 STUDIES IN TUNNEL DESIGN AND CONSTRUCTION.
CORDING, E. J. PAUL, S. L.
FIRST ANNUAL CONF. ON DOT RESEARCH AND DEVELOPMENT IN TUNNELING TECHNOLOGY
33-6, 1975.
(DOT-TST-75-136)
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
ILLINOIS,UNIVERSITY OF,URBANA,IL;USA

FUNDING ORGANIZATION(S)
U.S.GOVT;DEPT.OF TRANSPORTATION

THIS LAB-THEORETICAL REPORT CONTAINS ABSTRACTED ONLY DATA. GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON UNDERGROUND OPENING SUPPORTS IS ALSO PRESENTED.

R002914 TECHNICAL AND MANAGEMENT ASPECTS OF THE TUNNELING RESEARCH AT THE FEDERAL HIGHWAY ADMINISTRATION.
MAJTENYI, S. I.
FIRST ANNUAL CONF. ON DOT RESEARCH AND DEVELOPMENT IN TUNNELING TECHNOLOGY
39-42, 1975.
(DOT-TST-75-136)
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
U.S.GOVT;DEPT.OF TRANSPORTATION,FEDERAL HIGHWAY ADMINISTRATION,
WASHINGTON,D.C.

FUNDING ORGANIZATION(S)
U.S.GOVT;DEPT.OF TRANSPORTATION

THIS IN-SITU-THEORETICAL REPORT CONTAINS ABSTRACTED ONLY DATA. THE PROJECT INVESTIGATED IS UTILIZED FOR TRANSPORTATION PURPOSES. THE CUT AND COVER METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED.

R002915 GROUTING TECHNOLOGY IN CUT AND COVER AND SOFT GROUND TUNNELING.
HERNDON, J. LENAHAN, T.
FIRST ANNUAL CONF. ON DOT RESEARCH AND DEVELOPMENT IN TUNNELING TECHNOLOGY
43-5, 1975.
(DOT-TST-75-136)
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
HALLIBURTON SERVICES (P.O.BOX 1431) DUNCAN,OK;73533

FUNDING ORGANIZATION(S)
U.S.GOVT;DEPT.OF TRANSPORTATION

THIS IN-SITU-THEORETICAL REPORT CONTAINS ABSTRACTED ONLY DATA. GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON UNDERGROUND OPENING SUPPORTS IS ALSO PRESENTED.

P002920 DRILLING AND PREPARATION OF REUSABLE, LONG RANGE, HORIZONTAL BORE HOLES IN ROCK AND IN GOUGE MATERIALS.
HARDING, J. C.
FIRST ANNUAL CONF. ON DOT RESEARCH AND DEVELOPMENT IN TUNNELING TECHNOLOGY
65-7, 1975.
(DOT-TST-75-136)
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
MILLER,FOSTER ASSOCIATES,INC;135 SECOND AVE;
WALTHAM,MA;02154

FUNDING ORGANIZATION(S)
U.S.GOVT;DEPT.OF TRANSPORTATION

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THIS THEORETICAL REPORT CONTAINS ABSTRACTED ONLY DATA. THE DRILLING METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHODS SERVICING PROJECT EFFORTS INCLUDE MECHANICAL ABRASION (ROTARY) AND MECHANICAL ABRASION (PERCUSSION) . THIS DOCUMENT INCORPORATES ADDITIONALLY DRILLING EQUIPMENT CHARACTERISTICS. INFORMATION PERTINENT TO EXCAVATION COST IS GIVEN.

R002925 SUBWAY STATION DESIGN AND CONSTRUCTION.
GOZZO, S.
FIRST ANNUAL CONF. ON DOT RESEARCH AND DEVELOPMENT IN TUNNELING TECHNOLOGY
81, 1975.
(DOT-TST-75-136)
LANGUAGE: ENGLISH

FUNDING ORGANIZATION(S)
U.S.GOVT;DEPT.OF TRANSPORTATION

THIS THEORETICAL REPORT CONTAINS ABSTRACTED ONLY DATA. THE PROJECT INVESTIGATED IS UTILIZED FOR RAILWAY PURPOSES.

R002933 CRAWLER DRILL MODIFIED TO WORK UNDERWATER.
AUTHOR ANON.
ENG. NEWS REC.
196, 16, 1976.
LANGUAGE:ENGLISH

PERFORMING ORGANIZATION(S)
PRECISION BLASTING LTD;U.K.

THIS IN-SITU REPORT CONTAINS REVIEW DATA. THE PROJECT INVESTIGATED IS UTILIZED FOR HARBOUR DEEPENING PURPOSES. THE DRILL AND BLAST (OTHER THAN FULL FACE) METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES CONVENTIONAL EXPLOSIVE (UNSPECIFIED) . THIS DOCUMENT INCORPORATES ADDITIONALLY DRILLING EQUIPMENT AND TUNNELING MACHINE CHARACTERISTICS. ROCK TYPES REVIEWED INCLUDE SCHIST .

R002934 FINLAND'S SOLID GRANITE MAKES 75-MILE WATER TUNNEL A PUSHOVER.
AUTHOR ANON.
ENG. NEWS REC.
196 (7), 18-7, 1976.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
OY TIEFUNDAMENTTI AB;HELSINKI,FINLAND

FUNDING ORGANIZATION(S)
HELSINKI METROPOLITAN AREA WATER CO.

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENINGS DISCUSSED INCLUDE THE ON GOING EXCAVATION OF THE PAIJANNE TUNNEL-SECTION 1 (ASIKKALANSELKA, FINLAND), THE COMPLETED EXCAVATION OF THE PAIJANNE TUNNEL SECTION 2 (FINLAND), THE ON GOING EXCAVATION OF THE PAIJANNE TUNNEL SECTION 2 (FINLAND), THE ON GOING EXCAVATION OF THE PAIJANNE TUNNEL-SECTION 3 (HELSINKI, FINLAND) AND THE PROPOSED EXCAVATION OF THE PAIJANNE TUNNEL MACHINE HALL (FINLAND) . THE PROJECTS INVESTIGATED ARE UTILIZED FOR ACCESS TUNNEL (SHAFTS AND ADITS TO MAIN OPENING), MACHINE HALL (PUMPS) AND WATER SUPPLY TUNNEL PURPOSES. THE DRILL AND BLAST (FULL FACE) METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHODS SERVICING PROJECT EFFORTS INCLUDE CONVENTIONAL EXPLOSIVE (UNSPECIFIED) AND CONVENTIONAL EXPLOSIVE (AMMONIUM NITRATE AND FUEL OIL) . PERTINENT INFORMATION ON UNDERGROUND OPENING SUPPORTS AND MATERIALS HANDLING SYSTEM IS ALSO PRESENTED. PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE GNEISS, GRANITE AND GRANULITE .

R002965 THE HENDERSON PROJECT.
AUTHOR ANON.
MINING MAG.
133 (2), 90-2, 95-6, 1975.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
DRAVO CORP.(OR CO.),U.S.A.
AMAX INC;USA

(CONTINUED)

FUNDING ORGANIZATION(S)
AMAX,USA.

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE COMPLETED EXCAVATION OF THE HENDERSON TUNNEL (CO., USA) . THE PROJECT INVESTIGATED IS UTILIZED FOR MINE PURPOSES. THE DRILL AND BLAST (FULL FACE) METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES CONVENTIONAL EXPLOSIVE (GELEX) . GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON GROUND CONDITIONS AND UNDERGROUND OPENING SUPPORTS IS ALSO PRESENTED. THE EXCAVATION CHARACTERISTICS FOR SILVER PLUME GRANITE ARE TREATED. PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE GRANITE AND RHYOLITE .

R002986 FULL-FACE PENETRATION.
BRAUN, H. H.
CONSULTING ENGINEER
39 (10), 29, 31, 33, 1975.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
TYNE TEES TUNNELING CONSORTIUM (TTT)
1.BARESEL,C:STUTTGART
2.MONK,A AND CO:WARRINGTON
3.SWISS ALUMINUM MINING (UK) LTD.
5.ZUBLIN,E0.AG,STUTTGART

FUNDING ORGANIZATION(S)
NORTHUMBRIAN WATER AUTHORITY,U.K.

THE UNDERGROUND OPENING DISCUSSED INCLUDES TEES TUNNEL (ALSO CALLED KIELDER TUNNEL) (U.K.) . THE PROJECT INVESTIGATED IS UTILIZED FOR WATER SUPPLY TUNNEL PURPOSES. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. PERTINENT INFORMATION ON UNDERGROUND OPENING SUPPORTS AND MATERIALS HANDLING SYSTEM IS ALSO PRESENTED.

R002988 SLURRY SYSTEM SAVES ON SHAFT SINKING: WATER JETS CUT TUNNEL.
AUTHOR ANON.
ENG. NEWS REC.
192 (3), 18-9, 1976.
LANGUAGE:ENGLISH

PERFORMING ORGANIZATION(S)
1.ACTON CONSTRUCTION CO.,MUGO,MINN.,USA
2.MCCROSSAN C.S.,INC.,OSSEO,MINN.,USA
3.TRI STATE DRILLING AND EQUIPMENT CO.,MINNEAPOLIS, USA

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENINGS DISCUSSED INCLUDE THE COMPLETED EXCAVATION OF THE ST. PAUL STORM WATER TUNNEL PROJECT (ST. PAUL MINNESOTA, U.S.A.) AND THE ON GOING EXCAVATION OF THE ST. PAUL STORM WATER TUNNEL PROJECT (ST. PAUL MINNESOTA, U.S.A.) . THE PROJECTS INVESTIGATED ARE UTILIZED FOR SEWER PURPOSES. THE DRILL AND BLAST (FULL FACE) METHOD, DRILL BORING METHOD AND HYDRAULIC FRAGMENTATION METHOD REPRESENT THE EXCAVATION TECHNIQUES STUDIED. THE REPORTED FRAGMENTATION METHODS SERVICING PROJECT EFFORTS INCLUDE CONVENTIONAL EXPLOSIVE (UNSPECIFIED), JET ABRASION (WATER-CONTINUOUS) AND MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY DRILLING EQUIPMENT CHARACTERISTICS. GEOSTRUCTURAL AND SOIL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON GROUND CONDITIONS AND UNDERGROUND OPENING SUPPORTS IS ALSO PRESENTED. THE EXCAVATION CHARACTERISTICS FOR ST.PETER LIMESTONE ARE TREATED. PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE LIMESTONE AND TILL .

R003117 CHANNEL MAY BE STARTED AGAIN.
AUTHOR ANON.
TUNNELS AND TUNNELLING
8 (3), 19, 1976.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
CHANNEL (ENGLISH) TUNNEL CO:DEPT.OF ENVIRONMENT,U. K.GOVT.

(CONTINUED)

FUNDING ORGANIZATION(S)
U.K.GOVT.
EUROPEAN ECONOMIC COMMUNITY (EEC),MEMBER COUNTRIES OF

THIS IN-SITU REPORT CONTAINS REVIEW DATA. THE UNDERGROUND OPENINGS DISCUSSED INCLUDE THE PROPOSED EXCAVATION OF THE ENGLISH CHANNEL TUNNEL (U.K.) AND THE ABANDONED EXCAVATION OF THE ENGLISH CHANNEL TUNNEL (U.K.) . THE PROJECTS INVESTIGATED ARE UTILIZED FOR VEHICULAR TUNNEL (UNSPECIFIED) PURPOSES. THE TBM METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS.

R003118 HELSINKI METRO TENDERS ISSUED.
AUTHOR ANON.
TUNNELS AND TUNNELLING
8 (3), 19, 1976.
LANGUAGE: ENGLISH

FUNDING ORGANIZATION(S)
HELSINKI,CITY OF,RAPID TRANSIT OFFICE,HELSINKI, FINLAND

THIS IN-SITU REPORT CONTAINS REVIEW DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE PROPOSED EXCAVATION OF THE HELSINKI METRO, KLUUVI CLEFT SECTION(HELSINKI, FINLAND) . THE PROJECT INVESTIGATED IS UTILIZED FOR METRO PURPOSES.

R003119 SEWER STARTED.
AUTHOR ANON.
TUNNELS AND TUNNELLING
8 (3), 20, 1976.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
SYDNEY METROPOLITAN WATER BOARD,SYDNEY,AUSTRALIA

THIS IN-SITU REPORT CONTAINS REVIEW DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE PROPOSED EXCAVATION OF THE HEATHCOTE-ENGADINE CARRIER SEWER (SYDNEY, NSW., AUSTRALIA) . THE PROJECT INVESTIGATED IS UTILIZED FOR SEWER PURPOSES. THE TBM METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS.

R003120 OLLERTON COAL FIND.
AUTHOR ANON.
TUNNELS AND TUNNELLING
8 (3), 288 1976.
LANGUAGE: ENGLISH

THIS IN-SITU REPORT CONTAINS REVIEW DATA. THE UNDERGROUND OPENINGS DISCUSSED INCLUDE THE COMPLETED EXCAVATION OF THE DEVELOPMENT TUNNELS, OLLERTON COLLIERY (NOTTINGHAMSHIRE, U.K.), THE ON GOING EXCAVATION OF THE DEVELOPMENT TUNNELS, OLLERTON COLLIERY (NOTTINGHAMSHIRE, U.K.) AND THE PROPOSED EXCAVATION OF THE DEVELOPMENT TUNNELS, OLLERTON COLLIERY (NOTTINGHAMSHIRE, U.K.) . THE PROJECTS INVESTIGATED ARE UTILIZED FOR MINE PURPOSES.

R003121 HOWLEM CONTRACT.
AUTHOR ANON.
TUNNELS AND TUNNELLING
8 (3), 21, 1976.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
HOWLEM,JOHN AND CO.LTD.

FUNDING ORGANIZATION(S)
U.K.GOVT:POSTAL DEPT:

THIS IN-SITU REPORT CONTAINS REVIEW DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE ON GOING EXCAVATION OF THE CABLE TUNNEL, BIRD STREET-BROAD STREET (LONDON, ENGLAND, U.K.) . THE PROJECT INVESTIGATED IS UTILIZED FOR CABLE TUNNEL PURPOSES.

R003122 MODIFIED DOSCO.
AUTHOR ANON.

(CONTINUED)

TUNNELS AND TUNNELLING
5 (3), 21, 1976.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
BOVIS CIVIL ENGINEERING LTD;U.K.

FUNDING ORGANIZATION(S)
WESSEX WATER AUTHORITY,BRISTOL,U.K.

THIS IN-SITU REPORT CONTAINS REVIEW DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE ON GOING EXCAVATION OF THE SOUTHERN FOUL WATER INTERCEPTOR (BRISTOL, U.K.) . THE PROJECT INVESTIGATED IS UTILIZED FOR SEWER PURPOSES. THE TBM METHOD REPRESENT THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS.

R003142 HYDRAULIC TRANSPORTATION AND SOLIDS SEPARATION OF EXCAVATED MATERIALS IN TUNNELS.
NELSON, C. R. YARDLEY, D. H.
HAVRILAK, R. J., JR. MILLER, S. M.
U. S. DEPARTMENT OF TRANSPORTATION, WASHINGTON, D. C.
195PP., 1975.
(DOT-TST-76-70)
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
UNIVERSITY OF MINNESOTA,DEPT.OF CIVIL AND MINERAL ENGINEERING

FUNDING ORGANIZATION(S)
U.S.GOVT;DEPT.OF TRANSPORTATION
ST.PAUL PUBLIC WORKS DEPT;ST.PAUL,MN.

THIS IN-SITU-THEORETICAL AND IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE COMPLETED EXCAVATION OF THE ST. ANTHONY PARK STORM SEWER TUNNEL (ST.PAUL, MN., USA) . THE PROJECT INVESTIGATED IS UTILIZED FOR SEWER PURPOSES. THE DRILLING METHOD AND HEADING AND BENCH METHOD REPRESENT THE EXCAVATION TECHNIQUES STUDIED. THE REPORTED FRAGMENTATION METHODS SERVICING PROJECT EFFORTS INCLUDE CONVENTIONAL EXPLOSIVE (GELEX) AND JET ABRASION (WATER) . EXCAVATION ADVANCEMENT RATE IS ALSO DISCUSSED. GEOSTRUCTURAL CHARACTERISTICS AS WELL AS SOIL MECHANICAL PROPERTIES FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON UNDERGROUND OPENING SUPPORTS AND MATERIALS HANDLING SYSTEM IS ALSO PRESENTED. THE EXCAVATION CHARACTERISTICS FOR ST. PETERS SANDSTONE ARE TREATED. PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE SANDSTONE . THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES (LAB) DATA.

