UNDERGROUND EXCAVATION
An Annotated Bibliography

December 1976
Final Report

Prepared for the
U.S. DEPARTMENT OF TRANSPORTATION
OFFICE OF THE SECRETARY
WASHINGTON, D.C. 20590
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, originality 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.
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Unfortunately, outdated contracting and management practices and inefficient technologies make tunneling costly and, thus, unacceptable to many transportation planners and community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
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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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. Geostuctural 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.

* 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\(^\text{8}\). 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.

\(^{8}\) 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

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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 (VNIITRU GLEZHRU), MOSCOW, USSR
R00174

ALPINE EQUIPMENT COMPANY, R00192

AMAX INC, R00245

AMERICAN ECONOMY CO, R00074

AMERICAN PIPE AND CONSTRUCTION CONCENTRATED DIVISION OF R00277

AMERICAN-AMERICAN CORP OF SOUTH AFRICA R00124 R00122 R00190

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AYTEA CONSTRUCTION R00226

BARTLESHAW AND NORTON CONSULTING ENGINEERS, GLASGOW, SCOTLAND, UK, R00717

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BRECKFELD ASSOCIATES, PROFESSIONAL CORP, WASHINGTON, DC, USA R00190 R00017

BRECKFELD ENGINEERING, REI, STAN FRANCISCO, CA 94118 R00491 R00708 2 R00114

BREITWIESER, RESEARCH LABORATORIES, SOUTHFIELD, MI, USA R00324

BROWN, PETERSON & MUNIZ (DUSSELDORF, GERMANY) R00362

BROOKS & PARTNERS, LONDON, UK, R00242

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BROOKS AND PARTNERS LTD, R00127

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BUDAPEST, TECHNICAL UNIVERSITY OF HUNGARY R00046

BUNKER MILL CO, R00108

CALIFORNIA, UNIVERSITY OF, LOS ANGELES, CALIFORNIA R001086 R00197

CALIFORNIA, UNIVERSITY OF, SCHOOL OF ENGINEERING AND APPLIED SCIENCES, LOS ANGELES, CA, R00186 R00203

CALIFORNIA, UNIVERSITY OF, USA INC, CONSULT A.B., STOCKHOLM AND ROYAL INSTITUTE OF TECHNOLOGY, STOCKHOLM, SWEDEN R00279

CALIFORNIA INSTITUTE OF TECHNOLOGY, JET PROPULSION LABORATORY, 4888 OAK GROVE DRIVE, PASADENA, CA, USA R00314

CAMAY DRILLING CO, R00194

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HEALY, S.A., CO.

HECLA MINE CO., CASA GRANDE, USA.

HERNDICKS, R.S. AND MINER, G.M., WALLACE, ID, USA

HJALMANN, C.A., AND MARSELE, A., BIOT, FRANCE, SWEDEN

HOCHTIEF, A.G., WEST GERMANY

HONDA, A. AND HARRSELE, R., STOCKHOLM, SWEDEN

HURLÓN, M., USA.

HYSKRA, H., AND HARRSELE, A., STOCKHOLM, SWEDEN

ICOS (GREAT BRITAIN) LTD.

ILLINOIS UNIVERSITY OF, URBANA, IL, USA

IMPRESA CONSTRUZIONI, N.C., ALTURIN, ITALY

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INSASA CONSTRUCTION CO., INTUSA.

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IONARC ENTERPRISES LTD.

I.R.I.T. RESEARCH INSTITUTE, CHICAGO, IL, USA

JACOBS ASSOCIATES, SAN FRANCISCO, CA, USA

JAPANESE NATIONAL RAILWAYS, RAILWAY TECHNICAL RESEARCH INSTITUTE, JAPAN

JAPAN RAILWAY CONSTRUCTION PUBLIC CORP., SEIKAI, TUNNEL RESEARCH OFFICE, TOKYO, JAPAN

JARVA TUNNELING MACHINES AND CUTTERS, OHIO, USA

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KAJIMA CORPORATION

KAMEYA CONSTRUCTION CO., INC., NIKKO, JAPAN

KAMITANI CONSTRUCTION CO., INC., TOKYO, JAPAN

KIDD CREEK MINING CORPORATION

KINZERT, PETER AND SONS, CO., OHIO, USA

KOMATSU CO., JAPAN

KUEHN AND RHEINES

KUMAGAI GUNDAIJAPAN

KUNAI, JAPAN

KUNZ, ALFRED, ANO CO., MUNICH, GERMANY

LAING, JOHN CONSTRUCTION LTD., U.K.

LAWRENCE BERKELEY LAB., UNIV. OF CALIFORNIA, BERKELEY, CA, USA

LEEDS UNIVERSITY, DEPT. OF MINING AND MINERAL SCIENCE, U.K.

LEONARD FAIRCLOUGH LTD., TOUCHAN DIVISION, U.K.

LES GRANDS TRAVAUX DE MARSEILLE, FRANCE

LOFFLORD BROTHERS

LOSING, AG., SMITZERLAND

LOS ANGELES SCIENTIFIC LAB., UNIV. OF CALIFORNIA, L.A., USA.
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B. Bibliography

on

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SECTION II

DOCUMENT ABSTRACTS
II. DOCUMENT ABSTRACTS

R90227 HOLE INVADES NEW MEXICO.

AUTHOR ANON.

WESTERN CONSTRUCTION


LANGUAGE ENGLISH

PERFORMING ORGANIZATIONS

R.M. ROYLES DRILLING CO.

T.U.S.A.

FUNDING ORGANIZATIONS

U.S. BUREAU OF RECLAMATION

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE ON-GOING EXCAVATION OF THE AZTECA TUNNEL (JUAN-CHAMA PROJECT) IN NEW MEXICO, U.S.A. THE PROJECT INVESTIGATED IS UTILIZED FOR COMBINATION (IRRIGATION-WATER SUPPLY) TUNNEL PURPOSES. THE TAM METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS UTILIZES MECHANICAL ABRASION (ROTARY AND DRAG). THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS, CONSTRUCTIONAL 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.

R90228 SLUSHER TRAIN ADAPTS TO GROUND.

RUSSELL, J. W.

WESTERN CONSTRUCTION


LANGUAGE ENGLISH

PERFORMING ORGANIZATIONS

USA.

FUNDING ORGANIZATIONS

U.S. BUREAU OF RECLAMATION

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE COMPLETED EXCAVATION OF THE WILKIE CREEK TUNNEL (TORONTO, ONTARIO, CANADA). THE PROJECT INVESTIGATED IS UTILIZED FOR SEWER PURPOSES. THE DRILL AND BLAST FULL FAC. METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES CONVENTIONAL EXPLOSIVE (UNSPECIFIED). EXCAVATION ADVANCEMENT RATE IS ALSO DISCUSSIONED. GEOFRACTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON GROUND CONDITIONS AND UNDERGROUND OPENING SUPPORTS IS ALSO PRESENTED. ROCK TYPES REVIEWED INCLUDE GRANITE, SCHIST, AND SANDSTONE.

R90229 TUNNELLING IN SOFT GROUND.

RAMSEY, T. M.

CONSULTING ENGR. (LONDON)


LANGUAGE ENGLISH


R90230 TE C HNIQUES FOR TUNNELLING.

BRAN, W. M.

CONSULTING ENGR. (LONDON)


LANGUAGE ENGLISH

PERFORMING ORGANIZATIONS

W. M. BRAN.

FUNDING ORGANIZATIONS

U.S. BUREAU OF RECLAMATION


R90231 HYDRAULIC FORESPILING SHIELD DRIVES CAVED-IN TUNNEL DRIFT.

MONAGHAN, J. G.

CONSTRUCTION METHODS EQUIPMENT


LANGUAGE ENGLISH

PERFORMING ORGANIZATIONS

W. M. BRAN.

FUNDING ORGANIZATIONS

U.S. BUREAU OF RECLAMATION

THIS IN-SITU REPORT CONTAINS REVIEW DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE COMPLETED EXCAVATION OF THE TORONTO SUBWAY TUNNELS (TORONTO, ONTARIO, CANADA). THE PROJECTS INVESTIGATED ARE UTILIZED FOR SEWER PURPOSES. THE SHIELD METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. ROCK TYPES REVIEWED INCLUDE SANDSTONE.

R90232 H. S.-MADE MACHINE SPEEDS TOKYO TUNNEL.

CHAN, R.

CONSTRUCTION METHODS EQUIPMENT


LANGUAGE ENGLISH

PERFORMING ORGANIZATION

NISHIMATSU CONSTRUCTION CO LTD.

FUNDING ORGANIZATIONS

U.S. BUREAU OF RECLAMATION

THIS IN-SITU REPORT CONTAINS REVIEW DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE COMPLETED EXCAVATION OF THE TOKYO SEWER TUNNEL (JAPAN). THE PROJECT INVESTIGATED IS UTILIZED FOR SEWER PURPOSES. THE SHIELD METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. ROCK TYPES REVIEWED INCLUDE TILLITE.

R90233 BLAST OPENS WAY FOR FLOATING TUNNEL UNITS.

ALLEN, A. J.

CONSTRUCTION METHODS EQUIPMENT


LANGUAGE ENGLISH

PERFORMING ORGANIZATIONS

ALLEN, A. J.

FUNDING ORGANIZATIONS

U.S. BUREAU OF RECLAMATION

This in-situ report contains original data. The underground opening discussed includes the on-going excavation of the Saskatchewan tunnel (Canada), the project investigated is utilized for geothermal purposes. The project investigated represents the excavation technique studied. This document incorporates additional tunneling machine characteristics, petrography and rock types reviewed include shale.

This in-situ report contains original data. The underground opening discussed includes the on-going excavation of the Sagus 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. Excavation advancement rate is also discussed. Significant soil characteristics for the reported excavation activities are described. Pertinent information on materials handling system is also presented.

This in-situ report contains original data. The underground opening discussed includes the on-going excavation of the Felbertunnel tunnel (Austria). The project investigated is utilized for pipeline 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.

This in-situ report contains original data. The underground opening discussed includes the on-going excavation of the Belgian tunnel (in Belgium). The project investigated is utilized for mixed traffic tunnel (Railway-highway-bicycle purposes). The trench method represents the excavation technique studied. Soils characteristics for the reported excavation activities are described.

This in-situ report contains original data. The underground opening discussed includes the on-going excavation of the Grandsc Tunnel (in Mexico). The project investigated is utilized for experimental excavation purposes. Excavation advancement rate is also discussed.

This in-situ report contains original data. The underground opening discussed includes the on-going excavation of the Grandsc Tunnel (in Mexico). 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. Pertinent information on materials handling system is also presented. Petrography and rock types reviewed include asilite.

This in-situ report contains original data. The underground opening discussed includes the on-going excavation of the Missouri River dams. The project investigated is utilized for experimental excavation purposes. The drill and blast 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.

Performing organizations:
1. MASON AND WALSH CO.
2. CONNAM.
3. FOLEY BROS.
4. LYTLE.
5. MISSOURI VALLEY CONSTRUCTORS.
6. O'NEE CONSTRUCTORS.
7. WISTMONT BROS.
8. CONNAM-DUNNING INC.
9. F. AND S CONTRACTING CO.
10. KIERTON, PETER.
11. MORRISON-KNUDSON INC.
12. AMERICAN PIPE
FUNDING ORGANIZATIONS
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. 10, USA; THE COMPLETED EXCAVATION OF THE FORT PECK DAM TUNNELS NO. 6, 12 (USA); THE COMPLETE EXCAVATION OF THE GARONDA DAM TUNNELS NO. 1-6, USA; AND THE COMPLETE EXCAVATION OF THE CHALK (ROCK) SHAFT FOR 16TH STREET AND CIVIC CENTER STATIONS (BART PROJECT) SAN FRANCISCO, CA, USA. THE PROJECTS INVESTIGATED ARE UTILIZED FOR MECHANICAL ABRASION (ROTARY) AND MECHANICAL ABRASION (EXPLOSIVE-ROTARY). THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. PETROGRAPHY AND rock TYPES REVIEWED INCLUDE CHALK (ROCK), CLAYSTONE, LIMESTONE, SANDSTONE, SHALE AND TUFF. THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES (LAB DATA).

2.47 KLAUS BROTHERS
1.47 JOHN CHRISTENSEN & ASSOCIATES INC.
2.47 KADLICK, J. W. & associates, INC.


2.63 GEOLANDERS LTD./CANADA
2.47 GERRIT CHRISTENSEN & ASSOCIATES INC.
2.47 GROSBEND & COHEN, INC.


2.50 WALLACE & TIERNAN INC.
2.47 GOODWIN CORPORATION
2.47 GROSBEND & COHEN, INC.

THIS IN-SITU REPORT CONTAINS REVIEW DATA. THE UNDERGROUND OPENINGS DISCUSSED INCLUDE THE COMPLETED EXCAVATION OF THE LAFOUNTE TUNNEL (ALSO CALLED LOUIS-HIPPOLYTE OR BOUCHERVILLE TUNNEL) MONTREAL, QUEBEC, Canada; THE PROJECT INVESTIGATED IS UTILIZED FOR HIGHWAY PURPOSES. THE TBM AND CANOE METHOD AND TRENCH METHOD REPRESENT 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.

2.47 STRONGER SYSTEMS & MICHIGAN SHIELD TUNNEL PROJECT OFFICE
2.47 GOWER CORPORATION
2.47 GROSBEND & COHEN, INC.

THIS IN-SITU REPORT CONTAINS REVIEW DATA. THE UNDERGROUND OPENINGS DISCUSSED INCLUDE THE ON GOING EXCAVATION OF THE TUNNEL NO. 1, NAVAJO INDUSTRY AND MIRAFLORES DAM, COLOMBIA, South America THE PROJECTS INVESTIGATED ARE UTILIZED FOR MINING AND UNDERGROUND POWER STATION PURPOSES. PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE CHALK (ROCK), LIMESTONE, SANDSTONE, SHALE AND TUFF. THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE CHALK (ROCK), LIMESTONE, SANDSTONE, SHALE AND TUFF. THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES (LAB DATA).

2.47 WALLACE & TIERNAN INC.
2.47 GOODWIN CORPORATION
2.47 GROSBEND & COHEN, INC.

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 NUG FORMATION ARE TAKEN.

A RESEARCH PROGRAM FOR RAPID UNDERGROUND CONSTRUCTION, STILLWATER TUNNEL & PRACTICAL LABORATORY.

U.S. DEPARTMENT OF THE INTERIOR, BUREAU OF RECLAMATION, DENVER, COLORADO
21993, 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 SERVING PROJECT EFFORTS INCLUDE CONVENTIONAL EXPLOSIVE - DRILLING GROUPS, THE SHOT CRETE METHOD PERFORMS THE EXCAVATION ACTIVITIES AS DESCRIBED. THE EXCAVATION CHARACTERISTICS FOR RED RIVER SHALE (IN UTAH PROJECT GROUP) AND SANDSTONE (ROCK TYPES) REVIEWED INCLUDE QUARTZITE AND SHALE.

1973 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 METHODS SERVING PROJECT EFFORTS INCLUDE MECHANICAL ABRASION (ROTARY). THE EXCAVATION ACTIVITIES WERE ALSO PRESENTED, APPROPRIATE INFORMATION ON UNDERGROUND OPENING SUPPORTS IS ALSO PRESENTED. ROCK TYPES REVIEWED INCLUDE DIABASE, LIMESTONE, SANDSTONE AND SHALE.

1973 TUNNELL. MACHINE EXCAVATION, RATE OF PROGRESS MACHINE DATA.
U.S. DEPARTMENT OF THE INTERIOR, BUREAU OF RECLAMATION, DENVER, COLORADO
72 (1-03) 24PP., 1972.

RESEARCH INST. INC., GROUNDOLOGY, COSTANZA, NEVADA

LANGUAGE ENGLISH

Performing Organization(s)
1. BOYLES BROTHERS DRILLING CO.
2. OGDEN GRAM,C INC.,SALT LAKE CITY, UTAH
3. COLEMAN CONSTRUCTION, DENVER, CO
4. BOYLES BROTHERS DRILLING CO.
5. FENIX AND SIEBOLD, TULSA, OK

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 WATER SUPPLY TUNNEL PURPOSES. THE FRAGMENTATION METHODS SERVING PROJECT EFFORTS INCLUDE MECHANICAL ABRASION (ROTARY).

1973 TUNNELS, MACHINE EXCAVATION, RATE OF PROGRESS MACHINE DATA.
U.S. DEPARTMENT OF THE INTERIOR, BUREAU OF RECLAMATION, DENVER, COLORADO
72 (1-03) 24PP., 1972.

RESEARCH INST. INC., GROUNDOLOGY, COSTANZA, NEVADA

LANGUAGE ENGLISH

Performing Organization(s)
1. BOYLES BROTHERS DRILLING CO.
2. OGDEN GRAM,C INC.,SALT LAKE CITY, UTAH
3. COLEMAN CONSTRUCTION, DENVER, CO
4. BOYLES BROTHERS DRILLING CO.
5. FENIX AND SIEBOLD, TULSA, OK

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 WATER SUPPLY TUNNEL PURPOSES. THE FRAGMENTATION METHODS SERVING PROJECT EFFORTS INCLUDE MECHANICAL ABRASION (ROTARY).
USA) and the completed excavation of the water tunnel cut, USA. The projects investigated are utilized for water supply tunnel purposes. The manual method and the trench method represent the excavation techniques studied. The reported fragmentation method servicing project efforts include mechanical excavation (rotary) and unspecified. This document incorporates additionally mechanical excavation machine characteristics. The excavation rate is also discussed. Pertinent information on underground openings supports and materials handling systems is also presented. Petrography and rock types reviewed include lime flow, rhyolite, rhyolite, sandstone, shale and siltstone.

This document incorporates additionally mechanical properties. (Continued)


PERFORMING ORGANIZATION(S):
1. COLORADO CONSTRUCTORS, DENVER, CO.
2. BIXLER BROTHERS DRILLING CORPORATION, PENTX AND Sisson INC., Tulsa, OK
3. OKLAHOMA UNIVERSITY, STANFORD, CA, 93405

FUNDING ORGANIZATIONS:
U.S. BUREAU OF RECLAMATION

THIS IN-SITU AND THEORETICAL REPORT CONTAINS REVIEW DATA. The underground openings discussed include the completed excavation of the Beem tunnel (Juan-Chama project, USA), the completed excavation of the Black tunnel (Juan-Chama project, USA), the completed excavation of the river mountain tunnel, Nevada, USA, the completed excavation of the Starvation tunnel (Central Utah projects cut, USA) and the completed excavation of the Kanas tunnel, Nevada, USA. The projects investigated are utilized for water supply tunnel purposes. The trench method represents the excavation technique studied. The reported fragmentation method servicing project efforts include mechanical excavation (rotary) and unspecified. This document incorporates additionally mechanical excavation machine characteristics. The excavation rate is also discussed. Pertinent information on underground openings supports and materials handling systems is also presented. Petrography and rock types reviewed include lime flow, rhyolite, rhyolite, sandstone, shale and siltstone.

This document incorporates additionally mechanical properties. (Continued)


(TRANSLATION OF DEW. KUWARI, MECH, SHUNTU), 1:4:1, 14-21, 1969. LANGUAGE: ENGLISH

THIS THEORETICAL REPORT CONTAINS ORIGINAL DATA. The method represents the excavation technique studied. The reported excavation activities are described. (Continued)


PERFORMING ORGANIZATION(S):
HAVOR AND COUGHLIN, LITIHFIELD, U.K.

THIS IN-SITU AND THEORETICAL REPORT CONTAINS REVIEW DATA. The underground openings discussed include the completed excavation of the Messier 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. (Continued)


PERFORMING ORGANIZATION(S):
STANFORD UNIVERSITY, STANFORD, CA 93404

FUNDING ORGANIZATIONS:
CANADIAN NATIONAL RAILWAYS

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. The method represents the excavation technique studied. Soil characteristics for the reported excavation activities are described. (Continued)

R60239 PRELOADING AND STABILIZING AIRPORT TUNNEL SITE. AUTHOR ANON. AUSTRALIAN CIVIL ENG. CONSTR. 7(1):11-14, 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. (Continued)

R60240 SUMMARIZE OF THE FIRST INTERNATIONAL SYMPOSIUM ON JET CUTTING TECHNOLOGY. AUTHOR ANON. (CONTINUED)
This in-situ lab report contains review data. The excavation technique studied, excavation advancement rate, and also discussed, soil characteristics for the reported excavation activities are described.

R000249 SHIELDS FOR CONSTRUCTION OF LARGE TUNNELS IN SANDY GROUND.

SANGLOV, N. P.
SOIL MECHANICS FOUNDATION ENGR.

(1 ), NO-8, 1964.

( ENGLISH TRANSLATION OF OSN, FUNDAM. HEM. GRUNTOV, (1 ), 21-3, 1964. ( FOR ORIGINAL SEE NO. R00244 )

LANGUAGE ENGLISH

This in-situ report contains review data. The excavation technique studied, excavation advancement rate, and also discussed, soil characteristics for the reported excavation activities are described.

Rapid excavation-problems and progress (Chapter 1, 133-49, 1970).

PERFORMING ORGANIZATIONS:
JAPANESE NATIONAL RAILWAYS

FUNDING ORGANIZATIONS:
JAPAN RAILWAY

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

ROO8251 DRIVING THE GSD TUNNEL WITH A MECHANICAL MILL, FROM PROJ. OF THE TUNNEL AND SHAFT CONFERENCE, MINNEAPOLIS, MINNESOTA, MAY 15-17, 1966.

Rapid excavation-problems and progress (Chapter 1, 191-214, 1970).

PERFORMING ORGANIZATIONS:
W., W. BROADSMITH, H. K.

FUNDING ORGANIZATIONS:
LOWESTOFT BOROUGH COUNCIL


ROO82492 HIGH-SPEED SHAFT SINKING IN SOUTH AFRICA, FROM PROJ. OF THE TUNNEL AND SHAFT CONFERENCE, MINNEAPOLIS, MINNESOTA, MAY 15-17, 1966.

Rapid excavation-problems and progress (Chapter 1, 191-214, 1970).

PERFORMING ORGANIZATIONS:
W., W. BROADSMITH, H. K.

FUNDING ORGANIZATIONS:
LOWESTOFT BOROUGH COUNCIL

ROOOJOZO OEWELOPHENT ANO CONSTRUCTIO~ OF ROOOJOl PHENOMENA ASSOCIATEO MITH THE PROC!SS OF ROC~ ROOO~OO HEIT LOSS CILCULATIONS 'OR SHALL DIAMETER SUBTERAENE FLNOINC OR GANI Z A;IONISI

STUDIED, THE REPOR TE D FRAGMENTATION IETHOO SERVICING SUBTERRENE MEL TING METHOD REPRESENTS THE EXCAVATI

CHARACTERISTICS FOR 8A NO£L IER TUH ANO CHARACTE RISTICS FOR THE REPORTED EXC AVATION


RO08300 MEAT LOSS CALCULATIONS FOR SMALL DIAMETER SUBTERRENE PENETRATORS,

MURPHY, D. J., GTDO, B. G., LOS ALAMOS SCIENTIFIC LAB., UNIV. OF CALIF,, LOS ALAMOS, NEW MEXICO

( LA-9267-M ) LANGUAGE ENGLISH

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

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 , PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE ALBITE, ALLUVIUM, ANHYDRITE, BASALT, Feldspar, granite, lime stone, limesto ne, olivine, orthoclase, quartz, phyllite, sandstone, shale and tuff . THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES DATA .

