

PASTE • 2017

15-18 June, Beijing, China

20th International Seminar on Paste and Thickened Tailings - Short Course

Title

Mine Waste Management using Dewatered Tailings, Backfill and Co-disposal with Waste Rock – Emerging Technologies and Best Available Practice

Instructors

- Chris Lee, PEng, Principal, Golder Associates Ltd., Canada
- Sue Longo, PEng, MBA, Principal, Golder Associates Ltd., Canada
- Shiu N. Kam, PEng, Principal, Golder Associates Ltd., Canada

Course Overview

Mine waste management is an integral part of mining operations. Different strategies for the management of tailings and waste rock are being developed to mitigate environmental impacts, reduce failure risk, decrease costs and help reach the mining company's sustainability goals. The intent of this workshop is to provide the audience with the latest technologies and techniques in mine waste management.

The workshop will first present the current concepts employed in today's modern mines to manage tailings such as returning the tailings back underground for underground mines or back into open pits as well as processing the tailings to different dewatered states, to a thickened non-segregating, paste or filter cake consistency for surface disposal. The potential benefits of these techniques in addressing the needs of the mining industry will be discussed together with a method to select the appropriate disposal technology. The workshop will then show how these processed tailings can be deposited underground, in pit or combined with waste rock in some cases in co-disposal, co-mingling and paste rock applications in a surface disposal facility. The advantages and limitations of these mine waste disposal techniques will be discussed along with the technologies required to process the tailings and waste rock. Dewatered tailings disposal is a proven technology and must be considered in each mining project. It is seen from research and practice that these alternative methods of managing tailings may lower failure risk, reduce cost, improve performance and facilitate closure over conventional means of disposal. Current trends in mine waste disposal will also be a topic within this workshop. Case studies will be used to demonstrate the advantages of these techniques.

Course Objective

The workshop will touch on current trends and best available technologies for tailings disposal in mine

waste management. Emphasis will be on dewatered tailings (thickened, paste, filtered), backfill and waste rock co-disposal. A rational method of selecting the optimal technology will be presented.

Expected target audience

The workshop is designed for all professionals involved in surface tailings management and backfill for underground mines, including:

- Technical service and project managers
- Mine engineers
- Mill metallurgists
- Plant operators
- Tailings engineers
- Environmental managers
- Mill managers
- Personnel involved in the selection and placement of backfill in an underground mine

Course Program

Short Course 1 – Wednesday, 14 June	
09:00-10:30	Challenges in mine waste management
10:30-11:00	Morning Break
11:00-12:30	Changes and Best Available Technology in mine waste management
12:30-13:30	Lunch
13:30-15:00	Dewatered Tailings System Design
15:00-15:30	Afternoon Break
15:30-17:00	Current Trends in Mine Waste Disposal
	Completion

Instructor Bios

Chris Lee

Chris is a professional mechanical and mining engineer with over 20 years of experience in domestic and international mining projects, with a focus on backfill and thickened tailings systems. Backfill systems include: paste, hydraulic fill, and cemented rockfill. Thickened tailings for surface disposal include deep cone and paste thickeners as well as filtration systems. In addition, Chris has experience in mine dewatering systems, crushing and material handling and shaft sinking. Currently, Chris is the leader of

Golder's Process and Infrastructure Design (PID) group providing overall leadership to a team consisting of over 70 engineers, designers, and administrative professionals.

Since joining Golder, Chris has held numerous positions such as Project Manager and Technical Director for the detailed design and construction of 17 paste backfill and thickened tailings systems as well as numerous conceptual and feasibility studies. Duties included performing design and senior technical review for surface and underground distribution systems, hydraulic design, flow modelling, process design, equipment selection, plant layout, piping and valving specifications, pipe supports and layouts.

Chris has performed on-site pilot plant testing, construction QA/QC, commissioning and training for a variety of projects for paste backfill and surface disposal. He has performed commissioning and the successful start-up of a number of paste plants including Red Lake Mine, Goldcorp; Zinkgruvan, Rio Tinto; Greens Creek, Kennecott; Kidd Creek, Falconbridge; San Rafael, Minsur; Somincor, Lundin; Diavik (CRF), RioTinto; Young-Davidson, AuRico; Loulo, Randgold.

