



Vancouver Geotechnical Society

A Local Section of the
Canadian Geotechnical
Society

www.v-g-s.ca

2023-2024 Executive Committee:

Chair	- Intisar Ahmed, Thurber
Past-Chair	- Aran Thurairajah, WSP
Program Director	- Tyler Southam, Tetra Tech
	- Thushara Jayasinghe, UBC
Treasurer	- Mahdi Shahrabi, WSP
Secretary	- Karina Stapleton, KCB
	- Daniel Alphonso, Tetra Tech
Registrar	- Ibrahim Kawasme, Kiewit
	- Aya Bayoumi, WSP
Web Manager	- Tajinder Singh, Thurber
	- Muin Ahmed Alif, AECOM
CGS Director	- Marc Bossé, Thurber
Symposium Committee	- Ali Jahanfar, Stantec
	- Tajinder Singh, Thurber
	- Jared Whitehead, Kontur
Student Representative	- Simon Wong, UBC
Member-at-Large	- Andrea Lougheed, BGC, Eryn Alexander, BGC, Emir Hot, Arya, Prajakta Jadhav, Ecora, Yoshi Tanaka, Kontur, Masood Meidani, BBA, Jason Edgar, AtkinsRealis

NOTICE OF TECHNICAL PRESENTATION Thursday, 8 February 2024

TOPIC: Validation of Computational Liquefaction: 1974 Tar Island Slump

SPEAKERS: Michael G. Jefferies, P.Eng.

Mike Jefferies, P.Eng. is a civil engineer with some 50 years experience in offshore platforms, dams, and ground improvement; and, an exponent of insitu testing. Strongly influenced (ie tutored) in his early years by Rankine Lecturers Bob Gibson, Alan Bishop, and Peter Wroth, he has pursued an interest in theoretical soil mechanics, despite working as a consulting engineer, and derived the general form of critical state theory. A keynote speaker/author at international conferences on liquefaction, hydraulic fill construction, engineering mechanics, and the Arctic offshore, his published contributions (which have attracted nearly 9000 citations) include some eighty papers and the influential book Soil Liquefaction: A Critical State Approach. Mike was an invited contributor to the Geotechnique 60th anniversary, the Canadian Geotechnical Society's Fall/2012 Cross-Canada Lecturer, presented the 2014 Šuklje Lecture, and gave the 2017 Jennings Lectures; he was awarded a Telford Premium for geotechnical research in 2017.

CONTENT: Finite element analyses using critical state theory proved necessary to understand the development of static liquefaction during three recent large tailings dam failures at Fundao, Cadia and Brumadinho. However, the complexity of these events prevents them being viewed as a complete validation of the methodology - there are too many judgments over various aspects of each case history. Here we evaluate a far simpler case of static liquefaction: the 1974 Tar Island (Suncor, Alberta) slump, which involved a rapid drop of 5m during construction of a 12.5m high upstream raise over loose tailings. While not a dam stability issue, the event has the attraction of being load-induced, with simple geometry, and with known material properties and insitu state. The analyses were carried out with commercial software (PLAXIS) and use critical state theory with largely familiar soil properties measured by standard methods. The computed liquefaction develops from a prior drained condition, with essentially no precursors, before propagating rapidly undrained – there are similarities to the video record at Brumadinho and an animation will be shown to illustrate this. All aspects of the failure are replicated using properties as measured without "corrections", and in many ways this case history is a template for static liquefaction assessments. On a historical note, the theory and methodology were developed from construction in the Canadian arctic offshore 1982-9 by Gulf Canada Resources - this is very much a Canadian story, albeit one that is near fifty years old.

DETAILS: **Location:** Centennial Room, Executive Hotel, 4201 Lougheed Highway, Burnaby, BC V5C 3Y6
Social Hour: 5:30 to 6:15 pm (drinks available at the hotel bar)
Technical Presentation: 6:15 to 7:30 pm (No need to RSVP)
Dinner: 8:00 pm (\$20 will be charged for dinner). If you would like to stay for dinner, please RSVP to - Ibrahim Kawasme via email (Ibrahim.Kawasme@kiewit.com) or at the door.