RO08301 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

( LA-5208A-M ) LANGUAGE ENGLISH

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

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


RO08302 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

( LA-9269-M ) LANGUAGE ENGLISH

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

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


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

RO08303 LARGE SUBTERRENE ROCK-MELTING TUNNEL EXCAVATION SYSTEMS, A PRELIMINARY STUDY,

HANDLO, H. J., LOS ALAMOS SCIENTIFIC LAB., UNIV. OF CALIF., LOS ALAMOS, NEW MEXICO

( LA-5210-M ) LANGUAGE ENGLISH

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

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

THIS THEORETICAL REPORT CONTAINS RELEVANT DATA, THE SUBTERRENE MELTING METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED, THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS, TBM EXCAVATION RATE IS ALSO DISCUSSED, ADDITIONALLY 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 .

RO08304 DESIGN DESCRIPTION OF MELTING-CONSOLIDATING Prototype SUBTERRENE PENETRATORS,

NEURODER, J. M., LOS ALAMOS SCIENTIFIC LAB., UNIV. OF CALIF., LOS ALAMOS, NEW MEXICO

( LA-9212-M ) LANGUAGE ENGLISH

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

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 , PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE ALBITE, ALLUVIUM, SHALE AND TUFF . THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS (LAB) DATA .

RO08305 DESCRIPTION OF FIELD TESTS FOR ROCK-MELTING PENETRATION,

GIDO, R. G., LOS ALAMOS SCIENTIFIC LAB., UNIV. OF CALIF., LOS ALAMOS, NEW MEXICO

( LA-5215-M ) LANGUAGE ENGLISH

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

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 , PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE ALBITE, ALLUVIUM, BASALT, CONGLOM, DIOPSIDE, FELDSPAR, granite, GRAPHITE, IRON ORE, MAGNETITE, OLIVINE, QUARTZ, SANDSTONE AND SILICA (AMORPHOUS) .

R008328 CONTINUOUS HIGH VELOCITY JET EXCAVATION. PHASE I,

CHADWIC, R. F., KURNO, M. C., RENIX RESEARCH LABS, SMITHFIELD, MICH.

( LA-742-115, RLO-6424A, AVAILABLE, NTIS ) LANGUAGE ENGLISH

(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, MILWAUKIE, USA. THE PROJECT INVESTIGATED IS UTILIZED FOR MINE PURPOSES. THE Term REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHODS SERVICING PROJECT EFFORTS INCLUDE CHEMICAL (SURFACTANTS), MECHANICAL ABRASION (WATER-JETS) AND SUBTERFEE. THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. THIS 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 SLATE.

R0O3365 TUNNELLING, FRACTURING, DRILLING, AND MUCKING WITH HIGH SPEED WATER JETS UTILIZING CAVITATION DAMAGE. JOHNSON, W. P., JR., KOLH, R. A.

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-JETS). ROCK TYPES REVIEWED INCLUDE GRANITE.

R0O3366 ENERGY REQUIREMENTS FOR ROCK CUTTING BY HIGH SPEED WATER JETS. HUCK, L. H. R., PAGE, C. M.

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-JETS). ROCK TYPES REVIEWED INCLUDE GRANITE.

R0O3370 ROCK BREAKING WITH CONTINUOUS HIGH SPEED WATER JET STREAM. KOSUGITA, T., HOSHO, K., TAKAGI, 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-JETS) AND UNDERFRAGMENTATION.

R0O3371 ROCK FRACTURE RESEARCH SURFACTANTS. ME CARRY, P., MOYNIHAN, F.


ELECTRO-INDUSTRY LABORATORY, WASH, D.C., USA.

PERFORMING ORGANIZATION(S) ADVANCED RESEARCH PROJECT AGENCY (ARPA).

THIS LAB REPORT CONTAINS ORIGINAL DATA. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES JET ABRASION (WATER-JETS). GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITY ARE DESCRIBED. THE EXCAVATION CHARACTERISTICS FOR BARRE GRANITE, BREA SANDSTONE, DRESSER BASALT, HOLSTON MARBLE, LIMESTONE OR FORMATION, TENNESSEE MARBLE, SAWN MARBLE, SILO QUARTZITE (JASPER, QUARTZITE), ST. CLAUDE GRANITE (CHARCOAL, GREY GRANITE) CHARACTERISTICS FOR BARRE GRANITE, BEAR SANDSTONE, THIS DOCUMENT INCORPORATES ADDITIONALLY DRILLING AND MINING TECHNIQUES OF MARSEILLE, MONTREAL, TRANSITION AND CITY OF MONTREAL.

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-JETS). GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITY ARE DESCRIBED. THE EXCAVATION CHARACTERISTICS FOR HEBERDON GRANITE, ANDES GRANITE, 46TH LIMESTONE, RAIDEN SALT, BARLEY DALE SANDSTONE, HBA MARCH SANDSTONE, KIRBYWIGSIL LIMESTONE, KEPLER LIMESTONE, ST. GEES SANDSTONE, WOOLTON 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.

PERFORMING ORGANIZATION(S) FEDERAL RAILROAD ADMINISTRATION, DEPT. OF 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-JETS).
PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE ANDESITE, BASALT, DIORITE, GABBRO, GRANITE AND SANDSTONE.

RO00037 HYDRAULIC JETTING WITH CLEAR WATER FOR ROCK EXCAVATION.
ASH J. L.
PROC. 1ST INT. SYM. ON JET CUTTING TECHNOL, BHRA FLUID ENGINEERING, CRANFIELD, ENGLAND; 1972
(paper 87)
LANGUAGE: ENGLISH
PERFORMING ORGANIZATION:
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). PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE ANDESITE, DIORITE, GABBRO, GRANITE, RHYOLITE AND TUFF. THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES (LAB) DATA.

RO00037 HIGH-PRESSURE JET CUTTING.
HATSUGO K., HAYADA M., FUKUDA T., SHIYAMA A.
PROC. 1ST INT. SYM. ON JET CUTTING TECHNOL, BHRA FLUID ENGINEERING, CRANFIELD, ENGLAND; 1972
P 64-65, 1972.
LANGUAGE: ENGLISH
PERFORMING ORGANIZATION:
HOKANSHO SHOKKEI 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 ANDESITE, DIORITE, GABBRO, GRANITE, RHYOLITE AND TUFF. THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES (LAB) DATA.

RO00037 THE EFFECT OF CHANGE IN ENERGY AND MOMENTUM LEVELS ON THE ROCK REMOVAL RATE IN INDIANA LIMESTONE.
SUMERS G. A., HENRY R. L.
PROC. 1ST INT. SYM. ON JET CUTTING TECHNOL, BHRA FLUID ENGINEERING, CRANFIELD, ENGLAND; 1972
P 77-88, 1972.
(paper 83)
LANGUAGE: ENGLISH
PERFORMING ORGANIZATION:
(MS) ROCK MECHANICS AND EXPLOSIVES RESEARCH CENTER
HUNTSVILLE, MONTANA

FUNDING ORGANIZATION:
(U.S. GOVERNMENT)

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 ANDESITE, DIORITE, GABBRO, GRANITE, RHYOLITE AND TUFF. THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES (LAB) DATA.

RO00037 SOME COMPARISONS OF CONTINUOUS AND PULSED JETS FOR EXCAVATION.
DREWIE, J. C., CRISTY, G. A., MCCLAIN, M. C.
PROC. 1ST INT. SYM. ON JET CUTTING TECHNOL, BHRA FLUID ENGINEERING, CRANFIELD, ENGLAND; 1972
(paper 88)
LANGUAGE: ENGLISH
PERFORMING ORGANIZATION:
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). PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE ANDESITE, DIORITE, GABBRO, GRANITE, RHYOLITE AND TUFF. THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES (LAB) DATA.

RO00037 SOME RELATIONSHIPS IN THE COAL PENETrATION BY HIGH PRESSURE WATER JETS.
KUMICH, I. A.
PROC. 1ST INT. SYM. ON JET CUTTING TECHNOL, BHRA FLUID ENGINEERING, CRANFIELD, ENGLAND; 1972
(paper 88)
LANGUAGE: ENGLISH
PERFORMING ORGANIZATION:
JAPANESE NATIONAL RAILWAYS, RAILWAY TECHNICAL RESEARCH INSTITUTE, JAPAN

THIS LAB REPORT CONTAINS ORIGINAL DATA. THE PROJECT INVESTIGATED IS UTILIZED FOR EXPERIMENTAL EXCAVATION
OF POLLUTIONANO
R000•10 STUDIES ON THE CUTTING OF ROCK BY ROTARY CUTTERS.
THE REPORTED EXCAVATION ACTIVITIES
TAOKE, SO HAYA111ZU, H,
TREATED. PETROGRAPHY ANO ROCK TYPES REVIEWED INCLUDE
HNOIHG OltCUUZATIONISL
LANGUAGI ENGLISH
T ►IS
[FFCATS I~CLUOES MECHANICAL
SANDSTONE, THIS DOCUMENT INCORPORATES ADDITIONALLY
FAAGHENTATION ~ETHOO REPRESENTS THE EXCAVATION TECHNIQUES STUDIED, THE
REPORTED FRAGMENTATION METHOD SERVICING PROJECT
AElFSTOY, THE HATTON CROSS RAILWAY LINK (LONDON, U.K.), THE ON GOING EXCAVATION
OF THE HATTON CROSS RAILWAY LINK (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
EFFECTS INCLUDES CONVENTIONAL EXPLOSIVE (UNSPECIFIED).
PERFORMANCE ON UNDERGROUND OPENING SUPPORTS AND MATERIALS HANDLING SYSTEM IS ALSO PRESENTED.

RO00415 DEVELOPMENT OF STABILITY RATIOS FOR TUNNELS DRIVEN IN CLAY.
ATTEMELL, P. B., BO0DEN, J. B.
TUNNELS AND TUNNELLING
LANGUAGE ENGLISH
PERFORMING ORGANIZATION(S)
OUHAN, UNIVERSITY OF
FUNDING ORGANIZATION(S)
DEPT. OF ENVIRONMENT, ROAC RESEARCH LAB.
THIS LAB-THEORETICAL REPORT CONTAINS ORIGINAL DATA,
SOIL CHARACTERISTICS AS WELL AS SOIL MECHANICAL
PROPERTIES FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED.

RO00416 DESIGN AND CONSTRUCTION OF THE HONG KONG CROSS-HARBOR TUNNEL,
INNES, J. W.
TUNNELS AND TUNNELLING
LANGUAGE ENGLISH
PERFORMING ORGANIZATION(S)
SCOTT WILSON KIRKPATRICK AND PARTNERs, CONSULTING ENGINEERS,
LONDON, U.K.
FUNDING ORGANIZATION(S)
HONG KONG CROSS-HARBOR TUNNEL CO LTD.
THIS IN-SITU-THEORETICAL REPORT CONTAINS RE-PUBLISHED
DATA, THE UNDERGROUND OPENING DISCUSSED INCLUDES THE
ON GOING EXCAVATION OF THE HONG KONG CROSS-HARBOR
TUNNEL (HONG KONG).

RO00417 DESIGN AND CONSTRUCTION OF KINGSWAY THE SECOII
MERSEY ROAD TUNNEL AND MILES NON PROGRESSING IN THIRD
MERSEY ROAD TUNNEL DRIVE,
MEGAN, T. M.
TUNNELS AND TUNNELLING
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
TUNNELLING MACHINE CHARACTERISTICS, TAM EXCAVATION
RATE IS ALSO DISCUSSED, GEO-STRUCTURAL CHARACTERISTICS
FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED.
PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE SANDSTONE
AND NATURAL RESOURCES, SIITAMA, JAPAN
THIS IN-SITU REPORT CONTAINS RE-PUBLISHED
DATA, THE PROJECT INVESTIGATED IS UTILIZED FOR
EXPERIMENTAL PURPOSES, THE REPORTED FRAGMENTATION
METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY), THIS DOCUMENT
INCORPORATES ADDITIONALLY TUNNELLING MACHINE
CHARACTERISTICS, GEO-STRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED.
THE EXCAVATION CHARACTERISTICS FOR FUJISAKIMA ANDESITE, KOFU ANDESITE AND SAMARKI GRANITE ARE TREATED.
ROCK TYPES REVIEWED INCLUDE ANDESITE AND GRANITE.

METRO: LONDON'S PICADILLY LINE EXTENSION: MOUNSLON WEST TO HEATHROW AIRPORT CENTRE), PROGRESS AT
HALFWAY STAGE, AUTHOR ANON.
TUNNELS AND TUNNELLING
LANGUAGE ENGLISH
PERFORMING ORGANIZATION(S)
M AND C FRENCH CONSTRUCTION LTD,
MOWME, JOHN AND SUPER.
TAYLOR ROD MORE CONSTRUCTION LTD.
FUNDING ORGANIZATION(S)
1. SERVICES TECHNIQUES DE LA VILLE DE MARSEILLE ( DIRECTION DE
L'HUMANITÉ FRANCE
2. GREATER LONDON COUNCIL
3. BRITISH GOVT.
THIS IN-SITU REPORT CONTAINS ORIGINAL DATA, THE
UNDERGROUND OPENINGS DISCUSSED INCLUDE THE ON GOING
THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENINGS DISCUSSED INCLUDE THE COMPLETED EXCAVATION OF THE GREAT VICTORIA MATTI 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), THE 9TH AVENUE SEWER TUNNEL (VANCOUVER, B.C., CANADA). THE PROJECTS INVESTIGATED ARE UTILIZED FOR CONVENTIONAL EXPLOSIVE FRAGMENTATION EFFORTS. THIS DOCUMENT INCORPORATES ADDITIONALLY DRILLING EQUIPMENT CHARACTERISTICS. GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERITIENT INFORMATION ON UNDERGROUND OPENING SUPPORTS AND MATERIALS HANDLING SYSTEM IS ALSO PRESENTED. ROCK TYPES REVIEWED INCLUDE BASALT, LIMESTONE, AND SANDSTONE.

P008421 DEEP-SUTLEJ LINK PROJECT IN TUNNELING.
LAMNA, S., MALOTA, R.K.
LANGUAGE ENGLISH

P008425 CONSTRUCTING THE DEEP LEVEL DRAINAGE SYSTEM OF MEXICO CITY.
MABRE, D.A.
LANGUAGE ENGLISH

P008426 TUNNEL OUTLET SCHEME FROM LOCK THOM IN RENFRENSHIRE.
SCOTLAND.
MACDONALD, W.
LANGUAGE ENGLISH

P008431 TUNNELLING FOR SWISS SEWAGE TUNNEL.
ATLAS COPCO FULLFACE DRIVES 3-4 AM TUNNEL. AUTHER ANON.
LANGUAGE ENGLISH

P008435 BUDAPEST UNDERGROUND RAILWAY LINE.
VAJDA, Z., KLEEMEN, J.
LANGUAGE ENGLISH

P008425 CONSTRUCTING THE DEEP LEVEL DRAINAGE SYSTEM OF MEXICO CITY.
MABRE, D.A.
LANGUAGE ENGLISH

PERFORMING ORGANIZATIONS:
STPMA-COGUSA
1. CAMINOS Y URBANIZACIONES S.A.,
2. CONSTRUCTORA FROST CONSES.
3. CONSTRUCTOR ESTRELLA S.A.
4. CONSTRUTORA RAUDALPS
5. CONSTRUCTORA Y FRACTIONADORA
6. CONSTRUTORA URBANOS MEXICO
7. INGENIEROS CIVILES ASOCIADOS
FUNDING ORGANIZATIONS:
MEXICO CITY, CITY ADMINISTRATION OF MEXICO
BACKGROUND TO KAIMAI RAIL TUNNEL IN NEW ZEALAND.

TUNNELS AND TUNNELLING 2 (4) 31-4, 1970.

BACKGROUND TO KAIMAI RAIL TUNNEL IN NEW ZEALAND.

THEM BACKGROUNDS OF KAIRI RAIL TUNNEL IN NEW ZEALAND.

TUNNELS AND TUNNELLING 2 (2) 79-85, 1970.

BACKGROUND TO KAIRI RAIL TUNNEL IN NEW ZEALAND.

TUNNELS AND TUNNELLING 2 (2) 79-85, 1970.

TUNNELS AND TUNNELLING.

THEM BACKGROUND TO KAIRI RAIL TUNNEL IN NEW ZEALAND.

TUNNELS AND TUNNELLING 2 (2) 79-85, 1970.

BACKGROUND TO KAIRI RAIL TUNNEL IN NEW ZEALAND.

TUNNELS AND TUNNELLING 2 (2) 79-85, 1970.

BACKGROUND TO KAIRI RAIL TUNNEL IN NEW ZEALAND.

TUNNELS AND TUNNELLING 2 (2) 79-85, 1970.

BACKGROUND TO KAIRI RAIL TUNNEL IN NEW ZEALAND.

TUNNELS AND TUNNELLING 2 (2) 79-85, 1970.

BACKGROUND TO KAIRI RAIL TUNNEL IN NEW ZEALAND.

TUNNELS AND TUNNELLING 2 (2) 79-85, 1970.

BACKGROUND TO KAIRI RAIL TUNNEL IN NEW ZEALAND.

TUNNELS AND TUNNELLING 2 (2) 79-85, 1970.

BACKGROUND TO KAIRI RAIL TUNNEL IN NEW ZEALAND.

TUNNELS AND TUNNELLING 2 (2) 79-85, 1970.

BACKGROUND TO KAIRI RAIL TUNNEL IN NEW ZEALAND.

TUNNELS AND TUNNELLING 2 (2) 79-85, 1970.

BACKGROUND TO KAIRI RAIL TUNNEL IN NEW ZEALAND.

TUNNELS AND TUNNELLING 2 (2) 79-85, 1970.

BACKGROUND TO KAIRI RAIL TUNNEL IN NEW ZEALAND.

TUNNELS AND TUNNELLING 2 (2) 79-85, 1970.

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TUNNELS AND TUNNELLING 2 (2) 79-85, 1970.

BACKGROUND TO KAIRI RAIL TUNNEL IN NEW ZEALAND.

TUNNELS AND TUNNELLING 2 (2) 79-85, 1970.

BACKGROUND TO KAIRI RAIL TUNNEL IN NEW ZEALAND.

TUNNELS AND TUNNELLING 2 (2) 79-85, 1970.

BACKGROUND TO KAIRI RAIL TUNNEL IN NEW ZEALAND.

TUNNELS AND TUNNELLING 2 (2) 79-85, 1970.

BACKGROUND TO KAIRI RAIL TUNNEL IN NEW ZEALAND.

TUNNELS AND TUNNELLING 2 (2) 79-85, 1970.

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TUNNELS AND TUNNELLING 2 (2) 79-85, 1970.

BACKGROUND TO KAIRI RAIL TUNNEL IN NEW ZEALAND.

TUNNELS AND TUNNELLING 2 (2) 79-85, 1970.

BACKGROUND TO KAIRI RAIL TUNNEL IN NEW ZEALAND.

TUNNELS AND TUNNELLING 2 (2) 79-85, 1970.

BACKGROUND TO KAIRI RAIL TUNNEL IN NEW ZEALAND.

TUNNELS AND TUNNELLING 2 (2) 79-85, 1970.

BACKGROUND TO KAIRI RAIL TUNNEL IN NEW ZEALAND.

TUNNELS AND TUNNELLING 2 (2) 79-85, 1970.

BACKGROUND TO KAIRI RAIL TUNNEL IN NEW ZEALAND.

TUNNELS AND TUNNELLING 2 (2) 79-85, 1970.
R800496 PLANT COMPARISON IN NORWEGIAN SEWER TUNNEL.
DRAKE, J.
TUNNELS AND TUNNELLING 1 3 1, 128-9, 1967.
LANGUAGE: ENGLISH
PERFORMING ORGANIZATION(S):
ASTRUP & AABO, OSLO, NORWAY


R800497 REVIEW OF EFFECTS OF HYPERVELOCITY JETS AND PROJECTILES ON ROCK.
CLARK, C. E.
ROGERS, C. R.
LANGUAGE: ENGLISH
PERFORMING ORGANIZATION(S): MISSOURI UNIVERSITY OF ROLLA, MISSOURI
FUNDING ORGANIZATION(S):
ADVANCED RESEARCH PROJECT AGENCY (APA)
DEPT. OF TRANSPORTATION OFFICE OF HIGH SPEED GROUND TRANSPORTATION WASHINGTON, D.C., USA.

THIS LAGRANGIAN-THEORETICAL REPORT CONTAINS REVIEW DATA. THE REPORTED FRAGMENTATION METHODS SERVICING PROJECT EFFORTS INCLUDE JET ABRASSION METHODS, JET ABRASION (IMPACT), WATER CANNON, CONTINUOUS IMPACT AND JET ABRASION IMPACTS (PROJECTILES), CONTINUOUS IMPACT. GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. THE EXCAVATION CHARACTERISTICS FOR THE DRALEY DALE SANDSTONE ARE TREATED. ROCK TYPES REVIEWED INCLUDE BASALT, LIMESTONE AND SANDSTONE. THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. THE COMPLETE OPENING DISCUSSED INCLUDES THE PROPOSED JOB.

R800498 SCIENTIFIC AND TECHNICAL APPLICATIONS FORECAST-1964 EXCAVATION.
WILLIAMSON, T. W.
PAISH, T. W.
OFFICE OF THE CHIEF OF RESEARCH AND DEVELOPMENT DEPARTMENT OF THE ARMY, WASHINGTON, D. C.
44PP., 1964.
LANGUAGE: ENGLISH
PERFORMING ORGANIZATION(S):
HUGHES TOOL CO, FOIL TOOL GROUP, RESEARCH DEPT., HOUSTON, TX, USA.
FUNDING ORGANIZATION(S):
DEPT. OF THE ARM OF THE CHIEF OF RESEARCH AND DEVELOPMENT WASHINGTON, D.C., USA.


R800499 GREAT CHARLES STREET ROAD TUNNEL.
LYONS, A. C.
BODEFIELD, J.
TUNNELS AND TUNNELLING 1 3 1, 23-6, 1963.
LANGUAGE: ENGLISH
PERFORMING ORGANIZATION(S):
MACALOBY, SIR WILLIAM AND PARTNERS, CONSULTING ENGINEERS, LONDON, U.K.
FUNDING ORGANIZATION(S):
BIRMINGHAM SURVEYOR AND PLANNING OFFICE OF U.K.


R800493 MEXICAN DRAINAGE TUNNELS.
AUTHORS ANONY.
TUNNELS AND TUNNELLING 1 3 1, 39, 1964.
LANGUAGE: ENGLISH
PERFORMING ORGANIZATION(S):
MITCHELL CONSTRUCTION COMPANY MODIC GROUP LTD, PETERBOROUGH.


R800495 HINKLEY TUNNELS PROVE ECONOMICS OF MACHINE FOR SHORT DISTANCE TUNNELS.
PERRIS, W. D.
TUNNELS AND TUNNELLING 1 3 1, 45-7, 1969.
LANGUAGE: ENGLISH
PERFORMING ORGANIZATION(S):
MACALOBY, SIR WILLIAM AND PARTNERS, CONSULTING ENGINEERS, LONDON, U.K.
FUNDING ORGANIZATION(S):
CENTRAL ELECTRICITY GENERATING BOARD, U.K.