R003145 PNEUMATIC-HYDRAULIC MATERIAL TRANSPORT SYSTEM FOR RAPID EXCAVATION OF TUNNELS.
FADDICK, R. R. MARTIN, J. W.
U. S. DEPARTMENT OF TRANSPORTATION, WASHINGTON, D. C.
128PP., 1974.
(DOT-TST-75-17)
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
COLORADO SCHOOL OF MINES,DEPT.OF MINING,GOLDEN,CO; 80401
CONTINENTAL OIL COMPANY

FUNDING ORGANIZATION(S)
U.S.GOVT;DEPT.OF TRANSPORTATION
CONTINENTAL OIL COMPANY

THIS IN-SITU AND THEORETICAL REPORT CONTAINS ABSTRACTED ONLY, ORIGINAL AND REVIEW DATA. THE PROJECT INVESTIGATED IS UTILIZED FOR EXPERIMENTAL EXCAVATION PURPOSES. EXCAVATION ADVANCEMENT RATE IS ALSO DISCUSSED. PERTINENT INFORMATION ON MATERIALS HANDLING SYSTEM IS ALSO PRESENTED. ROCK TYPES REVIEWED INCLUDE COAL AND ROCK (UNSPECIFIED) . THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES (LAB) DATA.

R003146 AN EVALUATION OF THE EFFECTS OF AERODYNAMICS ON SUBWAY TUNNEL DESIGN AND OPERATING ENERGY REQUIREMENTS.
KURTZ, D. W.

(CONTINUED)

U. S. DEPARTMENT OF TRANSPORTATION, WASHINGTON, D. C.
41PP., 1976.
(DOT-TST-76-47)
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
CALIFORNIA INSTITUTE OF TECHNOLOGY,JET PROPULSION LABORATORY,
4800,OAK GROVE DRIVE,PASADENA,CA;91103,USA

FUNDING ORGANIZATION(S)
U.S.GOVT;DEPT.OF TRANSPORTATION

THIS LAB-THEORETICAL AND LAB REPORT CONTAINS ORIGINAL AND REVIEW DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE COMPLETED EXCAVATION OF THE BAY AREA RAPID TRANSIT PROJECT (BART) (SECTION UNSPECIFIED) (SAN FRANCISCO, CA., USA) . THE PROJECT INVESTIGATED IS UTILIZED FOR METRO PURPOSES. PERTINENT INFORMATION ON UNDERGROUND OPENING SUPPORTS IS ALSO PRESENTED.

R003147 EXPERIMENTAL VERIFICATION OF A PNEUMATIC TRANSPORT SYSTEM FOR THE RAPID EXCAVATION OF TUNNELS. PART 1. INSTALLATION OF TEST FACILITY.
MARTIN, J. W. FADDICK, R. R.
U. S. DEPARTMENT OF TRANSPORTATION, WASHINGTON, D. C.
110PP., 1976.
(DOT-TST-76-63)
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
COLORADO SCHOOL OF MINES,DEPT.OF MINING,GOLDEN,CO; 80401

FUNDING ORGANIZATION(S)
U.S.GOVT;DEPT.OF TRANSPORTATION

THIS IN-SITU-THEORETICAL REPORT CONTAINS ORIGINAL DATA. PERTINENT INFORMATION ON MATERIALS HANDLING SYSTEM IS ALSO PRESENTED.

R003148 SYSTEMS STUDY OF PRECAST CONCRETE TUNNEL LINERS.
BIRKMYER, J.
U. S. DEPARTMENT OF TRANSPORTATION, WASHINGTON, D. C.
145PP., 1975.
(DOT-TST-75-102)
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
BECHTEL INC;50,BEALE ST;SAN FRANCISCO,CA;94119
MAEDA KENSETSU,JAPAN
SATO KOHGYO,JAPAN
KUMAGAI;JAPAN
TEKKEN KENSETSU;JAPAN
1.KASHIMA,J.V.
2.NISHIMATSU
1.KUMAGAI,J.V.
2.SATO
TAISEI KENSETSU;JAPAN
KASHIMA KENSETSU;JAPAN
NISHIMATSU KENSETSU;JAPAN
TOBISHIMA KENSETSU;JAPAN
KUMAGAI GUMI;JAPAN
AOKI KENSETSU;JAPAN
1.KASHIMA
2.TOKYU

FUNDING ORGANIZATION(S)
BAY AREA RAPID TRANSIT DISTRICT,SAN FRANSISCO,CA; USA
U.S.GOVT;DEPT.OF TRANSPORTATION
JAPANESE NATIONAL RAILWAYS
TEITO RAPID TRANSIT AUTHORITY,JAPAN
JAPAN RAILWAY CONSTRUCTION CORP;JAPAN
YOKOHAMA,CITY OF
TOKYU (PRIVATE RAILWAY),JAPAN

THIS IN-SITU-THEORETICAL, IN-SITU AND LAB REPORT CONTAINS ORIGINAL AND REVIEW DATA. THE UNDERGROUND OPENINGS DISCUSSED INCLUDE THE COMPLETED EXCAVATION OF THE BANCHO TUNNEL, EIDAN NO.8 LINE (TOKYO, JAPAN), THE COMPLETED EXCAVATION OF THE BAY AREA RAPID TRANSIT PROJECT (BART) (SECTION UNSPECIFIED) (SAN FRANCISCO, CA., USA), THE COMPLETED EXCAVATION OF THE FLEET LINE TUNNEL, STAGE 1 (LONDON, ENGLAND, U.K.), THE ON GOING EXCAVATION OF THE FLEET LINE TUNNEL, STAGE 2 (LONDON, ENGLAND, U.K.), THE COMPLETED EXCAVATION OF THE HAMBURG RAILROAD UNDERPASS (HAMBURG, W.GERMANY), THE COMPLETED EXCAVATION OF THE

(CONTINUED)

HIBIYA-GORI TUNNEL, EIDAN NO.8 LINE (TOKYO, JAPAN), THE COMPLETED EXCAVATION OF THE HIRAKAWA-CHO I TUNNEL, EIDAN NO.8 LINE (TOKYO, JAPAN), THE COMPLETED EXCAVATION OF THE KANNO-SHITA II TUNNEL, YOKOHAMA LINE NO.1 (JAPAN), THE COMPLETED EXCAVATION OF THE KASUMIGASEKI TUNNEL, EIDAN NO.9 LINE (TOKYO, JAPAN), KASUMIGASEKI TUNNEL, EIDAN NO.8 LINE (TOKYO, JAPAN), THE COMPLETED EXCAVATION OF THE KEIHIN SANKU TUNNEL, EIDAN NO.5 LINE (TOKYO, JAPAN), THE COMPLETED EXCAVATION OF THE KODENMA-CHO TUNNEL, SOBU LINE (TOKYO, JAPAN), THE COMPLETED EXCAVATION OF THE KOMAZAWA (2) TUNNEL, SHIN-TAMAGAWA LINE (TOKYO, JAPAN), THE COMPLETED EXCAVATION OF THE KOMAZAWA (1) TUNNEL, SHIN-TAMAGAWA LINE (TOKYO, JAPAN), THE COMPLETED EXCAVATION OF THE METRO DE CARACAS (CARACAS, VENEZUELA), THE COMPLETED EXCAVATION OF THE MINAMI-AOYAMA II TUNNEL, EIDAN NO.9 LINE (TOKYO, JAPAN), THE COMPLETED EXCAVATION OF THE MINAMI-AOYAMA III TUNNEL, EIDAN NO.9 LINE (TOKYO, JAPAN), THE COMPLETED EXCAVATION OF THE MIYAMOTO-CHO TUNNEL, YOKOHAMA LINE NO.1 (JAPAN), THE COMPLETED EXCAVATION OF THE MOSCOW SUBWAY TUNNELS (MOSCOW, U.S.S.R.), THE COMPLETED EXCAVATION OF THE NAGATA-CHO II TUNNEL, EIDAN NO.8 LINE (TOKYO, JAPAN), THE COMPLETED EXCAVATION OF THE NEW VICTORIA LINE, TUNNEL OF (LONDON, ENGLAND, U.K.), THE COMPLETED EXCAVATION OF THE PICCADILY LINE TUNNEL (LONDON, ENGLAND, U.K.), THE COMPLETED EXCAVATION OF THE RHEIN TUNNEL (DUSSELDORF, W.GERMANY), THE COMPLETED EXCAVATION OF THE ROME METRO TUNNEL (ROME, ITALY), THE COMPLETED EXCAVATION OF THE SAKURAGICHO SUBWAY TUNNEL (YOKOHAMA, JAPAN), THE COMPLETED EXCAVATION OF THE SENJU MIDORI-CHO TUNNEL, EIDAN NO.9 LINE (TOKYO, JAPAN), THE COMPLETED EXCAVATION OF THE SHIBUYA TUNNEL, SHIN-TAMAGAWA LINE (TOKYO, JAPAN), THE COMPLETED EXCAVATION OF THE SHIODOME TUNNEL, TOKAIDO LINE (TOKYO, JAPAN), THE COMPLETED EXCAVATION OF THE SUMIDAGAWA TUNNEL, EIDAN NO.9, THE COMPLETED EXCAVATION OF THE SUSAKI TUNNEL, EIDAN NO.5 LINE (TOKYO, JAPAN), THE COMPLETED EXCAVATION OF THE TOKYO TEITO HST TUNNEL (TOKYO, JAPAN) AND THE COMPLETED EXCAVATION OF THE TOMIOKA-CHO TUNNEL, EIDAN NO.5 LINE (TOKYO, JAPAN) . THE PROJECTS INVESTIGATED ARE UTILIZED FOR METRO, RAILWAY AND SEWER PURPOSES. GEOSTRUCTURAL AND SOIL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON GROUND CONDITIONS AND UNDERGROUND OPENING SUPPORTS IS ALSO PRESENTED. ROCK TYPES REVIEWED INCLUDE MARL .

R003149 FEASIBILITY STUDY OF A SLURRY WALL TUNNEL THROUGH OVERTON PARK.
TOPOROFF, I. S.
U. S. DEPARTMENT OF TRANSPORTATION, WASHINGTON, D. C.
169PP., 1975-1976.
(DOT-TST-76-38)
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
SINGSTAD,KEHART,NOVEMBER AND HURKA (ONE WORLD TRADE CENTER,SUITE 2341),NEW YORK,NY!10048

FUNDING ORGANIZATION(S)
U.S.GOVT!DEPT.OF TRANSPORTATION

THIS THEORETICAL REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE PROPOSED EXCAVATION OF THE OVERTON PARK TUNNEL (MEMPHIS, TN., USA) . THE PROJECT INVESTIGATED IS UTILIZED FOR TWIN HIGHWAY PURPOSES. THE CUT AND COVER (REINFORCED CONCRETE) METHOD AND CUT AND COVER (UNDER ROOF SLURRY WALL, PRECAST CONCRETE SEGMENT) METHOD REPRESENT THE EXCAVATION TECHNIQUES STUDIED. INFORMATION PERTINENT TO EXCAVATION COST IS GIVEN. GEOSTRUCTURAL AND SOIL CHARACTERISTICS AS WELL AS SOIL MECHANICAL PROPERTIES FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED.

R003376 SYSTEMS AND COST ANALYSIS OF A DRILL AND SPLIT SYSTEM FOR ROCK EXCAVATION.
BUSHNELL, D. J. GIGNAC, L. P. CLARK, G. B.
TUNNELING TECHNOL. NEWSLETTER
(14), 2-11, 1976.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
MISSOURI,UNIVERSITY OF,ROLLA,MO!USA

(CONTINUED)

FUNDING ORGANIZATION(S)
NATIONAL SCIENCE FOUNDATION,WASHINGTON,D.C.!USA.

THIS LAB-IN-SITU REPORT CONTAINS ORIGINAL DATA. THE PROJECT INVESTIGATED IS UTILIZED FOR EXPERIMENTAL EXCAVATION PURPOSES. THE DRILL AND BLAST (FULL FACE) METHOD AND DRILL AND SPLIT METHOD REPRESENT THE EXCAVATION TECHNIQUES STUDIED. PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE DOLOMITE (ROCK), GRANITE, SANDSTONE AND SHALE .

R003377 FIELD DEMONSTRATION OF HIGH PRESSURE WATER JET ASSISTED TUNNEL BORING.
AUTHOR ANON.
TUNNELING TECHNOL. NEWSLETTER
(11), 2, 1975.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
1.COLORADO SCHOOL OF MINES
2.FLOW RESEARCH INC.
3.ROBBINS COMPANY

FUNDING ORGANIZATION(S)
1.COLORADO SCHOOL OF MINES
2.FLOW RESEARCH INC.
3.NATIONAL SCIENCE FOUNDATION
4.ROBBINS COMPANY
5.U.S.BUREAU OF MINES

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE PROJECT INVESTIGATED IS UTILIZED FOR EXPERIMENTAL EXCAVATION PURPOSES. THE WATER JET ASSISTED FULL FACE TUNNELING MACHINE METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY AND WATER JET) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. ROCK TYPES REVIEWED INCLUDE GRANITE

R003378 COST COMPARISON BETWEEN SUBTERRENE AND CURRENT TUNNELING METHODS.
BLEDSOE, J. O. HILL, J. E. COON, R. F.
TUNNELING TECHNOL. NEWSLETTER
(11), 3-5, 1975.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
MATHENS,A.A!INC.

FUNDING ORGANIZATION(S)
NATIONAL SCIENCE FOUNDATION,WASHINGTON,D.C.!USA.

THIS THEORETICAL REPORT CONTAINS ABSTRACTED ONLY DATA. THE UNDERGROUND OPENINGS DISCUSSED INCLUDE THE COMPLETED EXCAVATION OF THE GLENDORA TUNNEL (SAN GABRIEL MTS., CA., USA), THE COMPLETED EXCAVATION OF THE NEWHALL TUNNEL (USA) AND THE COMPLETED EXCAVATION OF THE RIVER MOUNTAINS TUNNEL (HENDERSON, NV., USA) . THE PROJECTS INVESTIGATED ARE UTILIZED FOR WATER SUPPLY TUNNEL PURPOSES. THE DRILL AND BLAST (FULL FACE) METHOD AND SUBTERRENE MELTING METHOD REPRESENT THE EXCAVATION TECHNIQUES STUDIED. THE REPORTED FRAGMENTATION METHODS SERVICING PROJECT EFFORTS INCLUDE CONVENTIONAL EXPLOSIVE (UNSPECIFIED) AND SUBTERRENE .

R003379 SUBSURFACE SITE INVESTIGATION BY ELECTROMAGNETIC RADAR.
RUBIN, L. A.
TUNNELING TECHNOL. NEWSLETTER
(11), 5-6, 1975.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
ENSCO,INC

FUNDING ORGANIZATION(S)
NATIONAL SCIENCE FOUNDATION,WASHINGTON,D.C.!USA.

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE COMPLETED EXCAVATION OF THE WASHINGTON METRO, CROWN DRIFT OF ZOOLOGICAL PARK STATION(WASH., D.C.USA) . THE PROJECT INVESTIGATED IS UTILIZED FOR METRO PURPOSES. ROCK TYPES REVIEWED INCLUDE SCHIST .

R003381 KAMAI TUNNEL MOVES SLOWLY.
AUTHOR ANON.
TUNNELS AND TUNNELLING
7 (6), 28, 1975.
LANGUAGE: ENGLISH

FUNDING ORGANIZATION(S)
MINISTRY OF WORKS,NEW ZEALAND

THIS IN-SITU REPORT CONTAINS REVIEW DATA. THE UNDERGROUND OPENINGS DISCUSSED INCLUDE THE ON GOING EXCAVATION OF THE KAMAI TUNNEL, WESTERN (MATAMATA) FACE (NEW ZEALAND) AND THE ON GOING EXCAVATION OF THE KAMAI TUNNEL, EASTERN (TAURANGA) FACE (NEW ZEALAND) . THE PROJECTS INVESTIGATED ARE UTILIZED FOR UNSPECIFIED PURPOSES. THE DRILL AND BLAST (FULL FACE) METHOD AND TBM METHOD REPRESENT THE EXCAVATION TECHNIQUES STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDE CONVENTIONAL EXPLOSIVE (UNSPECIFIED) AND MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. PERTINENT INFORMATION ON GROUND CONDITIONS AND UNDERGROUND OPENING SUPPORTS IS ALSO PRESENTED.

