

Program

Monday, September 29, 2003

Technical Sessions

Session 1A
9:00-10:00
Lombard Room

Contaminant Hydrogeology I
Session Chair: G. Phipps

9:00 – 9:15

J. Lewis, S. Thiboutot, G. Ampleman, R. Martel, J. M. Ballard and S. Downe

Research on the Environmental Conditions of Ground and Surface Water Prevailing in the Training Area at CFB Gagetown, New Brunswick

9:15 – 9: 30

C. Gauthier, R. Lefebvre, R. Martel, G. Ampleman, S. Thiboutot, J. Lewis and M. Parent

Assessment of the Impacts of Live Training on Soil and Groundwater at Canadian Forces Base Shilo, Manitoba

9:30 – 9:45

M. Sartaj, A. Taebi Harandi and H.Hashemi Nejad

Investigating the Fate and Transport Cyanide in the Vicinity of a Gold Mine

9:45 – 10:00

Discussion

Session 1B
9:00-10:00
York Room

Manitoba Hydrogeology I
Session Chair: H. Thorleifson

9:00 – 9:15

B. K. Horning and J. J. Bell

Large-scale Groundwater Development in Artificially Connected Paleozoic Aquifers - A Southeastern Manitoba Case Study

9:15 – 9:30

E. A. Wolowich, B. K. Horning, J. R. Racicot and J. J. Bell

Large-scale Groundwater Supply Investigations in a Glacial Aquifer - Sandilands, Manitoba

9:30 – 9:45

M. Gascoyne and G. Thorne

Hydrogeological and Paleohydrogeological Inferences from a Geochemical and Isotopic Study for a Local Groundwater Flow System in Granitic Rock Terrain, Southeastern Manitoba

9:45 – 9:50

B. Horning, J. Racicot and J. Bell

Natural and Artificial Influences on Saline Intrusion in a Paleozoic Carbonate Aquifer - A Review of Work in Progress

9:50 – 10:00

Discussion

Session 2A
10:30-12:00
Lombard Room

Prairie Hydrogeology I
Session Chair: Garth van der Kamp

10:30 – 11:15

J. Tóth (Keynote)

	<i>Early Hydrogeology in the Canadian Prairies: A Retrospect by an Old Timer</i>
11:15 – 11:25	Discussion
	M. Hayashi and G. van der Kamp
11:25 – 11:40	<i>Effects of Local Topography and Vegetation on Prairie Groundwater Recharge</i>
	M. J. Hendry, L. I. Wassenaar, T. G. Kotzer and D. K. Solomon
11:40 – 11:55	<i>A Long-Term Record of Climate History and Solute Transport in a Clay-Rich Aquitard from Isotopic Analyses of Porewaters</i>
11:55 – 12:00	Discussion
Session 2B	
10:30-12:00	Dams and Water Retaining Structures I
Essex/Canterbury Room	Session Chair: Charles Kwok
	Michel Massiera and Anna Szostak-Chrzanowski
10:30 – 10:45	<i>Contrantes et Deformations Dan Les Barrages Zones En Remblai Lors De Leur Construction</i>
	Krista Halayko, Richard Gervais, and Luc Chouinard
10:45 – 11:00	<i>Condition Indexing of Embankment Dams - Case Studies from Manitoba Hydro and Hydro Quebec</i>
	M. Palassi and A. Sharghi
11:00 – 11:15	<i>Re-Grouting of Maroon Dam Foundation</i>
	A. Shargi and M. Palassi
11:15 – 11:30	<i>Seepage Problem in Papan Dam and the Treatment</i>
	Murray Grabinsky and Ken Sutherland
11:30 – 11:45	<i>Evaluating Segregation in Granular Filters for Earth Dams</i>
	Wijit Dharmawardene, David Chan, Allan Herbig and John Morrison
11:45 – 12:00	<i>Stability and Performance of Older Dams</i>
Session 2C	Geoenvironmental Engineering I
10:30-12:00	Session Chair: Jocelyn Grozic
York Room	
	I. R. Fleming, C. L. Pearce, and M. D. Armstrong
10:30 – 10:45	<i>Case Study: Innovative Construction and Preliminary Results from a Multi-Phase Extraction System at an Industrial Toluene Spill Site</i>
	Jamie VanGulck, Kerry Rowe, and Andrew Cooke
10:45 – 11:00	<i>Predicting and Modeling Biogeochemical Precipitation of Calcium in Leachate Collection Systems</i>
	J. Q. Shang, W. Ding, L. Josic, and R. K. Rowe
11:00 – 11:15	<i>Detecting Heavy Metal Contamination in Soil Using Complex Permittivity and Artificial Neural Networks</i>

11:15 – 11:30 **Humberto Preciado, and Loretta Y. Li**
Environmental Monitoring of Highway Pollution by Metals Along Highway Corridors

11:30 – 11:45 **Loretta Y. Li**
Impact of Lead Pollution Along Road Side Soils - Two Decades After Phasing Out Leaded Gasoline

11:45 – 12:00 **Victor Sowa, Trevor Lumb and David Broomhead**
Geotechnical Aspects Influencing Remediation of Contaminated Environmental Projects

Session 2D
10:30-12:00
Wellington Room

Shallow Foundations
Session Chair: Jim Oswell

10:30 – 10:45 **Fanyu Zhu, Jack Clark, and Ryan Philips**
Scale Effect on Settlement of Footings on a Dense Sand

10:45 – 11:00 **Hesham El Naggar and Abdul Ghafar Chehab**
Vibration Barriers for Shock Producing Equipment

11:00 – 11:15 **V. Q. Hung and Del Fredlund**
Numerical Modeling of Two-Dimensional Heave For Slabs-On-Ground and Shallow Foundations

11:15 – 11:30 **James Blatz and Ken Skafffeld**
The Transcona Grain Elevator Failure: A Modern Perspective 90 Years Later

11:30 – 11:45 **Ermin Evgin and Jules-Anges Infantes**
Visualization of the Movements in an Interface Test

11:45 – 12:00 **Ermin Evgin, Carla Edde, and Magdi Mohareb**
Numerical Analysis of Stress-Strain States in a Soil-Structure Interface Test

Session 2E
10:30-12:00
Harrow Room

Earth Reinforcement
Session Chairs: Jonathan Fannin and Marolo Alfaro

10:30 – 10:45 **Graeme D. Skinner and R. Kerry Rowe**
Design Methodology of Increasing the External Stability of Reinforced Soil Walls Constructed on Yielding Foundations