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 Norma Storage Scheme (Hornsea, Yorkshire, U.K.), the completed excavation of the Hornsea Storage Scheme (Hornsea, Yorkshire, U.K.), the completed excavation of the Longsberg Tunnel and the completed excavation of the Prague Metro System tunnels of Prague, Czechoslovakia. The projects investigated are utilized for access tunnel shafts and/or water supply purposes. The circular concrete segments sunk by underpinning with circular multiple slurry method and TMB method represents 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. Geotechnical 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 limestone and sandstone. The projects investigated are utilized for access tunnel shafts and/or water supply purposes. The circular concrete segments sunk by underpinning with circular multiple slurry method and TMB method represents 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. Geotechnical 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 limestone and sandstone.
This in-situ report contains original data. The underground openings discussed include the on-going excavation of the Alberg tunnel (Austria), the completed excavation of the Musagac tunnel (USA), the completed excavation of the Longsengberg tunnel, the completed excavation of the Mount Caesar (French-Ireland), the completed excavation of the St. Gotthard tunnel (Switzerland), and the projects investigated are utilized for highway and twin highway purposes. The drill and blast method and other than full-face method represents the excavation technique used. The reported fragmentation method servicing project efforts includes conventional explosive (trient), and mechanical explosion efforts. The reported excavation activities are described, pertinent information on underground openings, supports, and materials handling system is also presented. Petrography and rock types reviewed include limestone, shale, and slate. This document incorporates additionally mechanical properties data.

This in-situ report contains original data. The underground openings discussed include the on-going excavation of the Alberg tunnel (Austria), the completed excavation of the Musagac tunnel (USA), the completed excavation of the Longsengberg tunnel, the completed excavation of the Mount Caesar (French-Ireland), the completed excavation of the St. Gotthard tunnel (Switzerland), and the projects investigated are utilized for highway and twin highway purposes. The drill and blast method and other than full-face method represents the excavation technique used. The reported fragmentation method servicing project efforts includes conventional explosive (trient), and mechanical explosion efforts. The reported excavation activities are described, pertinent information on underground openings, supports, and materials handling system is also presented. Petrography and rock types reviewed include limestone, shale, and slate. This document incorporates additionally mechanical properties data.

This in-situ report contains original data. The underground openings discussed include the on-going excavation of the Alberg tunnel (Austria), the completed excavation of the Musagac tunnel (USA), the completed excavation of the Longsengberg tunnel, the completed excavation of the Mount Caesar (French-Ireland), the completed excavation of the St. Gotthard tunnel (Switzerland), and the projects investigated are utilized for highway and twin highway purposes. The drill and blast method and other than full-face method represents the excavation technique used. The reported fragmentation method servicing project efforts includes conventional explosive (trient), and mechanical explosion efforts. The reported excavation activities are described, pertinent information on underground openings, supports, and materials handling system is also presented. Petrography and rock types reviewed include limestone, shale, and slate. This document incorporates additionally mechanical properties data.

This in-situ report contains original data. The underground openings discussed include the on-going excavation of the Alberg tunnel (Austria), the completed excavation of the Musagac tunnel (USA), the completed excavation of the Longsengberg tunnel, the completed excavation of the Mount Caesar (French-Ireland), the completed excavation of the St. Gotthard tunnel (Switzerland), and the projects investigated are utilized for highway and twin highway purposes. The drill and blast method and other than full-face method represents the excavation technique used. The reported fragmentation method servicing project efforts includes conventional explosive (trient), and mechanical explosion efforts. The reported excavation activities are described, pertinent information on underground openings, supports, and materials handling system is also presented. Petrography and rock types reviewed include limestone, shale, and slate. This document incorporates additionally mechanical properties data.

This in-situ report contains original data. The underground openings discussed include the on-going excavation of the Alberg tunnel (Austria), the completed excavation of the Musagac tunnel (USA), the completed excavation of the Longsengberg tunnel, the completed excavation of the Mount Caesar (French-Ireland), the completed excavation of the St. Gotthard tunnel (Switzerland), and the projects investigated are utilized for highway and twin highway purposes. The drill and blast method and other than full-face method represents the excavation technique used. The reported fragmentation method servicing project efforts includes conventional explosive (trient), and mechanical explosion efforts. The reported excavation activities are described, pertinent information on underground openings, supports, and materials handling system is also presented. Petrography and rock types reviewed include limestone, shale, and slate. This document incorporates additionally mechanical properties data.


PERFORMING ORGANIZATION(S) DEUER, W. K., ADVANCED RESEARCH PROJECTS AGENCY, 1973. LANGUAGE ENGLISH

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 COMPLETE EXCAVATION OF THE PORT MUKEN 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 SEGMENTATION 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 ANTRIM SHALE.

R00529 SOFT GROUND TUNNELS FOR THE BART PROJECT. KUESSEL, T. R. PROG. 1ST NORTH AMER. RAPID EXCAVATION TUNNELING CONF, 1, 127-133, 1972. LANGUAGE ENGLISH

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

THIS IN-SITU THEORETICAL REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE COMPLETE EXCAVATION OF THE BAY AREA RAPID TRANSIT PROJECT (UNSPECIFIED). THE PROJECT INVESTIGATED IS UTILIZED FOR RAPID TRANSIT PURPOSES. THE SEGMENTATION METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED SEGMENTATION 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 IS ALSO PRESENTED. PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE BASALT AND LIMESTONE.

R00527 A STRUCTURAL INTERPRETATION OF THE GARLOCK FAULT ZONE AT THE TEHACHAPI CROSSING. PETERS, C. W. F. PROG. 1ST NORTH AMER. RAPID EXCAVATION TUNNELING CONF, 1, 139-155, 1972. LANGUAGE ENGLISH

PERFORMING ORGANIZATION(S) ROOD'S, U.S. DEPT. OF TRANSPORTATION.

FUNDING ORGANIZATION(S) ROOD'S, U.S. DEPT. OF TRANSPORTATION.
INFORMATION ON GROUND CONDITIONS AND UNDERGROUND OPENING SUPPORTS IS ALSO PRESENTED. ROCK TYPES REVIEWED INCLUDE SANDSTONE AND SCHIST.

R000530 PERFORMANCE OF A SOFT GROUND TUNNEL ON THE WASHINGTON METRO, HAMMERSMITH, W. H., CORDING, C. J., PROC. 1ST NORTH AMER. RAPID EXCAVATION TUNNELING CONF., 1, 731-89, 1972, LANGUAGE: ENGLISH

PERFORMING ORGANIZATIONS:
ILLINOIS UNIVERSITY OF IURBANA, ILLINOIS
FUNDING ORGANIZATIONS:
WASHINGTON METRO, 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-W (WASHINGTON, D.C., USA). The Project Investigated is Utilized for Metro Purposes. This Shield Method Represents the Excavation Technique Studied. The Reported Fragmentation Method Servicing Project Efforts Includes Mechanical (Unspecified) Geostuctural and Soil Characteristics. The Reported Excavation Activities are Described. Pertinent Information on Underground Opening Supports and Materials Handling System Is Also Presented.


PERFORMING ORGANIZATIONS:
NEW YORK CITY TRANSIT AUTHORITY
FUNDING ORGANIZATIONS:
NEW YORK CITY TRANSIT AUTHORITY


R000532 CONTROLLED ELASTIC STRESSES FOR THE CHURCHFELL UNDERGROUND COMPLEX, BAXE, L. L., PROC. 1ST NORTH AMER. RAPID EXCAVATION TUNNELING CONF., 1, 739-46, 1972, LANGUAGE: ENGLISH

PERFORMING ORGANIZATIONS:
NEW YORK CITY TRANSIT AUTHORITY
FUNDING ORGANIZATIONS:
NEW YORK CITY TRANSIT AUTHORITY


R000533 TUNNEL EXCAVATION GRAND COULEE THIRD POWERPLANT, SUCH, O. J., PROC. 1ST NORTH AMER. RAPID EXCAVATION TUNNELING CONF., 1, 795-83, 1972, LANGUAGE: ENGLISH

PERFORMING ORGANIZATIONS:
1. GIBBONS AND REED CO.

(Continued)
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.

R000759 HARD ROCK TUNNEL BORING MOVES AHEAD.
AUTHOR ANON.
ENG. MINING J.

This theoretical report contains abstracted only data. The underground openings discussed include the completed excavation of the great lake water development (tasma
cania, australia), mangla dam diversion and power tunnels (pakistan), potomac
interceptor sewage and south baltimore river dam. The projects investigated are utilized for hydroelectric, sewer and unspecified purposes. The tmb method represents the excavation technique studied. The reported fragmentation method servicing project efforts includes mechanical abrasion (rotary). This document incorporates additionally tunneling machine characteristics. Tm excavation rate is also discussed. Rock types reviewed include claystone, mudstone, sandstone and shale. This document incorporates additionally mechanical properties (lab) data.

R000800 RAISE BORER.
AUTHOR ANON.
ENG. MINING J.

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. Tm excavation rate is also discussed. Rock types reviewed include tarmacite.

R000801 HARD ROCK HOLE TEAMS UP WITH RAISE BORER TO HELP DEVELOP HOMER-WAUSCA IRON MINE.
Cannon, N. E.
ENG. MINING J.

Performing Organization(s)
1. Dresser Industries, Security Engineering Division of
Funding Organization(s)

1. Dresser Industries, Security Engineering Division

This in-situ report contains original data. The underground openings discussed include the going excavation of the homer-wausca iron mine (omi.) and the proposed excavation of the homer-wausca iron mine (omi.). The projects investigated are utilized for mine purposes. The raise driving boring machines method and tmb method represent the excavation techniques studied. The reported fragmentation method servicing project efforts includes mechanical abrasion (rotary). This document incorporates additionally tunneling machine characteristics. Tm excavation rate is also discussed. Information pertinent to excavation that 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.
Dellinger, T. B.
ENG. MINING J.

Performing Organization(s)
1. S and M Constructors Inc.

Funding Organization(s)
1. Consolidation Coal Company, Coal Division of Cadiz

This in-situ-theoretical report contains review data. The underground openings discussed include the completed excavation of the bay area rapid transit project (part) (fraction 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 MBTE, mine, sewer and unspecified purposes. The tmb method represents the excavation technique studied. The reported fragmentation method servicing project efforts
ROO626 ROEWE NZ TUNNELLING SHIELD, TUNNELS AND TUNNELLING 4 (1), 446-49, 1972, LANGUAGE ENGLISH
PERFORMING ORGANIZATIONS:
MCAFFREY ROBERTS SONS LTD.

THIS IN-SITU REPORT CONTAINS ORIGINAL 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 + TNT) 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 DATA.

ROO682 TRAFFIC FROM STREAMING THROUGH HONG KONG CROSS HARBOR TUNNEL, TUNNELS AND TUNNELLING 4 (1), 91-95, 1972, LANGUAGE ENGLISH
PERFORMING ORGANIZATIONS:
1. CLINTON INTERNATIONAL OF LONDON,
2. POUL Y. CONSTRUCTION CO., LTD. OF HONG KONG,
3. RAYMOND INTERNATIONAL OF NEW YORK

FUNDING ORGANIZATIONS:
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 THEIR HIGHWAY PURPOSES. THE TRENCH METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. PERTINENT INFORMATION ON THE UNDERGROUND OPENING SUPPORTS AND MATERIALS HANDLING SYSTEM IS ALSO PRESENTED.

ROO683 NEW ZEALAND TUNNELS FOR TONGARIRO POWER DEVELOPMENT, TUNNELS AND TUNNELLING 4 (1), 921-4, 1972, LANGUAGE ENGLISH
PERFORMING ORGANIZATIONS:
NORCONSTRUCTION, NORWAY,
CODELFA-CEGEFAR IN. Z., ITALY
1. CODELFA CONSTRUCTION DEL FAREDO SP A, SUBSIDIARY OF 2. CONSTRUZIONE GENERALE FASURA SP A, ITALIAN

FUNDING ORGANIZATIONS:
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 + TNT) EXCAVATION RATE IS ALSO DISCUSSED. GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. ROCK TYPES REVIEWED INCLUDE LIMESTONE AND SANDSTONE. THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES DATA.

ROO833 SHIELD TUNNELLING WITH LINER PLATES, TUNNELS AND TUNNELLING 4 (1), 525-31, 1972, LANGUAGE ENGLISH
PERFORMING ORGANIZATIONS:
YAYAS AND FREYTAG GMBH, MUNICH, GERMANY

FUNDING ORGANIZATIONS:
DEUTSCHE BUNDESPOST FERNSPRECHER, MUNICH, GERMANY

THIS IN-SITU REPORT CONTAINS REVIEW DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE COMPLETED EXCAVATION OF THE CABLE TUNNEL FOR GERMEN GENERAL POST OFFICE (MUNICH, GERMANY). THE COMPLETED EXCAVATION OF THE MILD WATER SYMPHON FOR BERLINER ENTWASSERUNG, MUNICH, GERMANY AND THE COMPLETE EXCAVATION OF THE SEWAGE SYMPHON FOR BERLINER ENTWASSERUNG, BERLIN, GERMANY. THE PROJECTS INVESTIGATED ARE UTILIZED FOR CABLE TUNNEL, SEWER AND HIGHWAY PURPOSES. THE CHALK INHERENTLY ISSUE DISCUSSED, ROCK TYPES REVIEWED ARE DESCRIBED. PERTINENT INFORMATION ON MATERIALS HANDLING SYSTEM IS ALSO PRESENTED. GEOGRAPHY AND ROCK TYPES REVIEWED INCLUDE MARL.

ROO834 SECOND DARTFORD TUNNEL, TUNNELS AND TUNNELLING 4 (1), 921-2, 1972, LANGUAGE ENGLISH
PERFORMING ORGANIZATIONS:
BEATTY, BALFOUR AND CO., LTD., U.K.

FUNDING ORGANIZATIONS:
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 U.K.). THE PROJECT INVESTIGATED IS UTILIZED FOR HIGHWAY PURPOSES. THE PIVOT DRIVE-INVERT METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY AND DRAG) AND SOIL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON MATERIALS HANDLING SYSTEM IS ALSO PRESENTED.

ROO838 MECHANICAL PERIPHERAL EXCAVATION METHOD FOR UNDERGROUND CHAMBERS, TUNNELS AND TUNNELLING 4 (1), 522-3, 1972, LANGUAGE ENGLISH
PERFORMING ORGANIZATIONS:
KUNZ, ALFRED AND COMPANY, GERMANY

(Continued)
This report contains original data. The project investigated is utilized for sewer 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).

R000635 Rail tunnel in rock speeds B.C. trains, Author anon. Tunnels and tunneling 4 (1) 54-6, 1972. Language: English

Performing organizations: Standard General Construction Ltd, Granville Island, Vancouver, B.C., Canada

Funding organizations: 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 is also presented. Petrography and rock types reviewed include granite.

R000636 Switzerland N.9 - autoroute ou Leman, Author anon. Tunnels and tunneling 5 (2) 60-64, 1973. Language: English

Performing organizations: Société générale pour l'industrie, Lausanne, Switzerland

Funding organizations: Switzerland, G.O.V., S.G.

This in-situ report contains original data. The underground opening discussed includes the completed excavation of the Chaladorn tunnel in N.9 autoroute ou Leman (Switzerland). The project investigated is utilized for 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 tunneling machine characteristics. Geotechnical and rock types reviewed include granite.

R000636 Excavation of tunnels by the use of smooth-bore cannons to fire solid 10 lb concrete projectiles into the rock, Author anon. Tunnels and tunneling 5 (2) 1, 177-80, 1973. Language: English

Performing organizations: Physics International Co.

Funding organizations: Bureau of Mines, U.S. G.O.V.

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, intermittent impact). Rock types reviewed include granite. This document incorporates additionally tunneling machine characteristics. Rock types reviewed include granite.

R000638 Soft clay tunnel and caisson construction in Bangkok, Thailand, Author anon. Tunnels and tunneling 9 (3) 460-71, 1973. Language: English

Performing organizations: C.A.M. Edmond & King P. K. Inear-Noide Funding organizations: 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. The reported fragmentation method servicing project efforts includes mechanical abrasion (explosive). This document incorporates additionally tunneling machine characteristics. Rock types reviewed include granite.


Performing organizations: 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 new mining purposes. The raise driving method (platform method) represents the 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 clay shale and limestone.


Performing organizations: Hecla mining Co.

Funding organizations: El Paso natural gas Co., El Paso, Texas

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 new 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 (continued)
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 sandstone and tuffite. This document incorporates additionally mechanical properties (lab) data.

**R0084R**
OFFSHORE SHAFT CONSTRUCTION IN THE NORTH SEA. ADAMSON, J. N. PROC. NORTHERN, RAPID EXCAVATION TUNNELING CONF. 2. 914-29. 1972. LANGUAGE: ENGLISH

**FUNDING ORGANIZATION(S)**
ALCAN LTD.

**THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE ON-GOING EXCAVATION OF THE LYNX NORTH SHORE TUNNEL. 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 INCORPORATES MECHANICAL ABRASION (ROTARY). PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE SANDSTONE, TUFFITE AND TUFFITE CLAY. THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES (LAB) DATA.**

**R0084R**
OFFSHORE SHAFT CONSTRUCTION IN THE NORTH SEA. ADAMSON, J. N. PROC. NORTHERN, RAPID EXCAVATION TUNNELING CONF. 2. 914-29. 1972. LANGUAGE: ENGLISH

**FUNDING ORGANIZATION(S)**
ALCAN LTD.

**THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE ON-GOING EXCAVATION OF THE LYNX NORTH SHORE TUNNEL. 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 INCORPORATES MECHANICAL ABRASION (ROTARY). PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE SANDSTONE, TUFFITE AND TUFFITE CLAY. THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES (LAB) DATA.**

**R0084R**
OFFSHORE SHAFT CONSTRUCTION IN THE NORTH SEA. ADAMSON, J. N. PROC. NORTHERN, RAPID EXCAVATION TUNNELING CONF. 2. 914-29. 1972. LANGUAGE: ENGLISH

**FUNDING ORGANIZATION(S)**
ALCAN LTD.

**THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE ON-GOING EXCAVATION OF THE LYNX NORTH SHORE TUNNEL. 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 INCORPORATES MECHANICAL ABRASION (ROTARY). PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE SANDSTONE, TUFFITE AND TUFFITE CLAY. THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES (LAB) DATA.**
A000&60 UNDERCUTTING · A UNIQUE METHOD TO BORE NON-CIRCULAR ROCKS THROUGH THE MECHANICAL HOLE · A BREAKTHROUGH IN INCLINED TUNNELING.

THEME NGLISH

UNDERGROUND OPENING SUPPORTS AND MATERIALS HANDLING UTILIZED, AS STUDIED, THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDE CONVENTIONAL EXPLOSIVE (UNSPECIFIED) AND MECHANICAL ABRASSION (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.

R00059 THE MECHANICAL HOLE · A BREAKTHROUGH IN INCLINED SHAFT MINING CONSTRUCTION.


LANGUAGE: ENGLISH

PERFORMING ORGANIZATIONS:
SMITH TOOL & ENGINEERING DEPT.

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA; THE PROJECT INVESTIGATED IS UTILIZED FOR MINE AND EXCAVATION PURPOSES. THE PARTIAL FACE TUNNEL MACHINE METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDE CONVENTIONAL EXPLOSIVE (UNSPECIFIED) AND MECHANICAL ABRASSION (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.

R00068 UNDERCUTTING · A UNIQUE METHOD TO BORE NON-CIRCULAR OPENINGS.

BARENDSEN, P., PROC. NORTH AMER, RAPID EXCAVATION TUNNELING CONF, 2, 1197-1210, 1972.

LANGUAGE: ENGLISH

PERFORMING ORGANIZATIONS:
ATLAS COPCO, BISTOCKHOLM, SWEDEN

FUNDING ORGANIZATIONS:
RORSCHACH TUNNEL MUNICIPAL AUTHORITIES

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA; THE UNDERGROUND OPENING DISCUSSED INCLUDES THE ON-GOING EXCAVATION OF THE SOUTHEASTERN ILLINOIS COAL MINE TUNNEL (RORSCHACH). THE PROJECT INVESTIGATED IS UTILIZED FOR MINE PURPOSES. THE TM METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASSION (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.

R00068 OPERATING DATA FOR AN ALPINE MINER USED AT THE NEVADA TEST SITE WITH A CONVEYOR FOR RAIL HAULAGE MUCK DISPOSAL.


LANGUAGE: ENGLISH

PERFORMING ORGANIZATIONS:
PENIX & SCISSON INC., TULSA, OK

FUNDING ORGANIZATIONS:
UNITED STATES GOVT.

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA; THE UNDERGROUND OPENING DISCUSSED INCLUDES THE COMPLETED EXCAVATION OF THE UNDERGROUND OPENINGS AND TUNNELS (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 ABRASSION (ROTARY). THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. EXCAVATION ADVANCEMENT RATE IS ALSO DISCUSSED. ROCK TYPES REVIEWED INCLUDE SANDSTONE. THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES (LAB) DATA.

R00082 A COMPARISON OF LABORATORY CUTTING RESULTS AND ACTUAL TUNNEL BORING PERFORMANCE.


LANGUAGE: ENGLISH

PERFORMING ORGANIZATIONS:
COLORADO SCHOOL OF MINES, DEPT. OF MINING, GOLDEN, CO, USA

FUNDING ORGANIZATIONS:
U.S. DEPARTMENT 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 TM METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASSION (ROTARY). PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE MELITE, RHYOLITE AND SILEXITE. THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES (LAB) DATA.

R00083 WATER JETS AND ROCK HAMMERS FOR TUNNELING IN THE U.S. AND I. S. R.

COLEY, R. C., PROC. NORTH AMER, RAPID EXCAVATION TUNNELING CONF, 2, 1311-1323, 1972.

LANGUAGE: ENGLISH

PERFORMING ORGANIZATIONS:
TERRASPACE, INC., 304 N. STONE STREET, ALEXANDRIA, VA, USA

FUNDING ORGANIZATIONS:
TERRASPACE INC., 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 WATER ABRASSION (WATER).

R00084 THERMAL FRAGMENTATION OF ROCK · A REVIEW OF EXPERIMENTAL RESULTS.


LANGUAGE: ENGLISH

PERFORMING ORGANIZATIONS:
UNITED AIRCRAFT RESEARCH LAB, HARTFORD, CT, USA

FUNDING ORGANIZATIONS:
UNITED AIRCRAFT RESEARCH LAB, HARTFORD, CT, USA

THIS LAB-THREE-DIMENSIONAL 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).

R00086 RESEARCH AND DEVELOPMENT · KEY TO ADVANCE FOR RAPID EXCAVATION IN HARD ROCK.


LANGUAGE: ENGLISH

PERFORMING ORGANIZATIONS:
U.S. BUREAU OF MINES, MINNEAPOLIS, MN, USA.

(Continued)
THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENINGS DISCUSSED INCLUDE THE ON GOING EXCAVATION OF THE PILOT TUNNEL FOR DUPLEX MERSEY TUNNEL (LIVERPOOL, U.K.), THE PROJECTS INVESTIGATED ARE USED FOR PILOT ROCK AND TWO HIGHWAY PURPOSES. THE TBH 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.


R801022 RAPID EXCAVATION CONCEPTS NOW IN FOCUS AS PARAMETERS AND DIMENSIONS ISSUE. AUTHOR ANON. ENG, MINING J., 171 (4), 77-81, 1973. LANGUAGE ENGLISH

PERFORMING ORGANIZATIONS

MUIRALL, ATKINSON AND CO., CIVIL ENG.