R003483 PARIS REGIONAL RAPID TRANSIT CUTS DEEP UNDER THE OLD CITY.
AUTHOR ANON.
ENG. NEWS REC.
30-1, 1967.
LANGUAGE: ENGLISH

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENINGS DISCUSSED INCLUDE THE ON GOING EXCAVATION OF THE PARIS REGIONAL EXPRESS METRO., NANTERRE-DEFENSE SECTION (PARIS, FRANCE), THE ON GOING EXCAVATION OF THE PARIS REGIONAL EXPRESS METRO., DEFENSE-SEINE SECTION (PARIS, FRANCE), THE ON GOING EXCAVATION OF THE PARIS REGIONAL EXPRESS METRO., SEINE TUNNEL (PARIS, FRANCE) AND THE ON GOING EXCAVATION OF THE PARIS REGIONAL EXPRESS METRO., SEINE TUNNEL-L'ETOILE STATION SECTION (PARIS, FRANCE) . THE PROJECTS INVESTIGATED ARE UTILIZED FOR METRO PURPOSES. THE CUT AND COVER METHOD, DREDGE AND BURY METHOD, SHEILD (USING COMPRESSED AIR) METHOD AND TUNNEL BORING MACHINE (COMPRESSED AIR) METHOD REPRESENT THE EXCAVATION TECHNIQUES STUDIED. THE REPORTED FRAGMENTATION METHODS SERVICING PROJECT EFFORTS INCLUDE HAND MINING-PERCUSSION MECHANICAL ABRASION AND MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. SOIL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON GROUND CONDITIONS AND UNDERGROUND OPENING SUPPORTS IS ALSO PRESENTED. ROCK TYPES REVIEWED INCLUDE LIMESTONE .

R003484 MOLE BORES AT 16 FT PER HOUR.
AUTHOR ANON.
ENG. NEWS REC.
29, 1967.
LANGUAGE: ENGLISH

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE PROJECT INVESTIGATED IS UTILIZED FOR WATER SUPPLY TUNNEL PURPOSES. THE TBM METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. PERTINENT INFORMATION ON MATERIALS HANDLING SYSTEM IS ALSO PRESENTED. ROCK TYPES REVIEWED INCLUDE LIMESTONE .

R003485 SUBWAY BUILDERS RACE ON AMBITIOUS PROJECT.
AUTHOR ANON.
ENG. NEWS REC.
26-8, 1967.
LANGUAGE: ENGLISH

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE PROJECT INVESTIGATED IS UTILIZED FOR HIGHWAY AND UNDERGROUND RAILWAY STATION PURPOSES. THE CUT AND COVER METHOD AND TBM METHOD REPRESENT THE EXCAVATION TECHNIQUES STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDE HAND MINING AND MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. SOIL CHARACTERISTICS FOR THE

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REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON GROUND CONDITIONS AND UNDERGROUND OPENING SUPPORTS AND MATERIALS HANDLING SYSTEM IS ALSO PRESENTED.

R003486 MOLE DIGS 8 MILES IN 13 MONTHS.
AUTHOR ANON.
ENG. NEWS REC.
23, 1967.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
1.COLORADO CONSTRUCTORS,DENVER,CO.
2.HORNER,A.S.CONSTRUCTION CO.,DENVER,CO.

FUNDING ORGANIZATION(S)
U.S.BUREAU OF RECLAMATION

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENINGS DISCUSSED INCLUDE THE ON GOING EXCAVATION OF THE AZOTEA TUNNEL (JUAN-CHAMA PROJECT) (N.CEN.NM., USA), THE COMPLETED EXCAVATION OF THE BLANCO TUNNEL (JUAN-CHAMA PROJECT) (N.CEN.NM., USA) AND THE ON GOING EXCAVATION OF THE OSO TUNNEL (CO., USA) . THE PROJECTS INVESTIGATED ARE UTILIZED FOR IRRIGATION PURPOSES. THE MANUAL METHOD AND TBM METHOD REPRESENT THE EXCAVATION TECHNIQUES STUDIED. THE REPORTED FRAGMENTATION METHODS SERVICING PROJECT EFFORTS INCLUDE HAND MINING AND MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. SOIL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON GROUND CONDITIONS AND UNDERGROUND OPENING SUPPORTS AND MATERIALS HANDLING SYSTEM IS ALSO PRESENTED. PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE SANDSTONE AND SHALE .

R003487 BIG MOLE IS DOWN IN THE HOLE.
AUTHOR ANON.
ENG. NEWS REC.
20, 1967.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
1.THE ARUNDEL CORP.,BALTIMORE,MD,U.S.A.
2.DIXON-L.E.,CO.,SAN GABRIEL,CA,U.S.A.
3.KIEWIT,PETER SONS' CO.,OMAHA,NB,U.S.A.
4.MAC-DONALD AND KRUSE INC.,MONTROSE,CA,U.S.A.

FUNDING ORGANIZATION(S)
5.CALIFORNIA,METROPOLITAN WATER DIST.OF,CA(USA.

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE ON GOING EXCAVATION OF THE NEWHALL TUNNEL (USA) . THE PROJECT INVESTIGATED IS UTILIZED FOR WATER SUPPLY TUNNEL PURPOSES. THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. PERTINENT INFORMATION ON UNDERGROUND OPENING SUPPORTS AND MATERIALS HANDLING SYSTEM IS ALSO PRESENTED. ROCK TYPES REVIEWED INCLUDE CONGLOMERATE . THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES (LAB) DATA.

R003488 MOLE BORES TUNNEL NO. 1, MINERS NO. 2.
AUTHOR ANON.
ENG. NEWS REC.
26-8, AND 33, 1965.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
FENIX AND SCISSON INC., TULSA,OK
SHEA-KAISER-MACCO,REDDING,CALIFORNIA

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENINGS DISCUSSED INCLUDE THE ON GOING EXCAVATION OF THE NAVAJO INDIAN IRRIGATION PROJECT., TUNNEL NO.1 (NEW MEXICO, U.S.A) AND THE ON GOING EXCAVATION OF THE NAVAJO INDIAN IRRIGATION PROJECT., TUNNEL NO.2 (NEW MEXICO, U.S.A) . THE PROJECTS INVESTIGATED ARE UTILIZED FOR IRRIGATION PURPOSES. THE DRILL AND BLAST (FULL FACE) METHOD AND TBM METHOD REPRESENT THE EXCAVATION TECHNIQUES STUDIED. THE REPORTED FRAGMENTATION METHODS SERVICING PROJECT EFFORTS INCLUDE CONVENTIONAL EXPLOSIVE (AMMONIUM NITRATE) AND MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. PERTINENT INFORMATION ON UNDERGROUND

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OPENING SUPPORTS AND MATERIALS HANDLING SYSTEM IS ALSO PRESENTED. ROCK TYPES REVIEWED INCLUDE SANDSTONE . THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES (LAB) DATA.

R003489 MACHINE WILL BORE HARDROCK TUNNEL.
AUTHOR ANON.
ENG. NEWS REC.
24-5, 1964.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
1.MORRISON-KNUDSEN CO.
2.PERINI CORP.

FUNDING ORGANIZATION(S)
NEW YORK CITY,BOARD OF WATER SUPPLY,NY:USA.

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE PROJECT INVESTIGATED IS UTILIZED FOR ACCESS TUNNEL (SHAFTS AND ADITS TO MAIN OPENING) AND WATER SUPPLY TUNNEL PURPOSES. THE TBM METHOD AND UNSPECIFIED METHOD REPRESENT THE EXCAVATION TECHNIQUES STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON UNDERGROUND OPENING SUPPORTS AND MATERIALS HANDLING SYSTEM IS ALSO PRESENTED. THE EXCAVATION CHARACTERISTICS FOR MANHATTAN SCHIST ARE TREATED. PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE SCHIST .

R003490 MANGLA'S MOLE'S A MONSTER.
AUTHOR ANON.
ENG. NEWS REC.
17, 1963.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
1.ATKINSON,GUY F:SAN FRANCISCO,AND OTHERS

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE PROPOSED EXCAVATION OF THE MANGLA DAM DIVERSION AND POWER TUNNELS (PAKISTAN) . THE PROJECT INVESTIGATED IS UTILIZED FOR HYDROELECTRIC PURPOSES. THE TBM METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. PERTINENT INFORMATION ON UNDERGROUND OPENING SUPPORTS IS ALSO PRESENTED. PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE LIMESTONE .

R003491 A HYBRID MOLE WRAPS UP OAHE TUNNELS.
AUTHOR ANON.
ENG. NEWS REC.
56-8, 1961.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
MITTRY CONSTRUCTION CO:LOS ANGELES,CA:USA.
1.JOHNSON
2.KIEWIT
3.MORRISON-KNUDSEN
OAHE CONSTRUCTORS
PRAIRIE CONSTRUCTORS

FUNDING ORGANIZATION(S)
U.S.ARMY CORPS OF ENGINEERS

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENINGS DISCUSSED INCLUDE THE COMPLETED EXCAVATION OF THE OAHE DAM DOWNSTREAM OUTLET TUNNELS (SD., USA), THE COMPLETED EXCAVATION OF THE OAHE DAM DOWNSTREAM POWER TUNNELS (SD., USA), THE COMPLETED EXCAVATION OF THE OAHE DAM UPSTREAM OUTLET TUNNELS (SD., USA) AND THE COMPLETED EXCAVATION OF THE OAHE DAM UPSTREAM POWER TUNNELS (SD., USA) . THE PROJECTS INVESTIGATED ARE UTILIZED FOR HYDROELECTRIC AND OUTLET (DAMS) PURPOSES. THE TBM METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. PERTINENT INFORMATION ON UNDERGROUND OPENING SUPPORTS AND MATERIALS HANDLING SYSTEM IS ALSO PRESENTED. ROCK TYPES REVIEWED INCLUDE SHALE .

R003492 BIGGEST TUNNELER GOES TO OAHE.
AUTHOR ANON.
ENG. NEWS REC.
26, 1959.
LANGUAGE: ENGLISH

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE PROPOSED EXCAVATION OF THE OAHE TUNNEL (UNSPECIFIED) (SD., USA) . THE PROJECT INVESTIGATED IS UTILIZED FOR HYDROELECTRIC PURPOSES. THE TBM METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS.

R003493 THE MOLE COMES THROUGH.
AUTHOR ANON.
ENG. NEWS REC.
28, 1957.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
OAHE CONSTRUCTORS

THIS REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES OAHE DAM FLOOD CONTROL TUNNELS (SD., USA) . THE PROJECT INVESTIGATED IS UTILIZED FOR FLOOD CONTROL PURPOSES. THE TBM METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) . ROCK TYPES REVIEWED INCLUDE SHALE .

R003494 MECHANICAL MOLE.
AUTHOR ANON.
ENG. NEWS REC.
26, 1955.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
MITTRY CONSTRUCTION CO:LOS ANGELES,CA:USA.

FUNDING ORGANIZATION(S)
U.S.ARMY CORPS OF ENGINEERS

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE ON GOING EXCAVATION OF THE OAHE DAM UPSTREAM OUTLET TUNNELS (SD., USA) . THE PROJECT INVESTIGATED IS UTILIZED FOR OUTLET (DAMS) PURPOSES. THE TBM METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. EXCAVATION ADVANCEMENT RATE IS ALSO DISCUSSED. GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON UNDERGROUND OPENING SUPPORTS AND MATERIALS HANDLING SYSTEM IS ALSO PRESENTED. THE EXCAVATION CHARACTERISTICS FOR PIERRE SHALE ARE TREATED. ROCK TYPES REVIEWED INCLUDE SHALE .

R003495 NEW MACHINE SPEEDS LARGE BORE TUNNELING.
AUTHOR ANON.
ENG. NEWS REC.
24-5, 1954.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
MITTRY CONSTRUCTION CO:LOS ANGELES,CA:USA.

FUNDING ORGANIZATION(S)
U.S.ARMY CORPS OF ENGINEERS

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE ON GOING EXCAVATION OF THE OAHE DAM UPSTREAM OUTLET TUNNELS (SD., USA) . THE PROJECT INVESTIGATED IS UTILIZED FOR OUTLET (DAMS) PURPOSES. THE TBM METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON UNDERGROUND OPENING SUPPORTS AND MATERIALS HANDLING SYSTEM IS ALSO PRESENTED. THE

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EXCAVATION CHARACTERISTICS FOR PLEPPE SHALE ARE TREATED. ROCK TYPES REVIEWED INCLUDE SHALE .

R003496 USBR TUNNELS UNDER THE CONTINENTAL DIVIDE.
AUTHOR ANON.
CIVIL ENG.
83, 1965.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
1.BOYLES BROTHERS DRILLING CO:
2.DUGAN GRAHAM INC;SALT LAKE CITY,UT;USA
3.GIBBONS AND REED

FUNDING ORGANIZATION(S)
U.S.BUREAU OF RECLAMATION

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE ON GOING EXCAVATION OF THE AZOTEA TUNNEL (JUAN-CHAMA PROJECT) (N.CEN.NM., USA) . THE PROJECT INVESTIGATED IS UTILIZED FOR DIVERSION TUNNEL PURPOSES. THE TBM METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) . ROCK TYPES REVIEWED INCLUDE MUDSTONE .

R003497 MACHINE TUNNELING UNDER HOUSTON.
MURPHY, W. D.
CIVIL ENG.
44-5, 1964.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
1.BORING AND TUNNELING COMPANY OF AMERICA (BORTUNCO)
2.HOLLAND ENGINEERING CORP.

FUNDING ORGANIZATION(S)
TEXAS HIGHWAY DEPARTMENT;TX,U.S.A.

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE COMPLETED EXCAVATION OF THE HOUSTON STORM SEWER TUNNEL (HOUSTON, TEX., USA) . THE PROJECT INVESTIGATED IS UTILIZED FOR DRAINAGE TUNNEL PURPOSES. THE TBM METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) . SOIL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON GROUND CONDITIONS AND UNDERGROUND OPENING SUPPORTS AND MATERIALS HANDLING SYSTEM IS ALSO PRESENTED. ROCK TYPES REVIEWED INCLUDE SANDSTONE .

R003499 MACHINE TUNNELING IN TASMANIA.
THOMAS, H. H.
CIVIL ENG.
60, 1963.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
HYDROELECTRIC COMMISSION,HOBART,TASMANIA

FUNDING ORGANIZATION(S)
HYDROELECTRIC COMMISSION,HOBART,TASMANIA

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE COMPLETED EXCAVATION OF THE TASMANIA TAILRACE TUNNELS . THE PROJECT INVESTIGATED IS UTILIZED FOR WATER CONVEYANCE (OTHER THAN WATER SUPPLY) PURPOSES. THE TBM METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. PERTINENT INFORMATION ON GROUND CONDITIONS AND MATERIALS HANDLING SYSTEM IS ALSO PRESENTED. ROCK TYPES REVIEWED INCLUDE MUDSTONE AND SANDSTONE . THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES (LAB) DATA.

R003501 HUMBER RIVER TUNNEL AT TORONTO.
WHITE, G. A.
CIVIL ENG.
43, 1962.
LANGUAGE: ENGLISH

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PERFORMING ORGANIZATION(S)
FOUNDATION CO.OF CANADA

THIS IN-SITU REPORT CONTAINS REPUBLISHED DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE ON GOING EXCAVATION OF THE HUMBER RIVER SEWER TUNNEL (TORONTO, ONTARIO, CANADA) . THE PROJECT INVESTIGATED IS UTILIZED FOR SEWER PURPOSES. THE TBM METHOD REPRESENT THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. TBM EXCAVATION RATE IS ALSO DISCUSSED. PERTINENT INFORMATION ON MATERIALS HANDLING SYSTEM IS ALSO PRESENTED. PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE LIMESTONE, MUDSTONE AND SAND . THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES (LAB) DATA.