10:45 – 11:00 **I. Ismail and Gerry Raymond**
Monotonic Load Tests on Layered Granular Aggregates Reinforced with Geogrids

11:00 – 11:15 **Yadav Pathak, Marolo Alfaro and Christine Detournay**
Wetting-Induced Deformation of Geosynthetic Reinforced Slopes with Expansive Soils

11:15 – 11:30 **Stan Boyle and Trent M. Hudak**

Use of Geocellular Confinement to Improve Stability of a 480-Meter Long, 18-Meter High, 1H:1V Slope

Joel D. Ullring

11:30 – 11:45

Roadway Subsidence Repair Through the Use of Geofoam as a Light Weight Fill

Koh Tae-Hoon, Lee Seong-Hyeok, Hwang Seon-Keun, Lee Jin-Wook and Park Sung-Hyun

11:45 – 12:00

Performance of Reinforced Soil Segmental Retaining Wall under the Simulated Train Loading

Session 3A
13:30-15:00
Lombard Room

Prairie Hydrogeology II
Session Chair: Jim Hendry

G. van der Kamp (Invited Lecture)

13:30 – 13:45

The Permeability of Clay-rich Aquitards - Can we Predict and Detect the Existence of Fractures?

H. Maathuis and G. van der Kamp

13:45 – 14:00

Groundwater resource evaluations of the Estevan Valley aquifer in southeastern Saskatchewan: a 40-year historical perspective

B. Schmid, R. O. van Everdingen and H. Maathuis

14:00 – 14:15

The Impact of the Creation of Lake Diefenbaker on Water Levels in Underlying Extensive Bedrock Aquifers; a 40-Year History

Discussion

14:15 – 14:25

D. Heagle, M. Hayashi and G. van der Kamp

14:25 – 14:40

Influence of Hydrology and Sulphate Reduction on the Geochemical Evolution of a Small Prairie Wetland

P. L. Kennedy and A. Woodbury

14:40 – 14:55

Regional Scale Flow and Transport Model of Carbonate and Sandstone Aquifers in Southern Manitoba

Discussion

14:55 – 15:00

Session 3B
13:30-15:00
Essex/Canterbury
Room

Groundwater Heating/Cooling
Session Chair: D. Allen

Grant A. G. Ferguson and Allen D. Woodbury

13:30 – 13:45

Advective Heat Transport in the Upper Carbonate Aquifer Beneath Winnipeg, Manitoba

D. M. Allen and D. W. Bridger

13:45 – 14:00

Dealing with Load Imbalances and Aquifer Heterogeneity: Design and Monitoring of the ATEs System in Agassiz, BC

F. A. Michel and D. M. Allen

14:00 – 14:15

Identification and Management of Potential Problems in Aquifer Thermal Energy Storage Systems

14:15 – 14:25

Discussion

R. D. Sinclair and H. Jhinger

Sustainable and Reliable Groundwater Cooling - Manitoba Hydro Dorsey Converter Station

14:25 – 14:40

R. Matthews

Regulatory Framework and Examples of Ground-Source Heating/Cooling Technology in the Winnipeg Area

14:40 – 14:55

14:55 – 15:00

Discussion

Session 3C
13:30- 15:00
York Room

Permafrost

Session Chair: Kevin Jones

13:30 – 13:45

Ed Grozic, William Horne and Roland Merkosky

Permafrost Containment Landfills at Arctic DEW Line Sites

13:45 – 14:00

Keith Barnes, Jim Oswell and Elena Cigala

New Aurora College, Inuvik NT Foundation Design and Construction

14:00 – 14:15

Ken Torrance and F. J. Schellekens

A Conceptual Analysis Of Chemical Factors In Soil Freezing and Frost Heave

14:15 – 14:30

Katarzyna Kurpias

Effect of Duration and Number of Freeze-Thaw Cycles on the Consistency Limits of Natural Soils

14:30 – 14:45

Tomasz Kozlowski

The Melting Point Depression of Soil-Water System Determined From DSC Data

14:45 – 15:00

J. L. H. Grozic

A New Geotechnical Gas Hydrates Laboratory

15:00 – 15:15

Joel Kliner and Jocelyn Grozic

Physical Properties of Gas Hydrates

Session 3D
13:30 - 15:00
Wellington Room

Rock Mechanics

Session Chair: TBA

13:30 – 13:45

B. C. Hawlader, K. Y. Lo and I. D. Moore

Analysis of Tunnels in Shaly Rock Considering Three-Dimensional Stress Effects on Swelling

13:45 – 14:00

David F. Wood

Development of the Langford Strand System for Rock Mass Reinforcement

14:00 – 14:15

Mani Ram Saharan and Hani Mitri

Analysis of Destress Blasting Applications: A Systematic Approach

14:15 – 14:30	Nicholas Vlachopoulos and Mark S. Diederichs <i>Rock Mechanics in Highly Deformed Ground: Tunneling in Greece</i>
14:30 – 14:45	Cathy Banton, D.Jean Hutchinson, Mark Diederichs and Samantha Espley <i>Shotcrete Support Mechanisms in Moderately Jointed Hard Rock Environments in Underground Mines</i>
14:45 – 15:00	B.Burcin Avar and Nick W. Hudyma <i>Comparison of Elastic Modulus of Lithophysal Rich Tuff To Approximate Schemes</i>
Session 3E 13:30-15:00 Harrow Room	Hydraulics Session Chairs: Jean Lafleur and Shobha Bhatia
13:30 – 13:45	Rashmi Hawley and R. Jonathan Fannin <i>Filtration Performance of Geotextiles in Unidirectional Flow – A Laboratory Study</i>
13:45 – 14:00	Dhani Narejo and Sam Allen <i>Development of Equipment and Test Method for Studying Particulate Transport Within Synthetic Drainage Media</i>
14:00 – 14:15	Karen S. Henry and Robert D. Holtz <i>Long Term Gradient Ratio Tests</i>
14:15 – 14:30	S. Gudina, R. W. I. Brachman and S. Vardy <i>A Mehtod to Quantify Gravel Contacts Acting on Geomembranes</i>
14:30 – 14:45	S. Dickinson and R. W. I. Brachman <i>Thickness of a GCL Beneath a Geomembrane Wrinkle and Coarse Gravel Backfill Under Large Pressure</i>
14:45 – 15:00	Jason E. Obermeyer, Robert B. Gilbert, Mark E. Sebesta and Sam R. Allen <i>Drained Shear Testing on Clay-Geomembrane Interfaces</i>
Session 4A 15:30-17:00 Lombard Room	Prairie Hydrogeology III Session Chair: M. Hayashi
15:30 – 15:45	L. H. Thorleifson, G. L. D. Matile, G. R. Keller and D. M. Pyne <i>Construction of a New Hydrostratigraphic Model for Southern Manitoba</i>
15:45 – 16:00	W. J. Stolte, D. W. Willems, W. D. Eilers and R. G. Eilers <i>Modelling Salt Redistribution in Gentle Prairie Landscapes</i>
16:00 – 16:05	G. van der Kamp, A. Barr, R. Granger and R. Schimdt <i>Use of deep piezometers in aquitards for continuous monitoring of hectare-scale soil moisture balance</i>