THIS IN-SITU REPORT CONTAINS REPUBLISHED DATA, THE UNDERGROUND OPENING DISCUSSED INCLUDES THE COMPLETE EXCAVATION OF THE MILCA MINE (LOWER OAKVILLE, IDA., USA). THE PROJECT INVESTIGATED IS UTILIZED FOR MINING PURPOSES. TBH METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY). TBH EXCAVATION RATE IS ALSO DISCUSSED. INFORMATION PERTINENT TO EXCAVATION COST IS GIVEN. PERTINENT INFORMATION ON MATERIALS HANDLING SYSTEM IS ALSO PRESENTED.

R801023 WATER JET IS PROPOSED AS ROCK CUTTING MEDIUM FOR RAPID TUNNELLING. AUTHOR ANON. ENG, MINING J., 172 (1), 31-39, 1974. LANGUAGE ENGLISH

PERFORMING ORGANIZATIONS


R801024 RUSSIA DEVELOPS ROCKET FOR USE IN DRILLING. AUTHOR ANON. ENG, MINING J., 172 (10), 32-41, 1971. LANGUAGE ENGLISH

PERFORMING ORGANIZATIONS

DELMARSE W. M. CORP., UNIVERSITY OF MINNESOTA, DEPT. OF CIVIL AND MINERAL ENGINEERING

THIS IN-SITU-THEORETICAL REPORT CONTAINS ORIGINAL DATA. THE PROJECT INVESTIGATED IS UTILIZED FOR EXPERIMENTAL EXCAVATION PURPOSES. THE REPORTED FRAGMENTATION METHODS SERVICING PROJECT EFFORTS INCLUDES JET ABRASION (GAS). TBH EXCAVATION RATE IS ALSO DISCUSSED. PERTINENT INFORMATION ON ROCK TYPE IS REVIEWED AND INCLUDE PERMANENT TWO-PIECE S. TRAYLOR BROTHERS, SAN FRANCISCO, CALIF. USA.

R801025 SOFT GROUND TUNNELLING TECHNOLOGY ON THE BART PROJECT. PETRUSO, E., FROBENIUS, P., CIVIL ENG., ASCE 41 (10), 77-81, 1971. LANGUAGE ENGLISH

PERFORMING ORGANIZATIONS


THIS IN-SITU REPORT CONTAINS REPUBLISHED DATA, THE PROJECT INVESTIGATED IS UTILIZED FOR DRAIN PURPOSES. THE TBH METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. TBH EXCAVATION RATE IS ALSO DISCUSSED. PERTINENT INFORMATION ON GROUND CONDITIONS AND GROUND OPENING SUPPORTS IS ALSO PRESENTED.


PERFORMING ORGANIZATIONS

SMITH TOOL CO., ENGINEERING DEPT.

(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 CONG., J.
LANGUAGE ENGLISH
PERFORMING ORGANIZATION(S)
KERR-MOOG CORP.
SHAFT DRILLING INC.
FUNDING ORGANIZATION(S)
ATOMIC ENERGY COMMISSION
HUDSON BAY MINING AND SMELTING CO., CANADA
CONSOLIDATION COAL COMPANY COAL DIVISION, CANTON, USA.
ON, USA
INTERNATIONAL NICKEL CO. (INC.

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 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 MATERIALS HANDLING SYSTEM IS ALSO PRESENTED. ROCK TYPES REVIEWED INCLUDE COAL, POTASH AND SANDSTONE.

R001031 ORDER FOR TUNNEL PROJECT IN GREECE.
AUTHOR ANON.
CAN. MIN. METALL. BULL.
44 (7), 146, 1974.
LANGUAGE ENGLISH
PERFORMING ORGANIZATION(S)
RASK-TOER, GREECE

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE PROPOSED EXCAVATION OF THE CHICOSA 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. ROCK TYPES REVIEWED INCLUDE LIMESTONE. TUNNELING ACTIVITIES ARE DESCRIBED, PERTINENT INFORMATION ON ROCK TYPES REVIEWED INCLUDE LIMESTONE.

R001033 NEW TUNNEL ORDER TO DIG TORONTO SEWER.
AUTHOR ANON.
CAN. MIN. METALL. BULL.
91 (10), 119, 1970.
LANGUAGE ENGLISH
PERFORMING ORGANIZATION(S)
MCNALLY AND SON, HAMILTON


R001036 PNEUMATIC BORING TOOLS IN CONSTRUCTIONAL ENGINEERING AND MINING.
SUJODINSHIKOV, V. V.
KOSTYLEV, A. D.
TUPITSYN, A. K.
SOV. MIN. SCI.
(ENGLISH TRANSLATION OF T. TECHN. PROB. RAZAB.
POZ I, 13, 49-9, 1971 (FOR ORIGINAL SEE R001035)

 LANGUAGE ENGLISH

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 (ROTARY). THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES (LAB) DATA.

R001038 THE TUNNEL UNDER THE BRIDGE.
PHILLIPS, M.
ENGINEERING.
LANGUAGE ENGLISH
PERFORMING ORGANIZATION(S)
BRAND, CHARLES AND SON LTD, LONDON, UK.
FUNDING ORGANIZATION(S)
ROG (CENTRAL ELECTRICITY GENERATING BOARD), TRANSMISSION PROJECT.
ELECTRICITY GENERATING BOARD, UK.


R001039 THE APPLICATION OF CONTINUOUS MINING MACHINES AT COALBROOK COLLIERIES.
BURTON, R. E.
FERGUSON, J. G.
J. S. AFRICAN INST. MINING MET.
LANGUAGE ENGLISH
PERFORMING ORGANIZATION(S)
COALBROOK COLLIERIES, ELYEOSDALE COLLIERIES LTD, TRANSVAL, AFRICA

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE ON GOING EXCAVATION OF THE COALBROOK COLLIERIES (SAFRICA). 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. PERTINENT INFORMATION ON MATERIALS HANDLING SYSTEM IS ALSO PRESENTED. THE EXCAVATION CHARACTERISTICS FOR HARNESBERGER QUARTZITE ARE TREATED. PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE COAL.

R001047 HIGH SPEED DEVELOPMENT OF A 2,000 FOOT 12 DEGREE DECLINE.
LANTON, P. D.
STEEN, A.
CAN. INST. MIN. METALL. BULL.
LANGUAGE ENGLISH
PERFORMING ORGANIZATION(S)
ANGLO-AFRICA 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. PERTINENT INFORMATION ON MATERIALS HANDLING SYSTEM IS ALSO PRESENTED.

R001048 MINE PLANNING FOR RAISE BORING.
DURK, A. R.
CAN. INST. MIN. METALL. BULL.
LANGUAGE ENGLISH

(continued)

R001051 ROCK DISINTEGRATION-THE KEY TO MINING PROGRESS. CLARK, G. B. MINING ENG. 23 (11), 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 TUNNELING MACHINES METHOD REPRESENT THE EXCAVATION TECHNIQUES STUDIED.

R001055 RECORD TUNNEL EXCAVATION WITH BORING MACHINES. CANNON, C. E. CIVIL ENG. 37 (6), 45-53, 1967. LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S) 1. ALPINE BROTHERS DRILLING CO., 2. OSU GRAHAM CO., SALT LAKE CITY, UT, USA, 3. COLORADO CONSTRUCTORS, DENVER, CO., 4. HORNELL, A. E. CONSTRUCTION CO., WENDELL, CO.

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


R001056 DIFFICULT EXCAVATION AT CLAYTON PORTER TUNNEL. VARELLO, P. J. CIVIL ENG. 45 (4), 50-52, 1970. LANGUAGE: ENGLISH

PERFORMING ORGANIZATIONS 1. ATKINSON, GUY ZIDIS, FRANCIS, USA

FUNDING ORGANIZATIONS (CONTINUED)
THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE COMPLETED EXCAVATION OF THE GLENDORA TUNNEL (GERMAN INN., U.S.A.) AND 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) AND THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE 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 MUSTOPLASTE.

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE COMPLETED EXCAVATION OF THE GLENDORA TUNNEL (GERMAN INN., U.S.A.) AND 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) AND THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE 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 MUSTOPLASTE.

ROSS1096

ROO1096 PERFORMANCE OF TUNNEL BORING MACHINES, PERTORR, R. J., BULL., ASS. ENG., GEDOL, R. E. F., 159-171, 1969. LANGUAGE ENGLISH

FUNDING ORGANIZATION: U.S. BUREAU OF RECLAMATION

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE COMPLETED EXCAVATION OF THE GLENDORA TUNNEL (GERMAN INN., U.S.A.) AND 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) AND THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE 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 MUSTOPLASTE.

ROSS1096 GLENDORA-HIC ALPINE HIRDING MACHINE CUTS 20 FT. A DAY (BERNHAMMEN TUNNEL PROJECT), AUTHOR: ANON., CONTRACT JOURNAL (REPRINT), APR., 1968.

FUNDING ORGANIZATION: MCALPINE, S. ROBERTS SONS LTD.

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE ON-GOING EXCAVATION OF THE GLENDORA TUNNEL (GERMAN INN., U.S.A.) AND 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) AND THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE 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 MUSTOPLASTE.

ROSS1096 GREENSIDE-HIC ALPINE TUNNELER, MORSB., R., CONTRACTORS PLANT REVIEW, (REPRINT), APR., 1968.

FUNDING ORGANIZATION: DEG. VORSCHMASCHEIN.

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE ON-GOING EXCAVATION OF THE GLENDORA TUNNEL (GERMAN INN., U.S.A.) AND 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) AND THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE 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 MUSTOPLASTE.

ROSS1071 DEMAG. VORSCHMASCHEIN.

AUTHOR: ANON.

DEMS PUBLICATION FOR ADVERTISEMENT (CONTINUED)
THE IN-SITU REPORT CONTAINS REVIEW 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. PERTINENT INFORMATION ON MATERIALS HANDLING SYSTEM IS ALSO PRESENTED, THE EXCAVATION CHARACTERISTICS FOR LONDON CLAY ARE TREATED.

R001087 THE DEVELOPMENT OF MC ALPINE TUNNELLING MACHINE. AUTHOR ANON. ALAN SHEA-DICK AND PARTNERS LTD., LONDON, ENGLAND 4PP., 1973. LANGUAGE ENGLISH

THIS IN-SITU REPORT CONTAINS REVIEW 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. PERTINENT INFORMATION ON MATERIALS HANDLING SYSTEM IS ALSO PRESENTED, THE EXCAVATION CHARACTERISTICS FOR LONDON CLAY ARE TREATED.

RO0118 ROCK TUNNELLING FOR HYDRO-ELECTRIC AND HYDRAULIC PURPOSES IN CENTRAL AND SOUTHERN AFRICA, ENGELS, E. T. OUDAEN, J. J. SOUTH AFRICAN TUNNELLING CONFERENCE 1, 59-64, 1978. LANGUAGE: ENGLISH

PERFORMING ORGANIZATIONS: WATERTREYER, LEGGE, T.SOLDO AND ULMANN

EXPERIMENTAL STUDY OF THE RELATION BETWEEN THE ORIGIN OF HYDRAULIC HOE VERS AND STUDY OF HIGH POWERED PLASMA FOR IN SITU ROCK DISINTEGRATION.

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 transformed and methods. Plasma arc, geostuctural characteristics for the reported excavation activities are described. The excavation characteristics for the reported excavation activities are described. This document incorporates additionally mechanical properties of the rock types reviewed include granite.

PERCUSSIVE WATER JETS FOR RAPID EXCAVATION, NEUERMANN, C. H., RODRIGUEZ, S. E., SCIENTIFIC ASSOCIATES, INC., SANTA MONICA, CALIF.

This lab report contains original data. This project investigated is utilized for experimental excavation purposes. The reported fragmentation method servicing project efforts includes percussive equipment characteristics, geostuctural characteristics for the reported excavation activities are discussed. Pertinent information on materials handling system is also presented.

A THEORY OF HYPAURALIC ROCK CUTTING.

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 transformed and methods. Plasma arc, geostuctural characteristics for the reported excavation activities are described. This document incorporates additionally mechanical properties of the rock types reviewed include granite.

TUNNELING TECHNOLOGY: ITS PAST AND PRESENT.

This lab report contains republished data. The underground openings discussed include the completed excavation of the Allegheny Mountain Portage Tunnel (PA, USA). The completed excavation of the Ruby Gorge Tunnel (PA, USA), The completed excavation of the Blue Mountain Tunnel (PA, USA), The completed excavation of the Apache Tunnel (CA, USA), The completed excavation of the Ruby Creek No. 2 Tunnel (CA, USA), The completed excavation of the Apache Canyon Tunnel (CA, USA), The completed excavation of the Apache Canyon Tunnel (CA, USA), The completed excavation of the Apache Canyon Tunnel (CA, USA), The completed excavation of the Ruby Creek No. 2 Tunnel (CA, USA), The completed excavation of the Apache Canyon Tunnel (CA, USA), The completed excavation of the Ruby Creek No. 2 Tunnel (CA, USA), The completed excavation of the Apache Canyon Tunnel (CA, USA), The completed excavation of the Ruby Creek No. 2 Tunnel (CA, USA), The completed excavation of the Apache Canyon Tunnel (CA, USA), The completed excavation of the Ruby Creek No. 2 Tunnel (CA, USA), The completed excavation of the Apache Canyon Tunnel (CA, USA).
R01235 Big John Excavator 1019 for Mixed-Face Tunnel Excavating, Meno Mining Equipment Manufacturing Corp., Racine, Wisconsin

Language: English

This E-97 report contains abstracted-only data. The underground opening discussed includes the completed excavation of the tunnel for north river water pollution control project (New York City, NY, USA). The project investigated is designed for access tunnel (shafts and adits to main openings), sewer and ventilation purposes, the compressed air method and TBM method represent the excavation techniques studied. The reported fragmentation methods servicing project efforts include conventional explosive methods, and mechanical abrasion (rotary). The document incorporates additionally tunneling machine characteristics. The excavation rate is also discussed. Geostuctural and soil characteristics for the reported excavation activities are discussed. Pertinent information on underground opening supports and materials handling system is also presented. Rock types reviewed include: boulder, sandstone, and tuff. This document incorporates additionally mechanical properties (lab data).

R01236 Big John Excavator 1626 for Mixed-Face Tunnel Excavating, Meno Mining Equipment Manufacturing Corp., Racine, Wisconsin

Language: English

This E-97 report contains abstracted-only data. The underground opening discussed includes the completed excavation of the tunnel for north river water pollution control project (New York City, NY, USA). The project investigated is designed for access tunnel (shafts and adits to main openings), sewer and ventilation purposes, the compressed air method and TBM method represent the excavation techniques studied. The reported fragmentation methods servicing project efforts include conventional explosive methods, and mechanical abrasion (rotary). The document incorporates additionally tunneling machine characteristics. The excavation rate is also discussed. Geostuctural and soil characteristics for the reported excavation activities are discussed. Pertinent information on underground opening supports and materials handling system is also presented. Rock types reviewed include: boulder, sandstone, and tuff. This document incorporates additionally mechanical properties (lab data).
NEW RAISE-BORING EQUIPMENT WILL ACCELERATE UNDERGROUND DEVELOPMENT.

- 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 INCORPORATE ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. THE RAISE EXCAVATION RATE IS ALSO DISCUSSED.

Re: Open Letter of Complaint

Dear Sir/Madam,

I am writing to express my dissatisfaction with the service provided by your company. I placed an order last week for some goods that were supposed to arrive yesterday, but they have not been delivered yet.

I understand that delays are sometimes unavoidable, but this situation is unacceptable. The goods were essential for my business and the delay has caused significant inconvenience and potential financial loss.

I would appreciate it if you could provide an update on the status of my order and inform me of the expected delivery date. I would also like to know if there are any compensation or refund options available for this delay.

Thank you for your attention to this matter.

Sincerely,
[Your Name]

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R001270 TUNNELLING IN THE RUHR.

JACOBSON, E. W.


LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S): Hochtief, Gelsen, West Germany

THE REPORTED TUNNELLING ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON THE PROJECT EFFORTS INCLUDE CONVENTIONAL EXPLOSIVE SERVICES, AND MECHANICAL ABRAZION (ROTARY). THE DOCUMENT INCORPORATES ADDITIONALLY DRILLING EQUIPMENT AND TUNNELING MACHINES CHARACTERISTICS, THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON UNDERGROUND OPENING SUPPORTS AND MATERIALS HANDLING SYSTEM IS ALSO PRESENTED. ROCK TYPES REVIEW INCLUDES MARL.

FUNDING ORGANIZATION(S): FEDERAL REPUBLIC OF 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 BONE-CROWN METHOD REPRESENT THE EXCAVATION TECHNIQUES STUDIED, THE REPORTED FRAGMENTATION METHODS SERVICING PROJECT EFFORTS INCLUDE CONVENTIONAL EXPLOSIVE UNSPECIFIED AND MECHANICAL ABRAZION (ROTARY). THE DOCUMENT INCORPORATES ADDITIONALLY DRILLING EQUIPMENT IN TUNNELING MACHINES CHARACTERISTICS. THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON UNDERGROUND OPENING SUPPORTS AND MATERIALS HANDLING SYSTEM IS ALSO PRESENTED. ROCK TYPES INCLUDES MARL.

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R001278 GEOTECHNICAL OBSERVATIONS DURING CONSTRUCTION OF A TUNNEL THROUGH SOFT CLAY IN MANDREI, NORWAY.

HARTMARK, N.


LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S): NORWEGIAN STATE RAILWAYS, GEOTECHNICAL DEPARTMENT, NORWAY

THIS IN-SITU REPORT CONTAINS REPUBLISHED DATA. 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 ABRAZION (DRAG). GEOSTRUCTURAL AND SOIL CHARACTERISTICS AS WELL AS SOIL MECHANICAL PROPERTIES FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON UNDERGROUND OPENING SUPPORTS IS ALSO PRESENTED.

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R001275 BUREAU OF RECLAMATION EXPERIENCE IN USE OF BORING MACHINES IN TUNNEL EXCAVATION.

BELLPORT, B. P.


LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S): COLORADO CONSTRUCTORS, DENVER, CO.

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENINGS DISCUSSED INCLUDE THE COMPLETED EXCAVATION OF THE TOMBALL TUNNEL (TOMBALL PROJECT) IN TEXAS. THE PROJECTS INVESTIGATED ARE UTILIZED FOR RAILWAY PURPOSES. THE CUT AND COVER METHOD, RAISE DRIVING (DRIVING MACHINES) METHOD AND SHIELD METHOD REPRESENT THE EXCAVATION TECHNIQUES STUDIED. THE REPORTED FRAGMENTATION METHODS SERVICING PROJECT EFFORTS INCLUDE MECHANICAL ABRAZION (ROTARY). THE DOCUMENT INCORPORATES ADDITIONALLY DRILLING EQUIPMENT AND TUNNELING MACHINES CHARACTERISTICS. THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON UNDERGROUND OPENING SUPPORTS IS ALSO PRESENTED.

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R001274 STATE OF TEXAS BUREAU OF RECLAMATION.

BELLPORT, B. P.


LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S): COLORADO CONSTRUCTORS, DENVER, CO.

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENINGS DISCUSSED INCLUDE THE COMPLETED EXCAVATION OF THE TOMBALL TUNNEL (TOMBALL PROJECT) IN TEXAS. THE PROJECTS INVESTIGATED ARE UTILIZED FOR RAILWAY PURPOSES. THE CUT AND COVER METHOD, RAISE DRIVING (DRIVING MACHINES) METHOD AND SHIELD METHOD REPRESENT THE EXCAVATION TECHNIQUES STUDIED. THE REPORTED FRAGMENTATION METHODS SERVICING PROJECT EFFORTS INCLUDE MECHANICAL ABRAZION (ROTARY). THE DOCUMENT INCORPORATES ADDITIONALLY DRILLING EQUIPMENT AND TUNNELING MACHINES CHARACTERISTICS. THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON UNDERGROUND OPENING SUPPORTS IS ALSO PRESENTED.
PERFORMING ORGANIZATION(S)
JAPAN NATIONAL RAILWAYS, JAPAN

FUNDING ORGANIZATION(S)
JAPAN NATIONAL RAILWAYS

THIS IN-SITU AND LAB REPORT CONTAINS RESEARCH RESULTS INCLUDING THE ON-GOING EXCAVATION OF THE EVA TUNNEL (JAPAN), THE ON-GOING EXCAVATION OF THE SEIKAN RAILWAY TUNNEL (JAPAN), AND THE COMPLETED EXCAVATION OF THE TANAGAWA TUNNEL (JAPAN) AND TANAYA SUBWAY NETWORK (TOKYO, 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 TEMPORARY METHOD REPRESENT THE EXCAVATION TECHNIQUES STUDIED. THE REPORTED FRAGMENTATION METHODS SERVICING PROJECT EFFORTS INCLUDE CONVENTIONAL EXPLOSIVE UNSPECIFIED AND MECHANICAL ABRASION ROYARY. 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 SLAG, SLATE, THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES DATA.

POOL1349 TUNNELS FOR EMPINGHAM RESERVOIR SCHEME.

AUTHOR (S)

TUNNELS AND TUNNELLING


LANGUAGE
ENGLISH

PERFORMING ORGANIZATION(S)
MITTAL STEEL LTD, UK.

FUNDING ORGANIZATION(S)
JOINT VENTURE

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA, THE UNDERGROUND OPENING DISCUSSED INCLUDES THE ON-GOING EXCAVATION OF THE TUNNELS FOR EMPINGHAM RESERVOIR SCHEME. 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 UNDERGROUND OPENINGS ARE TREATED. ROCK TYPES REVIEWED INCLUDE 5LATE, LIMESTONE. THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES DATA.

POOL1350 DETERMINATION OF QUASI-HOMOGENEOUS ZONES OF ELASTICITY AND DEFORMATION CHARACTERISTICS OF ROCK MASS IN TUNNEL, ON THE BASIS OF IN SITU INVESTIGATIONS.

PAVLOVIC, M.


PAPER NO. 1-17.

LANGUAGE
ENGLISH

PERFORMING ORGANIZATION(S)
COBAMHAG MUNICIPALITY, DENMARK

FUNDING ORGANIZATION(S)
COBAMHAG MUNICIPALITY, DENMARK

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. 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 DOBYNE (ROCK) AND LIMESTONE. THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES DATA.

POOL1351 DEFORMATION OF ROCK MASS AND STRESS IN CONCRETE LINING AROUND THE MACHINE HALL OF KISENYAMA UNDERGROUND POWER PLANT.

YOSHIDA, M., YOSHIMURA, K.


PAPER NO. 4-29.

LANGUAGE
ENGLISH

PERFORMING ORGANIZATION(S)
DETROIT METROPOLITAN WATER DEPT, DETROIT, MI, USA.

FUNDING ORGANIZATION(S)
DETROIT METROPOLITAN WATER DEPT, DETROIT, MI, USA.

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE COMPLETED EXCAVATION OF THE KISENYAMA UNDERGROUND POWER PLANT. 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, SLAG AND LIME. THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES DATA.

POOL1352 ROCK BREAKEY BY HIGH-SPEED IMPACT.

SINGH, M.


PAPER NO. 5-13.

LANGUAGE
ENGLISH

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

(Continued)
CONSTRUCTING A SOFT-GROUND TUNNEL UNDER BOSTON LOCAL HOVING FOR CHEAPER.