R003503 SUBWAY BUILDERS START TUNNELING UNDER SAO PAULO.
AUTHOR ANON.
ENG. NEWS REC.
16, 1973.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
METROPOLITAN SAO PAULO CO.;SAO PAULO,BRAZIL

FUNDING ORGANIZATION(S)
METROPOLITAN SAO PAULO CO.;SAO PAULO,BRAZIL

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE ON GOING EXCAVATION OF THE SAO PAULO SUBWAY (SAO BENTO STATION-LUZ STATION) (SAO PAULO, BRAZIL) . THE PROJECT INVESTIGATED IS UTILIZED FOR METRO PURPOSES. THE CUT AND COVER METHOD AND TBM METHOD REPRESENT THE EXCAVATION TECHNIQUES STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) . PERTINENT INFORMATION ON UNDERGROUND OPENING SUPPORTS AND MATERIALS HANDLING SYSTEM IS ALSO PRESENTED.

R003504 LASER STEERS BIG MOLE IN BAD ROCK UNDER LAKE.
AUTHOR ANON.
ENG. NEWS REC.
26-8, 1970.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
GREENFIELD AND ASSOCIATES,LIVONIA,MI;USA.

FUNDING ORGANIZATION(S)
DETROIT METROPOLITAN WATER DEPT;DETROIT,MI;USA.

THIS IN-SITU AND LAB REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENINGS DISCUSSED INCLUDE THE ON GOING EXCAVATION OF THE DETROIT WATER SUPPLY PROJECT., LAKE HURON TUNNEL , DETROIT, MI., USA., THE COMPLETED EXCAVATION OF THE DETROIT WATER SUPPLY PROJECT., PUMPING SHAFT (DETROIT, MI., USA), THE ON GOING EXCAVATION OF THE DETROIT WATER SUPPLY PROJECT., PUMPING SHAFT (DETROIT, MI., USA) AND THE ON GOING EXCAVATION OF THE DETROIT WATER SUPPLY PROJECT., ACCESS CHAMBER (DETROIT, MI., USA) . THE PROJECTS INVESTIGATED ARE UTILIZED FOR ACCESS TUNNEL (OTHER THAN SHAFTS AND AUDITS TO MAIN TUNNELS), PUMPING SHAFT AND WATER SUPPLY TUNNEL PURPOSES. THE BLASTING (NO DRILLING) METHOD, DRILL AND BLAST (FULL FACE) METHOD, MECHANICAL EXCAVATOR METHOD AND PNEUMATIC BORING METHOD REPRESENT THE EXCAVATION TECHNIQUES STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDE CONVENTIONAL EXPLOSIVE (UNSPECIFIED) AND MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. GEOSTRUCTURAL AND SOIL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON GROUND CONDITIONS AND UNDERGROUND OPENING SUPPORTS IS ALSO PRESENTED. THE EXCAVATION CHARACTERISTICS FOR ANTRIM SHALE ARE TREATED. ROCK TYPES REVIEWED INCLUDE SHALE .

R003505 MOLE READIES FOR TWIN MERSEY BORE AFTER TROUBLE-PRONE FIRST DRIVE.
AUTHOR ANON.
ENG. NEWS REC.
22-3, 1970.
LANGUAGE: ENGLISH

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FUNDING ORGANIZATION(S)
MERSEY TUNNEL JOINT COMMITTEE,U.K. .

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE ON GOING EXCAVATION OF THE MERSEY RIVER TUNNELS (LIVERPOOL, UK) . THE PROJECT INVESTIGATED IS UTILIZED FOR PILOT BORE AND TWIN HIGHWAY PURPOSES. THE TBM METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. GEOSTRUCTURAL AND SOIL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON GROUND CONDITIONS AND UNDERGROUND OPENING SUPPORTS AND MATERIALS HANDLING SYSTEM IS ALSO PRESENTED. ROCK TYPES REVIEWED INCLUDE SANDSTONE .

R003506 WORLD'S LARGEST MOLE BORES JAPANESE TUNNEL.
AUTHOR ANON.
ENG. NEWS REC.
12, 1970.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
MAEDA CONSTRUCTION CO.;JAPAN

FUNDING ORGANIZATION(S)
JAPANESE NATIONAL RAILWAYS

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE ON GOING EXCAVATION OF THE NEW SANYO SUPER EXPRESS RAIL LINE TUNNEL (JAPAN) . THE PROJECT INVESTIGATED IS UTILIZED FOR METRO PURPOSES. THE SHIELD METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. SOIL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON UNDERGROUND OPENING SUPPORTS AND MATERIALS HANDLING SYSTEM IS ALSO PRESENTED. ROCK TYPES REVIEWED INCLUDE ALLUVIUM .

R003507 PIPES JACKED BEHIND MINI-MOLE.
AUTHOR ANON.
ENG. NEWS REC.
45-6, 1969.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
1.JAY-DEE CONTRACTORS INC.,SOUTHFIELD,MICHIGAN
2.MICHIGAN SEWER COMPANY,SOUTHFIELD,MICHIGAN

FUNDING ORGANIZATION(S)
GREATER CHICAGO,METROPOLITAN SANITARY DIST.OF,
CHICAGO,IL;USA.
CHICAGO, IL. USA

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE ON GOING EXCAVATION OF THE CHICAGO SEWER SYSTEM (CHICAGO, IL., USA) . THE PROJECT INVESTIGATED IS UTILIZED FOR SEWER PURPOSES. THE TBM METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. PERTINENT INFORMATION ON UNDERGROUND OPENING SUPPORTS AND MATERIALS HANDLING SYSTEM IS ALSO PRESENTED.

R003508 MOLE BREAKS THROUGH AFTER 293 FT. DAY AND 1,114 FT. WEEK.
AUTHOR ANON.
ENG. NEWS REC.
28-9, 1969.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
UTAH CONSTRUCTION AND MINING CO.

FUNDING ORGANIZATION(S)
U.S.BUREAU OF RECLAMATION

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE COMPLETED EXCAVATION OF THE RIVER MOUNTAINS TUNNEL (HENDERSON, NV., USA) . THE TBM METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY DRILLING EQUIPMENT AND TUNNELING MACHINE CHARACTERISTICS. PERTINENT INFORMATION ON UNDERGROUND OPENING SUPPORTS AND MATERIALS HANDLING SYSTEM IS ALSO PRESENTED. PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE RHYODACITE AND RHYOLITE . THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES (LAB) DATA.

R003509 TUNNELING MACHINE HOLES THROUGH FOUR MONTHS EARLY.
AUTHOR ANON.
ENG. NEWS REC.
26-8, 1969.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
DELAWARE V.M.CORP.

FUNDING ORGANIZATION(S)
SOUTHERN CALIFORNIA,METROPOLITAN WATER DISTRICT OF,

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENINGS DISCUSSED INCLUDE THE COMPLETED EXCAVATION OF THE CASTAIC TUNNEL, LOS ANGELES (CA., USA.), THE COMPLETED EXCAVATION OF THE CASTAIC TUNNEL, NO.2, LOS ANGELES (CA, U.S.A.) AND THE ON GOING EXCAVATION OF THE CASTAIC TUNNEL, NO.1, LOS ANGELES (CA, U.S.A.) . THE PROJECTS INVESTIGATED ARE UTILIZED FOR WATER SUPPLY TUNNEL PURPOSES. THE SHIELD METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (UNSPECIFIED) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. SOIL CHARACYERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON GROUND CONDITIONS AND UNDERGROUND OPENING SUPPORTS AND MATERIALS HANDLING SYSTEM IS ALSO PRESENTED. ROCK TYPES REVIEWED INCLUDE SANDSTONE .

R003510 MOLE ADAPTS TO VARYING SOIL.
AUTHOR ANON.
ENG. NEWS REC.
43, 1968.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
1.BADE AND COMPANY;HAMBURG,WEST GERMANY
2.HOLZMAN,PHILIPP A.G.;HAMBURG,WEST GERMANY

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE PROJECT INVESTIGATED IS UTILIZED FOR METRO PURPOSES. THE TBM METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. SOIL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. ROCK TYPES REVIEWED INCLUDE MARL .

R003511 THIRD MOLE DIGS BART'S SUBWAY.
AUTHOR ANON.
ENG. NEWS REC.
19, 1968.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
1.KIEWIT SONS
2.TRAYLOR BROTHERS,SAN FRANSISCO,CA;USA

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE COMPLETED EXCAVATION OF THE BAY AREA RAPID TRANSIT PROJECT (BART) (MARKET STREET SECTION) (SAN FRANCISCO, CA., USA) . THE PROJECT INVESTIGATED IS UTILIZED FOR METRO PURPOSES. THE TBM METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. PERTINENT INFORMATION ON UNDERGROUND OPENING SUPPORTS AND MATERIALS HANDLING SYSTEM IS ALSO PRESENTED.

R003512 HARDROCK MOLE NOW READY TO BORE.
AUTHOR ANON.
ENG. NEWS REC.

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71, 1967.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
1.MORRISON-KNUDSEN CO.
2.PERINI CORP.

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE TBM METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. TBM EXCAVATION RATE IS ALSO DISCUSSED. ROCK TYPES REVIEWED INCLUDE SCHIST .

R003513 MOLE SPADES THROUGH SOFT GROUND.
AUTHOR ANON.
ENG. NEWS REC.
27, 1967.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
1.PACIFIC MECHANICAL CONSTRUCTORS!INC.!SEATTLE,WA, U.S.A.
2.TAYLOR BROTHERS, INC.!EVANSVILLE,IN,U.S.A.

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE ON GOING EXCAVATION OF THE SEATTLE INTERCEPTOR SEWER (SEATTLE, WA, U.S.A.) . THE PROJECT INVESTIGATED IS UTILIZED FOR SEWER PURPOSES. THE MECHANICAL EXCAVATOR METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (DRAG) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. SOIL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON UNDERGROUND OPENING SUPPORTS AND MATERIALS HANDLING SYSTEM IS ALSO PRESENTED.

R003515 MOLE TAKES UNDERGROUND WORK OFF ROAD CONTRACTORS HANDS.
AUTHOR ANON.
ROADS AND STREETS
155-8, 1973.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
MOLE CONSTRUCTION COMPANY,INC.!ROMULUS,MI,U.S.A.

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE PROJECT INVESTIGATED IS UTILIZED FOR SEWER PURPOSES. THE MECHANICAL EXCAVATOR METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (DRAG) . THIS DOCUMENT INCORPORATES ADDITIONALLY DRILLING EQUIPMENT CHARACTERISTICS.

R003516 BUILDING THE SUBWAYS AND TUNNELS.
AUTHOR ANON.
WEST. CONSTR.
43 AND 46, 1973.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
1.BROWN AND ROOT
2.PERINI

FUNDING ORGANIZATION(S)
BAY AREA RAPID TRANSIT,SAN FRANCISCO,CA!USA

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENINGS DISCUSSED INCLUDE THE COMPLETED EXCAVATION OF THE BAY AREA RAPID TRANSIT PROJECT (BART) (SECTION UNSPECIFIED) (SAN FRANCISCO, CA., USA), THE COMPLETED EXCAVATION OF THE BAY AREA RAPID TRANSIT PROJECT (BART) (MARKET STREET SECTION) (SAN FRANCISCO, CA., USA) AND THE COMPLETED EXCAVATION OF THE BERKLEY HILLS TUNNEL (SAN FRANCISCO, CA, USA) . THE PROJECTS INVESTIGATED ARE UTILIZED FOR ACCESS TUNNEL (SHAFTS AND ADITS TO MAIN OPENING) AND METRO PURPOSES. THE COMPRESSED AIR METHOD, CUT AND COVER METHOD AND TBM METHOD REPRESENT THE EXCAVATION TECHNIQUES STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED

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EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON GROUND CONDITIONS AND UNDERGROUND OPENING SUPPORTS IS ALSO PRESENTED.

R003517 COMBINING MOLE, BELT, SHOTCRETE.
WITTE, J.
WEST. CONSTR.
39-43, 1970.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
1.WATTSON R.A.,CO.
2.WINSTON BROS.CO.

FUNDING ORGANIZATION(S)
SOUTHERN CALIFORNIA,METROPOLITAN WATER DISTRICT OF,

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE ON GOING EXCAVATION OF THE BALBOA OUTLET TUNNEL PROJECT (S.CALIFORNIA, U.S.A) . THE PROJECT INVESTIGATED IS UTILIZED FOR WATER SUPPLY TUNNEL PURPOSES. THE TBM METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (DRAG) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON UNDERGROUND OPENING SUPPORTS AND MATERIALS HANDLING SYSTEM IS ALSO PRESENTED. THE EXCAVATION CHARACTERISTICS FOR SAUGUS FORMATION ARE TREATED. PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE CONGLOMERATE, SANDSTONE AND SILTSTONE .

R003518 NORTHERN CALIFORNIA WATER TUNNEL.
AUTHOR ANON.
WESTERN CONSTR.
63-4 AND 67, 1967.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
1.BALL,GORDON H. ENTERPRISES
2.GATES AND FOX,INC.
3.GRANITE CONSTRUCTION CO.!LOOMIS,CA!USA

FUNDING ORGANIZATION(S)
S.CALIFORNIA,METROPOLITAN WATER DIST.OF,CA!USA.

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENINGS DISCUSSED INCLUDE THE ON GOING EXCAVATION OF THE CRYSTAL SPRINGS BYPASS WATER TUNNEL (SAN MATEO CO., CA., USA), THE COMPLETED EXCAVATION OF THE NINDOLA MINE (ZAMBIA), THE ON GOING EXCAVATION OF THE NAST TUNNEL (CO., USA), THE ON GOING EXCAVATION OF THE ORANGE-FISH TUNNEL (S.AFRICA) AND THE ON GOING EXCAVATION OF THE ROMEO TUNNELS (OAKLAND-MACOMB SYSTEM) (DETROIT, MI., USA) . THE PROJECTS INVESTIGATED ARE UTILIZED FOR TRANSFORMER STATION AND WATER SUPPLY TUNNEL PURPOSES. THE DRILLING METHOD AND TBM METHOD REPRESENT THE EXCAVATION TECHNIQUES STUDIED. THE REPORTED FRAGMENTATION METHODS SERVICING PROJECT EFFORTS INCLUDE CONVENTIONAL EXPLOSIVE (UNSPECIFIED) AND MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY DRILLING EQUIPMENT AND TUNNELING MACHINE CHARACTERISTICS. GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON GROUND CONDITIONS AND UNDERGROUND OPENING SUPPORTS AND MATERIALS HANDLING SYSTEM IS ALSO PRESENTED. PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE SANDSTONE .

R003519 BART'S FIRST COMPRESSED AIR JOB.
AUTHOR ANON.
WEST. CONSTR.
76-7 AND 80, 1968.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
1.BROWN AND ROOT INC.
2.MORRISON-KNUDSEN CO!INC.
3.PERINI CORP.
GERWICK,BEN C., INC.