16:05 – 16:20 **S. E. Grasby and R. N. Betcher**
Saline Springs of Central Manitoba

16:20 – 16:30 **Discussion**

R. N. Betcher, G. C. Phipps, L. Frost and M. Leybourne
Distribution of the Trace Elements As, B, Ba, F and U In Groundwater in Manitoba

16:30 – 16:35

R. G. Eilers, K. E. Buckley and G. W. Lelyk
A GIS-Based Methodology for Evaluating Soils, Landscapes and Geology for Nutrient Management Planning in the Prairie Landscape

16:35 – 16:50

16:50 – 17:00 **Discussion**

Session 4B

15:30-17:00

Essex/Canterbury Room

Hydrogeology Case Studies

Session Chair: L. Olmsted

15:30 – 15: 45 **R. N. Betcher and G. A. G. Ferguson**
Impacts from Boreholes Interconnecting Multiple Aquifers - A Case Study of Paleozoic Aquifers in Southeastern Manitoba

15:45 – 16:00 **B. D. Smerdon, C. A. Mendoza, A. McCann, C. Kraushar and A. Nilson**
Assessment of Leakage From an Engineered Reservoir Using Hydrogeological Tools

16:00 – 16:15 **Y. Champollion, M. R. Gleixner, J. Wozniewicz, W. D. MacFarlane and L. Skulski**
Case Study: Evaluation of Oilfield and Water Well Disposal Well Designs for Oil Sands Facility in Northern Alberta, Canada

16:15 – 16:25 **Discussion**

S. F. Rayner, L. R. Bentley and J. M. Robillard
Correlation of Electrical Resistivity Imaging, Push-Tool and Groundwater Electrical Conductivity at a Heterogeneous Field Site

16:25 – 16:40

16:40 – 16:55 **Tóth, J.**
Hydrogeological Reasons for the Geotechnical Failure of a Prairie Town's Municipal Sewage Lagoon: A Case Analysis

16:55 – 17:00 **Discussion**

Session 4C
15:30-17:00
York Room

Underground Nuclear Waste Storage I
Session Chair: Dieter Eigenbrod

15:30 – 15:45

Neil Chandler, Paul Thompson and Ed Kozac
Twenty Years of Geotechnical and Hydrogeological Studies at the Underground Research Laboratory

15:45 – 16:00

Richard Everitt and David Woodcock
Geological Characterization of AECL's Underground Research Laboratory: Methods and Accomplishments

16:00 – 16:15

Jason Martino, D.Dixon, S.G. Keith, N. Chandler and B. Kjartanson
Sealing Studies at the URL

16:15 – 16:30

David Dixon, B. Kjartanson, P. Baumgartner and J. Martino
The Role of Interfaces And Permeant Salinity On The Hydraulic Behaviour of Bentonite Based Barriers

16:30 – 16:45

Bruce Kjartanson, S. Stroes-Gascoyne and D. Dixon
Microbe Viability and Activity in Bentonite-Based Barriers

Session 4D
15:30-17:00
Wellington Room

Soil Mechanics I
Session Chair: Rob Kenyon

15:30 – 15:45

A. Lashkari and M. Latifi
Effects of State Parameter on Elastoplastic Sand Models

15:45 – 16:00

Dharma Wijewickreme and S. Sriskandakumar
Characterization of Cyclic Loading Response of Air-Pluviated Fraser River Sand for Validation of Numerical Models

16:00 – 16:15

Guofu Zhu and Jian-Hua Yin
Consolidation of a Soil Layer Subsequent to Cease of Deposition

16:15 – 16:30

S. Yasrebi and I. Ashayeri
Predicting Optimum Water Content and Dry Unit Weight of Clay Soils Using Neural Networks

16:30 – 16:45

Jin-Hua Yin, Chen Zhou and Jun-Gao Zhu
An Anisotropic Elastic Visco-Plastic Model For the Time-Dependent Stress-Strain Behaviour of Ko Consolidated Marine Clays

16:45 – 17:00

Chen Zhou, Jian-Hua Yin and Mark Cheung
Hollow Cylinder Testing and Anisotropic Elastic Visco-Plastic Modeling of Hong Kong Marine Clays

Session 4E
15:30-17:00
Harrow Room

Hydraulics and Bioengineering
Session Chairs: Barry Christopher and Robbin Sotir

- 15:30 – 15:45** **Han-Yong Jeon, Yong-Chai Chang, Hong-Jong Kim and Joong-Bai Park**
Applications and Analysis of Prefabricated Board Drains to Weak Ground
- 15:45 – 16:00** **Han-Yong Jeon**
Weatherability and Drainage Properties of Duplicated Nonwoven Geotextiles for Waste Landfills
- 16:00 – 16:15** **Bill Allison, Bruno Herlin, Daniel Jetté and Kent von Maubeuge**
Geosynthetic Solutions Landfill Remediation / Case Study
- 16:15 – 16:30** **Robbin Sotir and Barry Christopher**
Vegetated Reinforced Soil Slopes for Waterfront and Streambank Stabilization and Restoration
- 16:30 – 16:45** **Eric Blond, Martin Bouthot, Olivier Vermeersch and Jacek Mlynarek**
Selection of Protective Cushions for Geomembrane Puncture Protection
- 16:45 – 17:00** **Toshifumi Mukunoki, R. Kerry Rowe, H. Matt Li , Henri P. Sangam, Paul Hurst, Richard J. Bathurst and Kazem Badv**
Hydraulic Conductivity and Diffusion Characterization of GCLs