This in-situ report contains original data. The underground openings discussed include the completed excavation of the discharge tunnel in the hydro-electric power plant (newbury, u.k.), the completed excavation of the hammersley railway tunnel (stockholm, sweden), the completed excavation of the power plant discharge tunnels (jarmersroen hydroelectric project) (sweden) and the completed excavation of the power plant discharge tunnel in the hydroelectric projects (sweden). The project investigated are utilized for hydroelectric and railway purposes. The drill and blast (full face) method and hammer 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. The excavation rate is also discussed, geotechnical characteristics for the reported excavation activities are described. Pertinent information on materials handling system is also presented. Petrography and rock types reviewed include amphibolite, gneiss, granite 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 conventional explosive (unspecified). This document incorporates additionally drilling equipment and tunneling machine characteristics. The excavation rate is also discussed, geotechnical 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.

Authors: t. c.
Trans. 7th cong. mining met. cong., south africa
21, 626-93, 1964, language: english
Performing organization(s): rand mines ltd., south 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 and tunneling machine characteristics. The excavation rate is also discussed, geotechnical characteristics for the reported excavation activities are described. Pertinent information on materials handling system is also presented.

R001477 MINE VERSUS CONVENTIONAL: A COMPARISON OF TWO TUNNEL DRIVING TECHNIQUES.

Author: a. midway
midway research record
1, 1963, 1-9, 1967, language: english
Performing organization(s): u.s. bureau of reclamation
Funding organization(s): u.s. bureau of reclamation

This in-situ report contains review data. 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). This document incorporates additionally drilling equipment and tunneling machine characteristics. The excavation rate is also discussed, geotechnical 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, shale and silcrete. The excavation rate is also discussed, geotechnical characteristics for the reported excavation activities are described. Pertinent information on materials handling system is also presented.
THIS IN-SITU REPORT CONTAINS REVIEW DATA, THE TB M METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED, THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS.

EXCAVATION ACTIVITIES ARE DESCRIBED, THE EXCAVATION CHARACTERISTICS FOR BARRER GRANITE, KERIA SANDSTONE, DREYKEN BASALT, NEW HAVEN FRESH ROCK, ICY ROYALITE (+JASPER QUARTZITE) AND ST. LOUIS GRAY (GRANODIORITE) MATERIALS ARE TREATED. PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE AMORITE, ARGILITE, BASALT, GENTYTEE (ROCK), BRECCIA, (DEPT. INTERNAL), CLAY, GUYMANITE, DOLOMITE (ROCK), GNEISS, GRANITE, GRAYWACKE, HEMATITE, IGNIMBRITE, LIMESTONE, MAGNETITE, HORIZOITE, MUSTINE, PORPHYRT QUARTZITE, QUARTZITE, XHYDORITE, KRYSTE, SANDSTONE, SCHIST, SERPENTINE, SHALE, Siltstone, TRAP AND TUFF, THIS DOCUMENT INCORPORATES ADDITIONALLY GEOLOGICAL PROPERTIES (LAB DATA).

METHODS OF EXCAVATION AND ROOF SUPPORT USED IN SOME RECENTLY CONSTRUCTED TUNNELS.

Performing Organization(s)
U.S. BUREAU OF MINES, SPOKANE MINING RESEARCH CENTER, SPOKANE, WASHINGTON

Funding Organization(s)
U.S. BUREAU OF MINES

EXCAVATION RAZE IS ALSO DISCUSSED. GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DISCUSSED. PERTINENT INFORMATION ON GROUND CONDITIONS AND UNDERGROUND OPENING SUPPORTS IS ALSO PRESENTED. PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE SEDIMENTARY, NODULAR, GRAPHITE, IRON ORE, LIMESTONE, MARBLE, CEMENTITE, SANDSTONE, SCHIST, SHALE. THIS DOCUMENT INCORPORATES ADDITIONALLY MEXICAN AGRICULTURAL (LAB) DATA.

**R001595**

A STUDY ON A NEW CONCEPT OF THERMAL HARD ROCK CRUSHING.

_Thekumay, K. Cheung, J. W._

IAP Symposium on Rock Mechanics, Pennsylvania State University, 17-19 June 1972

APP., 1972.

**LANGUAGE** ENGLISH

**PERFORMING ORGANIZATIONS**

U.S. Bureau of Mines, Minneapolis, Minn., USA.

**FUNDING ORGANIZATIONS**

U.S. Bureau of Mines.

**THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE PROJECT INVESTIGATED IS UTILIZED FOR EXPERIMENTAL EXCAVATION PURPOSES. THIS NEW AUSTRIAN TUNNELLING METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DISCUSSED. PERTINENT INFORMATION ON GROUND CONDITIONS AND UNDERGROUND OPENING SUPPORTS IS ALSO PRESENTED. PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE LIMESTONE AND SCHIST.**

**R001596**

THE NEW AUSTRIAN TUNNELLING METHOD.

_Kremerz, L. V._

_WATER POWER_


**LANGUAGE** ENGLISH

**THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE PROJECT INVESTIGATED IS UTILIZED FOR HIGHWAY PURPOSES. THE NEW AUSTRIAN METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DISCUSSED. PERTINENT INFORMATION ON GROUND CONDITIONS AND UNDERGROUND OPENING SUPPORTS IS ALSO PRESENTED. PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE LIMESTONE AND SCHIST.**
AND UNDERGROUND OPENING SUPPORTS AND MATERIALS
HANDLING SYSTEM IS ALSO PRESENTED.

001543 DEVELOPMENT OF TUNNELING METHODS AND CONTROLS.
ARMSTRONG, F. L.

001544 PERFORMING ORGANIZATIONS
U. S. Bureau of Reclamation


001545 THE DEVELOPMENT OF LARGE DIAMETER ROTARY DRILLING MACHINES AND EQUIPMENT FOR THE MINING AND CONSTRUCTION INDUSTRIES.
ALEN, J. H.

001546 PERFORMING ORGANIZATIONS
WILLIAMS HUGH D. MANUFACTURING CO.

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA, THE PROJECT INVESTIGATED IS UTILIZED FOR EXPERIMENTAL EXCAVATION, NEW AND UNSPECIFIED PURPOSES, THE PILOT NON-CENTER METHOD AND TAM METHOD REPRESENT THE EXCAVATION TECHNIQUES STUDIED, THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY), THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINES AND EQUIPMENT AND TUNNELING MACHINE CHARACTERISTICS, THE TAM 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, ROCK TYPES REVIEWED INCLUDE LIMESTONE, RHODITE, SANDSTONE, SCHIST AND SLATE.

001547 MACHINE TUNNELING IN TASMANIA.
THOMAS, H. M.
WATER RESOURCES 49, 1983.

001548 PERFORMING ORGANIZATIONS
HYDROELECTRIC COMMISSION, ROYAL, TASMANIA
FUNDED ORGANIZATIONS
HYDROELECTRIC COMMISSION, ROYAL, 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 TAM METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED, THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY). THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS, THE TAM 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 LIMESTONE, RHODITE, SANDSTONE, SCHIST AND SLATE. THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES (LAB DATA).

001549 BLASTING ROCK WITH WATER.

001550 TUNNEL RÖSING.

001551 PERFORMING ORGANIZATIONS
WIRTH TECHNISCHE INFORMATIONEN

001552 TUNNEL RÖSING.

001553 PERFORMING ORGANIZATIONS
WIRTH TECHNISCHE INFORMATIONEN

001554 TUNNEL RÖSING.

001555 PERFORMING ORGANIZATIONS
WIRTH TECHNISCHE INFORMATIONEN

001556 TUNNEL RÖSING.

001557 SOVIET CAPABILITIES FOR BIG-HOLE DRILLING AND TUNNELING IN REMOTE AREAS.

(Continued)
THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENINGS DISCUSSED INCLUDE THE COMPLETED EXCAVATION OF THE TRENCHES FOR THE MAIN TUNNELS (USSR). THE PROJECT INVESTIGATED IS UTILIZED FOR SEWER PURPOSES. 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. THE EXCAVATION ACTIVITIES ARE DESCRIBED. THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES (LAB) DATA.

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENINGS DISCUSSED INCLUDES THE ONGOING EXCAVATION OF THE TRENCHES FOR SEWER TUNNELS (USSR). 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 (MECHANICAL) TECHNIQUE AND GEO-STRUCTURAL SOIL CHARACTERISTICS. THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED, PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE GNEISS.

THESE IN-SITU REPORTS CONTAIN ORIGINAL DATA. THE UNDERGROUND OPENINGS DISCUSSED INCLUDES THE COMPLETED AND ONGOING EXCAVATION OF THE TUNNELS FOR THE MAIN TUNNELS (USSR). THIS PROJECT INVESTIGATED IS UTILIZED FOR MINT PURPOSES. THE IN-SITU REPORT CONTAINS REVIEW DATA. THE PROJECT INVESTIGATED IS UTILIZED FOR MINT PURPOSES. THE DRILL AND BUSTER (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. THE EXCAVATION ACTIVITIES ARE DESCRIBED. THE EXCAVATION METHODS ARE DESCRIBED. THE EXCAVATION ACTIVITIES ARE DESCRIBED. THE EXCAVATION ACTIVITIES ARE DESCRIBED. THE EXCAVATION ACTIVITIES ARE DESCRIBED. THE EXCAVATION ACTIVITIES ARE DESCRIBED.
OF COAL MINING MACHINE CONSTRUCTION (VINCIIPU GLENNASH MOSCOW, USSR).

THIS LAB REPORT CONTAINS ORIGINAL DATA. THE PROJECT INVESTIGATED IS UTILIZED FOR EXPERIMENTAL EXCAVATION PURPOSES. THE PROJECT EFFORTS INCLUDES MECHANICAL EXCAVATION PERCUSSION, GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. ROY TYPES REVIEWED INCLUDE GRAPHITE.

R001783 UNDERGROUND COAL MINING USING THE HYDRAULIC METHOD, Copley, A. M.

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.K. NOTRAY COALFIELD (BAMER COAL SEAM) IN THE CANADIAN COLUMBIA. THE PROJECT INVESTIGATED IS UTILIZED FOR HIRE PURPOSES. THE HYDRAULIC EXCAVATION METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED EXCAVATION TECHNIQUE SERVICING PROJECT EFFORTS INCLUDES GEOSPATIAL DATA. GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED.

R001784 DOWN UNDER IN OXFORDSHIRE, Author Anon.

TUNNELS AND TUNNELLING 6 (1) 9 AND 13, 1974.

LANGUAGE ENGLISH

THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINES CHARACTERISTICS, TUNNELING ACTIVITIES ARE DESCRIBED./MITMATION ON MATERIALS HANDLING SYSTEM IS ALSO PRESENTED. ROCK TYPES REVIEWED INCLUDE CHALK ROCK.

R001787 CASEY ON TUNNELLING, Harring, M.

TUNNELS AND TUNNELLING 6 (1) 19-31, 1974.

LANGUAGE ENGLISH

PERFORMING ORGANIZATIONS: NORTHERN CONSTRUCTION CO. (J.M. STEWART LTD.)

BRITISH TUNNELLING SOCIETY WORLDBANK MISSION

FUNDING ORGANIZATIONS: TOMTOM CITY OF CANADA

LITANI RIVER AUTHORITY, LEBAHON


R001790 ROCK ROLLS AT CHURCHILL FALLS, Wood, W. D., Jr., VAN RYMYK, B.


LANGUAGE ENGLISH

FUNDING ORGANIZATIONS: QUEBEC NORTH SHORE AND LARRASON RAILWAY, CANADA

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE ON-GOING EXCAVATION OF THE CHURCHILL FALLS TUNNEL. THE PROJECTS INVESTIGATED ARE UTILIZED FOR UNDERGROUND POWER STATION PURPOSES. THE DRILL AND BLAST (FULL FACE) METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED EXCAVATION TECHNIQUE SERVICING PROJECT EFFORTS INCLUDES CONVENTIONAL EXPLOSIVE (UNSPECIFIED). PETRIENT INFORMATION ON UNDERGROUND OPENING SUPPORTS IS ALSO PRESENTED. ROCK TYPES REVIEWED INCLUDE GNEISS.

R001777 GRANGEMOUTH TUNNEL SEWER, HENRY, K.

TUNNELS AND TUNNELLING 6 (1) 28 AND 29, 1974.

LANGUAGE ENGLISH

PERFORMING ORGANIZATIONS: BARTLE, S. W. AND HORTON, CONSULTING ENGINEERS, GLASGOW, SCOTLAND, UK.

FUNDING ORGANIZATIONS: GRANGEMOUTH TOWN COUNCIL, SCOTLAND, UK.


R001778 SUBTERRANEAN ROCK MELTING DEVICES, Al-SHERRI, M.

TUNNELS AND TUNNELLING 6 (1) 34, 36-7, AND 40-1, 1974.

LANGUAGE ENGLISH

PERFORMING ORGANIZATIONS: LOR ALAMOS SCIENTIFIC LAB. (UNIV. OF CALIFORNIA), NAI.

FUNDING ORGANIZATIONS: NATIONAL SCIENCE FOUNDATION, WASHINGTON, D.C., USA.

THIS LAB REPORT CONTAINS ORIGINAL DATA. THE PROJECTS INVESTIGATED ARE UTILIZED FOR EXPERIMENTAL EXCAVATION PURPOSES. THE DRILL AND BLAST (FULL FACE) METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED EXCAVATION TECHNIQUE SERVICING PROJECT EFFORTS INCLUDES MACHINE-NUCLEAR (NUCLEAR HEATING). THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINES CHARACTERISTICS, TBM EXCAVATION RATE IS ALSO DISCUSSED. ROCK TYPES REVIEWED INCLUDE TUFF.

R001779 INNSBRUCK MINI-TUNNEL, HAMMER, M.


LANGUAGE ENGLISH

PERFORMING ORGANIZATIONS: OBERBRENZER, K. AUTRICHA

FUNDING ORGANIZATIONS: INNSBRUCK CITY, AUTRICHA

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE COMPLETED EXCAVATION OF THE INNSBRUCK TUNNEL (INNSBRUCK, AUTRICHA). THE PROJECTS INVESTIGATED ARE UTILIZED FOR CABLE TUNNEL PURPOSES. THE DRILL AND BLAST (FULL FACE) METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED EXCAVATION TECHNIQUE SERVICING PROJECT EFFORTS INCLUDES ELECTRICAL ABRASION. THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINES 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. Petrography and rock types reviewed include breccia and limestone.

R001894 Performance of shotcrete linings at the Climax Mine, 7, 1974, English, Language CLIMAX MINING CORPORATION, COAL. CLIMAX MOLYBDENUM CORPORATION, CALLS.

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 (C.E.). Pertinent information on ground conditions and underground opening supports is also presented.

R001895 Coal mine ceilings. 1027-1974, English, Language SIMPSON, P.E. PROCE. RAPID EXCAVATION AND TUNNELING CONF, 7, 1974-75, USA.

Performing organizations: U.S. BUREAU OF MINES, SPOKANE MINING RESEARCH CENTER, SPOKANE, WASHA.

Funding organizations: MINE, U.S. GOVT.

This in-situ report contains original data. The project investigated is utilized for mine purposes. Geotechnical characteristics for the reported excavation activities are described. Pertinent information on ground conditions and underground opening supports is also presented. Rock types verified include coal and shale.


Performing organization: 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.A.). The project investigated is utilized for mine purposes. The raised driving (driving 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 equipment characteristics. The excavation rate is also discussed. Information pertinent to excavation costs is given. Geotechnical characteristics for the reported excavation activities are described. The excavation characteristics for wellwater-springs are treated. Rock types reviewed include quartzite. This document incorporates additionally mechanical properties (LAB). Data.

R001897 Long hole drop raising. 119-1974, English, Language ENGLISH.

Performing organizations: MORGAN MINE MANGANITE DIVISION, HANIHOLM MINE, ONTARIO, CANADA.

This in-situ report contains original data. The underground opening discussed includes the completed excavation of the Morgan 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 (C.E.). This document incorporates additionally drilling equipment and tunneling machine characteristics, geotechnical characteristics for the reported excavation activities are described.

R001892 Long vertical shaft raising in Canada. 7, 1983-84, English, Language ENGLISH.

Performing organizations: RAISE CONTRACTING LTD, CANADA

Funding organizations: DENISON MINING COMPANY 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 raised driving (mech. platform) method represents the excavation technique studied. The reported fragmentation method servicing project efforts includes conventional explosive (C.E.). This document incorporates additionally drilling equipment and tunneling machine characteristics. Excavation advancement rate is also discussed. Geotechnical 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. 2, 1985-86, English, Language ENGLISH.

Performing organization: HARRISON WESTERN CORPORATION, CURA.

This theoretical report contains review data. The project investigated is utilized for mine purposes. The raised driving (driving machines) method represents the excavation technique studied.

R001894 Construction of Port Huron, Michigan intake shaft. 2, 1981-11, English, Language ENGLISH.

Performing organization: HARTMANN ENGINEERING (GENERAL UNDERGROUND STRUCTURES), CURA.

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 raised driving (mech. platform) method represents the excavation technique studied. Geotechnical and soil characteristics for the reported excavation activities are described. Pertinent information on ground conditions and underground opening supports is also presented.

R001895 Tunnel construction for the Sao Paulo Subway. 2, 1972-73, English, Language ENGLISH.

Performing organizations: PASOBR, BRINCHERHOFF-READE AND DOUGLAS, ENGINEERS, NEW YORK AND SAN FRANCISCO, USA.

Funding organizations: COMPANHIA DE METROPOLITANO DE SÃO PAULO, BRAZIL

(Continued)
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 METRO PURPOSES. THE PROJECT INVESTIGATED IS UTILIZED FOR HYDROELECTRIC PURPOSES. THE DRILL AND BLAST METHOD, MEETING AND BENCH METHOD, PILC'TORE CENTER METHOD AND RISE DRIVING (DRIVING MACHINES) METHOD ARE REPRESENTED THE EXCAVATION TECHNIQUES STUDIED. THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON GROUND CONDITIONS AND UNDERGROUND OPENING SUPPORTS IS ALSO PRESENTED.

PROCEEDINGS
WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY (WMATA), WASHINGTON, D.C., USA

FUNDING ORGANIZATIONS:
NEW ENGLAND ELECTRIC POWER CO., INC.

PERFORMING ORGANIZATIONS:
BECHTEL ASSOCIATES, PROFESSIONAL CORPORATION, WASHINGTON, D.C., USA


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, meeting and bench method, pilc'tore center method and rise driving (driving machines) method are represented the excavation techniques studied. The reported fragmentation method servicing project efforts includes conventional explosive (unspecified). This document incorporates additionally mechanical properties data. This excavation characteristic for the reported excavation activities are described. Pertinent information on underground opening supports is also presented. The excavation characteristics for gneiss formation (or schist) are treated. Rock types are discussed. Geotechnical characteristics for the reported excavation activities are described. Pertinent information on underground opening supports is also presented. The excavation characteristics for concrete granite, green river formation, sykesville formation and mississippi formation for schist are treated. Petrography and rock types reviewed include mica. This document incorporates additionally mechanical properties data.
THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE COMPLETED EXCAVATION OF THE PALISADE PROJECT (LITTLE CONNEMALLAS ISLAND, CANADA). THE PROJECT INVESTIGATED IS UTILIZED FOR IN-SITU TESTING. THE DRILL AND BLAST METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVING PROJECT EFFORTS INCLUDES CONVENTIONAL EXPLOSIVES (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

PERFORRING ORGANIZATIONS:
1. ARK MINES LTD, CANADA
2. RICHTI EF TEDDSEN, GERMANY
3. NUMER CITICNEM, SWITZERLAND

FUNDING ORGANIZATIONS:
1. SCHUMENGER, FREEBURG, GERMANY
2. NEW YORK CITY DEPT. OF WATER RESOURCES, NY, USA

THIS IN-SITU REPORT CONTAINS ORIGINAL 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 SERVING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY). THIS DOCUMENT INCORPORATES ADDITIONALLY DRILLING EQUIPMENT AND 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.

PERFOMING ORGANIZATIONS:
1. JACOBS ASSOCIATES, SAN FRANCISCO, CA, USA
2. RICHTFIE LEDDEN, GERMANY
3. CHAPARRAL CONSTRUCTORS, INC, USA
4. MORTON-KNUDE INC, USA

FUNDING ORGANIZATIONS:
1. NEW YORK CITY DEPT. OF WATER RESOURCES, NY, USA

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE PROJECT INVESTIGATED IS UTILIZED FOR UNDERGROUND OPENING SUPPORTS AND MATERIALS HANDLING SYSTEM. PERTINENT INFORMATION ON GROUND CONDITIONS AND UNDERGROUND OPENING SUPPORTS AND MATERIALS HANDLING SYSTEM IS ALSO PRESENTED.

PERFORMANCE ORGANIZATIONS:
1. JACOBS ASSOCIATES, SAN FRANCISCO, CA,USA
2. RICHTFIE LEDDEN, GERMANY

FUNDING ORGANIZATIONS:
1. SCHUMENGER, FREEBURG, GERMANY
2. NEW YORK CITY DEPT. OF WATER RESOURCES, NY, USA

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE PROJECT INVESTIGATED IS UTILIZED FOR UNDERGROUND OPENING SUPPORTS AND MATERIALS HANDLING SYSTEM. PERTINENT INFORMATION ON GROUND CONDITIONS AND UNDERGROUND OPENING SUPPORTS AND MATERIALS HANDLING SYSTEM IS ALSO PRESENTED.

PERFORMING ORGANIZATION(S)
COLORADO SCHOOL OF MINES, DEPT. OF MINING AND METAL. ENG., C.0., USA.

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

This lab-in-situ report contains original data. The underground opening discussed includes the following excavations of the North Branch Interception Silver Tunnel (NY, USA). The project investigated is utilized for experimental excavation and instrumentation purposes. The TBM method and vertical rotary method represent the excavation techniques studied. The reported fragmentation method and hoisting method includes mechanical abrasion (rotary). This document incorporates additionally tunneling machine characteristics. Rock types reviewed include granite. This document incorporates additionally mechanical properties (FLD) data.

R001910 DEVELOPMENT OF A CONCRETE MAKING UNIT,

PERFORMING ORGANIZATION(S)
WILLER, FOSTER ASSOCIATES, INC., 1135 SECOND AVE., WALTHAM, MA., USA.

FUNDING ORGANIZATION(S)
ADVANCED RESEARCH PROJECT AGENCY (ARPA), NATIONAL SCIENCE FOUNDATION, WASHINGTON, D.C., USA.
US. 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. Rock types reviewed include granite. This document incorporates additionally mechanical properties (FLD) data.

R001910 ROCK MELTING SUBTRENCHES—THEIR ROLE IN FUTURE EXCAVATION TECHNOLOGY,

PERFORMING ORGANIZATION(S)
LOS ALAMOS SCIENTIFIC LAB., UNIV. OF CALIFORNIA, 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 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,

PERFORMING ORGANIZATION(S)
SOUTHERN CALIFORNIA METROPOLITAN WATER DISTRICT.

This lab-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. Geotechnical characteristics for the reported excavation activities are described. Pertinent information on underground opening supports is also presented.

R001912 LINING AND FINISHING EISENHOWER MEMORIAL TUNNEL,

PERFORMING ORGANIZATION(S)
ATLAS COPCO MASCHINEN AG, SWITZERLAND

FUNDING ORGANIZATION(S)
ATLAS COPCO MASCHINEN AG, SWITZERLAND.