FUNDING ORGANIZATION(S)
BAY AREA RAPID TRANSIT,SAN FRANCISCO,CA!USA

(CONTINUED)

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENINGS DISCUSSED INCLUDE THE ON GOING EXCAVATION OF THE BAY AREA RAPIT TRANSIT PROJECT (CONTRACT NO.S0022., 19TH TO 8TH STREET) (SAN FRANCISCO, CA., USA), THE ON GOING EXCAVATION OF THE BAY AREA RAPID TRANSIT PROJECT (CONTRACT NO.M0031., 24TH TO RANDALL STREET) (SAN FRANCISCO, CA, USA), THE ON GOING EXCAVATION OF THE CONSTRUCTION SHAFT, FOR CONTRACT NO.M0031 (BART PROJECT) (SAN FRANCISCO, CA, USA), THE ON GOING EXCAVATION OF THE CROSS-PASSAGES FOR CONTRACT NO.S0022 (BART PROJECT) (SAN FRANCISCO, CA, USA), THE ON GOING EXCAVATION OF THE CROSS-PASSAGES FOR CONTRACT NO.M0031 (BART PROJECT) (SAN FRANCISCO, CA, USA), THE ON GOING EXCAVATION OF THE PUMPING STATION FOR CONTRACT NO.M0031 (BART PROJECT) (SAN FRANCISCO, CA, USA), THE ON GOING EXCAVATION OF THE SWITCHING STATION FOR CONTRACT NO.M0031 (BART PROJECT) (SAN FRANCISCO, CA, USA), THE ON GOING EXCAVATION OF THE VENT-PUMP SHAFT FOR CONTRACT NO.S0022 (BART PROJECT) (SAN FRANCISCO, CA., USA) AND THE ON GOING EXCAVATION OF THE VENT SHAFT FOR CONTRACT NO.M0031 (BART PROJECT) (SAN FRANCISCO, USA) . THE PROJECTS INVESTIGATED ARE UTILIZED FOR ACCESS TUNNEL (SHAFTS AND ADITS TO MAIN OPENING), COMPOSITE:VENTILATION-PUMPING, CONSTRUCTION, MACHINE HALL (PUMPS), METRO, UNDERGROUND RAILWAY STATION AND VENTILATION PURPOSES. THE TBM METHOD AND TRENCH METHOD REPRESENT THE EXCAVATION TECHNIQUES STUDIED. THE REPORTED FRAGMENTATION METHODS SERVICING PROJECT EFFORTS INCLUDE MECHANICAL ABRASION (ROTARY) AND MECHANICAL ABRASION (DRAG) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. PERTINENT INFORMATION ON GROUND CONDITIONS AND UNDERGROUND OPENING SUPPORTS AND MATERIALS HANDLING SYSTEM IS ALSO PRESENTED.

R003520 HOLE SETS FAST PACE IN NEVADA ROCK.
AUTHOR ANON.
WEST. CONSTR.
38-9 AND 52, 1968.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
UTAH CONSTRUCTION AND MINING CO.

FUNDING ORGANIZATION(S)
U.S.BUREAU OF RECLAMATION

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE ON GOING EXCAVATION OF THE RIVER MOUNTAINS TUNNEL (HENDERSON, NV., USA) . THE PROJECT INVESTIGATED IS UTILIZED FOR WATER SUPPLY TUNNEL PURPOSES. THE TBM METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. SOIL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON GROUND CONDITIONS AND UNDERGROUND OPENING SUPPORTS AND MATERIALS HANDLING SYSTEM IS ALSO PRESENTED. ROCK TYPES REVIEWED INCLUDE DACITE, RHYOLITE AND TUFF . THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES (LAB) DATA.

R003521 HOLING THROUGH AT RIVER MOUNTAINS (NEVADA).
AUTHOR ANON.
WEST. CONSTR.
29-32, 1969
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
UTAH CONSTRUCTION AND MINING CO.
MULLEN,S.S.INC:SEATTLE,WA,USA
MORRISON-KNUDSEN COMPANY:BOISE,ID:U.S.A.

FUNDING ORGANIZATION(S)
U.S.BUREAU OF RECLAMATION

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENINGS DISCUSSED INCLUDE THE ON GOING EXCAVATION OF THE LAKE MEAD INTAKE TUNNEL (SADDLE ISLAND, NV, U.S.A.), THE ON GOING EXCAVATION OF THE PUMPING PLANT NO.1 (SOUTHERN NEVADA WATER PROJECT) (SADDLE ISLAND, NV, U.S.A.) AND THE COMPLETED EXCAVATION OF THE RIVER MOUNTAINS TUNNEL (HENDERSON, NV., USA) . THE PROJECTS INVESTIGATED ARE UTILIZED FOR MACHINE HALL (PUMPS) AND WATER SUPPLY TUNREL

(CONTINUED)

PURPOSES. THE TBM METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. PERTINENT INFORMATION ON UNDERGROUND OPENING SUPPORTS AND MATERIALS HANDLING SYSTEM IS ALSO PRESENTED. PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE RHYODACITE, RHYOLITE AND TUFF . THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES (LAB) DATA.

R003522 AZOTEA-TOLGH TUNNEL TO FINISH.
AUTHOR ANON.
WEST. CONSTR.
37-9 AND 91, 1969.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
1.BOYLES BROTHERS DRILLING CO:
2.DUGAN GRAHAM INC:SALT LAKE CITY,UT:USA
3.GIBBONS AND REED

FUNDING ORGANIZATION(S)
U.S.BUREAU OF RECLAMATION

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE COMPLETED EXCAVATION OF THE AZOTEA TUNNEL (JUAN-CHAMA PROJECT) (N.CEN.NM., USA) . THE PROJECT INVESTIGATED IS UTILIZED FOR WATER SUPPLY TUNNEL PURPOSES. THE TBM METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON GROUND CONDITIONS AND UNDERGROUND OPENING SUPPORTS AND MATERIALS HANDLING SYSTEM IS ALSO PRESENTED. THE EXCAVATION CHARACTERISTICS FOR LEWIS SHALE, MANCOS FORMATION AND MESAVERDE FORMATION (OR GROUP) ARE TREATED. ROCK TYPES REVIEWED INCLUDE SANDSTONE AND SHALE .

R003927 RECORDS TUMBLE AT NAVAJO NO. 3.
FRASER, H.
WEST. CONSTR.
27-30, 1972.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
FLUOR UTAH,INC:SAN MATEO,CA:USA

FUNDING ORGANIZATION(S)
U.S.BUREAU OF RECLAMATION

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENINGS DISCUSSED INCLUDE THE COMPLETED EXCAVATION OF THE NAVAHO INDIAN IRRIGATION PROJECT., TUNNEL NO.3 (NM, USA) AND THE ON GOING EXCAVATION OF THE NAVAJO INDIAN IRRIGATION PROJECT, TUNNEL NO.3A (NM., USA) . THE PROJECTS INVESTIGATED ARE UTILIZED FOR WATER SUPPLY TUNNEL PURPOSES. THE TBM METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. SOIL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON UNDERGROUND OPENING SUPPORTS AND MATERIALS HANDLING SYSTEM IS ALSO PRESENTED. PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE SANDSTONE, SHALE AND SILTSTONE . THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES (LAB) DATA.

R003924 THE FACTS ON SIX BORED TUNNELS.
BELLPORT, B. P.
WEST. CONSTR.
34-6, 42, 57, 1971.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
BOYLES BROTHERS DRILLING CO:CO:USA.
CLYDE AND CO.

FUNDING ORGANIZATION(S)
U.S.BUREAU OF RECLAMATION

(CONTINUED)

THIS IN-SITU REPORT CONTAINS REPUBLISHED DATA. THE UNDERGROUND OPENINGS DISCUSSED INCLUDE THE COMPLETED EXCAVATION OF THE BLANCO TUNNEL (JUAN-CHAMA PROJECT) (N.CEN.NM., USA), THE COMPLETED EXCAVATION OF THE NAVAJO INDIAN IRRIGATION PROJECT., TUNNEL NO.1 (NEW MEXICO, U.S.A), THE COMPLETED EXCAVATION OF THE OSO TUNNEL (CO., USA), THE COMPLETED EXCAVATION OF THE RIVER MOUNTAINS TUNNEL (HENDERSON, NV., USA), THE COMPLETED EXCAVATION OF THE STARVATION TUNNEL (CENTRAL UTAH PROJECT) (UT., USA) AND THE COMPLETED EXCAVATION OF THE STARVATION DAM OUTLET WORKS TUNNEL (CENTRAL UTAH PROJECT) (UT., USA) . THE PROJECTS INVESTIGATED ARE UTILIZED FOR WATER SUPPLY TUNNEL PURPOSES. THE DRILL AND BLAST (FULL FACE) METHOD AND TBM METHOD REPRESENT THE EXCAVATION TECHNIQUES STUDIED. THE REPORTED FRAGMENTATION METHODS SERVICING PROJECT EFFORTS INCLUDE CONVENTIONAL EXPLOSIVE (UNSPECIFIED) AND MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. EXCAVATION ADVANCEMENT RATE IS ALSO DISCUSSED. GEOSTRUCTURAL AND SOIL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON GROUND CONDITIONS AND UNDERGROUND OPENING SUPPORTS AND MATERIALS HANDLING SYSTEM IS ALSO PRESENTED. THE EXCAVATION CHARACTERISTICS FOR ST.CLOUD(GRAY)GRANODIORITE (=CHARCOAL GREY GRANITE) ARE TREATED. PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE CLAY, QUARTZ, SANDSTONE, SHALE AND SILTSTONE . THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES (LAB) DATA.

R003556 FASTER, CHEAPER TUNNELING.
WOOD, A. M.
NEW SCIENTIST
98-100, 1970.
LANGUAGE: ENGLISH

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE ON GOING EXCAVATION OF THE MEXICO CITY DRAINAGE TUNNELS (MEXICO CITY, MEXICO) . THE PROJECT INVESTIGATED IS UTILIZED FOR DRAINAGE TUNNEL PURPOSES. THE SHIELD (USING SLURRY) METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS.

R003577 MECHANICS OF CUTTING AND BORING. PART II: KINEMATICS OF AXIAL ROTATION MACHINES.
MELLOR, M.
COLD REGIONS RESEARCH AND ENGINEERING LAB., HANOVER, NEW HAMPSHIRE
45PP., 1976.
(CRREL-76-16)
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
U.S.ARMY COLD REGIONS RESEARCH AND ENGINEERING LAB: HANOVER,NH:USA.

FUNDING ORGANIZATION(S)
U.S.ARMY COLD REGIONS RESEARCH AND ENGINEERING LAB. (CRREL)

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (EXPLOSIVE-ROTARY) .

R003612 RESOURCEFUL TUNNELING BEATS SEVERE DIGGING CHALLENGE.
PARKINSON, G.
CONSTR. METHODS EQUIPMENT
56 (7), 62-3, 1974.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
TUNNEL S.A. DEC.V. (TUSA) (SEVEN COMPANY JOINT VENTURE CONTRACTOR)

FUNDING ORGANIZATION(S)
COMINCO AMERICAN

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENINGS DISCUSSED INCLUDE THE ON GOING EXCAVATION OF THE DEEP LEVEL DRAINAGE INTERCEPTOR TUNNELS-MEXICO CITY (MEX.CITY, MEX) AND THE ON GOING EXCAVATION OF THE DEEP LEVEL DRAINAGE OUTFALL

(CONTINUED)

TUNNEL-MEXICO CITY (MEXICO CITY, MEX.) . THE PROJECTS INVESTIGATED ARE UTILIZED FOR COMBINED SEWER PURPOSES. THE HEADING AND BENCH METHOD AND SHEILD (USING COMPRESSED AIR) METHOD REPRESENT THE EXCAVATION TECHNIQUES STUDIED. THE REPORTED FRAGMENTATION METHODS SERVICING PROJECT EFFORTS INCLUDE CONVENTIONAL EXPLOSIVE (UNSPECIFIED) AND HAND MINING . THIS DOCUMENT INCORPORATES ADDITIONALLY DRILLING EQUIPMENT AND TUNNELING MACHINE CHARACTERISTICS. SOIL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON UNDERGROUND OPENING SUPPORTS AND MATERIALS HANDLING SYSTEM IS ALSO PRESENTED.

R003613 COAL MINING HEADERS DOUBLE AS TUNNELERS FOR CITY SUBWAY SYSTEM.
NELSON, B.
CONSTR. METHODS EQUIPMENT
56 (7), 106-7, 1974.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
FAIRCLOUGH,LEONARD (NORTHWICH,,U.K.)
NUTTAL,EDMUND (LONDON,,U.K.)

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENINGS DISCUSSED INCLUDE THE ON GOING EXCAVATION OF THE LIVERPOOL UNDERGROUND EXTENSION, LOOP TUNNEL (LIVERPOOL, U.K.), THE ON GOING EXCAVATION OF THE LIVERPOOL UNDERGROUND EXTENSION, UNDERGROUND STATIONS (LIVERPOOL, U.K.), THE ON GOING EXCAVATION OF THE LIVERPOOL UNDERGROUND EXTENSION, LINKING TUNNELS (LIVERPOOL, U.K.), THE ON GOING EXCAVATION OF THE LIVERPOOL UNDERGROUND EXTENSION, ACESS SHAFTS (LIVERPOOL, U.K.) AND THE ON GOING EXCAVATION OF THE LIVERPOOL UNDERGROUND EXTENSION, ABOVE GROUND RAIL SERVICE CONNECTION (LIVERPOOL, U.K.) . THE PROJECTS INVESTIGATED ARE UTILIZED FOR ACCESS TUNNEL (SHAFTS AND ADITS TO MAIN OPENING), METRO AND UNDERGROUND RAILWAY STATION PURPOSES. THE LONGWALL CUTTING MACHINE METHOD AND SHAFT EXCAVATION-CONCRETE UNDERPINNING METHOD REPRESENT THE EXCAVATION TECHNIQUES STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. PERTINENT INFORMATION ON UNDERGROUND OPENING SUPPORTS IS ALSO PRESENTED. ROCK TYPES REVIEWED INCLUDE SANDSTONE .

R003614 JOB SITES.
AUTHOR ANON.
CONSTR. METHODS EQUIPMENT
56 (7), 125-6, 1974.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
HYDROELECTRIC COMMISSION,HOBART,TASMANIA

THIS IN-SITU REPORT CONTAINS REVIEW DATA. THE UNDERGROUND OPENINGS DISCUSSED INCLUDE THE COMPLETED EXCAVATION OF THE INTAKE AND TAILRACE TUNNELS FOR GORDON RIVER POWER STATION (TASMANIA), THE ON GOING EXCAVATION OF THE PILOT TUNNELS FOR HONSHU-HOKKAIDO RAILWAY CONNECTION (ALSO CALLED SEIKAN UNDERSEA TUNNEL) (JAPAN), THE ON GOING EXCAVATION OF THE SEIKAN RAILWAY TUNNEL (JAPAN) AND THE ON GOING EXCAVATION OF THE WORK TUNNEL FOR HONSU-HOKKAIDO RAILWAY CONNECTION (ALSO CALLED SEIKAN UNDERSEA TUNNEL) (JAPAN) . THE PROJECTS INVESTIGATED ARE UTILIZED FOR HYDROELECTRIC, PILOT BORE AND RAILWAY PURPOSES. THE TBM METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) . PERTINENT INFORMATION ON UNDERGROUND OPENING SUPPORTS IS ALSO PRESENTED.

R003615 TOOLS AND TUNNELS HELP EARN FAT CONSTRUCTION BONUSES.
BLOOMBERG, R.
CONSTR. METHODS EQUIPMENT
56 (10), 46-8, 1974.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
MANNIX LTD:CALGARY,ALBERTA,CANADA

FUNDING ORGANIZATION(S)
B.C. HYDRO, CANADA

(CONTINUED)

THIS IN-SITU REPORT CONTAINS REVIEW DATA. THE UNDERGROUND OPENINGS DISCUSSED INCLUDE THE COMPLETED EXCAVATION OF THE MICA DAM PROJECT, UNDERGROUND POWER HOUSE (BRITISH COLUMBIA, CANADA), THE COMPLETED EXCAVATION OF THE MICA DAM PROJECT, TAILRACE TUNNELS (BRITISH COLUMBIA, CANADA), THE COMPLETED EXCAVATION OF THE MICA DAM PROJECT, PENSTOCK TUNNELS (BRITISH COLUMBIA, CANADA), THE COMPLETED EXCAVATION OF THE MICA DAM PROJECT, ACCESS TUNNELS (BRITISH COLUMBIA, CANADA) AND THE COMPLETED EXCAVATION OF THE MICA DAM PROJECT, ELEVATOR SHAFT (BRITISH COLUMBIA, CANADA) . THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. PERTINENT INFORMATION ON MATERIALS HANDLING SYSTEM IS ALSO PRESENTED.