Tuesday, September 30, 2003

Session 5A
9:00-10:00
Lombard Room

Contaminant Hydrogeology II
Session Chair: J. Thompson

9:00 – 9:15

K. F. Steele, T. M. Kresse and R. K. Davis
Small-Scale Spatial Variation of Water Quality Within the Mississippi River Valley Alluvial Aquifer, Arkansas, USA

9:15 – 9:30

P. Micková and J. Datel
The New Way of Clean Up Time Estimation for CLU Contamination

9:30 – 9:45

K. Lange, P. J. Van Geel and T. S. Nguyen
Physical and Numerical Modelling of a Dual Porosity Fractured Rock Surrounding an In-Pit Uranium Tailings Management Facility

9:45 – 9:50

Saleh N. Dalaan
The Effect of Industrial Waste Water on Environmental Ground Water

9:50 – 10:00

Discussion

Session 5B
9:00-10:00
York Room

Groundwater Resource Evaluation I
Session Chair: H. Maathuis

9:00 – 9:15

D. C. Toop and N. de la Cruz
Groundwater Resources Assessment of the Canmore Corridor and Northwestern Kananaskis Country, Alberta

9:15 – 9:30

M. I. Jyrkama and J. F. Sykes
Recharge Analysis of the Grand River Watershed

9:30 – 9:45

R. Globa and H. Rohde
Application of Impressed Current Systems to Mitigate Water Well Biofouling

9:45 – 10:00

D. G. Abbey, M. L. Bester, A. J. MacDonald and P. J. Martin
Advancing Water Budget Analyses with Finite Element Groundwater Models

10:00 – 10:10

Discussion

Session 6A
10:30-12:00
Lombard Room

Radioactive Waste Management I
Session Chair: G. Thorne

10:30 – 11:15

J. Paces (Keynote)
A 13-Million-Year History of Unsaturated-Zone Flow at Yucca Mountain; Mineralogy, Geochronology, Isotope Geochemistry and Thermochronology of Secondary Fracture Minerals

11:15 – 11:25	Discussion M. Jensen and A. Vorauer
11:25 – 11:40	<i>The Deep Geologic Repository Technology Program Geoscience - Background and Overview</i>
11:40 – 11:55	R. I. Sikorsky, M. Serzu, D. Tomsons and J. Hawkins <i>A GIS Based Lineament Interpretation Methodology: Whiteshell Research Area Case Study</i>
11:55 – 12:00	Discussion
Session 6B 10:30-12:00 York Room	Site Characterization Session Chair: Lynden Penner
10:30 – 10:45	D.A. Shuttle <i>Effect of Pore Pressure Dissipation on SBP Tests in Clay</i>
10:45 – 11:00	Ali Amini and John Howie <i>Numerical Simulation of Downhole Seismic Cone Signals</i>
11:00 – 11:15	Assodollah Noorzad, Ali Noorzad and D. Ebrahimi <i>Investigation of Site Effect on the Wave-Propagation in Continuously Non-homogeneous Soil Subjected To Seismic Motion</i>
11:15 – 11:30	H. Longtin and B. Ladanyi <i>Short and Long Term Cone Tests In Clay</i>
11:30 – 11:45	Denis Leboeuf, Simon Grenier and Jean-Marie Konrad <i>Dynamic Analysis Of The Falling Weight Deflectometer Test</i>
11:45 – 12:00	Chris Daniel, John Howie and Brady Taylor <i>Analysis of SPT Stress Wave Data Using the Case Method</i>
Session 6C 10:30-12:00 Wellington Room	Slope Stability Session Chair: TBA
10:30 – 11:00	Andrew Baracos and K. V. Lew <i>Geotechnical and Related Hydrology Studies of the Red River Banks Through Winnipeg and Upstream to the U.S. Border (1989-2001)</i>
11:00 – 11:15	D. Yarechewski and Jeff Tallin <i>Riverbank Stabilization Performance With Rock-Filled Ribs/Shear Keys and Rock Columns in Winnipeg</i>
11:15 – 11:30	Gilson Gitirana Jr. and Del Fredlund <i>Analysis of Transient Embankment Stability Using The Dynamic Programming Method</i>
11:30 – 11:45	Jian Chen, Jian-Hua Yin and C.F.Lee <i>Application of the Rigid Finite Element Method to Upper Bound Limit Analysis of Slope Stability</i>

11:45 – 12:00

D. M. Cruden, C.D. Martin and K. W. Soe Moe
*Stages in the Translational Sliding of Two Inclined Blocks:
Observations From Edmonton*

Session 6D
10:30-12:00
Essex/Canterbury
Room

Ground Improvement
Session Chair: Michel Massiera

10:30 – 10:45

Bill Brockbank, Derek Essery and Peter Wu
*Design of a Reinforced Earth Wall for Contingent Loading and
Longevity*

10:45 – 11:00

Tareq Salloum, Gerry Pernica, R. Glazer and K.T. Law
*Using the Impulse-Response Technique to Estimate the Length of
In-Situ Soil Nails*

11:00 – 11:15

Ali Pak and Ali Sharghi
*Numerical Analysis of Geotextile Silty Sand Reinforced
Embankments on Soft Clay*

11:15 – 11:30

M.R. Shahverdiloo, Mehdi Shahabi and B. Ahadi Manafi
*Numerical Analysis of Ground Anchors and Comparison with Field
Test Results*

11:30 – 11:45

D. Russell, G. Kempton, M. MacDonald and P. Naughton
A New Design Procedure For Piled Embankments

11:45 – 12:00

Grant Su, C.D. Martin and DD Tannant
*Shear Strength Mobilization Of Ottawa Sand With HDPE
Interference*

Session 6E
10:30-12:00
Harrow Room

Geoenvironmental
Session Chairs: Bob Mackey and Jorge Zornberg

10:30 – 10:45

**Werner Blümel, Antje Müller-Kirchenbauer, Kent von
Maubeuge and Norbert Markwardt**
*Investigations on Water Permeability and Balance in Landfill
Capping Systems with GCL*

10:45 – 11:00

**Martin Bouthot, Éric Blond, Alexis Fortin, Olivier G.
Vermeersch, Pascal Quesnel and Stephen Davidson**
*Landfill extension using Geogrids as Reinforcement: Discussion
and Case Study in Quebec, Canada*

11:00 – 11:15

K. Renken, E. K. Yanful and D. M. Mchaina
*Experimental Soil-Based Cover System to Mitigate ARD in
Potentially Acid-Generating Tailings: Pre-Construction Design and
Modeling*