This lab-in-situ report contains original data. The underground opening discussed includes the complete excavation of the Eisenhower Memorial Tunnel (also called Straight Creek Tunnel) (NY, USA). The project investigated is utilized for highway purposes. Pertinent information on underground opening supports and materials handling system is also presented.

R001913 ROCK TUNNELLING SYSTEM FOR SMALL CROSS SECTIONS,

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. Geotechnical 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,

PERFORMING ORGANIZATION(S)
PERINI CORP.

FUNDING ORGANIZATION(S)
PERINI CORP.

This lab-in-situ report contains original data. The underground opening discussed includes the completed excavation of the North Branch Interception Silver 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 includes conventional explosive (unspecified) and mechanical abrasion (rotary). This document incorporates additionally tunneling machine characteristics. Time advancement rate is also discussed. Geotechnical 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 clastic, marble and schist.

R001916 HENDERSON TUNNEL HAULAGE AND MATERIALS HANDLING.

PERFORMING ORGANIZATION(S)
ARCO CORP., INC., CO., USA.

FUNDING ORGANIZATION(S)
ARCO CORP., INC., CO., USA.

This lab-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. Geotechnical characteristics for the (continued)
This in-situ report contains original data. The underground openings discussed include the completed excavation of the Fenclerpson tunnel (CO., USA), the project investigated is utilized for mine purposes. The drill and blast (full face) method represents the excavation technique studied. Geostuctural 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.

PROC. 1974.

This document incorporates additionally mechanical properties (LAB) data.

R0310920 UNDERGROUND TESTS OF THE REAM METHOD OF ROCK FRAGMENTATION FOR HIGH-SPEED TUNNELING.

FUNDING ORGANIZATIONS

ADVANCED RESEARCH PROJECT AGENCY (ARPA)

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE ON-GOING EXCAVATION OF THE IDAHO SPRINGS FORMATION IN IDAHO SPRINGS FORMATION. THE PROJECT INVESTIGATED IS UTILIZED FOR EXPERIMENTAL EXCAVATION PURPOSES. THE DRILLING METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED SEGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES IMPACT ABRASION (ROD Type), INTERMITTENT IMPACT, GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. ROCK TYPES REVIEWED INCLUDE GRANITE, LIMESTONE, HARMINE, HEBERITE, AND TRAVERTINE. THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES (LAB) DATA.

R0310921 THE APPLICATION OF WIDE-SAW TO UNDERGROUND EXCAVATION.

FUNDING ORGANIZATIONS

U.S. ARMY CORPS OF ENGINEERS

THIS IN-SITU AND THEORETICAL REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENINGS DISCUSSED INCLUDES THE COMPLETE EXCAVATION OF THE HURON FALLS TUNNEL (IN., USA). THE PROJECT INVESTIGATED IS UTILIZED FOR EXPERIMENTAL EXCAVATION AND OUTLET (SHAFT) PURPOSES. THE DRILL AND BLAST (FULL FACE) METHOD AND THE PROJECT REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED SEGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROD, INTERMITTENT IMPACT, PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE CHALK, LIMESTONE, MARMOL, METABOLUM AND TRAVERTINE (ROCK). THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES (LAB) DATA.

R0310922 APPLICATION OF BORING-TYPE EXCAVATORS.

FUNDING ORGANIZATIONS

ALPINE EQUIPMENT CORPORATION

THIS IN-SITU-THEORETICAL REPORT CONTAINS REVIEW DATA. THE UNDERGROUND OPENINGS DISCUSSED INCLUDE THE COMPLETED EXCAVATION OF THE IDAHO SPRINGS FORMATION IN IDAHO SPRINGS FORMATION. THE PROJECT INVESTIGATED IS UTILIZED FOR EXPERIMENTAL EXCAVATION AND OUTLET (SHAFT) PURPOSES. THE DRILL AND BLAST (FULL FACE) METHOD AND THE PROJECT REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED SEGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROD, INTERMITTENT IMPACT, PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE CHALK, LIMESTONE, MARMOL, METABOLUM AND TRAVERTINE (ROCK). THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES (LAB) DATA.
R01941 MINING HARD ROCK ORES WITH A FIXID DRUM CONTINUOUS MINE. VIZE, W. C.
PROC. RAPID EXCAVATION AND TUNNELING CONF., 1974.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S):
JEFFREY MINING MACHINERY COSLUMBOMH, OHIO.

FUNDING ORGANIZATION(S):
JEFFREY MINING MACHINERY COLUMBUS, OHIO.


R01939 TUNNELING WITH HIGH SPEED WATER JETS. KOH, R. E.
WEHRMANNICS, INC., LAUREL, MD.
42PP., 1968.

PERFORMING ORGANIZATION(S):
VEREINIGTE ÖSTERREICHISCHE EISEN-UND STAHLWERKE-
ALPINE MONTAN AG., AUSTRIA

LANGUAGE: ENGLISH

FUNDING ORGANIZATION(S):
MUNICH, CITY OF MUNICH, GERMANY.

This laboratory report contains original data. The project investigated is utilized for experimental excavation purposes. The reported fragmentation method serving project efforts includes jet ablation (electrohydraulic). Geotechnical characteristics for the reported excavation activities are described. The excavation characteristics for Holston marble (limestone or formationl Tennessee marble) and st. Lawrence granite (sandstone gray granite) are treated. Rock types reviewed include basalt, granite, limestone, marble, and slate.

This laboratory report contains original data. The excavation of the shaft is discussed in detail. The project investigated is utilized for experimental excavation purposes. The drilling method and the method represent the excavation techniques studied. The reported fragmentation method serving project efforts includes mechanical ablation (rotary and mechanical). 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.

This in-situ and lab report contains original data. The excavation of the shaft is discussed in detail. The project investigated is utilized for experimental excavation purposes. The drilling method and the method represent the excavation techniques studied. The reported fragmentation method serving project efforts includes mechanical ablation (rotary and mechanical). 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.

This laboratory report contains original data. The excavation of the shaft is discussed in detail. The project investigated is utilized for experimental excavation purposes. The drilling method and the method represent the excavation techniques studied. The reported fragmentation method serving project efforts includes mechanical ablation (rotary and mechanical). 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.

This in-situ and lab report contains original data. The excavation of the shaft is discussed in detail. The project investigated is utilized for experimental excavation purposes. The drilling method and the method represent the excavation techniques studied. The reported fragmentation method serving project efforts includes mechanical ablation (rotary and mechanical). 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.

This laboratory report contains original data. The excavation of the shaft is discussed in detail. The project investigated is utilized for experimental excavation purposes. The drilling method and the method represent the excavation techniques studied. The reported fragmentation method serving project efforts includes mechanical ablation (rotary and mechanical). 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.

This laboratory report contains original data. The excavation of the shaft is discussed in detail. The project investigated is utilized for experimental excavation purposes. The drilling method and the method represent the excavation techniques studied. The reported fragmentation method serving project efforts includes mechanical ablation (rotary and mechanical). 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.
SERVICING PROJECT EFFORTS INCLUDES CONVENTIONAL EXPLOSIVE DEMOLITION. 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.

P001575 STILL MILITING A PRACTICAL TRIAL
WILLIAMS, R. F.
TUNNELS AND TUNNELLING 7 (1), 1-44, 1975.
LANGUAGE ENGLISH

PERFORMING ORGANIZATION(S)
CALIFORNIA, UNIVERSITY OF LOS ANGELES, CANADA

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 SERVING PROJECT EFFORTS INCLUDES SUBSEQUENT TIME. 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.

P001574 UNDERGROUND HOCKET
AUTHOR ANON.
TUNNELS AND TUNNELLING 7 (1), 1-44, 1975.
LANGUAGE ENGLISH

THIS LAB-INSITU REPORT CONTAINS REVIEW DATA. THE PROJECT INVESTIGATED IS UTILIZED FOR CABLE TUNNEL PURPOSES. THE REPORTED FRAGMENTATION METHOD SERVING PROJECT EFFORTS INCLUDES IMPACT ABRASION (HOCKET SANDSTONE AND DRILL). THIS DOCUMENT INCORPORATES ADDITIONALLY DRILLING EQUIPMENT CHARACTERISTICS, GEOSTRUCTURAL AND SOIL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED.

P001577 FOCUSED LASER HAMMS TO ASSIST ROCK EXCAVATION
MICHIE, P. H. A.
GREENWALD, L. E.
BROWN, G. D.
UNITED AIRCRAFT RESEARCH LAB., EAST HARTFORD, CONN.
CONNECTICUT

( WRL-MR74-411, Fra-590 and D-74-020 )

LANGUAGE ENGLISH

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

FUNDING ORGANIZATION(S)
FEDERAL RAILROAD ADMINISTRATION (EOPF OF TRANSPORTATION, WASHINGTON, D.C., USA.

THIS LAB REPORT CONTAINS ORIGINAL DATA. THE REPORTED FRAGMENTATION METHOD SERVING PROJECT EFFORTS INCLUDES THERMAL-RADIAN (COHERENT LIGHT-LASER). GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. THE EXCAVATION CHARACTERISTICS FOR DIA-GRANITE AND SOIL QUARTZITE (JASPER QUARTZITE) ARE TREATED. METROGRAPHY AND ROCK TYPES REVIEWED INCLUDE DIABASE, GRAINITE AND QUARTZITE. THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES LAB DATA.

P001579 TUNNELLING UNDER MANCHESTER
CUTLER, S.

LANGUAGE ENGLISH

PERFORMING ORGANIZATION(S)
NUETAL, EDMUNDO LTD., USA.

FUNDING ORGANIZATION(S)
BRITISH TELECOMMUNICATIONS HEADQUARTERS, DEVELOPMENT DEPT., OF (DEVELOPMENT DEPT.)


P001580 CRYOGENIC TREATMENT OF SHAFTS AND TUNNELS
HARRIS, J. S.
TUNNELLING AND TUNNELLING 6 (6), 1-44, 1974.

LANGUAGE ENGLISH

PERFORMING ORGANIZATION(S)
MOOGEN, BEENHUNE AND POLSTIC, USA.

FUNDING ORGANIZATION(S)
EDINBURGH CORPORATION, U.K.


P001581 OTTAWA SEWER PROJECT
BRICKLIE, E.
TUNNELLING AND TUNNELLING 6 (7), 1-44, 1974.

LANGUAGE ENGLISH

PERFORMING ORGANIZATION(S)
SCHMENGER CONSTRUCTION (OTTAWA, CANADA)

FUNDING ORGANIZATION(S)
OTTAWA, REGIONAL MUNICIPALITY OF CARLETON WOOD DEPT.

THIS LAB-INSITU REPORT CONTAINS ORIGINAL DATA, THE UNDERGROUND OPENING DISCUSSED INCLUDES THE COMPLETED EXCAVATION OF THE OTTAWA SEWER PROJECT (OTTAWA, ONTARIO, CANADA). THE PROJECT INVESTIGATED IS UTILIZED FOR SEWER PURPOSES, THE TM METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTTY), THIS DOCUMENT INCORPORATES ADDITIONALLY DRILLING EQUIPMENT AND TUNNELLING MACHINE CHARACTERISTICS. TM EXCAVATION RATE IS ALSO DISCUSSED. GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DISCUSSED. PERTINENT INFORMATION ON GROUND CONDITIONS AND UNDERGROUND OPENING SUPPORTS AND MATERIALS HANDLING SYSTEM IS ALSO PRESENTED. METROGRAPHY AND ROCK TYPES REVIEWED INCLUDE SHALE. THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES LAB DATA.

P001582 NEW BRITISH TUNNELER TO CUT ITS TEETH IN COAL.
AUTHOR ANON.
TUNNELLING AND TUNNELLING 6 (8), 1-44, 1974.

LANGUAGE ENGLISH

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

THIS LAB-INSITU REPORT CONTAINS REVIEW DATA, THE PROJECT INVESTIGATED IS UTILIZED FOR RINE PURPOSES. THE TM METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTTY). THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELLING MACHINE CHARACTERISTICS.
EXCAVATION CHARACTERISTICS FOR BEREA SANDSTONE ARE EXAMINED. THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE GRANITE. THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES DATA.

THE BRETBY TUNNELLING MACHINE. THIS LAB REPORT CONTAINS ORIGINAL DATA. THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. THE EXCAVATION CHARACTERISTICS FOR ST. CLOUD/GRAY/GRANITOIDITE (CHARCOAL GREY GRANITE) ARE TREATED. PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE GRANITE. THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES DATA.


A ROTATING WATER JET DEVICE AND DATA ON ITS USE FOR SLITTING BLACK SANDSTONE. PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE LIMESTONE AND SANDSTONE. THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES (LAB DATA).

GROUND VIBRATIONS FROM TUNNEL BLASTING IN GRANITE. PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (PERCUSSION). THIS DOCUMENT INCORPORATES ADDITIONALLY DRILLING EQUIPMENT CHARACTERISTICS. GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. THE EXCAVATION CHARACTERISTICS FOR BEREA SANDSTONE ARE TREATED. PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE LIMESTONE. THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES (LAB DATA).

CUTTER SCALING IN GRANITE FOR SMALL CHARGES. PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (PERCUSSION). THIS DOCUMENT INCORPORATES ADDITIONALLY DRILLING EQUIPMENT CHARACTERISTICS. GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. THE EXCAVATION CHARACTERISTICS FOR BLACK SANDSTONE ARE TREATED. PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE LIMESTONE. THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES (LAB DATA).

PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (PERCUSSION). THIS DOCUMENT INCORPORATES ADDITIONALLY DRILLING EQUIPMENT CHARACTERISTICS. GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. THE EXCAVATION CHARACTERISTICS FOR BLACK SANDSTONE ARE TREATED. PETROGRAPHY AND ROCK TYPES REVIEWED INCLUDE LIMESTONE. THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES (LAB DATA).
THIS IN-SITU REPORT CONTAINS ORIGINAL DATA, THE PROJECT INVESTIGATED IS UTILIZED FOR EXPERIMENTAL EXCAVATION PURPOSES, THE DRILL METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED, THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES CONVENTIONAL EXPLOSIVE (UNSPECIFIED), TRENCH AND ROCK TYPES REVIEWED INCLUDE GRANITE, THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES (LAB) DATA.


PERFORMING ORGANIZATIONS
U.S. BUREAU OF MINES

FUNDING ORGANIZATIONS
U.S. BUREAU OF MINES

THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED, THE EXCAVATION CHARACTERISTICS FOR BIMINARIC FORMATION, CHEEVER MARBLE, KIDSTAL SANDSTONE, HORTON GRANITE GENESIS FOR QUARTZ MONZONITE GENESIS, ROCKVILLE QUARTZ MONZONITE FOR FABRICATION QUARTZITE (JASPER QUARTZITE) AND ST. CLAIR CARRYS SANDSTONE (CHARCOAL GREY GRANITE) ARE TREATED, ROCK TYPES REVIEWED INCLUDE BASALT, GRANITE, QUARTZITE, SANDSTONE AND Talcmite, THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES (LAB) DATA.


PERFORMING ORGANIZATIONS
U.S. BUREAU OF MINES, MINNEAPOLIS, MINNUSA.

FUNDING ORGANIZATIONS
U.S. BUREAU OF MINES

THE PROJECT INVESTIGATED IS UTILIZED FOR EXPERIMENTAL EXCAVATION PURPOSES, THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES CONVENTIONAL EXPLOSIVE, TRENCH AND ROCK TYPES REVIEWED INCLUDE GRANITE, THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES (LAB) DATA.


PERFORMING ORGANIZATIONS
U.S. BUREAU OF MINES

FUNDING ORGANIZATIONS
U.S. BUREAU OF MINES

THE PROJECT INVESTIGATED IS UTILIZED FOR EXPERIMENTAL EXCAVATION PURPOSES, THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED, THE EXCAVATION CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED, THE EXCAVATION CHARACTERS FOR HORTON GRANITE, HORTON MARBLE, LIMESTONE FOR FORMATION (QUARTZITE) AND KIDSTAL SANDSTONE, MANISTIQUE DOLOMITE FOR FORMATION, ROCK TYPES REVIEWED INCLUDE GRANITE, QUARTZITE, SANDSTONE AND Talcmite, THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES (LAB) DATA.


PERFORMING ORGANIZATIONS
U.S. BUREAU OF MINES, MINNEAPOLIS, MINNUSA.

FUNDING ORGANIZATIONS
U.S. BUREAU OF MINES

THE PROJECT INVESTIGATED IS UTILIZED FOR EXPERIMENTAL EXCAVATION PURPOSES, THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED, THE EXCAVATION CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED, THE EXCAVATION CHARACTERISTICS FOR HORTON GRANITE, HORTON MARBLE, LIMESTONE FOR FORMATION (QUARTZITE) AND KIDSTAL SANDSTONE, MANISTIQUE DOLOMITE FOR FORMATION, ROCK TYPES REVIEWED INCLUDE GRANITE, QUARTZITE, SANDSTONE AND Talcmite, THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES (LAB) DATA.

R002070 DATA FOR THE CUTTING OF VERMONT MARBLE WITH CONTINUOUS WATER JETS, HARRIS, M. D., INT. J. ROCK MECH. MIN. SCI., 12 (2), 27-31, 1975, LANGUAGE: ENGLISH

PERFORMING ORGANIZATIONS
NATIONAL RESEARCH COUNCIL OF CANADA, OTTAWA, CANADA

THE PROJECT INVESTIGATED IS UTILIZED FOR EXPERIMENTAL EXCAVATION PURPOSES, 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.
UNDERWATER SHOCKS DEAL CRUSHING BLow.

PERFORMING ORGANIZATION(S)
UK ATOMIC ENERGY AUTHORITY, HAREWELL, UK.

THIS LAB-IN-SITU REPORT CONTAINS REVIEW DATA. 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 THE REPORTED EXCAVATIONS ARE TREATED, ROCK TYPES REVIEWED INCLUDE QUARTZITE, ROCK MECHANICAL AND GEOSTRUCTURAL CHA\-RACTERISTICS, THE DRILL AND BLAST INSTALLATION DISCUSSED INCLUDES THE COMPLETED EXCAVATION OF THE seeding SHAPED, VAN DUCY MOUNTAINBAND, S.AFRICA.

PROBLEMS IN SHAFT-TUNNELING.

Lancaster-Jones, P. F. F.

TUNNELS AND TUNNELLING T 1 (7), 26-70, 1974.

LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
BRAND, CHARLES AND SON LTD., LONDON, UK.

FUNDING ORGANIZATION(S)
NORTHUMBRIAN WATER AUTHORITY, UK.

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE COMPLETED EXCAVATION OF THE FREE SPIN N12 SEWER TUNNEL (UK.), THE PROJECT INVESTIGATED IS UTILIZED FOR SEWER PURPOSES, THE CAISSON METHOD, DRILL AND BLAST FULL FACE METHOD REPRESENT THE EXCAVATION TECHNIQUE STUDIED, 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 THE REPORTED EXCAVATIONS ARE TREATED, ROCK TYPES REVIEWED INCLUDE QUARTZITE.

UNDER THE TYNE AGAIN.

Harle, B. A. O., ORMORNE, G. V.


LANGUAGE: ENGLISH

FUNDING ORGANIZATION(S)
FINANCIAL ORGANIZATION(S)
UTILITY TUNNEL, SEATTLE-TACOMA INTERNATIONAL AIRPORT (SEATTLE, WA, USA). THE PROJECT INVESTIGATED IS UTILIZED FOR ACCESS TUNNEL OTHER THAN SHAFTS AND AUBITS TO MAIN TUNNELS AND UTILITY TUNNEL PURPOSES. THE COMPRESSED AIR METHOD AND CUT-AND-COVER METHOD REPRESENT THE EXCAVATION TECHNIQUES STUDIED, PERIODICAL INFORMATION ON UNDERGROUND OPENINGS SUPPORTS AND MATERIALS HANDLING SYSTEM IS ALSO PRESENTED.

KEMANO PENDIX TUNNEL LINER BACKFILLED WITH PREPACKED CONCRETE.

Davis, R. E., JR.

JOHNSON, G. O.

MURRIS, G. E.


LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
MORRISON-KNUDSON CO. OF CANADA LTD.

FUNDING ORGANIZATION(S)
ALUMINUM COMPANY OF CANADA


EXPERIMENTS IN HYDRAULIC ROCK CUTTING.

Hurlbut, L. A., CROW, S. C., LADER, P. V.


LANGUAGE: ENGLISH

FUNDING ORGANIZATION(S)
CAIPEGAY UNIVERSITY OF CALIFORNIA, 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 EXCAVATION METHODOLOGY FOR PROJECT EFFORTS INCLUDES JET EROSION (WATER, AIR, CONTINUOUS IMPACT), GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED, THE EXCAVATION CHARACTERISTICS FOR THE Project are DESCRIBED, EXCAVATION ACTIVITIES ARE TREATED, PERTINENT INFORMATION ON ROCK TYPES REVIEWED INCLUDE QUARTZITE, ROCK MECHANICAL AND GEOSTRUCTURAL PROPERTIES (LAB DATA).
Performing Organizations

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 Parába-Pirajú project, Forcava underground power station intake tunnel (Brazil), the on going excavation of the Parába-Pirajú project, Forcava underground power station intake tunnel (Brazil), and the on going excavation of the Paraíba-Pirajú project, Forcava underground power station intake tunnel (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.


Performing Organizations

Twin Falls Power Corp., Ltd., Canada

Funding Organizations

Twin Falls Power Corporation, Public Corporations, Japan

Performing Organizations

Japan Railway Construction Public Corporations

This In-situ report contains abstracted only data. The underground opening discussed includes the completed excavation of the tunnel branches from pilot bore, Kakkaido end, Honshu-Makkaido railway connection (also called Sekikan underssea tunnel), Honshu side (Japan), the on going excavation of the pilot tunnel for Honshu-Makkaido railway connection (also called Sekikan underssea tunnel); Honshu side (Japan), the on going excavation of the branch tunnels from pilot bore, Kakkaido end, Honshu-Makkaido railway connection (also called Sekikan underssea tunnel), Makkaido side (Japan), the on going excavation of the side track tunnel, Makkaido side (Japan), the completed excavation of the inclined shaft for Sekikan underssea tunnel, Honshu side (Japan), the completed excavation of the inclined shaft for Sekikan underssea tunnel, Honshu side (Japan), the on going excavation of the pilot tunnel for Honshu-Makkaido railway connection (also called Sekikan underssea tunnel), Makkaido side (Japan), the on going excavation of the service tunnel, Sekikan underssea tunnel, Honshu side (Japan), and the on going excavation of the side track tunnel, Makkaido side for Honshu-Makkaido railway connection (also called Sekikan underssea tunnel), Makkaido side (Japan), the on going excavation of the service tunnel, Sekikan underssea tunnel, Honshu side (Japan), and the on going excavation of the side track tunnel, Makkaido side for Honshu-Makkaido railway connection (also called Sekikan underssea tunnel), Makkaido side (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 conventional explosive (unspecified). This document incorporates additionally tunnelling machine characteristics. The excavation rate is also discussed. Geotechnical characteristics for the
REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED, PERTINENT INFORMATION ON GROUND CONDITIONS AND MATERIALS HANDLING SYSTEM IS ALSO PRESENTED. PHOTOGRAFy AND ROCK TYPES REVIEWED INCLUDE ANDESITE AND VOLCANIC ROCKS. THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS, PERTINENT INFORMATION ON UNDERGROUND EXCAVATION PROJECTS IS ALSO PRESENTED.