R003618 ROUGH TUNNELING THROUGH BUSY CITY IS EASED BY MODIFIED MACHINES, METHODS.
INGERSOLL, R.
CONSTR. METHODS EQUIPMENT
57 (7), 62-3, 1975.
LANGUAGE:ENGLISH

PERFORMING ORGANIZATION(S)
ED.ZUBLIN AG (W.GERMANY)

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE COMPLETED EXCAVATION OF THE SEWER TUNNEL FOR COLOGNE (COLOGNE, FRANCE) . THE PROJECT INVESTIGATED IS UTILIZED FOR SEWER PURPOSES. THE SHEILD (USING DRILL AND BLAST) METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES CONVENTIONAL EXPLOSIVE (UNSPECIFIED) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE CLAY AND ROCK (UNSPECIFIED) .

R003619 BUILD-AND-ROLL TECHNIQUE GETS HEAVY PIPELINE ACROSS UNSTABLE LAKE BANK.
EDIGER, D.
CONSTR. METHODS EQUIPMENT
57 (7), 75, 1975.
LANGUAGE:ENGLISH

PERFORMING ORGANIZATION(S)
ROYAL ADRIAAN VOKER GROUP (ROTTERDAM,NETHERLANDS)
1.DREDGING AND CONSTRUCTION CO.LTD. (U.K.)
2.VISSER EN SMIT (NETHERLANDS)

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE PROJECT INVESTIGATED IS UTILIZED FOR SEWER PURPOSES. THE TRENCH METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED.

R003620 CRAWLER CUTTER PLUS SHOTCRETING PROTECT ENVIRONMENT, CUT COSTS.
AUTHOR ANON.
CONSTR. METHODS EQUIPMENT
57 (7), 76-7, 1975.
LANGUAGE:ENGLISH

PERFORMING ORGANIZATION(S)
BETON-UND MONIERBAU (DUSSLEDORF,W.GERMANY)

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE PROJECT INVESTIGATED IS UTILIZED FOR RAILWAY PURPOSES. THE NEW AUSTRAIN METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (UNSPECIFIED) . PERTINENT INFORMATION ON UNDERGROUND OPENING SUPPORTS IS ALSO PRESENTED. PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE MARL .

R003621 JACKING DRIVES DELIVER UNDERGROUND CULVERT SECTIONS.
MC CLURE, J. S.
CONSTR. METHODS EQUIPMENT
57 (7), 96-7, 1975.
LANGUAGE:ENGLISH

PERFORMING ORGANIZATION(S)
CEMENTATION (AFRICAN CONTRACTS PTY) LTD.

FUNDING ORGANIZATION(S)
DURBAN,CITY OF,NATAL,SOUTH AFRICA.

(CONTINUED)

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENINGS DISCUSSED INCLUDE THE ON GOING EXCAVATION OF THE EAST DRIVE NO.1, ALBERT PARK STORMWATER CULVERT (DURBAN, NATAL, SOUTH AFRICA), THE ON GOING EXCAVATION OF THE EAST DRIVE NO.2, ALBERT PARK STORMWATER CULVERT (DURBAN, NATAL, SOUTH AFRICA) AND THE COMPLETED EXCAVATION OF THE WEST DRIVE, ALBERT PARK STORMWATER CULVERT (DURBAN, NATAL, SOUTH AFRICA) . THE PROJECTS INVESTIGATED ARE UTILIZED FOR DRAINAGE (UNSPECIFIED) PURPOSES. THE PILOT BORE-CENTER AND MANUAL METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. PERTINENT INFORMATION ON UNDERGROUND OPENING SUPPORTS IS ALSO PRESENTED.

R003623 WATER JETTING OPENS DEEP STORM TUNNEL.
BROWN, D. C.
CONSTR. METHODS EQUIPMENT
58 (1), 48-9, 1976.
LANGUAGE:ENGLISH

PERFORMING ORGANIZATION(S)
1.ACTON CONSTRUCTION CO.,HUGO,MINN.,USA
2.MCCROSSAN C.S.,INC.,OSSEO,MINN.,USA
3.TRI STATE DRILLING AND EQUIPMENT CO.,MINNEAPOLIS, USA

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENINGS DISCUSSED INCLUDE THE COMPLETED EXCAVATION OF THE ST. PAUL STORM WATER TUNNEL PROJECT (ST. PAUL MINNESOTA, U.S.A.) AND THE ON GOING EXCAVATION OF THE ST. PAUL STORM WATER TUNNEL PROJECT (ST. PAUL MINNESOTA, U.S.A.) . THE PROJECTS INVESTIGATED ARE UTILIZED FOR SEWER PURPOSES. THE DRILL BORING METHOD AND HEADING AND BENCH METHOD REPRESENT THE EXCAVATION TECHNIQUES STUDIED. THE REPORTED FRAGMENTATION METHODS SERVICING PROJECT EFFORTS INCLUDE CONVENTIONAL EXPLOSIVE (UNSPECIFIED), JET ABRASION (WATER-CONTINUOUS) AND MECHANICAL ABRASION (ROTARY) . PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE LIMESTONE AND TILL .

R003626 STORINGNATURAL GAS UNDERGROUND.
AUTHOR ANON.
GROUND ENGINEERING
7 (5), 21-23, 1974.
LANGUAGE:ENGLISH

PERFORMING ORGANIZATION(S)
DREDGING AND CONSTRUCTION (KING'S,NORFOLK,U.K.)

FUNDING ORGANIZATION(S)
BRITISH GAS CORPORATION

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENINGS DISCUSSED INCLUDE THE COMPLETED EXCAVATION OF THE ACCESS SHAFTS FOR THE DORTMUND-MENGEDE SEWER TUNNELS (DORTMUND, W.GERMANY), THE ON GOING EXCAVATION OF THE DORTMUND-MENGEDE SEWER TUNNEL, SECTION A (DORTMUND, W.GERMANY) AND THE COMPLETED EXCAVATION OF THE DORTMUND-MENGEDE SEWER TUNNEL, SECTION B (DORTMUND, W.GERMANY) . THE PROJECT INVESTIGATED ARE UTILIZED FOR GAS STORAGE, PUMPING SHAFT AND WATER CONVEYANCE (OTHER THAN WATER SUPPLY) PURPOSES. ROCK TYPES REVIEWED INCLUDE SALT .

R003630 GROUND FREEZING AT STIRCHLEY.
HARRIS, J. S. REED, R. J.
GROUND ENGINEERING
8 (5), 46-8, 1975.
LANGUAGE:ENGLISH

PERFORMING ORGANIZATION(S)
SPECIALIST CONTRACTORS.
1.FORAKY LTD. (NOTTINGHAM,,U.K.)
2.LILLEY,F.J.C.(MIDLANDS)LTD. (,,U.K.)
3.REES,C.W.,LTD (ECCLESHALL,STAFFORDSHIRE,U.K.)

FUNDING ORGANIZATION(S)
SEVRN-TRENT WATER AUTHORITY (,,U.K.)

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE COMPLETED EXCAVATION OF THE STIRCHLEY AND COTTERIDGE SEWERAGE SCHEME TUNNEL (CHARLOTTE ROAD SECTION) (STIRCHLEY, U.K.) . THE PROJECT INVESTIGATED IS UTILIZED FOR IRRIGATION PURPOSES. THE JACKING (PREFABRICATED SECTIONS) METHOD AND MANUAL METHOD REPRESENT THE EXCAVATION TECHNIQUES STUDIED. PERTINENT INFORMATION ON UNDERGROUND OPENING SUPPORTS IS ALSO PRESENTED.

R003631 UNDERGROUND UMBRELLA PROTECTS TUNNEL DRIVE IN UNSTABLE SANDS.
AUTHOR ANON.
GROUND ENGINEERING
9 (2), 40-3, 1976.
LANGUAGE:ENGLISH

PERFORMING ORGANIZATION(S)
SOLETANCHE ENTREPRISE

FUNDING ORGANIZATION(S)
REGIE AUTONOME DES TRANSPORTS PARISIENS,PARIS, FRANCE.

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE COMPLETED EXCAVATION OF THE REGIONAL EXPRESS TRANSPORT SYSTEM (R.E.R.), TUNNELS-SECTION 18C (PARIS, FRANCE) . THE PROJECT INVESTIGATED IS UTILIZED FOR HIGHWAY PURPOSES. GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON UNDERGROUND OPENING SUPPORTS IS ALSO PRESENTED. THE EXCAVATION CHARACTERISTICS FOR BEAUCHAMP SAND ARE TREATED.

R003632 IONARC GETS USBM AID FOR TUNNELING RESEARCH.
AUTHOR ANON.
ENG. MINING J.
173 (7), 37, 1972.
LANGUAGE:ENGLISH

PERFORMING ORGANIZATION(S)
IONARC SMELTERS LTD.

FUNDING ORGANIZATION(S)
U.S.BUREAU OF MINES

THIS LAB-IN-SITU REPORT CONTAINS ABSTRACTED ONLY DATA. THE PROJECT INVESTIGATED IS UTILIZED FOR EXPERIMENTAL EXCAVATION PURPOSES. THE THERMAL FRAGMENTATION METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES THERMAL-ELECTRICAL (UNSPECIFIED) .

R003633 GOING UNDERGROUND AT KIDD CREEK.
AUTHOR ANON.
ENG. MINING J.
173 (7), 78-9, 1972.
LANGUAGE:ENGLISH

PERFORMING ORGANIZATION(S)
KIDD CREEK MINE

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENINGS DISCUSSED INCLUDE THE ON GOING EXCAVATION OF THE KIDD CREEK MINE, MAIN SHAFT, THE COMPLETED EXCAVATION OF THE KIDD CREEK MINE, ACCESS RAMP, THE ON GOING EXCAVATION OF THE KIDD CREEK MINE, ACCESS RAMP, THE ON GOING EXCAVATION OF THE KIDD CREEK MINE, MAIN LEVEL HEADINGS, THE ON GOING EXCAVATION OF THE KIDD CREEK MINE, SUBLEVEL HEADINGS, THE ON GOING EXCAVATION OF THE KIDD CREEK MINE, SLOT RAISES AND THE ON GOING EXCAVATION OF THE KIDD CREEK MINE, ORE PASSES . THE DRILL AND BLAST (FULL FACE) METHOD AND RAISE DRIVING (BORING MACHINES) METHOD REPRESENT THE EXCAVATION TECHNIQUES STUDIED. THE REPORTED FRAGMENTATION METHODS SERVICING PROJECT EFFORTS INCLUDE CONVENTIONAL EXPLOSIVE (UNSPECIFIED) AND MECHANICAL ABRASION (ROTARY) .

R003634 TREES, TRADITION GOVERN DESIGN OF UNDERGROUND LECTURE HALL.
AUTHOR ANON.
ENG. NEWS-REC.
195 (15), 22 AND 27, 1975.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
HEGIN,H.J:INC:NAUGATUCK,CT:USA

FUNDING ORGANIZATION(S)
YALE UNIVERSITY

THIS IN-SITU REPORT CONTAINS ABSTRACTED ONLY DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE COMPLETED EXCAVATION OF THE UNDERGROUND LECTURE HALL, CENTER FOR AMERICAN ARTS AND CULTURE, YALE UNIVERSITY, NEW HAVEN, CT., USA . THE PROJECT INVESTIGATED IS UTILIZED FOR UNDERGROUND LECTURE HALL PURPOSES. THE DREDGE AND SURY METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES ELECTRICAL ABRASION (HIGH FREQUENCY) . PERTINENT INFORMATION ON UNDERGROUND OPENING SUPPORTS IS ALSO PRESENTED.

(CONTINUED)

R003635 SWISS START $110-MILLION AIRPORT RAIL LINE.
AUTHOR ANON.
ENG. NEWS-REC.
195 (19), 13, 1975.
LANGUAGE:ENGLISH

FUNDING ORGANIZATION(S)
1.SWISS FEDERAL RAILWAYS, SWITZERLAND
2.SWITZERLAND,GOVERNMENT OF.
3.ZURICH,MUNICIPALITY OF,ZURICH,SWITZERLAND

THIS IN-SITU REPORT CONTAINS DATA. THE PROJECT INVESTIGATED IS UTILIZED FOR FLOOD CONTROL AND METRO PURPOSES. THE CUT AND COVER METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. PERTINENT INFORMATION ON UNDERGROUND OPENING SUPPORTS IS ALSO PRESENTED.

R003637 URBAN RAIL SYSTEM STAYS UP TO DATE AND KEEPS ITS RIDERS.
AUTHOR ANON.
ENG. NEWS-REC.
195 (23), 19, 1975.
LANGUAGE:ENGLISH

THIS IN-SITU REPORT CONTAINS DATA. THE PROJECT INVESTIGATED IS UTILIZED FOR METRO AND UNDERGROUND RAILWAY STATION PURPOSES.

R003638 TWO METHODS TESTED FOR BUILDING UNDERGROUND LIQUEFIED NATURAL GAS STORAGE TANKS.
AUTHOR ANON.
ENG. NEWS-REC.
195 (24), 14, 1975.
LANGUAGE:ENGLISH

PERFORMING ORGANIZATION(S)
KAJIMA CORPORATION
ICOS (GREAT BRITIAN) LTD.

FUNDING ORGANIZATION(S)
TOKYO GAS COMPANY (TOKYO,JAPAN)

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENINGS DISCUSSED INCLUDE THE COMPLETED EXCAVATION OF THE MERSEY OUTFALL INTERCEPTOR SEWER TUNNELS (BARRINGTON, LANCASHIRE, U.K.) AND THE ON GOING EXCAVATION OF THE TOKYO GAS CO.STORAGE TANK COMPLEX (SODEGAURA, TOKYO BAY, JAPAN) . THE PROJECTS INVESTIGATED ARE UTILIZED FOR GAS STORAGE AND METRO PURPOSES. THE CIRCULAR CONCRETE SEGMENTS SUNK BY UNDERMINING WITHIN CIRCULAR SHEETPILE CUTOFF METHOD AND PRECAST CONCRETE SEGMENTS AND CIRCULAR SHAFT TYPE SLURRY WALL METHOD REPRESENT THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES QUICK LIME . PERTINENT INFORMATION ON UNDERGROUND OPENING SUPPORTS IS ALSO PRESENTED.

R003639 HIGH HEAD PUMPED STORAGE PLANT HIDES UNDER WELSH SLATE QUARRY.
AUTHOR ANON.
ENG. NEWS-REC.
195 (25), 27-8, 1975.
LANGUAGE:ENGLISH

PERFORMING ORGANIZATION(S)
CONSORTIUM:HEADED BY SIR ALFRED MCALPINE AND SONS (LONDON,U.K.)

FUNDING ORGANIZATION(S)
GOVT.AUTHORITY AGUA Y ENERGIA ELECTRICA,ARGENTINA
CENTRAL ELECTRICITY GENERATING BOARD,U.K.

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENINGS DISCUSSED INCLUDE THE ON GOING EXCAVATION OF THE ACCESS TUNNEL, DINORWIC PROJECT (SNOWDONIA, WALES, U.K.), THE ON GOING EXCAVATION OF THE DIVERSION TUNNEL, DINORWIC PROJECT (SNOWDONIA, WALES, U.K.), THE ON GOING EXCAVATION OF THE DINORWIC PROJECT, VALVE STATION OF (WALES, U.K.), THE ON GOING EXCAVATION OF THE HIGH PRESSURE TUNNEL, DINORWIC

(CONTINUED)

PROJECT (SNOWDONIA, WALES, U.K.), THE ON GOING EXCAVATION OF THE LOW PRESSURE TUNNEL, DINORWIC PROJECT (SNOWDONIA, WALES, U.K.), THE ON GOING EXCAVATION OF THE OUTFALL TUNNELS, DINORWIC PROJECT (SNOWDONIA, WALES, U.K.), THE ON GOING EXCAVATION OF THE PENSTOCK TUNNELS, DINORWIC PROJECT (SNOWDONIA, WALES, U.K.), THE ON GOING EXCAVATION OF THE SURGE SHAFT, DINORWIC PROJECT (SNOWDONIA, WALES, U.K.), THE ON GOING EXCAVATION OF THE TRANSFORMER HALL, DINORWIC PROJECT (SNOWDONIA, WALES, U.K.), THE ON GOING EXCAVATION OF THE VENTILATION SHAFT, DINORWIC PROJECT (SNOWDONIA, WALES, U.K.) AND THE ON GOING EXCAVATION OF THE VERTICAL HIGH PRESSURE SHAFT, DINORWIC PROJECT (SNOWDONIA, WALES, U.K.) . THE PROJECTS INVESTIGATED ARE UTILIZED FOR ACCESS TUNNEL (SHAFTS AND ADITS TO MAIN OPENING), DIVERSION TUNNEL, OUTLET (DAMS), PRESSURE TUNNEL, PUMP STORAGE AND VENTILATION PURPOSES. THE DRILL AND BLAST (FULL FACE) METHOD AND UNSPECIFIED METHOD REPRESENT THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES CONVENTIONAL EXPLOSIVE (UNSPECIFIED) . ROCK TYPES REVIEWED INCLUDE SLATE .