11:15 – 11:30

K. Renken, E. K. Yanful and D. M. Mchaina
Experimental Soil-Based Cover System to Mitigate ARD in

Potentially Acid-Generating Tailings: Construction and Preliminary Results

11:30 – 11:45

Ian D. Peggs

Factors Influencing HDPE Geomembrane Durability

11:45 – 12:00

Ian D. Peggs

Geomembrane Liners: Where We Are, Where We Are Going, and How We Get There

Session 7A

13:30-15:00

Lombard Room

Radioactive Waste Management II

Session Chair: M. Gascoyne

13:30 – 13:45

R. M. Srivastava

Probabilistic Models of 3-Dimensional Fracture Geometry

13:45 – 14:00

J. F. Sykes, S. D. Normani, E. A. Sudicky and M. R. Jensen

Modeling Strategy to Assess Long-Term Regional-Scale Groundwater Flow within a Canadian Shield Setting

14:00 – 14:15

S. D. Normani, J. F. Sykes, E. A. Sudicky and R. G. McLaren

Modelling Strategy to Assess Long-Term Sub-Regional Scale Groundwater Flow within an Irregular Discretely Fractured Canadian Shield Setting

14:15 – 14:25

Discussion

R. B. Ejeckam and B. L. Sherriff

Absorption of Cs on the Fracture Filling Clay Minerals of the Lac Du Bonnet Batholith, SE Manitoba: Implications for Nuclear Fuel Waste Disposal

14:25 – 14:40

R. Ridgway, E. Wolowich, G. Thorne, B. Horning, J. Bell, J. Racicot and K. Ross

Hydrogeological Assessment of Atomic Energy of Canada's Low Level Radioactive Waste Management Trenches at Whiteshell Laboratories

14:40 – 14:55

14:55 – 15:00

Discussion

Session 7B

13:30-15:00

Essex/Canterbury Room

Agricultural Impacts on Groundwater

Session Chair: S. Holysh

13:30 – 13:45

R. N. Betcher, G. C. Phipps and K. E. Buckley

Monitoring Groundwater Impacts from Agriculture on a Shallow Sand Aquifer – Manure as a Source of Fertilizer

13:45 – 14:00

G. C. Phipps and R. N. Betcher

The Source and Fate of Groundwater Nitrate Beneath a Field Fertilized with Hog Manure: Assiniboine Delta Aquifer, Manitoba, Canada

14:00 – 14:05

J. M. Enns, W. Akinremi, W. L. Stout and K. Buckley

Estimate of Nitrate Leaching Following Application of Hog Manure

and Fertilizer

- 14:05 – 14:10** **R. J. McMillan, A. D. Woodbury and R. N. Betcher**
Assessing the Performance of Earthen Hog Manure Storage Facilities Constructed in Typical Hydrogeological Settings in Southern Manitoba
- 14:10 – 14:20** **Discussion**
- 14:20 – 14:25** **S. F. Korom and A. J. Schlag**
Design, Installation, and Use of In-Situ Mesocosms for Aquifer Tracer Tests
- 14:25 – 14:40** **S. F. Korom and A. J. Schlag**
Network of In-Situ Mesocosms for Monitoring Denitrification in Selected Aquifers of Minnesota and North Dakota
- 14:40 – 14:45** **S. Bolduc, M. Larocque and G. Prichonnet**
Groundwater Nitrate Contamination on the Noire River Watershed (Montérégie, Quebec)
- 14:45 – 14:50** **K. N. Lorenz, M. C. Ryan, C. Chang and X. Hao**
Identification of N₂O Sources and Sinks in Shallow Groundwater and Soil Zones in Southern Alberta
- 14:50 – 14:55** **P. W. Todosichuk and T. M. Horbulyk**
Choice of Strategies to Reduce Agricultural Impacts on Groundwater: The Case of Anaerobic Digesters and Intensive Livestock Production
- 14:55 – 15:00** **Discussion**
- Session 7C**
13:30-15:00
Wellington Room
- 13:30 – 13:45** **A. MacDonald, M. Vogrig, S. Vanapalli, J. Siekmeier, R. Robertson and Elizabeth Garven**
A Laboratory Technique for Estimating the Resilient Modulus of Unsaturated Soil Specimens from CBR and Unconfined Compression Tests
- 13:45 – 14:00** **E. Tan, B. Marjerison and D.G. Fredlund**
Measurements and Analysis of Temperature and Soil Suctions Below Thin Membrane Surfaces (SMS) In Saskatchewan
- 14:00 – 14:15** **Hung Pham, Del Fredlund and Lee Barbour**
Estimation Of The Hysteretic Soil-Water Characteristic Curves From The Drying Boundary Curve
- 14:15 – 14:30** **P. H. Simms and E.K. Yanful**
Pore Network Modelling For Unsaturated Soils
- 14:30 – 14:45** **E. A. Garven, K. D. Eigenbrod and S. K. Vanapalli**
Measurement of Capillary Stresses in Three-Compacted Granular Soils

14:45 – 15:00

K. Badv and M.R. Faridfard

A New Apparatus for Measuring Unsaturated Soil Characteristic Curve and Diffusion Coefficient

Session 7D

13:30-15:00

York Room

Mining

Session Chair: Hani Mitri

13:30 – 13:45

Dragana Simon and Katherine Klein

Strength Development in Cemented Mine Paste Backfill

13:45 – 14:00

Richard Simon, Michel Aubertin and Desheng Deng

Estimation of Post-Peak Behaviour of Hard Rocks Using a Constitutive Model for Rock Joints

14:00 – 14:15

Mamadou Fall and Mostafa Benzaazoua

Modeling and Simulation of Paste Backfill Performance Properties

14:15 – 14:30

Robert Armstrong, Fred Claridge and Mike Thompson

Flood Protection for the Antimina Mining Project Slurry Pipeline

14:30 – 14:45

Serge Ouellet, Bruno Bussiere, Mostafa Benzaazoua, Michel Aubertin, Mamadou Fall and Tikou Belem

Sulphide Reactivity Within Cemented Paste Backfill: Oxygen Consumption Test Results

