

CENTER FOR NUCLEAR WASTE REGULATORY ANALYSES

TRIP REPORT

SUBJECT: Short course on Mechanical Excavation Techniques in Mine Development and Production offered by the Colorado School of Mines, Golden, Colorado. (20-3702-021-010-001)

DATE AND PLACE: October 15-17, 1990 at the Colorado School of Mines, Golden, Colorado

AUTHOR: Asadul H. Chowdhury

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PERSON PRESENT: Asadul H. Chowdhury

BACKGROUND AND PURPOSE OF TRIP:

The Colorado School of Mines with the sponsorship of The Earth Mechanics Institute (EMI) and The Institute of Shaft Drilling Technology (ISDT) offered an intensive short course to provide a comprehensive review of new and emerging mechanical excavation technologies for excavation in hard rock. This course included discussion on equipment and techniques both for horizontal and vertical underground openings.

The purpose for attending the course was to enhance my background and to maintain familiarity with the state-of-the-art mechanical excavation technologies.

SUMMARY:

The course began with the presentation on principles of mechanical rock cutting and boring. The primary emphasis throughout the course was the mechanical excavation techniques on hard rock mining where considerable need and interest currently exist for replacing conventional drill and blast operations. The course covered the equipment and techniques both for horizontal and vertical underground openings, including the application of roadheaders, tunnel and raise borers, shaft drilling machines, and mobile mechanical miners. For each type of equipment, the course presentation included discussion on the history of development, design principles and operation, geotechnical considerations, machine and cutter selection criteria, bit design, performance prediction, cutter wear and cost estimation, muck removal and hoisting, ground support, site preparation, machine dismantling and reassembly, field equipment operations, suitability to particular mining schemes, and mechanical excavation costs versus conventional mining costs.

This course also included presentations on case history and future anticipated developments in mechanical mining equipment, and a demonstration tour of the rock mechanics laboratory of the Earth Mechanics Institute of the Colorado School of Mines. The Earth Mechanics Institute is currently working on a DOE project on mechanical excavation techniques on hard rock. For this purpose the EMI has collected welded tuff rock blocks from Apache Leap area.


IMPRESSIONS/CONCLUSIONS:

The course was very informative in presenting the state-of-the-art mechanical excavation technologies for use in hard rock excavations. A copy of the course outline, and a list of speakers, and participants are attached. The detailed course notes are available from the author of this trip report.

PROBLEMS ENCOUNTERED: None

PENDING ACTIONS: None

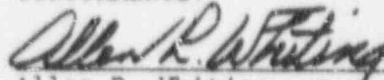
SIGNATURES:



Asadul H. Chowdhury

12/10/90
Date

CONCURRENCE:



Allen R. Whiting
Director, WSE&I

12/19/90
Date

COURSE SCHEDULE

Monday, October 15

7:30 a.m. Registration
8:00 Welcome and Introduction
8:15 Principles of Mechanical Rock Cutting and Boring
Levent Ozdemir, Colorado School of Mines
9:15 Rock Property and Geologic Factors
Levent Ozdemir, Colorado School of Mines
10:15 Coffee Break
10:30 Mine Design, Development and Production
Considerations for Mechanical Mining
Bill Hustrulid, Colorado School of Mines
12:15 p.m. Lunch
1:15 Tunnel Boring Machines - Design, Operation, Selection
and Cost Estimation
Jim Friant, The Robbins Company
3:15 Coffee Break
3:30 Tunnel Boring Performance Prediction
Jim Friant, The Robbins Company
4:30 Tunnel Boring Applications in Mining
Levent Ozdemir, Colorado School of Mines
7:00 Hospitality Hour (Cash Bar)
7:30 Banquet - Denver Marriott West
Banquet Speaker - *Mr. Don Zeni,*
President, Zeni Drilling Company

Tuesday October 16

8:00 a.m. Raise Boring Machines - Design, Selection and Operation
Tom Wake, The Robbins Company
10:00 Coffee Break
10:15 Raise Boring Operations in Mine Development -
Equipment Set-up, Operations and Case Histories
Dick England, J. R. England Consultants Ltd.
12:15 p.m. Lunch
1:15 Shaft Drilling Machines - Design, Selection Operation
and Case Histories
Joe Benjamin, Construction Drilling Associates
2:15 Shaft Boring Machines - Design, Selection, Operation
and Case Histories
Jim Friant, The Robbins Company
3:15 Coffee Break
3:30 Shaft Bits, Cutters and Muck Removal
Euclid Worden, Zeni Drilling Company
5:30 Tour of Research Facilities

Wednesday, October 17

| | |
|-----------|---|
| 8:00a.m. | Roadheaders - Design, Selection, Operation and Case Histories <i>Dave Neil, Neil and Associates, Inc.</i> |
| 10:00 | Coffee Break |
| 10:15 | Mobile Miner - Design, Operation and Mining Applications <i>Jim Friant, The Robbins Company</i> |
| 11:15 | Other Mining Machines - Impact Miner, Vein Miner, etc. <i>Levent Ozdemir, Colorado School of Mines</i> |
| 12:15p.m. | Lunch |
| 1:15 | Novel Rock Fragmentation and Boring Techniques <i>Levent Ozdemir, Colorado School of Mines</i> |
| 2:15 | Methods for Site Investigations, Laboratory Testing, Cutter and Bit Selection, Machine Performance Prediction <i>Levent Ozdemir, Colorado School of Mines</i> |
| 3:15 | Coffee Break |
| 3:30 | Automation of Mechanical Boring Equipment <i>Andy Anderson, The Robbins Company</i> |
| 4:30 | Future of Mechanical Rock Excavation Open Forum <i>All Speakers</i> |
| 5:00 | Closing Remarks and Adjournment |

Course Speakers

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Colorado School of Mines
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COLORADO SCHOOL OF MINES - SPECIAL PROGRAMS & CONTINUING EDUCATION 1
MECHANICAL EXCAVATION TECHNIQUES IN MINING AND UNDERGROUND CONSTRUCTION

October 15, 0190 to October 17, 1990

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MECHANICAL EXCAVATION TECHNIQUES IN MINING AND UNDERGROUND CONSTRUCTION

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