R022637 NEW POWERFUL RAISE USERS, AUTHOR ANON., MINING MAG. 120 1. 2 799-321, 1974. LANGUAGE ENGLISH


R022640 AN EFFICIENT RIPPING OPERATION AT MONKTONHALL, AUTHOR ANON., MINING MAG. 120 1. 3 6 1, 9. 1974. LANGUAGE ENGLISH


R022647 LONGEST VERTICAL RAISE, AUTHOR ANON., WORLD MINING. 27 15 14, 49, 1974. LANGUAGE ENGLISH

PERFORMING ORGANIZATION(S)
RAISE CONTRACTING LTD CANADA
FUNGING ORGANIZATION(S)
DENSINU (UNAURINHINUS LTD) CANADA


R022651 GIANT MINE SPEEDS MANGLAES FIVE DIVERSION TUNNELS, HARRELL P.B., ROADS STREETS 49 77 81-2, 1985. LANGUAGE ENGLISH

PERFORMING ORGANIZATION(S)
MANGLA OM CONTRACTORS
1. LAMININ CORPORATION 2. CHICAGO BRIDGE AND IRON CO.
3. GRAVES RAD AND CO.
4. NAVENY CHARLES J. COMPANY
5. LANGFELDER & J. COMPANY
6. OSTRANDER CONSTRUCTION COMPANY
7. TREPPEH R & J COMPANY
8. MARSH CONSTRUCTION COMPANY


R022669 SOVIET SHAFT BORING HAS UNIQUE HEAD, SHANKIN, M., ENG. NEWS-REC. 147 16, 1974. LANGUAGE ENGLISH

THIS IN-SITU REPORT CONTAINS ABSTRACTED ONLY DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE ONGOING EXCAVATION OF THE RAISE-1 PROJECT NO. 422 (USSR). THE PROJECT INVESTIGATED IS UTILIZED FOR EXPERIMENTAL EXCAVATION AND MINE PURPOSES. THE TBM METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED EXCAVATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (ROTARY). THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS. THE EXCAVATION RATE IS ALSO DISCUSSED. GEOMINERAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED, PERTINENT INFORMATION ON MATERIALS HANDLING SYSTEM IS ALSO PRESENTED. THE EXCAVATION CHARACTERISTICS FOR MANGAL Limestone ARE TREATED. PHOTOGRAFy AND ROCK TYPES REVIEWED INCLUDE LIMESTONE. THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS, PERTINENT INFORMATION ON MATERIALS HANDLING SYSTEM IS ALSO PRESENTED.

R022664 FIRST UNDERGROUND POWER PLANT, AUTHOR ANON., ENGINEER NEWS-REC. 147 16, 1974. LANGUAGE ENGLISH

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA, THE UNDERGROUND OPENINGS DISCUSSED INCLUDES THE COMPLETED
EXCAVATION OF THE NAVAJO IRRIGATION PROJECT (U.S.A.), THE PROJECT was INVESTIGATED TO DETERMINE THE
EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS
INCLUDES MECHANICAL ABRASION (ROTARY). This Document incorporates ADDITIONALLY TUNNELLING MACHINE
CHARACTERISTICS.

THIS IN-SITU THEORETICAL REPORT CONTAINS ORIGINAL DATA, THE UNDERGROUND OPENINGS DISCUSSED INCLUDES THE
PROPOSED EXCAVATION OF THE HIGHWAY TUNNELS, NORTH AND SOUTH URBAN STREET SAFFETS (NICE, FRANCE), THE PROJECT
INVESTIGATED TO UTILIZE FOR TWIN HIGHWAY PURPOSES, THE UNSPECIFIED METHOD REPRESENTS THE EXCAVATION
TECHNIQUE STUDIED.

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA, THE UNDERGROUND OPENINGS DISCUSSED INCLUDES THE COMPLETED
EXCAVATION OF THE NAVAJO IRRIGATION PROJECT (U.S.A.), THE PROJECT was INVESTIGATED TO DETERMINE THE
EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS
INCLUDES MECHANICAL ABRASION (ROTARY). This Document incorporates ADDITIONALLY TUNNELLING MACHINE
CHARACTERISTICS.

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA, THE UNDERGROUND OPENINGS DISCUSSED INCLUDES THE COMPLETED
EXCAVATION OF THE NAVAJO IRRIGATION PROJECT (U.S.A.), THE PROJECT was INVESTIGATED TO DETERMINE THE
EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS
INCLUDES MECHANICAL ABRASION (ROTARY). This Document incorporates ADDITIONALLY TUNNELLING MACHINE
CHARACTERISTICS.
R00278

PERFORMING ORGANIZATION(S)
YTHE TES TUNNELING CONSORTIUM (ITI)
1. NACEL, NAGARKAT, HONG KONG
2. MCKINNAW F 
3. TSTM ALUMINUM MINING LTD, BELGIUM
4. JUIN, LTD, STUTTGART

FUNDING ORGANIZATION(S)
NORTHUMBERLAND WATER AUTHORITY, U.K.


R00278B

BREAKTHROUGH ON THE MAJES PROJECT.
AUTHOR ANON.
TUNNELS AND TUNNELLING
8 (1), 1976, LANGUAGE ENGLISH

FUNDING ORGANIZATION(S)
GOV'T OF PEPERU DEPRESION EJECUTIVO DEL PROYECTO ESPÍN

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.

R00278C

$60 MILLION TUNNEL NEARS COMPLETION.
AUTHOR ANON.
TUNNELS AND TUNNELLING
8 (1), 1976, LANGUAGE ENGLISH

FUNDING ORGANIZATION(S)
PEARNON BRIDGE ENSW PRIVATE LTD,AUSTRALIA

PERFORMING ORGANIZATION(S)
NEW SOUTH WALES DEPT. OF MAIN ROADS, AUSTRALIA


R00278A

WORKING WELL AT ANHERG.
AUTHOR ANON.
TUNNELS AND TUNNELLING
8 (1), 1976, LANGUAGE ENGLISH

PERFORMING ORGANIZATION(S)
1. IL-SALSPIETAL/RAU
2. INNEN & AUGSTE, INNSBRUCK
3. DERAMEN, RENNSBURG
4. SORAVIA, SPIETAL/RAU
5. INNEN & AUGSTE, INNSBRUCK
6. SORAVIA, SPIETAL/RAU
7. HINTEREGGER, SALZBURG/REGENZ
8. SCHMITH, AUSFABRICH
9. MAYRER & KRAUZ, SALZBURG
10. FREEMAN & COMPANY, JOHN, CONSTRUCTION LTD, U.K.
11. JOHN CONSTRUCTION LTD, U.K.
12. CENTRAL ELECTRICITY GENERATING BOARD, U.K.

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

PERFORMING ORGANIZATION(S)
Cleveland County Council, U.K.

FOUNDING ORGANIZATION(S)
Cleveland County Council, U.K.

THIS IN-SITU REPORT CONTAINS REVIEW DATA. THE UNDERGROUND OPENINGS DISCUSSED INCLUDE THE COMPLETED EXCAVATION OF THE BALTIMORE TUNNEL (EASTERN SECTION) (UNITED STATES), THE ON-GOING EXCAVATION OF THE BALTIMORE TUNNEL (WESTERN SECTION) (UNITED STATES), THE ON-GOING EXCAVATION OF THE MIDDLETOWN SHORE TUNNEL (UNITED STATES), AND THE PROJECTS INVESTIGATED ARE UTILIZED FOR WATER SUPPLY PURPOSES. THE PROJECTS INVESTIGATED ARE ALSO DISCUSSED. GEOSTRUCTURAL AND SOIL CHARACTERISTICS FOR THE EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON MATERIALS HANDLING CONDITIONS AND HANDLING OPENING SUPPORTS IS ALSO PRESENTED.

R00278A

IMMERSE-TUDES AND THE TEES.
AUTHOR ANON.
TUNNELS AND TUNNELLING
8 (1), 1976, LANGUAGE ENGLISH

FUNDING ORGANIZATION(S)
FREEWAN FOX AND PARTNERS, U.K.

PERFORMING ORGANIZATION(S)
Cleveland County Council, U.K.

FUNDING ORGANIZATION(S)
Cleveland County Council, U.K.


R002784 EARLY HISTORY OF SAPPER TUNNELING.
CLIFFORD, N. D.
TUNNELS AND TUNNELLING
A 3 1 , 93-7, 1976.
LANGUAGE:ENGLISH


R002785 EARLY HISTORY OF SAPPER TUNNELING.
CLIFFORD, N. D.
TUNNELS AND TUNNELLING
A 3 1 , 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 (IBARATAN), THE PROJECT INVESTIGATED IS UTILIZED FOR COMBINATION TUNNELING MACHINE CHARACTERISTICS, THE EXCAVATION RATE IS ALSO DISCLOSED, GEOSTRUCTURAL CHARACTERISTICS FOR THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED.

R002772 FAST FINISH FOR DURIL TUNNEL.
WALDO, J.
TUNNELS AND TUNNELLING
A 3 1 , 23-1, 1976

LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S): CONSTATE CIVIL ENGINEERING LTD.
FUNDING ORGANIZATION(S): RULER OF DUBAI, DUBAI
This in situ report contains original data. The excavation techniques studied, the reported excavation methods, project efforts include mechanical excavation. This document incorporates additional tunneling machine characteristics. Pertinent information on underground opening supports is also presented.


Performing organizations: Cementsation Projects Ltd. U.K.

Funding organizations:
2. Halsgrove Group, U.K.

This in situ report contains original data. The underground openings discussed include the completed 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 and excavation activities are described. The excavation characteristics for Hunseck Slate are treated. Petrography and Rock types reviewed include schist.


Performing organizations: Marti AG, Bern, Switzerland.

Funding organizations: Switzerland, Soft.O.F.

This in situ-theoretical report contains original data. Geostuctural characteristics for the reported excavation activities are described. Pertinent information on underground opening supports is also presented. The excavation characteristics for Hunseck Slate are treated. Petrography and Rock types reviewed include schist.


Performing organizations: Marti AG, Bern, Switzerland.

Funding organizations: Switzerland, Soft.O.F.

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 (east or south section). (Seelisberg, Switzerland). The projects investigated are utilized for access tunnel (shafts and adits to main openings) and twin highway purposes, the drill and blast (full face) method represents the excavation technique studied. The reported fragmentation method and excavation project efforts include conventional explosive (unspecified). This document incorporates additional 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 additional mechanical properties (LAB) data.

R002832 Progress on the Empingham Reservoir Tunnels, Cole, R. G., Schofield, R. J. (continued)

R002828 TUNNELLING IN THE NORTH. TUNNELS AND TUNNELLING 7 (3), 13, 1975. LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
THYSSEN (GREAT BRITAIN LTD)

FUNDING ORGANIZATION(S)
NORTHUMBERLAND WATER AUTHORITY, U.K.
WATER RESEARCH COUNCIL, U.K.


R002828 BILL FOR HONG KONG RAILWAY. TUNNELS AND TUNNELLING 7 (3), 13, 1975. LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
THYSSEN (GREAT BRITAIN LTD)

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

CONTINUES

MUNSTER UNDERGROUND, MILLER, F. TUNNELS AND TUNNELLING 7 (3) 1, 60-6, 1976. LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S): ARGE MUNCHEN AG/ARZEN AND CO.


GARTFORD CRIVE RESIGNS, AUTHOR ANON. TUNNELS AND TUNNELLING 7 (3) 1, 66-74, 1976. LANGUAGE: ENGLISH

OF THE DARFTD TUNNEL (MELBOURNE, AUSTRALI\(A\), U.K.) \(\ldots\) THE PROJECTS INVESTIGATED ARE UTILIZED FOR EXPERIMENTAL EXPLOSIVE PURPOSES (UNSPECIFIED). THE PROJECTS INVESTIGATED ARE UTILIZED FOR EXPERIMENTAL EXPLOSIVE PURPOSES (UNSPECIFIED). 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. ROCK TYPES REVIEWED INCLUDE CHALK (ROCK), CHALK, SLATE, TUNNELS AND TUNNELLING.

THIS IN-SITU THEORETICAL REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE PROPOSED EXCAVATION OF THE CHINNOR TUNNEL (CHINNOR, U.K.). THE PROJECT INVESTIGATED IS UTILIZED FOR HIGHWAY PURPOSES.

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, geostuctural and soil characteristics for the reported excavation activities are described. Rock types reviewed include alluvium, sea sediments, alluvium, sea sediments, alluvium, sea sediments, alluvium, sea sediments.

THIS IN-SITU THEORETICAL REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE PROPOSED EXCAVATION OF THE CHINNOR TUNNEL (CHINNOR, U.K.). THE PROJECT INVESTIGATED IS UTILIZED FOR HIGHWAY PURPOSES.

THIS IN-SITU THEORETICAL REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE PROPOSED EXCAVATION OF THE CHINNOR TUNNEL (CHINNOR, U.K.). THE PROJECT INVESTIGATED IS UTILIZED FOR HIGHWAY PURPOSES.
This in-situ report contains original data, the underground openings discussed include the completed excavation of the Washington Metro, Archives Station Sec. 1-B, West Tube, Sendo (Washington, D.C.), USA. The completed excavation of the Washington Metro, Archives Station Sec. 1-B, East Tube, Nendo (Washington, D.C., USA) and the completed excavation of the Washington Metro, Archives Station Sec. 1-B, West Tube, Nendo (Washington, D.C., USA) and the completed excavation of the Washington Metro, Archives Station Sec. 1-B, East Tube, Sendo (Washington, D.C., USA). 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 methods servicing project efforts include percussion and mechanical abrasion (percussion and draci), this document incorporates additionally tunneling machine characteristics, excavation advancement rate is also discussed, geotechnical 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.

R002859 INVESTIGATIONS FOR THE ABERDEEN TUNNEL.

CHAPPELL, B. A. TONE, W. A.

TUNNELS AND TUNNELLING

F. 45, 9/24, 1975

LANGUAGE: ENGLISH

PERFORMING ORGANIZATION:

MAINSELL GEOTECHNICAL SERVICES, MELBOURNE, AUSTRALIA

THIS LAB-2-SITU AND LAB REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENINGS DISCUSSED INCLUDE THE PROPOSED EXCAVATION OF THE ABERDEEN TUNNEL (HONG KONG-KEVINLOO, HONG KONG) AND THE COMPLETED EXCAVATION OF THE PILOT TUNNEL FOR ABERDEEN TUNNEL (HONG KONG). THE PROJECTS INVESTIGATED ARE UTILIZED FOR EXPLORATORY TUNNEL AND HIGHWAY PURPOSES. PSEUDOGRAPHY AND ROCK TYPES REVIEWED INCLUDE CHALK, GRANITE, MONZONITE, RHYOLITE AND VOLCANICS. THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES (LAB) DATA.

R002858 GETTING IT RIGHT AT GAITHRIGHT.

ALTWHY ANOM.

TUNNELS AND TUNNELLING

F. 413, 9/7, 1975

LANGUAGE: ENGLISH

PERFORMING ORGANIZATIONS:

KEMPER FRONDER CONSTRUCTORS, LOS ANGELES, CA, USA

FUNDING ORGANIZATION:

U.S. ARMY CORPS OF ENGINEERS


R002857 SEGMENTED CONCRETE LINER STUDY.

BIRKSMYER, J.

FIRST ANNUAL CONF. ON DOT RESEARCH AND DEVELOPMENT IN TUNNELLING TECHNOLOGY

18-21, 1975.

CONTINUED

LANGUAGE: ENGLISH

PERFORMING ORGANIZATION:

BECHTEL ENGINEERING, BEALE ST. SAN FRANCISCO, CA, 94119

FUNDING ORGANIZATION:

U.S. DOT

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.

DREYER, H. L.

PERFORMING ORGANIZATION:

UNIVERSITY OF CALIFORNIA, BERKELEY, COLLEGE OF ENGINEERING

FUNDING ORGANIZATION:

U.S. DOT

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.

PERFORMING ORGANIZATION:

UNIVERSITY OF MINNESOTA, DEPT. OF CIVIL AND MINERAL ENGINEERING

FUNDING ORGANIZATION:

U.S. DOT

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 TRANSPORTATION SYSTEM FOR THE RAPID EXCAVATION OF TUNNELS.

FADDICK, R. R.

PERFORMING ORGANIZATION:

COLORADO SCHOOL OF MINES, DEPT. OF MINING, GOLDEN, CO, 80440

FUNDING ORGANIZATION:

U.S. DOT

THEORETICAL REPORT CONTAINS ABSTRACTED ONLY DATA. PERTINENT INFORMATION ON MATERIALS HANDLING SYSTEM IS ALSO PRESENTED.

R002912 DEVELOPMENT OF RATIONAL DESIGN METHODOLOGY FOR SOFT GROUND GRANTED TUNNELS.

CLOUGH, G. W.

FIRST ANNUAL CONF. ON DOT RESEARCH AND DEVELOPMENT IN TUNNELLING TECHNOLOGY

31-2, 1975.

CONTINUED

LANGUAGE: ENGLISH

PERFORMING ORGANIZATION:

BECHTEL ENGINEERING, BEALE ST. SAN FRANCISCO, CA, 94119

FUNDING ORGANIZATION:

U.S. DOT
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.

R020904 SUBWAY STATION DESIGN AND CONSTRUCTION.
FUNDING ORGANIZATIONS: U.S. GOVT DEPT OF TRANSPORTATION

THIS THEORETICAL REPORT CONTAINS ABSTRACTED ONLY DATA. THE PROJECT INVESTIGATED IS UTILIZED FOR RAILWAY PURPOSES.

R020933 DRAW DRILL MODIFIED TO WORK UNDERWATER.
FUNDING ORGANIZATIONS: U.S. GOVT DEPT OF TRANSPORTATION

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 SICHT.

R020914 FINLAND'S SOLID GRANITE MAKES 79-MILE WATER TUNNEL A PUSHSOVER.
FUNDING ORGANIZATIONS: HELSINKI METROPOLITAN AREA WATER CO.


R020965 THE HENDERSON PROJECT.
FUNDING ORGANIZATIONS: U.S. GOVT DEPT OF TRANSPORTATION

This empirical 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.

FUNDING ORGANIZATIONS:
U.K. GOVT.
EUROPEAN ECONOMIC COMMUNITY (EEC), MEMBER COUNTRIES.


HELLENKI METRO TENDERS 1982.
LANGUAGE: ENGLISH
FUNDING ORGANIZATIONS:
HELLENKI STATE OF RAPID TRANSIT OFFICE, HELLENSKI, FINLAND

THIS IN-SITU REPORT CONTAINS REVIEW DATA, THE UNDERGROUND OPENING DISCUSSED INCLUDES THE PROPOSED EXCAVATION OF THE HELSINKI METRO, ALLUVI CLEFT SECTION (HELLENSKI, FINLAND), THE PROJECT INVESTIGATED IS UTILIZED FOR METRO PURPOSES.

SEWER STARTED.
LANGUAGE: ENGLISH
FUNDING ORGANIZATIONS:
SYDNEY METROPOLITAN WATER BOARD, SYDNEY, AUSTRALIA


DIXON COAL FUND.
LANGUAGE: ENGLISH
FUNDING ORGANIZATIONS:
UK GOVERNMENT.


HOMEL CONTRACT.
LANGUAGE: ENGLISH
FUNDING ORGANIZATIONS:
HOMEL, JOHN AND CO. LTD.

THIS IN-SITU REPORT CONTAINS REVIEW DATA, THE UNDERGROUND OPENING DISCUSSED INCLUDES THE ON GOING EXCAVATION OF THE CABLE TUNNEL, BIRD STREET-BROKE STREET (LONDON, ENGLAND, U.K.), THE PROJECT INVESTIGATED IS UTILIZED FOR CABLE TUNNEL PURPOSES.

MODIFIED GOSCO.
AUTHOR ANON.

(continued)
TUNNELS AND TUNNELLING
1 1 1 1 25, 1974.

PERFORMING ORGANIZATION(S)
ROVS CIVIL ENGINEERING LTD, UK.

FUNDING ORGANIZATION(S)
HESSE WATER AUTHORITY, FRANKFURT, UK.


PERFORMING ORGANIZATION(S)
UNIVERSITY OF MINNESOTA, DEPT. OF CIVIL AND MINERAL ENGINEERING

FUNDING ORGANIZATION(S)
U.S. GOVERNMENT, DEPT. OF TRANSPORTATION, ST. PAUL PUBLIC WORKS DEPT., ST. PAUL, MN.


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

FUNDING ORGANIZATION(S)
U.S. GOVERNMENT, DEPT. OF TRANSPORTATION, CONTINENTAL OIL COMPANY

THIS IN-SITU AND THEORETICAL REPORT CONTAINS ORIGINAL AND REVIEW DATA. THE PROJECT INVESTIGATED IS UTILIZED FOR ELECTRICAL EXCAVATION PURPOSES. EXCAVATION ADVANCEMENT RATE IS ALSO DISCUSSED. PERTINENT INFORMATION ON MATERIALS HANDLING SYSTEM IS ALSO PRESENTED. ROCK TYPES REVIEWED INCLUDE GALLEYS AND ROCK (UNSPECIFIED). THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES (LAB) DATA.

AN EVALUATION OF THE EFFECTS OF AERODYNAMICS ON SUBWAY TUNNEL DESIGN AND OPERATING ENERGY REQUIREMENTS.

KURTZ, D. W.

CONTINUOUS
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.

R80377 FIELD DEMONSTRATION OF HIGH PRESSURE WATER JET ASSISTED TUNNEL BORING.

AUTHOR ANON.

TUNNELING TECHNOL. NEWSLETTER (111), 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 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.

R80378 COST COMPARISON BETWEEN SUBTERRANEAN AND CURRENT TUNNELING METHODS.


LANGUAGE ENGLISH

PERFORMING ORGANIZATION(S)

MATHews ASsOCIATED.

FUNDING ORGANIZATION(S)

1. NATIONAL SCIENCE FOUNDATION
2. U.S. BUREAU OF MINES


R80379 SUBSURFACE SITE INVESTIGATION BY ELECTROMAGNETIC RADAR.

RUBIN, L. A.; TUNNELING TECHNOL. NEWSLETTER (11), 5-6, 1976.

LANGUAGE ENGLISH

PERFORMING ORGANIZATION(S)

EMCO, INC.

FUNDING ORGANIZATION(S)

1. NATIONAL SCIENCE FOUNDATION
2. U.S. BUREAU OF MINES

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE COMPLETED EXCAVATION OF THE WASHINGTON METRO DEPT. OF ZOLOGICAL PARK STATION (HASH, D.C., USA). THE PROJECT INVESTIGATED IS UTILIZED FOR METRO PURPOSES. ROCK TYPES REVIEWED INCLUDE BECTON.
138

R003384 KAMII TUNNEL MOVES SLOWLY. AUTHOR ANON.
LANGUAGE: ENGLISH
FUNDING ORGANIZATION: MINISTRY OF WORKS, NEW ZEALAND


R003406 HOLE DIGS 8 MILES IN 13 MONTHS. AUTHOR ANON.
LANGUAGE: ENGLISH
PERFORMING ORGANIZATION: 1. COLORADO CONSTRUCTORS, DENVER, CO.
2. HORNER, J. S. CONSTRUCTION CO., DENVER, CO.
FUNDING ORGANIZATION: U.S. BUREAU OF RECLAMATION


R003417 BIG HOLE IS DOWN IN THE HOLE. AUTHOR ANON.
LANGUAGE: ENGLISH
PERFORMING ORGANIZATION: 1. THE KUNKEL CORP., BALTIMORE, MD, U.S.A.
2. JOHNSON & CO., SAN GABRIEL, CA, U.S.A.
3. KENT, PETER SONS CO., OHAMA, NB, U.S.A.
4. MACGREGOR AND KRUSE INC., MONTROSE, CA, U.S.A.
FUNDING ORGANIZATION: U.S. CALIFORNIA METROPOLITAN WATER DISTRI, LOS ANGELES.