Session 7E

13:30-15:00

Harrow Room

NAGS Student Competition

Session Chair / Competition Chair: David Elton

13:30 – 13:45

John S. McCartney and Jorge G. Zornberg

Characterization of GCL Shear Strength Variability

13:45 – 14:00

Sethapong Sethabouppha and Isao Ishibashi

EPS-Filled Tires as a Lightweight Construction Material

14:00 – 14:15

Mun-Sung Mok and Han-Yong Jeon

Long-Term Performance of Reinforced Geosynthetics by Creep Tests

14:15 – 14:30

Randal Osicki

Changes in Hydraulic Conductivity of Geosynthetic Clay Liners (GCL) Related to Double Layer Thickness

14:30 – 14:45

Mengjia Li and Y. Grace Hsuan

Pressure Effects on the Oxidation of High Density Polyethylene Geogrids

14:45 – 15:00

Fadzilah Saidin and R. D. Holtz

Behaviour of a Geosynthetic-Reinforced Back-to-Back Wall

Session 8A

15:30 – 17:00

Radioactive Waste Management III

Session Chair: M. Jensen

Lombard Room

- 15:30 – 15:45** **P. Vilks, N. H. Miller and M. Jensen**
In-situ Diffusion Experiment in Sparsely Fractured Rock
- 15:45 – 16:00** **M. Gascoyne, J. McMurry and R. B. Ejeckam**
Paleohydrogeologic Interpretation of Fracture Infill Mineralogy, Geochemistry and Isotope Systematics
- 16:00 – 16:10** **Discussion**
- 16:10 – 16:25** **T. Chan, F. W. Stanchell, E. T. Kozak, R. E. Everitt and C. T. Vandergraaf**
Finite-Element Modeling of Conservative Tracer Tests in the Moderately Fractured Rock (MFR) Experiment at the Underground Research Laboratory (URL)
- 16:25 – 16:40** **Y.-J. Park, E. A. Sudicky, R. G. McLaren and J. F. Sykes**
An Approach to Geostatistical Characterisation and Numerical Simulation of Flow and Transport within Moderately Fractured Rock
- 16:40 – 17:00** **Discussion**

Session 8B
15:30-17:00
Essex/Canterbury
Room

- 15:30 – 15:45** **M. Nastev, A. Rivera, R. Lefebvre and M. Savard**
Numerical Simulation of Regional Groundwater Flow in the St. Lawrence Lowlands of South-Western Quebec
- 15:45 – 16:00** **A. Salama, P. J. Van Geel and T. S. Nguyen**
Potential Violation of the REV when Modeling the Pervious Surround Concept for the In-Pit Disposal of Uranium Mine Tailings in Fractured Rock Systems
- 16:00 – 16:15** **J. Armstrong, C. Deutsch and K. Biggar**
Geostatistical Assessment of Cone Penetrometer Test Data for Soil Characterization Based on Ultraviolet Induced Fluorescence
- 16:15 – 16:25** **Discussion**
- 16:25 – 16:40** **D. M. LeNeveu**
Boundary Element and Laplace Transform Methods as Applied to the Advection-Dispersion Equation
- 16:40 – 16:55** **M. A. Mardiyanto and E. Evgin**
Estimation of Hydraulic Conductivity of an Area Using Stochastic Finite Element Method
- 16:55 – 17:00** **Discussion**

Session 8C
15:30 – 17:00
Wellington Room

- Deep Foundations**
Session Chair: Branko Ladanyi

15:30 – 15:45	M. Hesham El Naggar, Mohammad Sakr and Moncef Nehdi <i>Toe Driving for Efficient Installation of Thin-Walled Piles</i>
15:45 – 16:00	M. Sakr, H. El Naggar and M. Nehdi <i>Interference and Performance Characteristics of FRP/Concrete Piles</i>
16:00 – 16:15	Ken Peaker, Fanyu Zhu, Shaheem Ahmad and Chris Andrew <i>Lateral Load Test of Drilled Caissons</i>
16:15 – 16:30	Tamer Elkateb, Don Law and Robin Tweedie <i>Underpinning of Frankie Pile Foundations Of A Mall in Spruce Grove Alberta: A Case Study</i>
16:30 – 16:45	Dongmei Chu and Kevin Z. Truman <i>Soil -Pile Gap Modeling in Seismic Soil-Pile-Structure Interaction</i>
16:45 – 17:00	Vince Liu and L. Fernando <i>Ultimate Pullout Capacity of Helical Pile Foundations</i>
Session 8D 15:30 - 17:00 Wellington Room	Site Characterization and Slope Stability Session Chair: Andrew Baracos
15:30 – 15:45	Muhsin Elie Rahhal, Rob Nini and Jean Louis Favre <i>Analysis of Factors Causing Slope Instabilities</i>
15:45 – 16:00	Paul Chaisson and Julie Wang <i>Stability Analysis of a Test Excavation Involving Stochastically Spatial Variable Soil</i>
16:00 – 16:15	Lynden Penner, Micheal Holm and Robert Sutherby <i>Geological, Geotechnical and Hydrogeological Setting of a Gas Pipeline Failure near Brandon, Manitoba</i>
16:15 – 16:30	Mohammad Toufigh and Ahad Ouria <i>Group Wells Subsidence Modelling Based On Water Level Oscillation and Finite Element Formulation</i>
16:30 – 16:45	John Hayles and W.T. Reynolds <i>Seismic Measurements for Near-Surface Dynamic Properties of Soils</i>
16:45 – 17:00	Baolin Wang <i>Geotechnical Considerations of Landslide Impact on Caissons During Earthquake Induced Soil Liquefaction</i>
Session 8E 15:30 – 17:00 Harrow Room	Networking Session for Women
15:30 – 17:00	Speakers: Dr. Suzanne Lacasse, Dr. Karen Henry, Dr. Shobha Bhatia and Dr. Grace Hsuan

Wednesday, October 1, 2003

Session 9A
9:00-10:00
Lombard Room

Contaminant Hydrogeology III
Session Chair: A. Piggott

9:00 – 9:15

M. King, G. Check, G. Carey, D. Abbey and F. Baechler
Groundwater and Contaminant Transport Modelling at the Sydney Tar Ponds

9:15 – 9:30

T. Hamilton and T. Martison
Delineation of a Groundwater Contaminant Plume using Surface and Downhole Geophysics - A Case Study

9:30 – 9:45

K. M. Beneteau, K. Rich, D. G. Pritchard, D. R. Brown and Q. Dai
Investigation and Computer Model Simulation of a Regional-Scale Brine Plume in Central Alberta