R003641 PILED WALL AND ROOF CLEARS THE WAY FOR SUBWAY TUNNELING.
AUTHOR ANON.
CONSTR. METHODS EQUIPMENT
55, 68-9, 1973.
LANGUAGE:ENGLISH

PERFORMING ORGANIZATION(S)
HALCROW,SIR WILLIAM AND PARTNERS,CONSULTING ENGINEERS,LONDON,U.K.

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE ON GOING EXCAVATION OF THE HATTON CROSS-HEATHROW CENTRAL RAILWAY LINK (LONDON, U.K.) . THE PROJECT INVESTIGATED IS UTILIZED FOR METRO PURPOSES. THE HYDRAULIC EXCAVATOR METHOD AND MECHANICAL EXCAVATOR METHOD REPRESENT THE EXCAVATION TECHNIQUES STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. PERTINENT INFORMATION ON MATERIALS HANDLING SYSTEM IS ALSO PRESENTED.

R003642 DEEP-WATER TUNNELING OPERATIONS TIE-IN WITH PINPOINT ACCURACY.
LEE, R. E.
CONSTR. METHODS EQUIPMENT
55, 76-9, 1973.
LANGUAGE:ENGLISH

PERFORMING ORGANIZATION(S)
1.KIEWIT SONS CO., PETER,(OMAHA,NEBRASKA,U.S.A.)
2.RAYMOND INTERNATIONAL,(HOUSTON,TEXAS,U.S.A.)
3.TIDEWATER CONSTRUCTION CORP.(NORFOLK,,U.S.A.)

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE ON GOING EXCAVATION OF THE SECOND HAMPTON ROADS TUNNEL (FORT MONROE, VIRGINIA U.S.A.) . THE PROJECT INVESTIGATED IS UTILIZED FOR HIGHWAY PURPOSES. THE DREDGE AND BURY METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. PERTINENT INFORMATION ON UNDERGROUND OPENING SUPPORTS IS ALSO PRESENTED.

R003643 GRADE-CLIMBING MOLE BORES MOUNTAIN TUNNEL.
AUTHOR ANON.
CONSTR. METHODS EQUIPMENT
55, 83, 1973.
LANGUAGE:ENGLISH

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE PROJECT INVESTIGATED IS UTILIZED FOR METRO PURPOSES. THE TBM METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS.

R003644 JUMBO-MOUNTED SCABBLERS READY VALVE CHAMBER.
AUTHOR ANON.
CONSTR. METHODS EQUIPMENT
55, 84-5, 1973.
LANGUAGE:ENGLISH

(CONTINUED)

PERFORMING ORGANIZATION(S)
PRADER AG.

FUNDING ORGANIZATION(S)
CALIFORNIA, STATE OF,DEPT. OF WATER RESOURCES,CA) USA.

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE ON GOING EXCAVATION OF THE PYRAMID DAM, VALVE CHAMBER (TEHACHAPI MOUNTAINS, CALIFORNIA, U.S.A.) . PERTINENT INFORMATION ON UNDERGROUND OPENING SUPPORTS IS ALSO PRESENTED.

R003645 OCEAN FLOOR SHAFT DRILLING MOVES BETTER WHEN STARTED FROM BELOW.
NAKABAYASHI, J.
CONSTR. METHODS EQUIPMENT
55, 89-91, 1973.
LANGUAGE:ENGLISH

PERFORMING ORGANIZATION(S)
KUMAGAI GUMI:JAPAN

FUNDING ORGANIZATION(S)
CHUBA ELECTRIC POWER CO,HAMAOKA,JAPAN

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENINGS DISCUSSED INCLUDE THE COMPLETED EXCAVATION OF THE HAMAOKA NUCLEAR REACTOR COOLING SYSTEM (HAMAOKA, JAPAN), THE COMPLETED EXCAVATION OF THE INTAKE SHAFT FOR HAMAOKA NUCLEAR REACTOR COOLING SYSTEM (HAMAOKA, JAPAN), THE COMPLETED EXCAVATION OF THE MAIN TUNNEL FOR HAMAOKA NUCLEAR REACTOR COOLING SYSTEM (HAMAOKA, JAPAN), THE COMPLETED EXCAVATION OF THE PILOT BORE FOR HAMAOKA NUCLEAR REACTOR COOLING SYSTEM (HAMAOKA, JAPAN) AND THE COMPLETED EXCAVATION OF THE PILOT SHAFT FOR HAMAOKA NUCLEAR REACTOR COOLING SYSTEM (HAMAOKA, JAPAN) . THE PROJECTS INVESTIGATED ARE UTILIZED FOR WATER CONVEYANCE (OTHER THAN WATER SUPPLY) PURPOSES. THE MANUAL METHOD, PILOT BORE-CENTER AND MANUAL METHOD AND SHIELD METHOD REPRESENT THE EXCAVATION TECHNIQUES STUDIED. THE REPORTED FRAGMENTATION METHODS SERVICING PROJECT EFFORTS INCLUDE HAND MINING AND MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. GEOSTRUCTURAL AND SOIL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON UNDERGROUND OPENING SUPPORTS AND MATERIALS HANDLING SYSTEM IS ALSO PRESENTED. PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE SANDSTONE AND SAND .

R003646 BENTONITE SLURRY AND CONVENTIONAL TUNNELING JOIN HANDS TO BURROW THROUGH SOFT EARTH.
NELSON, B.
CONSTR. METHODS EQUIPMENT
55, 120-2, 1973.
LANGUAGE:ENGLISH

PERFORMING ORGANIZATION(S)
MUTTAL,EDMUND LTD(U.K.

FUNDING ORGANIZATION(S)
NATIONAL RESEARCH AND DEVELOPMENT CORP.,U.K.

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE COMPLETED EXCAVATION OF THE LONDON SUBWAY TUNNEL (LONDON, U.K.) . THE PROJECT INVESTIGATED IS UTILIZED FOR METRO PURPOSES. THE BENTONITE SHEILD METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. SOIL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON UNDERGROUND OPENING SUPPORTS IS ALSO PRESENTED.

R003647 LONG GANTRY RIDING ABOVE FRESH CONCRETE ELIMINATES TUNNEL POURING DELAYS.
AUTHOR ANON.
CONSTR. METHODS EQUIPMENT
56, 62-3, 1974.
LANGUAGE:ENGLISH

PERFORMING ORGANIZATION(S)
TUNNEL CONSTRUCTORS:

(CONTINUED)

1.ROCCO FERRERA AND CO.;LIVONIA,MI,USA
2.GREENFIELD CONSTRUCTION CO.;LIVONIA,MI,USA
3.S.A.HEALEY CO.;MCCOOK,IL,USA

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE PROJECT INVESTIGATED IS UTILIZED FOR SEWER PURPOSES.

R003648 MINI-TUNNELER DRIVES FULLFACE BORE.
AUTHOR ANON.
CONSTR. METHODS EQUIPMENT
56, 68, 1974.
LANGUAGE:ENGLISH

PERFORMING ORGANIZATION(S)
INSANA CONSTRUCTION CO. (NY;USA)

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE PROJECT INVESTIGATED IS UTILIZED FOR SEWER PURPOSES. THE TBM METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. PERTINENT INFORMATION ON MATERIALS HANDLING SYSTEM IS ALSO PRESENTED.

R003650 FROZEN LAKE BOTTOM PERMITS UPSIDE-DOWN SHAFT DRILLING.
HAMPTON, W.
CONSTR. METHODS EQUIPMENT
56, 106-7, 1974.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
MILE HIGH DRILLING CO.,INC. (DENVER,CO,USA)

FUNDING ORGANIZATION(S)
DETROIT METROPOLITAN WATER DEPT;DETROIT,MI;USA.

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENINGS DISCUSSED INCLUDE THE COMPLETED EXCAVATION OF THE INTAKE SHAFT FOR DETROIT METROPOLITAN WATER DEPT.PROJECT(DETROIT, MI, U.S.A.) AND THE COMPLETED EXCAVATION OF THE SUPPLY TUNNEL FOR DETROIT METROPOLITAN WATER DEPT.PROJECT (DETROIT MI, U.S.A.) . THE PROJECTS INVESTIGATED ARE UTILIZED FOR WATER SUPPLY TUNNEL PURPOSES. THE FREEZE WALL BORING METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. PERTINENT INFORMATION ON UNDERGROUND OPENING SUPPORTS AND MATERIALS HANDLING SYSTEM IS ALSO PRESENTED.

R003657 MECHANICS OF CUTTING AND BORING. PART III.
KINEMATICS OF CONTINUOUS BELT MACHINES.
MELLOR, M.
COLD REGIONS RES. AND ENGR. LAB., HANOVER, NH
24PP., 1976.
(CRREL-R-76-17)
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
U.S.ARMY COLD REGIONS RESEARCH AND ENGINEERING LAB; HANOVER,NH;USA.

FUNDING ORGANIZATION(S)
U.S.ARMY COLD REGIONS RESEARCH AND ENGINEERING LAB. (CRREL)

THIS THEORETICAL REPORT CONTAINS ORIGINAL DATA. THE MECHANICAL EXCAVATOR METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) .

R003660 RECORD CLAIMED FOR NZ TUNNEL.
AUTHOR ANON.
TUNNELS AND TUNNELLING
8 (4), 15, 1976.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
CODELFA-COGEFAR (N.Z.)LTD;
1.CODELFA CONSTRUCTION DEL FARERO SP A,SUBSIDIARY OF
2.CONSTRUZIONI GERERALI FARSURA SP A,MILAN

(CONTINUED)

FUNDING ORGANIZATION(S)
MINISTRY OF WORKS,NEW ZEALAND

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE COMPLETED EXCAVATION OF THE MOAWHANGO TO TONGARIRO TUNNEL (NEW ZEALAND) . THE PROJECT INVESTIGATED IS UTILIZED FOR HYDROELECTRIC PURPOSES. THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. PERTINENT INFORMATION ON GROUND CONDITIONS IS ALSO PRESENTED.

R003661 OVERCOMING FLOODING AT SEIKAN.
AUTHOR ANON.
TUNNELS AND TUNNELLING
8 (4), 15, 17, 1976.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
JAPAN RAILWAY CONSTRUCTION PUBLIC CORP;SEIKAN TUNNEL RESEARCH OFFICE,TOKYO,JAPAN

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENINGS DISCUSSED INCLUDE THE ON GOING EXCAVATION OF THE PILOT TUNNEL FOR HONSHU-HOKKAIDO RAILWAY CONNECTION (ALSO CALLED SEIKAN UNDERSEA TUNNEL), HOKKAIDO SIDE (JAPAN) AND THE ON GOING EXCAVATION OF THE SERVICE TUNNEL, SEIKAN UNDERSEA TUNNEL (JAPAN) . THE PROJECTS INVESTIGATED ARE UTILIZED FOR METRO PURPOSES. PERTINENT INFORMATION ON GROUND CONDITIONS IS ALSO PRESENTED.

R003666 EXTENSION OF THE PICCADILLY LINE.
HARTLEY, D. C.
TUNNELS AND TUNNELLING
8 (4), 55-6, 1976.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
MOWLEM,JOHN AND CO.LTD.

THIS IN-SITU REPORT CONTAINS DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE COMPLETED EXCAVATION OF THE PICCADILLY LINE EXTENSION (LONDON UNDERGROUND)., HATTON CROSS-HEATHROW SECTION. . THE PROJECT INVESTIGATED IS UTILIZED FOR METRO PURPOSES. THE SHIELD (MECHANICAL EXCAVATOR,) METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) . PERTINENT INFORMATION ON UNDERGROUND OPENING SUPPORTS AND MATERIALS HANDLING SYSTEM IS ALSO PRESENTED.

R003668 THE FUTURE FOR ROCK STORAGE.
AUTHOR ANON.
TUNNELS AND TUNNELLING
8 (5), 17, 1976.
LANGUAGE: ENGLISH

FUNDING ORGANIZATION(S)
CROMARTY PETROLEUM,SCOTLAND

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA, THE PROJECT INVESTIGATED IS UTILIZED FOR OIL STORAGE PURPOSES.

R003669 BALTIMORE METRO BOLTON HILL BIDS.
AUTHOR ANON.
TUNNELS AND TUNNELLING
8 (5), 17, 1976.
LANGUAGE: ENGLISH

FUNDING ORGANIZATION(S)
BALTIMORE REGIONAL TRANSIT SYSTEM;BALTIMORE,MD,U.S.A.

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE PROPOSED EXCAVATION OF THE BOLTON HILL TUNNEL (BALTIMORE, MD, U.S.A.) . THE PROJECT INVESTIGATED IS UTILIZED FOR METRO PURPOSES. THE COMPRESSED AIR METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. SOIL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON UNDERGROUND OPENING SUPPORTS IS ALSO PRESENTED.

R003670 FIRST UK IMMERSED TUBE TUNNEL.
AUTHOR ANON.

(CONTINUED)

TUNNELS AND TUNNELLING
8 (5), 17, 1976.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
CHRISTIANI NIELSEN

FUNDING ORGANIZATION(S)
NORTHERN IRELAND ELECTRICITY SERVICES,N.IRELAND,U.K.

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE ON GOING EXCAVATION OF THE KILROOT POWER STATION. CIRCULATING WATER SYSTEM OUTFALL (CARRICKFERGUS, N.IRELAND, U.K.) . THE PROJECT INVESTIGATED IS UTILIZED FOR EFFLUENT OUTFALL (OTHER THAN SEWERAGE) PURPOSES. THE IMMERSED TUBE (PRE-STRESSED CONCRETE BOX) METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. PERTINENT INFORMATION ON UNDERGROUND OPENING SUPPORTS AND MATERIALS HANDLING SYSTEM IS ALSO PRESENTED.

R003671 ARCTIC TUNNELS.
AUTHOR ANON.
TUNNELS AND TUNNELLING
8 (5), 17, 19, 1976.
LANGUAGE: ENGLISH

FUNDING ORGANIZATION(S)
POLAR GAS PROJECT

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE PROPOSED EXCAVATION OF THE GAS TUNNEL, CORNWALLIS ISLAND TO LITTLE CORNWALLIS ISLAND (US-CANADA) . THE PROJECT INVESTIGATED IS UTILIZED FOR GAS TRANSPORT PURPOSES. THE TBM METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY) .

R003672 SOUTH AFRICAN NEWS.
AUTHOR ANON.
TUNNELS AND TUNNELLING
8 (5), 23, 1976.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
1.MURREY AND STEWARTSCAPE TOWN,S.AFRICA
2.SAVAGE AND LOVEMORE
3.RUC MINING AND CONTRACTING
4.DORMAN LONG/SWAN HUNTER
1.OSMAR CIVIL ENGINEERING (PTY, LTD.
2.LTD CONSTRUCTION

FUNDING ORGANIZATION(S)
SOUTH AFRICAN RAILWAYS (SAR)
SOUTH WEST AFRICA WATER AND ELECTRICITY CORPORATION

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENINGS DISCUSSED INCLUDE ORANGE-FISH TUNNEL (S.AFRICA), THE ON GOING EXCAVATION OF THE RUACANA HYDROPOWER SCHEME (ACCESS GALLERY) (RUACANA FALLS, S.AFRICA), THE ON GOING EXCAVATION OF THE RUACANA HYDROPOWER SCHEME (PRESSURE TUNNEL) (RUACANA FALLS, S.AFRICA), THE ON GOING EXCAVATION OF THE RUACANA HYDROPOWER SCHEME (POWERHOUSE CAVERNS) RUACANA FALLS, S.AFRICA), THE ON GOING EXCAVATION OF THE RUACANA HYDROPOWER SCHEME (TAILRACE TUNNEL) (RUACANA FALLS, S.AFRICA) AND THE ON GOING EXCAVATION OF THE STEENBRAS PUMPED STORAGE HYDROELECTRIC SCHEME (CAPETOWN, S.AFRICA) . THE PROJECTS INVESTIGATED ARE UTILIZED FOR EXPLORATORY TUNNEL, HYDROELECTRIC, METRO, PRESSURE TUNNEL, UNDERGROUND POWER STATION AND UNDERGROUND RAILWAY STATION PURPOSES. THE DRILL AND BLAST (FULL FACE) METHOD, DRILL BORING METHOD AND RAISE DRIVING (BORING MACHINES) METHOD REPRESENT THE EXCAVATION TECHNIQUES STUDIED. THE REPORTED FRAGMENTATION METHODS SERVICING PROJECT EFFORTS INCLUDE MECHANICAL ABRASION (ROTARY) AND MECHANICAL ABRASION (UNSPECIFIED) . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON MATERIALS HANDLING SYSTEM IS ALSO PRESENTED. PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE GNEISS .

