

MINECLOSURE | 2007

COURSE 2: Designing Sustainable Cover Systems and Final Landforms for Mine Waste Storage Facilities

October 16, Sheraton Hotel & Convention Center, Santiago, Chile

BACKGROUND:

The objectives of a cover system may vary from site to site but generally include (i) dust and erosion control; (ii) chemical stabilisation of acid-forming mine waste (through control of oxygen ingress) (iii) contaminant release control (through control of infiltration); and/or (iv) provision of a growth medium for establishment of sustainable vegetation.

This workshop will present the technical background and tools required to develop sustainable cover system and final landform designs on a case-by-case basis and with due consideration of the short-term and long-term impacts on the receiving environment at a particular site.

WORKSHOP OBJECTIVES:

The workshop will provide the opportunity for personnel from different locations and backgrounds to share experiences on waste storage, mine reclamation, and cover systems. Provision of training and discussion in the area of cover system and landform design in the areas of:

- Material Characterization;
- Numerical Modelling;
- Field Performance Monitoring;
- Long-Term Performance; and
- Case Studies.

WORKSHOP PROGRAM

Time	Topic of Discussion	Presenter
8:30 am – 8:40 am	<ul style="list-style-type: none"> • Welcome and Introductions • Overview of the Workshop 	Mark Phillip
8:40 am – 9:10 am	Session One: “General Introduction to Cover Systems”	Brian Ayres
9:10 am – 10:00 am	Session Two: “Basic Theory and Fundamental Concepts”	Mike O’Kane
10:00 am – 10:20 am	COFFEE BREAK	
10:20 am – 11:20 am	Session Three: “Cover System Design (Basis for Material Characterisation and Overview of Numerical Modelling)”	Mike O’Kane
11:20 am – 11:50 am	Session Four: “Landform Engineering”	Brian Ayres
11:50 am – 12:30 pm	Session Five: “Field Performance Monitoring”	Mark Phillip & Mike O’Kane
12:30 pm – 1:45 pm	LUNCH	
1:45 pm – 2:15 pm	Session Five (continued): “Field Performance Monitoring”	Mark Phillip & Mike O’Kane
2:15 pm – 2:45 pm	Session Six: “Long-Term Performance”	Mike O’Kane
2:45 pm – 3:10 pm	Session Seven: “Case Study #1 – Reactive Waste Rock in a Semi-Arid to Arid Climate”	Mark Phillip
3:10 pm – 3:30 pm	COFFEE BREAK	
3:30 pm – 4:15 pm	Session Seven: “Case Study #2 – Reactive Waste Rock in a Semi-Humid Climate”	Brian Ayres
4:15 pm – 5:20 pm	Session Seven: “Case Study #3 – Reactive Tailings in a Semi-Arid Climate”	Mike O’Kane
5:20 pm – 5:30 pm	<ul style="list-style-type: none"> • Workshop Evaluation and Wrap-up • Provision of Workshop Diplomas 	

INSTRUCTORS:



Mr. Mike O'Kane, P.Eng

Mr. Mike O'Kane, M.Sc., P.Eng.: is the President of O'Kane Consultants and is based in the Calgary office. He has a B.Sc. in Civil Engineering, a M.Sc. in Geotechnical Engineering, and over 13 years experience in applied academic research and consulting. Prior to joining O'Kane Consultants he worked as a Research Engineer for the Unsaturated Soils Research Group at the University of Saskatchewan. His area of expertise is the design, implementation, and performance monitoring of cover systems for mine waste. The focus of his work is on the application of unsaturated zone hydrology and geochemistry to closure of tailings and waste rock storage facilities.

Mr. O'Kane has extensive mining industry experience and involvement in a wide range of mine property environmental projects. He also has a strong technical background in site-specific characterization of hydrology and hydrogeology, and their influence on the sustainable reclamation of mine waste material and management of surface water and groundwater. Mr. O'Kane has designed cover systems for application in humid and arid climates for control of acid mine drainage from mine waste rock and tailings at numerous sites in Argentina, Australia, Canada, Chile, and the USA. Each of these projects includes implementing all or some component of the design, implementation, and performance monitoring of cover systems at a detailed and/or feasibility level of design. In addition, Mr. O'Kane has served as a third party reviewer for State regulatory agencies.



Mr. Brian Ayres, P.Eng

Mr. Brian Ayres, M.Sc., P.Eng.: is a Senior Geotechnical Engineer with O'Kane Consultants in the Saskatoon office. He has a B.Sc. in Civil Engineering, a M.Sc. in Geotechnical Engineering, and 10 years experience as a geo-environmental engineer. The focus of Mr. Ayres' graduate work was on field monitoring of soil-atmosphere fluxes through tailings and natural surface soils at a uranium mine site in northern Saskatchewan. Prior to joining O'Kane Consultants he worked as an Environmental Engineer for COGEMA Resources Inc. in the Saskatoon main office, as well as at remote mine sites in northern Saskatchewan.

Mr. Ayres' area of expertise is the design, implementation and performance monitoring of cover systems for all types of mine waste. He also has experience in the design of erosion control measures and other hydraulic structures for surface water management systems, and in developing detailed cost estimates for construction of full-scale cover systems. Mr. Ayres has

conducted material characterization programmes, supervised the construction of large-scale test cover plots, and installed field performance monitoring systems at several mine sites located in Canada, Australia, and the United States.



Mr. Mark Phillip, P.Eng.

Mr. Mark Phillip, M.Sc., E.I.T.: is an Environmental Engineer with O'Kane Consultants stationed in Fort McMurray, Alberta. He has a B.Sc. in Environmental Engineering and a M.Sc. in Environmental Engineering with an emphasis in mine waste management. He has extensive experience with mine hydrology, geochemistry, closure planning, financial assurance, and cost estimation.

Mr. Phillip currently manages an extensive network of reclamation monitoring stations, and designs and installs new stations for large oil sands mines operated by Syncrude Canada Ltd. As of August 2007, Mr. Phillip will open and subsequently manage OKC's office near Butte, Montana. Prior to joining O'Kane Consultants in 2004, Mr. Phillip regulated both active and historic mine sites as an employee of the New Mexico Environment Department's Ground Water Quality Bureau. As closure permit lead for a major copper mine, he guided the development of a closure plan by working with the mine operator, public interest groups, and other government agencies. He developed internal closure cost estimates and reviewed external cost estimate submittals for several mines. Mr. Phillip served as the project manager for a Superfund-like cleanup of historic mine waste, providing oversight on closure implementation and groundwater impact studies.