9:45 – 10:00

Discussion

Session 9B
9:00-10:00
York Room

Manitoba Hydrogeology II
Session Chair: R. Lemoine

9:00 – 9:05

A.J. Desbarats
Hydrogeology of the Lake Saint-Martin Impact Structure, Manitoba, Canada

9:05 – 9:20

S. L. Simpson and A. J. Desbarats
Isotopic Characterization of Groundwaters in the Vicinity of the Lake Saint-Martin Impact Structure, Manitoba, Canada

9:20 – 9:35

M. J. Hinton
Comparison of Groundwater CFC Sampling Methods for Measuring Recharge

9:35 – 9:40

J. G. Hayles and I. J. Ferguson
Terrain Electrical Conductivity Survey Examples in Manitoba

9:40 – 10:00

Discussion

Session 10A
10:15-12:00
Lombard Room

Groundwater Management and Protection I
Session Chair: T. Wingrove

10:15 – 11:00

D. Rudolph (Keynote)
Technical and Political Challenges Facing Groundwater Resource Management Within the Canadian Environment

11:00 – 11:15
11:15 – 11:30

Discussion
D. R. Brown, S. B. Donald, D. MacDougall, M. Monier-Williams

and Q. Dai

Management and Protection of the Walkerton, Ontario Municipal Groundwater Supply Following the 2000 E. Coli Tragedy

- 11:30 – 11:45**
A. Piggott, D. Brown and B. Mills
Estimating the Impacts of Climate Change on Groundwater Conditions in Western Southern Ontario
- 11:45 – 11:50**
M. Journeay, D. M. Allen, E. de Kemp, S. Denny and B. Turner
3-D Geologic Architecture and Vulnerability Mapping in Structurally-Controlled Aquifers, Gulf Islands, BC
- 11:50 – 12:00**
Discussion
- Session 10B**
10:15-12:00
Essex/Canterbury Room
- 10:15 – 10:30**
S. M. Duchesne, T. S. Sandford, D. N. Humphrey and T. C. Sheahan
Soil Nail Retaining Walls In Cold Weather Regions
- 10:30 – 10 :45**
Alastair Gorman, Paulo Branco and Tony Sangiuliano
Design and Performance of Embankments on Soft Deposits - A Case History
- 10:45 – 11:00**
Roger Skirrow and Don Proudfoot
Geotechnical Aspects Of the Kings Street Interchange Construction, Fort McMurray, Alberta
- 11:00 – 11:15**
Richard Armstrong and Marolo Alfaro
Reduction of Seismic-Induced Pressures on Rigid Retaining Structures Using Compressible Inclusions: A Numerical Study
- 11:15 – 11:30**
G. Robinson, J. Graham, K. Skafffeld and R. Sorokowski
Limit States and Reliability Based Design Methods Applied to the Buoyancy Assessment of the Shoal Lake Aqueduct
- 11:30 – 11:45**
Zhaojun Xia, Yanfu Sun, Jaun Channhine and Hans Dworatzek
The Impact of a Massive Topsoil Pile On Subsurface Hydrology of a Project Site

Session 10C
10:15–12:00
Wellington Room

Geoenvironmental Engineering II
Session Chair: Jeff Tutkaluk

- 10:15 – 10:30**
B. Bussiere, S. A. Apithy, M. Aubertin and R. Chapuis
Water Diversion Capacity Of Inclined Capillary Barriers
- 10:30 – 10 :45**
Ryan Krushelnitzky and Richard Brachman
Large Scale Laboratory Test of a Leachate Collection Pipe in a Trench
- 10:45 – 11:00**
V. G. Kallur, T. T. Wong, J. Naus, A. P. Michielsen and J. G.

Agar

Dual Phase Vacuum Extraction Technology For The Recovery Of Petroleum Hydrocarbon Contamination From The Subsurface - A Case History

11:00 – 11:15

John Sims, Paul Chaisson and Phil Riebel

Laboratory and Field Testing of a Paper Mill Fiber Clay and Native Clay for Use as a Disposal Site Final Cover

11:15 – 11:30

V.R. Ouhadi and M. Sedighi

Zinc Sorption Influence at Acidic pH Levels on the Physical and Mechanical Properties of Bentonite

11:30 – 11:45

Mostafa Warith and Graham Jon Takata

Effect of Aeration On Fresh and Aged Municipal Solid Waste

11:45 – 12:00

Tai Wong, John Agar and Michel Gregoire

Technical Rationale and Sampling Procedures for Assessing the Effects of Subsurface Volatile Organic Contaminants on Indoor Air Quality

Session 10D
10:15-12:00
York Room

Underground Nuclear Waste Storage II

Session Chair: Bruce Kjartanson

10:15 – 10:30

Randal Ridgeway

Planning the Decommissioning of Whiteshell Laboratories

10:30 – 10:45

R. Guo, N. Chandler and D. Dixon

Thermo-Hydro-Mechanical Modelling The Tunnel Sealing Experiment Clay Bulkhead at the Underground Research Laboratory

10:45 – 11:00

T. S. Nguyen, A. P. S. Selvadurai and G. Armand

Computational Predictions of the Buffer Response in an In-Situ Heater Test at the Grimsel Site

11:00 – 11:15

T. S. Nguyen, A. P. S. Selvadurai and G. Armand

Thermo-Poro-Elastic Model for Buffer Materials Considered In Nuclear Fuel Waste Disposal Endeavours

11:15 – 11:30

A. P. S. Sevadurai, G. Armand and T. S. Nguyen

Computational Predictions of the Rockmass Response in an in situ Heater Test for Nuclear Waste

Session 10E
10:15-12:00
Harrow Room

Transportation Applications

Session Chairs: David Suits and Karen Henry

10:15 – 10:30

Chunling Li and Jorge G. Zornberg

Validation of Discrete Framework for Fiber Reinforcement

10:30 – 10:45

Karen S. Henry and Jeb Tingle

Pavement Base and Subgrade Mixing Due to Repeated Loading: A

Literature Review

- 10:45 – 11:00** **Jean Lafleur, Marc Lebeau and Yves Savard**
Drainability of Road Aggregates Related to the Use of Geosynthetics
- 11:00 – 11:15** **J. L. Smith, S. K. Bhatia, D. Lake and D. Walowsky**
Evaluation of Vegetative and Root System Growth Through Different Geosynthetic Rolled Erosion Control Products in a Highway Drainage Channel
- 11:15 – 11:30** **B. Joel Sprague and Thomas Carpenter**
An Update on Recent Silt Fence System Research
- 11:30 – 11:45** **Mohammad Raheem, Bernard Breul, Gerry Stenson and Colas Teoranta**
A Review of the Use of Prefabricated Bituminous Geomembranes in Railroad Substructure Applications

