

TC221

Tailings and Mine Waste

Stability of tailings dams will be discussed in a webinar on January 20th.

The International Society for Soil Mechanics and Geotechnical Engineering (ISSMGE) Technical Committee TC221 on *Tailings and Mine Wastes* is organizing a Tailings and Mine Waste Webinar taking place on 20th January 2022. This webinar was motivated by answers given to a brief questionnaire on some main geotechnical issues associated with the stability of tailing dams. A significant number of responses showed serious divergences on key aspects related to design, analysis and monitoring of tailings dams, prompting the organization of a discussion session.

Time

The 2 hours webinar will be broadcast by the Brazilian Society Channel starting at 14:00 UTC (Coordinated Universal Time)¹, which is considered an appropriate time to facilitate participation in the different time zones. The link of this event will be provided.

Debate

Colleagues with a high expertise on tailings dams and related issues will present the views on the design of tailings dams and how it has evolved with time to ensure better performance, considering the views of the geotechnical community expressed in the answers to TC221 questionnaire.

The debate will begin with presentations by Prof. Jonathan Bray and Prof. Antonio Gens. Then, Ramon Verdugo and Antonio Carraro will address the controversial topic related to the design and maintenance of upstream tailings dams, covering the various geotechnical analyses required throughout the lifecycle of the structure in order to ensure long term stability.

Assessment of the residual (post-liquefaction) undrained shear strength will be addressed by Prof. Fernando Schnaid in support to current engineering practice, whereas Arcesio Lizcano will support a more solid theoretical basis in design.

A third question is referred to monitoring upstream dams with potentially liquefiable tailings zones, identifying the most appropriate instrumentation to prevent flow failure. Prof. David Williams and Prof. Roberto Cudmani will approach this topic.

Luis Valenzuela will approach the stability of tailings dams using limit equilibrium analysis. In closing, Mike Jefferies will highlight the need for more robust stress-strain analysis with appropriate constitutive models in supporting engineering design.

The audience will be allowed to make questions to the different topics, which will be discussed during the debate.

¹ Sydney 24:00 (UTC+10), Pacific Coast (US/Canada) 6:00 (UTC-8). The time in other time zones can be checked under <https://www.calculator.net/time-zone-calculator.html>

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QUESTIONS TO BE ADDRESSED

The number of tailings dam failures that have occurred systematically over time has left the mining industry in a poor position worldwide. In this context, the ICMM (International Council on Mining & Metals), UNEP (United Nations Environment Programme) and PRI (Principles for Responsible Investment) developed the Global Industry Standard on Tailings Management, which strives to achieve the goal of zero harm to people and the environment with zero tolerance for human fatality. This standard makes clear that extreme consequences to people and the environment from catastrophic tailings facility failures are unacceptable. Consequently, we are experiencing international concerns associated with the stability of tailings dams and a demand to build these deposits safely throughout their project lifecycle. In this new world scenario, the geotechnical engineering associated with the stability analyses of tailings dams acquires a preponderant role. In this context, in July 2021, a short questionnaire of 6 questions (see below) was prepared and sent to the TC221 members. Close to 50 responses were received, which will be discussed in the online event of January 20th.

- 1.- Is it possible to design upstream tailings dams where their stability can be guaranteed on a long-term basis? If so, which are the basic requirements that an upstream tailings dam must meet?
- 2.- Which are the most appropriate procedures to evaluate the residual undrained strength (shear strength of liquefied soils) in the laboratory and in the field?
- 3.- In an upstream dam with zones of potentially liquefiable tailings, what would be the most appropriate instrumentation to monitor the dam for preventing flow failure?
- 4.- Is it correct to evaluate the stability of tailings dams using limit equilibrium analysis? If so, what would be the acceptable factor of safety for static and pseudo-static conditions?
- 5.- Would you consider stress-strain analysis with appropriate constitute models a necessary requirement for design?
- 6.- Do you think it would be useful to write a technical document that addresses the stability of tailings dams built upstream, or on materials that may potentially lose strength?