R003673 SWEDEN'S UNDERGROUND MILLIONS.
NINDOLF, G.

(CONTINUED)

TUNNELS AND TUNNELLING
8 (5), 24-6, 1976.
LANGUAGE: ENGLISH

FUNDING ORGANIZATION(S)
STOCKHOLM HARBOUR AUTHORITY,STOCKHOLM,SWEDEN.

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE ON GOING EXCAVATION OF THE LOUDDEN PROJECT.. UNDERGROUND STORAGE CAVERNS (LOUDDEN, SWEDEN) . THE PROJECT INVESTIGATED IS UTILIZED FOR OIL STORAGE PURPOSES. THE HEADING AND BENCH METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES CONVENTIONAL EXPLOSIVE (UNSPECIFIED) . THIS DOCUMENT INCORPORATES ADDITIONALLY DRILLING EQUIPMENT CHARACTERISTICS. SOIL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON MATERIALS HANDLING SYSTEM IS ALSO PRESENTED.

R003679 LETTERS.
MULLER, L. MERETH, A.
TUNNELS AND TUNNELLING
8 (5), 76, 1976.

PERFORMING ORGANIZATION(S)
1.ANGUST PAPE KG,CASTROP-RAUXEL
2.BETON AND MONIERBAU,GMBH,INNSBRUCK
3.THYSSEN SCHACHTBAU,GMBH,MULHEIM-RUHR
1.BERGER, JULIUS
2.GRUN AND BILFINGER AG

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE PROJECT INVESTIGATED IS UTILIZED FOR METRO PURPOSES. THE NEW AUSTRIAN METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. SOIL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON UNDERGROUND OPENING SUPPORTS IS ALSO PRESENTED. PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE MARL AND MUDSTONE .

R003730 WORLD'S LONGEST TUNNEL.
AUTHOR ANON.
GROUND ENG.
8 (SEPT), 5, 1975.

FUNDING ORGANIZATION(S)
REPUBLIC OF S.AFRICA,DEPT.OF WATER AFFAIRS

THIS IN-SITU REPORT CONTAINS ABSTRACTED ONLY DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE COMPLETED EXCAVATION OF THE ORANGE-FISH TUNNEL (S.AFRICA) . THE PROJECT INVESTIGATED IS UTILIZED FOR WATER SUPPLY TUNNEL PURPOSES. THE UNSPECIFIED METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES UNSPECIFIED . GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON UNDERGROUND OPENING SUPPORTS IS ALSO PRESENTED. ROCK TYPES REVIEWED INCLUDE DOLERITE .

SECTION III

AUTHOR INDEX

III. AUTHOR INDEX

APPENDICES

APPENDIX 1

UERPIC's Current Scope of Coverage of the Literature on Excavation Technology

APPENDIX 1

UERPIC's Current Scope of Coverage of the Literature on Excavation Technology

(1 May 1976)

The scope of UERPIC's current literature coverage can be expressed in terms of the ICET Activity Classification Categories in Excavation Technology as follows*:

1. Interaction with Society
   - 1.2. Environmental Factors
   - 1.3. Health and Safety
   - 1.6. Legal Relations
     - 1.6.3. Contractual Relations
   - 1.7. Education and Evaluation
     - 1.7.1. Academic Education and Training
2. Site Investigation and Measurement of Earth Properties
   - 2.1. Geology
   - 2.2. Geophysics
   - 2.3. Hydrology
   - 2.4. Topography
   - 2.6. Rock Mechanics
   - 2.7. Soil Mechanics
3. Excavation Methods (soil and rock)
   - 3.1. Explosive
   - 3.2. Mechanical
   - 3.3. Thermal
   - 3.4. Chemical
4. Ground Control and Stabilization
   - 4.1. Excavation Design
   - 4.2. Supports in Open Cuts
   - 4.3. Tunnel Supports and Lining
5. Materials Handling
   - 5.1. Excavated Materials Handling

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* "ICET" is the acronym for the Federal Government's Interagency Committee on Excavation Technology. The associated numerical designations are those given in the original ICET classification.

This current scope of coverage is reflected in UERPIC's list of data elements extracted from the literature on excavation technology and incorporates more than 90% of the key words listed in the U.S.G.S. Thesaurus of Index Words in Excavation Technology.

The remaining elements of the ICET Activity Classification Categories in Excavation Technology represent a large volume of highly specialized literature which is beyond UERPIC's present processing capacity. These latter categories, however, incorporate less than 10% of the key words listed in the U.S.G.S. Thesaurus of Index Words in Excavation Technology. In particular, the ICET elements which lie outside the current scope of UERPIC's coverage are listed as follows:

1. Interactions with Society
   - 1.1. Analysis and Planning
   - 1.4. Disruptions
   - 1.5. Economic Factors
   - 1.6. Legal Relations
     - 1.6.1. Terraspace Ownership and Rights-of-Way
     - 1.6.2. Distribution of Risk
     - 1.6.4. Patent Rights
   - 1.7. Education and Evaluation
     - 1.7.2. Publication and Distribution of R & D Results
     - 1.7.3. Stimulation to Encourage Use of Subsurface
     - 1.7.4. System and Component Demonstration
     - 1.7.5. Evaluation of System Performance
2. Site Investigation and Measurement of Earth Properties
   - 2.5. Cultural Factors
5. Materials Handling
   - 5.2. Construction Materials Handling
6. Maintenance

APPENDIX 2

Current UERPIC Data Elements Extracted from the Literature on Rock Properties and Underground Excavation Technology

APPENDIX 2

Current UERPIC Data Elements Extracted from the Literature on Rock Properties and Underground Excavation Technology

I. Bibliographic Citation

1. Title
2. Author(s)
3. Source
4. Language

II. Principle Organizations

1. Performing Organization (and Location)
2. Funding Organization (and Location)

III. Contractual Relations

IV. Type of Report

1. Lab Report
2. In-Situ Report
3. Theoretical Report
4. Lab-In-Situ Report
5. Lab-Theoretical Report
6. In-Situ-Theoretical Report
7. Lab-In-Situ-Theoretical Report
8. Comprehensive Report
9. Workshop Report

V. Originality of Data

1. Original Data
2. Republished Data
3. Abstracted Data
4. Review Data

VI. Reported Stage of Project Completion

1. Completed
2. In-Progress
3. Proposed
4. Abandoned

VII Tunnel-Underground Opening Name and Location

VIII Tunnel-Underground Opening Design, Attitude and Geometry

IX. Utilization of Tunnel-Underground Opening

1. Building Foundation
2. Cable Tunnel
3. Diversion Tunnel

4. Drainage Tunnel
5. Experimental Excavation
6. Exploratory Tunnel
7. Highway
8. Hydroelectric
9. Irrigation
10. Metro
11. Military Installation
12. Mine
13. Outlet (Dams)
14. Pedestrian Tunnel
15. Pipeline (Unspec.)
16. Power Station
17. Pump Storage
18. Railway
19. Sewer
20. Underground Parking
21. Water Supply Tunnel

X. Excavation Technique

1. Austrian Method
2. Caisson Method
3. Compressed Air Method
4. Cut and Cover Method
5. Drill and Blast (Full Face) Method
6. Drilling and Thermal Fracturing Method
7. Drilling Method
8. Full Face Method
9. Heading and Bench Method
10. Hydraulic Fragmentation Method
11. Inclined Stage Method
12. Longwall Cutting Machine Method
13. Manual Method
14. Multi Drift Method
15. Partial Face Tunneling Machine Method
16. Peripheral Saw and Drill-Blast Method
17. Pilot Bore - Center Method
18. Pilot Bore - Crown Method
19. Pilot Bore - Invert Method
20. Raise Driving (Boring Machines) Method
21. Raise Driving (Mech. Platform) Method
22. Shield Method
23. Side Drift Method
24. Steel Shell Method
25. TBM and Drill-Blast Method
26. TBM Method
27. Trench Method
28. Vertical Rotary Method

XI. Energy Application Method

1. Air Jet Abrasion
2. Cavitational Abrasion
3. Chemical Solution

4. Chemical Surfactants
5. Chemical Weakening
6. Drag Mechanical Abrasion
7. Electrical Abrasion
8. Electrohydraulic Abrasion (Impact)
9. Explosives (Conventional)
10. Explosives (Nuclear)
11. Flame Jet Abrasion
12. Jet Abrasion
13. Mechanical and Air Jet Abrasion
14. Mechanical and Water Jet Abrasion
15. Nuclear Heating Energy
16. Pellet Abrasion (Impact)
17. Percussion and Drag Mechanical Abrasion
18. Percussion Mechanical Abrasion
19. Projectile (Continuous Impacting) Jet Abrasion
20. Projectile (Intermittant Impact) Abrasion
21. Rocket Exhaust and Drill Abrasion (Impact)
22. Rotary and Drag Mechanical Abrasion
23. Rotary and Percussion Mechanical Abrasion
24. Rotary Mechanical Abrasion (TBM)
25. Rotary Mechanical and Water Jet Abrasion
26. Saw (Undercutting) Mechanical Abrasion
27. Shock Wave Drill Abrasion (Impact)
28. Steam Jet Abrasion
29. Subterrene
30. Thermal-Electric Energy
31. Thermal Mechanical Energy
32. Thermal-Radiant Energy (LASER)
33. Water Cannon (Continuous Impacting) Jet Abrasion
34. Water Cannon (Intermittant Impact) Abrasion
35. Water Jet Abrasion

XII. General Power Source for Excavation

XIII. Drilling Equipment Characteristics

XIV. Tunneling Machine Characteristics

XV. Boreability and Specific Energy

XVI. Excavation Advancement Rate

XVII TBM Excavation Rate

XVIII. Total Construction Advancement Rate

XIX. Excavation Cost

XX. Total Construction Cost

XXI. Environmental Factors

XXII. Communication Systems

XXIII. Excavation Environmental Security

XXIV. Instrumentation

XXV. Surface Ground Conditions

XXVI. Subsurface Ground Conditions

1. Squeezing Ground Conditions
2. Running Ground Conditions
3. Slides of Opening in Soft Ground
4. Rock Falls in Opening
5. Water Flow During Excavation
6. Gas Conditions

XXVII. Tunnel and Underground Opening Supports

1. Component of Opening Supported
2. Vertical Support Elements
3. Horizontal Support Elements
4. Rock Stabilization at Depth
5. Rock/Soil Stabilization of Excavation Surface
6. Laggings
7. Liners
8. Support Methods
9. Rib or Post Spacing
10. Bolt or Anchor Spacing and Depth
11. Lining Thickness

XXVIII. Hydraulic Stabilization

XXIX. Materials Handling System

1. Cactus Grab
2. Chainbar Scraper Conveyor
3. Conveyor Belt
4. Conveyor Belt and Hoist Buckets
5. Conveyor Belt and Mine Cars and Trucks
6. Hand Lashing
7. Hand Lashing and Mine Cars and Trucks
8. Hoist Buckets
9. Loader and Trucks
10. Mine Cars and Trucks
11. Pipelines and Air
12. Pipelines and Water
13. Truck Mounted Loader
14. Water and Flume

XXX. Excavated Material Utilization

XXXI. Excavated Material Disposal

XXXII. Regional Landform Associated with Excavation

XXXIII. Site Investigation Method

XXXIV. Engineering Survey Technique

XXXV. Ground Water Characteristics

XXXVI. Geostructural Characteristics

XXXVII. Soil Characteristics

XXXVIII. Soil Mechanical Properties

XXXIX. Stratigraphic Formation Characteristics

XL. Rock Type(s)

XLI. Geographic Location

XLII. Petrography

1. Grain Bond
2. Grain Shape
3. Macroscopic Structure
4. Mineral and/or Chemical Composition
5. Moisture Absorption
6. Permeability
7. Porosity
8. Rock Quality Designation (RQD)
9. Sample Geometry
10. Specific Gravity
11. Texture and Its Alteration Due to Weathering

XLIII. Rock Mechanical Properties (Lab and/or In-Situ)

1. Abrasive Hardness
2. Scleroscopic Hardness
3. Compressive Strength (Unconfined and Triaxial)
4. Creep Deformation
5. Impact Toughness
6. Modulus of Deformation (Compressive and Tensile)
7. Modulus of Elasticity (Young's Modulus)
8. Modulus of Rigidity (Shear Modulus)
9. Modulus of Rupture
10. Poisson's Ratio
11. Schmidt Hammer
12. Set (After Unloading)
13. Shear Strength
14. Specific Damping Capacity
15. Tensile Strength
16. Wave Propagation Velocity (Longitudinal and Transverse)

XLIV. Rock Thermophysical Properties (Lab and/or In-Situ)

1. Specific Heat (At Constant Pressure)
2. Thermal Conductivity
3. Thermal Diffusivity
4. Thermal Expansion (Linear and Volumetric)
5. Thermal Radiative Properties (Emittance, Reflectance)

XLV. Rock Electromagnetic Properties (Lab and/or In-Situ)

1. Electrical Resistivity (Conductivity)
2. Dielectric Constant
3. Dielectric Loss
4. Magnetic Permeability
5. Remanent Magnetization

APPENDIX 3

UERPIC's Documentation Sources for the Literature on Underground Excavation Technology

APPENDIX 3

UERPIC's Documentation Sources for the Literature on Underground Excavation Technology

Documents accepted as data sources are from books and proceedings of symposia and congresses on rock mechanics and underground excavation. Also represented are national and international publications such as:

Amer. Soc. of Civil Engineers Journals and Transactions (USA)
Assoc. of Engineering Geologists Bulletin (USA)
Bauingineur (D)
Bureau of Mines Reports (USA)
Bureau of Reclamation Reports (USA)
Canadian Mining Journal (CDN)
Canadian Symp. on Rock Mechanics (CDN)
Colliery Engineering (UK)
Construction Methods and Equipment (USA)
Engineering and Mining Journal (USA)
Engineering Geology (NL)
Engineering News Record (USA)
Geotimes (USA)
Ground Engineering (UK)
International Journal of Rock Mechanics and Mining Sciences (UK)
Jl. South African Inst. of Mining & Metallurgy (ZA)
Mining Congress Journal (USA)
Mining Engineering (USA)
Pit and Quarry (USA)
Rapid Excavation and Tunneling Conference Proceedings (USA)
Rock Mechanics (A)
Transactions of the Institution of Mining and Metallurgy (UK)
Tunneling Machine Manufacturer's Literature (WORLDWIDE)
Tunnels and Tunneling (UK)
Tunnels and Underground (J)
Tunnels et Ouvrages Souterrains (F)
Underground Space (USA)
U.S. National Committee on Rock Mechanics Annual Symposia (USA)
Water Power (UK)
Western Construction (USA)

UERPIC also scans profiled data tapes periodically generated by the following services:

Chemical Abstracts (American Chemical Society, USA)
COMPENDEX (Engineering Index, Inc., USA)
Defense Documentation Center (USA)
GEO. REF (American Geological Institute, USA)
GOEDEX (GEODEX International, Inc., USA)
Geomechanics Abstracts (UK)
National Technical Information Service (USA)
Physics Abstracts (Institute of Electrical Engineers, UK)
TRIS-ON-LINE (U.S. Department of Transportation, USA)
Other Special Bibliographic Services (DASIAC, NMIMT, etc.)