Session 11A
13:30 - 15:00
Essex/Canterbury
Room

Groundwater Resource Evaluation II
Session Chair: J. Tóth

- 13:30 – 13:45** **S. Holysh, S. Davies, L. Lemon, B. Jeffrey, A. Korniluk, A. Warren, S. Banz, B. Golas, C. Darling, L. Rivierre, B. Snodgrass, D. Goodyear, D. Ford, S. Meek, G. Soo Chan, R. Powell, M. Peacock, M. Majchrowski, R. Gerber and H. Bretton**
Groundwater Management Through Cooperation - An Example of Local Government Leadership from the Oak Ridges Moraine - Southern Ontario
- 13:45 – 14:00** **S. Holysh, D. Kassenaar, E. J. Wexler and R. Gerber**
Regional and Sub-Regional Groundwater Flow Modeling, Oak Ridges Moraine Area of Southern Ontario
- 14:00 – 14:15** **V. Gerrie, S. Holysh, J. Boyce, S. Pullan, K. Blasco and S. Collins**
Borehole Geophysics and its Potential for Mapping the Geological Framework of the Oak Ridges Moraine, Southern Ontario
- 14:15 – 14:20** **J. Scibek, D. M. Allen, M. Wei and P. Whitfield**
Modeling the Impact of Climate Change on Groundwater in Grand Forks, BC: Consideration of Aquifer Heterogeneity
- 14:20 – 14:25** **Discussion**
- 14:25 – 14:40** **D. Kassenaar, S. Holysh and R. Gerber**
Integrated 3D Hydrostratigraphic Interpretation in Complex Aquifer Systems
- 14:40 – 14:55** **M. Friedman Hamm, J. B. Smith and J. Gehrels**
Groundwater Under Direct Influence of Surface Water
- 14:55 – 15:00** **Discussion**

Session 11B

Groundwater Management and Protection II

13:30 - 15:00
Lombard Room

Session Chair: A. Rivera

13:30 – 13:45

R. George, N. Grainger and J. A. Küpper
Groundwater Management and Conflict Resolution in Alberta

13:45 – 14:00

J. T. Freeman and R. M. Pockar
Prairie Groundwater Management in the 21st Century: New Expectations, New Regulations and Need For New Tools

14:00 – 14:05

G. Matile, B. Betcher, T. Dash, B. Eilers, G. Keller, J. Oosterveen, M. Pyne and H. Thorleifson
Compilation of Geological Data and Soil Mapping Required for Groundwater Protection in Manitoba

14:05 – 14:10

Discussion

14:10 – 14:25

R. Harrison and D. Kelln
Inter-Relationship of the Assiniboine Delta Aquifer and the Assiniboine River

14:25 – 14:40

H. Rasmussen, A. Rouleau and M. Gravel
Contribution of Decision Analysis to the Determination of Wellhead Protection Zone

14:40 – 14:45

M. Tremblay, D. W. Roy, A. Rouleau and H. Rasmussen
Demarche d'estimation d'aires d'alimentation d'ouvrages de captage integrant l'information geologique

14:45 – 14:50

J. Hayles, D. Danielson and B. Williamson
Underground Municipal Infrastructure Route Selection and Siting Using Terrain Electrical Conductivity Scans

14:50 – 15:00

Discussion

Session 11C
13:30 - 15:00
Wellington Room

Dams and Water Retaining Structures II
Session Chair: Marolo Alfaro

13:30 – 13:45

Tamer Elkateb, R. Chalaturnyk, and P. Robertson
Geostatistical Stability Analysis of Co-Depositional Sand-Thickened Tailings Embankments

13:45 – 14:00

Abbas Soroush and Mohsen Rezai-Seraji
Stability Analysis of the Sarcheshmeh Upstream Tailings Dam

14:00 – 14:15

B. Shadravan, M. Pakzad and N. Tarkeshdooz
Cost and Advantage Evaluation of Karkkeh Dam Foundation Water-Sealing System

14:15 – 14:30

Kate Franklin, Jim Graham, M. Alfaro and J. Wortley
Assessment of Degradation of Shaley Limestone Riprap

14:30 – 14:45

Alex Man, J. Graham, M. Alfaro and T. B. Goh
Changes in Clay Behaviour Produced by Seepage Under a Water Retention Dyke

14:45 – 15:00

Bert Smith, Rob Kenyon and David Anderson
Embankment Construction on Soft Lacustrine Clay Deposits

Session 11D
13:30 - 15:00
York Room

Soil Mechanics II
Session Chair: David Dixon

13:30 – 13:45

Michel Aubertin, Richard Simon, Bruno Bussiere and Li Li
Un critère de plasticité et de rupture pour les géomatériaux à porosité variable

13:45 – 14:00

Brendan O'Kelly and Pat Naughton
Development of the University College Dublin Hollow Cylinder Apparatus

14:00 – 14:15

Runglawan Rachan and Suksun Horpibuksuk
Undrained Strength Characteristics of Cement Admixed Clay

14:15 – 14:30

Suksun Horpibilsuk and Runglawan Rachan
Prediction of Strength of Cement Admixed Clays

14:30 – 14:45

Chris Anderson, Dharma Wijewickreme and Allen Mitchel
Development of a Full Scale Laboratory Testing Facility for Soil-Pipeline Interaction Research

14:45 – 15:00

Denis Dubois, Valerian Yereniuk and James Betke
Comparing Methods of Estimating Strength Parameters For Fissured Clays At Seven Sisters Generating Station

Session 11E
13:30 - 15:00
Harrow Room

Mining and Rock Mechanics
Session Chair: TBA

13:30 – 13:45

J.H. Curran, Thamer Yacoub and Reginald Hammah
A Two-Dimensional Approach for Designing Tunnel Support in Weak Rock

13:45 – 14:00

Pavol Oblozinsky, Jiro Kuwano and Qiang Li
FE Analysis on Stability of Tunnel Face

14:00 – 14:15

M.R. Shahverdiloo and Mehdi Shahabi
Effect of Installing Monobars in Stability of Powerhouse Cavern Roof in Masjed-Soliman Power Plant Extension