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA, THE UNDERGROUND OPENING DISCUSSED INCLUDES THE ON GOING EXCAVATION OF THE MEMHALL TUNNEL (USA), THE PROJECT INVESTIGATED IS UTILIZED FOR IRRIGATION PURPOSES, THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS, PERTINENT INFORMATION ON GROUND CONDITIONS AND UNDERGROUND OPENING SUPPORTS IS ALSO PRESENTED, ROCK TYPES REVIEWED INCLUDE CONGLOMERATE, THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL PROPERTIES.

R003418 HOLE BORDERS TUNNEL NO. 1, MINERS NO. 1. AUTHOR ANON.
LANGUAGE: ENGLISH
PERFORMING ORGANIZATION: FENEX AND JECTION INC., TULSA, OK
SNE-KAISER-MACO, REDDING, CALIFORNIA


R003438 RAILWAY BUILDERS RACE ON AMBITIOUS PROJECT. AUTHOR ANON.
LANGUAGE: ENGLISH

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA, THE PROJECT INVESTIGATED IS UTILIZED FOR HIGHWAY AND UNDERGROUND RAILWAY STATION PURPOSES, THE COVER METHOD AND TBEB METHOD REPRESENT THE EXCAVATION TECHNIQUES STUDIED, THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDE HAND MINING MECHANICAL ABRASION (ROTARY), THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERISTICS, SOIL CHARACTERISTICS FOR THE (CONTINUED)
OPENING SUPPORTS AND MATERIALS HANDLING SYSTEMS ARE 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.

R003450 MANGLA DAM 6A MONSTER, AUTHOR ANON.
ENG. NEWS REC.
26-5, 1954.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATIONS:
1. Morrison-Knudsen Co.
2. Perini Corp.

FUNDING ORGANIZATION:
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, geotechnical 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.

R003451 MANGLA DAM 6A MONSTER, AUTHOR ANON.
ENG. NEWS REC.
26-5, 1954.
LANGUAGE: ENGLISH

PERFORMING ORGANIZATIONS:
1. Atkinson, Guy Fisan 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, geotechnical 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.

R003452 NEW MACHINES SPEEDS LARGE BORE TUNNELING.
AUTHOR ANON.
ENG. NEWS REC.
26-5, 1954.

PERFORMING ORGANIZATIONS:
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 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, geotechnical 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.

R003453 THE HOE COMES THROUGH.
AUTHOR ANON.
ENG. NEWS REC.
28, 1957.

PERFORMING ORGANIZATIONS:
Oahe Constructors

This report contains original data, the underground opening discussed includes the 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.

R003454 MECHANICAL HOE.
AUTHOR ANON.
ENG. NEWS REC.
24-5, 1955.

PERFORMING ORGANIZATIONS:
Mitty Construction Group AnGELES, CA, USA

This in-situ report contains original data, the underground opening discussed includes the ongoing 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. Geotechnical 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.

(Continued)
EXCAVATION CHARACTERISTICS FOR PLUMB SHAFT ARE TREATED. ROCK TYPES REVIEWED INCLUDE MUDSTONE.

R00348  USA F TUNNELS UNDER THE CONTINENTAL DIVIDE.

PRODUCED BY USAF HUNTER RIVER TUNNEL.

PERFORMING ORGANIZATION(S)
1. HUNTER RIVER DRILLING CO.
2. OGAN RIVER INC. LITTLE ROCK CITY, USA.
3. GIBBON and REDO.

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


R00497 MACHINE TUNNELING UNDER HOUSTON.

MURPHY, W. D.

CIVIL ENG.

4.5-6, 1964.

LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
1. BORING AND TUNNELING COMPANY OF AMERICA (BORTUNCE).
2. HOLLAND ENGINEERING CORP.

FUNDING ORGANIZATION(S)
U.S. DEPARTMENT OF THE INTERIOR.

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE COMPLETE EXCAVATION OF THE HOUSTON STORM SEWER TUNNEL (HOUSTON, TEX., USA). THE PROJECT INVESTIGATED IS UTILIZED FOR DRAINAGE TUNNEL PURPOSES. THE TMH METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRAISON (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.

R00499 MACHINE TUNNELING IN TASMANIA.

J. HARDING

CIVIL ENG.

69, 1953.

LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
1. HYDROELECTRIC COMMISSION, HOBART, TASMANIA.
2. HYDROELECTRIC COMMISSION, HOBART, TASMANIA.

FUNDING ORGANIZATION(S)
HYDROELECTRIC COMMISSION, HOBART, TASMANIA.

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENING DISCUSSED INCLUDES THE COMPLETE EXCAVATION OF THE TASMANIA TAILRACE TUNNELS. THE PROJECT INVESTIGATED IS UTILIZED FOR WATER CONVEYANCE (OTHER THAN WATER SUPPLY) PURPOSES. THE TMH METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRAISON (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.

R00501 HUMBER RIVER TUNNEL AT TORONTO.

WHITE, G. A.

CIVIL ENG.

43, 1942.

LANGUAGE: ENGLISH

PERFORMING ORGANIZATION(S)
1. BORING AND TUNNELING COMPANY OF AMERICA (BORTUNCE) AND TSERI.

FUNDING ORGANIZATION(S)
DEPORT METROPOLITAN WATER (DEPT DETROIT, MI). USA.

THIS IN-SITU AND LAB REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENINGS DISCUSSED INCLUDES THE COMPLETE 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 OPERATOR, MI, USA. 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 SCAFFOLDS TO MAIN TUNNEL), PUMPING SHAFT AND WATER SUPPLY TUNNEL PURPOSES. THE BLASTING (DRILLING) METHOD, UNIL AND BLAST (FULL FACE) METHOD, MECHANICAL EXCAVATION METHOD AND PNEUMATIC BORING METHOD REPRESENT THE EXCAVATION TECHNIQUES STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES CONVENTIONAL EXPLOSIVE (UNSPECIFIED) AND MECHANICAL ABRAISON (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 ANTHRACITE SHALE ARE TREATED. ROCK TYPES REVIEWED INCLUDE ANTHRACITE SHALE.

R00505 MOLLE READY FOR THIN MERCEY BORE AFTER TROUBLE-PROOF FIRST DRIVE.

AUTHOR ANON.

ENG. NEWS REC.

22-5, 1938.

LANGUAGE: ENGLISH

(continued)
This In-Situ Report contains original data. The underground opening discussed includes the ongoing 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. Geotechnical 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.

P003906 World's Largest Hole Bored Japanese Tunnel
Author Anon.
12, 1978
Language: English
Performing Organization(s)
Nakai Construction Co., Ltd., Japan
Funding Organization(s)
Japanese National Railways
This In-Situ Report contains original data. The underground opening discussed includes the ongoing 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.

P003907 Pipes Jacked Behind Mini-Hole
Author Anon.
46, 1968
Language: English
Performing Organization(s)
2. Michigan Sewer Company, Southfield, Michigan
Funding Organization(s)
Greater Chicago Metropolitan Sanitary District, Chicago, Illinois, Chicago, IL USA
This In-Situ Report contains original data. The underground opening discussed includes the ongoing 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.

P003908 Hole Breaks Through After 293 ft. Day and 1,114 ft. Week
Author Anon.
28-9, 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 completed excavation of the River Mountains Tunnel (Henderson), Nevada, USA. 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.
THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE REPORTED 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, CROSSILITE, AND BURNT ROCK.

FUNDING ORGANIZATION(S):
1. PERINI CORP., 2. PERINI INC.

PERFORMING ORGANIZATION(S):
1. HOLTZ. WOODEN CO., 2. PERINI INC.

AUTHOR ANON.

71, 1967.

LANGUAGE: ENGLISH

EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON GROUND CONDITIONS AND UNDERGROUND OPENING SUPPORTS IS ALSO PRESENTED.

FUNDING ORGANIZATION(S):
1. WATTS R.A., CO., 2. WINSTON BROS. CO.

PERFORMING ORGANIZATION(S):
1. BROWN AND ROOT INC., 2. PERINI CORP.

AUTHOR: JOHN.

63-4, 1967.

LANGUAGE: ENGLISH

EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON GROUND CONDITIONS AND UNDERGROUND OPENING SUPPORTS IS ALSO PRESENTED. METROLOGY AND ROCK TYPES REVIEWED INCLUDE CONGLOMERATE, SANDSTONE AND Siltstone.

FUNDING ORGANIZATION(S):
1. SOUTHERN CALIFORNIA METROPOLITAN WATER DISTRICT, 2. VERNER, INC., 3. PERINI CORP., 4. BROWN AND ROOT INC.

PERFORMING ORGANIZATION(S):
1. BROWN AND YETT INC., 2. GATE AND FOY, INC., 3. FARM CONSTRUCTION CO., LOOMIS, CALIF., USA.

AUTHOR: JOHN.

63-4, 1967.

LANGUAGE: ENGLISH

EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON GROUND CONDITIONS AND UNDERGROUND OPENING SUPPORTS IS ALSO PRESENTED. METROLOGY AND ROCK TYPES REVIEWED INCLUDE CONGLOMERATE, SANDSTONE AND Siltstone.

FUNDING ORGANIZATION(S):
1. BROWN AND ROOT INC., 2. BROWN AND ROOT CO., 3. BROWN AND WOODEN CO.

PERFORMING ORGANIZATION(S):
1. HOLTZ. WOODEN CO., 2. PERINI INC.

AUTHOR: JOHN.

76-7 AND 80, 1966.

LANGUAGE: ENGLISH

EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON GROUND CONDITIONS AND UNDERGROUND OPENING SUPPORTS IS ALSO PRESENTED. METROLOGY AND ROCK TYPES REVIEWED INCLUDE CONGLOMERATE, SANDSTONE AND Siltstone.

FUNDING ORGANIZATION(S):
1. BROWN AND ROOT INC., 2. BROWN AND WOODEN CO., 3. BROWN AND PERINI INC.

PERFORMING ORGANIZATION(S):
1. BROWN AND ROOT INC., 2. BROWN AND WOODEN CO., 3. BROWN AND PERINI INC.

AUTHOR: JOHN.

76-7 AND 80, 1966.

LANGUAGE: ENGLISH

EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON GROUND CONDITIONS AND UNDERGROUND OPENING SUPPORTS IS ALSO PRESENTED. METROLOGY AND ROCK TYPES REVIEWED INCLUDE CONGLOMERATE, SANDSTONE AND Siltstone.

FUNDING ORGANIZATION(S):
1. BROWN AND ROOT INC., 2. BROWN AND WOODEN CO., 3. BROWN AND PERINI INC.

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENINGS DISCUSSED INCLUDE THE ON GOING EXCAVATION OF THE AZOTEA-TOLGH TUNNEL TO FINISH. 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, PCRTINENT INFORMATION ON GROUND CONDITIONS AND UNDERGROUND OPENING SUPPORTS AND MATERIALS HANDLING SYSTEM IS ALSO PRESENTED.

PE2956  FASTER, CHEAPER TUNNELING.

WOLF, A. M.

NEW SCIENTIST 9A (105), 1970.

LANGUAGE ENGLISH

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENINGS DISCUSSED INCLUDES THE ON-GOING EXCAVATION OF THE MEXICO CITY DRAINAGE TUNNELS (MEXICO CITY, MEXICO). THE PROJECT INVESTIGATED IS UTILIZED FOR HYDROELECTRIC PURPOSES. THE SHEET PILING (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.

PE2957  MECHANICS OF CUTTING AND BORING. PART III. KINEMATICS OF AXIAL ROTATION MACHINES.

MELLOR, H.

COLO REGIONS RESEARCH AND ENGINEERING LAB., HANOVER, NEW HAMPSHIRE 03824, 1976.

CAREL-7A-1A.

LANGUAGE ENGLISH

PERFORMING ORGANIZATION:

U.S. ARMY COLO REGIONS RESEARCH AND ENGINEERING LAB., HANOVER, NEW HAMPSHIRE.

FUNDING ORGANIZATION:

U.S. ARMY COLO REGIONS RESEARCH AND ENGINEERING LAB. (CAREL).

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES MECHANICAL ABRASION (EXPLOSIVE-ROTARY).

PE3042  RESOURCEFUL TUNNELING BEATS SEVERE DIGGING CHALLENGE.

MARKOW, G.


LANGUAGE ENGLISH

PERFORMING ORGANIZATION:

TUNNEL S.A. (DEUXX, ITUSA) (SEVEN COMPANY JOINT VENTURE CONTRACTOR).

FUNDING ORGANIZATION:

CONCORD 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 (MEXICO CITY, MEXICO) AND THE ON-GOING EXCAVATION OF THE DEEP LEVEL DRAINAGE OUTLET TUNNEL-MEXICO CITY (MEXICO CITY, MEXICO). THE PROJECTS INVESTIGATED ARE UTILIZED FOR COMBINED SEWER PURPOSES. THE HEADING AND BENCH METHOD AND SHEILD USING COMPRESSED AIR TECHNIQUE REPREsENT THE EXCAVATION TECHNIQUES STUDIED. THE REPORTED FRAGMENTATION METHODS SERVICING PROJECT EFFORTS INCLUDE CONVENTIONAL EXPLOSIVE (UNSPECIFIED) AND HAND MINING. THIS DOCUMENT INCORPORATES ADDITIONALLY MECHANICAL ABRASION (ROTARY) AND PERTINENT INFORMATION ON UNDERGROUND OPENING SUPPORTS AND MATERIALS HANDLING SYSTEM IS ALSO PRESENTED.

R13319  G OAL MINING HEADERS DOUBLE AS TUNNELERS FOR CITY SUBWAY SYSTEM.

NELSON, E.


LANGUAGE ENGLISH

PERFORMING ORGANIZATION:

PACIFIC COLORADO LEONARD (NORTHICH, U.K.)

HIN TON, LONDON (LONDON, U.K.)


R3044  JOS SITES.

AUTHOR ANON.


LANGUAGE ENGLISH

PERFORMING ORGANIZATION:

HYDROELECTRIC CONSTRUCTION-ROBERT TASNAMIA.


B8836  TOOLS AND TUNNELS HELP EARN FAST CONSTRUCTION BONUSES.

BLOOMBERG, R.

CONSTR. METHODS EQUIPMENT 9A (16), 1976.

LANGUAGE ENGLISH

PERFORMING ORGANIZATION:

HAMILTON LTIDIOGALY, ALBERTA, CANADA.

FUNDING ORGANIZATION:

W.A.C., HYDRO, CANADA.
Hier ist das naturgetreue Text-Darstellung des Dokuments:

This in-situ report contains original data. The underground openings discussed include the completed excavation of the St. Paul Stormwater tunnel project. The reported fragmentation method servicing project efforts includes mechanical abrasion (rotary). This document incorporates additional tunneling machine characteristics. Pertinent information on materials handling system is also presented.


Funding Organization(s): Severn Trent Water Authority (U.K.)

This in-situ report contains original data. The underground openings discussed include the completed 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.
UNDERGROUND HUMILLA HUNTER S TUNNEL DRIVE IN UNSTABLE SANDS
AUTHOR ANON.
GROUND ENGINEERING 11:2 1.07/77
L'ANGELENGISH

PERFORMING ORGANIZATION(S)
SOCIETE D'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.T.S.), TUNNELS-SECTION 16C (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.

IONAIC GETS USSM AD FOR TUNNELING RESEARCH
AUTHOR ANON.
ENG. MINING J. 174 (7) 77/72.
L'ANGELENGISH

PERFORMING ORGANIZATION(S)
IONAIC SMELTHER LTD.

PLACING ORGANIZATION(S)
U.S. BUREAU OF MINES

THIS LAB-1N-SITU REPORT CONTAINS ABSTRACTED ONLY DATA. THE PROJECT INVESTIGATED IS UTILIZED FOR EXPERIMENTAL EXCAVATION PURPOSES. THE THERMAL-FLUXION METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED FRAGMENTATION METHOD SERVICING PROJECT EFFORTS INCLUDES THERMAL-ELECTRICAL (UNSPECIFIED).

GOING UNDERGROUND AT KIDD CREEK
AUTHOR ANON.
ENG. MINING J. 175 (4) 4Q/72.
L'ANGELENGISH

PERFORMING ORGANIZATION(S)
KIDD CREEK MINE


PRESS, TRADITION GOVERN DESIGN OF UNDERGROUND LECTURE HALL
AUTHOR ANON.
ENG. NEWS-REG. 195 (1) 22 AND 27/79.
L'ANGELENGISH

PERFORMING ORGANIZATION(S)
KAJIMA CORPORATION

FUNDING ORGANIZATION(S)
CENTRAL ELECTRICITY GENERATING BOARD, UK

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENINGS 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 BORE DEB AND IHP 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.

SMALL START § 10-MILLION AI PORT RAIL LIFT
AUTHOR ANON.
ENG. NEWS-REG. 195 (10) 13-79.
L'ANGELENGISH

FUNDING ORGANIZATION(S)
SWISS FEDERAL RAILWAYS - 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.

URBAN RAIL SYSTEM STAYS UP TO DATE AND KEEPS ITS RIDERS
AUTHOR ANON.
ENG. NEWS-REG. 196 (2) 14/79.
L'ANGELENGISH

PERFORMING ORGANIZATION(S)
KAFZIA CORPORATION

FUNDING ORGANIZATION(S)
CENTRAL ELECTRICITY CAPANY (TOKYO, JAPAN)


HIGH HEAD PUMPED STORAGE PLANT RIDES UNDER WELSH SLATE QUARRY
AUTHOR ANON.
ENG. NEWS-REG. 196 (65) 27-8, 79.
L'ANGELENGISH

PERFORMING ORGANIZATION(S)
CONSORTIUM HEADED BY SIR ALFRED MCLAIN AND SONS (LONDON, U.K.)

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


(continued)
PILED WALL AND PROOF CLEAR THE WAY FOR SUBWAY TUNNELING.

AUTHOR ANON.


LANGUAGE ENGLISH


DEEP-WATER TUNNELING OPERATIONS TIE-IN WITH PINPOINT ACCURACY.

AUTHORS R. E.


LANGUAGE ENGLISH

PERFORMING ORGANIZATION(S): 1. Kiewiet-Turns Co., Peter, Iowa, Nebraska, U.S.A.
2. Raymond International, Houston, Texas, U.S.A.
3. Tide Water Construction Corp., Norfolk, U.S.A.


GRAPE-CLIMBING MIRE BORES MOUNTAIN TUNNEL.

AUTHOR ANON.


LANGUAGE ENGLISH


JUNO-MOUNTED SCABBLERS READY VALVE CHAMBER.

AUTHOR ANON.

METHODS EQUIPMENT 95, 84-9, 1973.

LANGUAGE ENGLISH

(continued)
THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE PROJECT INVESTIGATED IS UTILIZED FOR SEWER PURPOSES.

PERFORMING ORGANIZATION:
INSANA CONSTRUCTION CO. (MTUS)

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE PROJECT INVESTIGATED IS UTILIZED FOR SEWER PURPOSES. THE ISM 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 IS ALSO PRESENTED.

PERFORMING ORGANIZATION:
JAPAN RAILWAY CONSTRUCTION PUBLIC CORPS, TAMAGAWA, OFFICE, TOKYO, JAPAN

THIS IN-SITU REPORT CONTAINS ORIGINAL DATA. THE UNDERGROUND OPENINGS DISCUSSED INCLUDES THE COMPLETE EXCAVATION OF THE PIKAKO TUNNEL (JAPAN), THE PROJECT INVESTIGATED IS UTILIZED FOR HYDROELECTRIC PURPOSES. THIS DOCUMENT INCORPORATES ADDITIONALLY TUNNELING MACHINE CHARACTERS. PERTINENT INFORMATION ON GROUND CONDITIONS IS ALSO PRESENTED.

FUNDING ORGANIZATION:
CROWTHET PETROLEUM, SCOTLAND

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PERFORMING ORGANIZATION:
BAYLOR METRO BOLTON MILL BIDS

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PERFORMING ORGANIZATION:
MINISTRY OF WORKS, NEW ZEALAND

R003661 OVERCOMING FLOODING AT SEIKAAN.

AUTHOR ANON.


PERFORMING ORGANIZATION:
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TUNNELS AND TUNNELLING
8, 9, 17, 1976
LANGUAGE: ENGLISH
PERFORMING ORGANIZATION:
CHRISTIANI NIELSEN
FUNDING ORGANIZATION(S):
NORTHERN IRELAND ELECTRICITY SERVICE, IRELAND, U.K.
THIS IN-SITU REPORT CONTAINS ORIGINAL DATA: THE UNDERGROUND OPENING DISCUSSED INCLUDES THE ON-GOING EXCAVATION OF THE KILLOCH POWER STATION CIRCULATING WATER SYSTEM OUTFALL (CARRICKFERGUS, N. IRELAND, U.K.), THE PROJECT INVESTIGATED IS UTILIZED FOR EFFLUENT OUTFALL (OTHER THAN BEVERAGE) PURPOSES. THE IMPERVIOUS PIPE (PRE-STRESSED CONCRETE BOX) METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. PERTINENT INFORMATION ON UNDERGROUND OPENING SUPPORTS AND MATERIALS HANDLING SYSTEM IS ALSO PRESENTED.

RO3671 ARCTIC TUNNELS.
AUTHOR ANON.
TUNNELS AND TUNNELLING
8, 9, 17, 1976
LANGUAGE: ENGLISH
FUNDING ORGANIZATION(S):
POLAR GAS PROJECT

RO3677 SOUTH AFRICAN NEWS.
AUTHOR ANON.
TUNNELS AND TUNNELLING
8, 9, 17, 1976
LANGUAGE: ENGLISH
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1. HURLEY AND STEWARTCAPE TOWN, S. AFRICA
2. JG, PLUMBING AND LOVEMOR
3. JUDE MINING AND CONTRACTING
4. DORAEN LONGWENG HUNTER
5. O'MARA CIVIL ENGINEERING I PTY LTD.
6. LTQ CONSTRUCTION
FUNDING ORGANIZATION(S):
SOUTH AFRICAN RAILWAYS (SAR)
SOUTH WEST AFRICA WATER AND ELECTRICITY CORPORATION

RO3678 WORLD'S LONGEST TUNNEL.
AUTHOR ANON.
GROUND ENG.
8, 9, 17, 1976
LANGUAGE: ENGLISH
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 PROJECTS INVESTIGATED ARE UTILIZED FOR WATER SUPPLY TUNNEL PURPOSES. THE UNSPECIFIED METHOD REPRESENTS THE EXCAVATION TECHNIQUE STUDIED. THE REPORTED EXCAVATION ACTIVITIES ARE DESCRIBED. PERTINENT INFORMATION ON UNDERGROUND OPENING SUPPORTS IS ALSO PRESENTED. ROCK TYPES REVIEWED INCLUDE DOLERITE.
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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

* "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

VII. 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
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 (Intermittent 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 (Intermittent 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. Geosstructural 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)
J. 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.)