Chris is a registered professional engineer in the provinces of Ontario, and the Northwest Territories and Nunavut.

Sue Longo

Sue Longo is a Principal and Senior Project Manager with over 15 years of experience in domestic and international mining projects, with a focus on backfill and tailings disposal in the mining, power and oil sand industries. Since joining Golder Associates Ltd., she has worked on conceptual, feasibility and detailed engineering design mandates, as well as start-up and commissioning assignments and operation of pilot plants. Her project management experience is broad, and includes cost estimating and project scheduling. She has spent time as a QA/QC site supervisor on a contracted backfill delivery project in Western Canada, participated in the commissioning of a paste backfill plant in Indonesia and more recently led a multimillion dollar contracted backfill delivery program in Northern Canada. Since relocating to Alberta, Sue has been involved in various tailings management testing programs and has been managing oil sands tailings projects in northern Alberta.

Sue has worked on and managed underground backfill and surface disposal projects in various locations worldwide which include the Basic Engineering design of a backfill plant for the Porgera Mine in Papua New Guinea, the bankable feasibility design for the Minas Conga surface disposal plant in Cajamarca, Peru, the feasibility surface paste plant design for Shakespeare in Espanola, Ontario and the feasibility designs for surface disposal paste plants for Cerro de Maimon, Marathon, Nunavik and PJV Dome. The largest consulting project to date has been the Sue's management of the Integrated Waste Study for Vale Inco in Sudbury, Ontario. She was also a Component Lead on the Alberta Government's Tailings Roadmap project on Integrated Tailings Management in the Oil Sands.

On the detailed engineering side, she has managed the EPC projects at Goldcorp's Musselwhite Mine (Thickening Plant), pumping and piping upgrade projects at Diavik Diamond Mines Inc. and DeBeers' Victor Mine, the detailed design and commissioning project at Freeport's Big Gossan Mine in Papua, Indonesia as well as the Boiler Feed Well pumping project at Imperial's Kearsarge Site.

In 2010, Sue transferred to the Golder Calgary operation to pursue the tailings management initiative for Golder and Golder's Process and Engineering Design (PID) group. As a part of this initiative she has

managed multiple major oil sands projects in the field of tailings processing and deposition looking at tailings management solutions on surface including the lab and field programs. In addition, Sue is managing the Golder's PID group in Calgary and is responsible for the operations and development of the group including the financial and overall performance.

Sue is a professional engineer registered in the provinces of Ontario and Alberta.

Shiu N. Kam

Mr. Kam is a Principal in the Mine Waste and Environment Division and a project manager for a wide variety of mine waste management, decommissioning and geotechnical engineering projects. He has over 30 years of geotechnical engineering and mine waste management experience. He has worked on many base metals and gold mining projects relating to basin expansion planning, facility design, geotechnical and hydrogeological investigations and assessments, tailings deposition, dam stability, safety and performance reviews, closure design, seepage remediation and dam instrumentation. Some of the representative projects are listed below:

Quirke, Panel, Stanleigh, Denison and Stanrock Tailings Management Areas - Closure options evaluation, decommissioning design, dam and bedrock grouting design, construction management, hydrogeological modelling, stability studies, instrumentation, long-term care and maintenance guidelines and performance evaluation. These facilities hold over 150 Mt of tailings.

Musselwhite Mine - Feasibility and expansion studies, geotechnical and hydrogeological assessments, foundations and retaining structures, tailings basin and dam design, construction inspection, water management, environmental monitoring and contingency planning. Musselwhite commenced thickened tailings disposal in 2010. Since 1997, Mr. Kam has been assisting the mine in tailings and water management and monitoring performance of the facility.

INCO Central Tailings Area, Copper Cliff - Geotechnical and geophysical investigations, seismic stability assessment, foundation improvements and design of dams founded on tailings. This work involved densification of over one million m³ of tailings using dynamic compaction and blast densification methods.

Kidd Metallurgical Division - Thickened tailings deposition planning, water, sludge and tailings management reviews, pond expansion and closure cover designs, progressive rehabilitation and closure cost estimate for a 130 Mt tailings facility.