

Appendix A: **Operations of the ITRB**

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A1. Terms of Reference for the ITRB

The terms of reference provided to the ITRB are outlined in Annexure A of the appointment letters to the individual members. They are as follows:

ANNEXURE A – TERMS OF REFERENCE FOR THE INDEPENDENT TECHNICAL REVIEW BOARD – PRIVILEGED & CONFIDENTIAL

1. INTRODUCTION

Ashurst Australia have engaged Hatch on behalf of Cadia Holdings Pty Ltd (**CHPL**), and its parent company Newcrest Mining Limited (**NML**), to coordinate and manage an independent technical investigation into the recent dam wall slump that occurred at CHPL's Northern Tailings Storage Facility (**NTSF**) on 9 March 2018 (the **Event**). It is proposed that the investigation will be undertaken by independent subject matter experts (**SME**) comprising an Independent Technical Review Board (**ITRB**) and Hatch will coordinate, manage and support the ITRB during their investigation.

The purpose of this memo is to present the Terms of Reference to the members of the ITRB.

2. TERMS OF REFERENCE

2.1 Task of the Independent Technical Review Board

The task of the ITRB is to investigate into and report on the Event.

The ITRB will provide independent and unbiased professional judgment and expertise in determining the immediate cause(s) of the Event and report on the same.

This Technical Review is to focus on:

- (a) Why did the Event occur
- (b) Why did the Event occur where it happened
- (c) Why did the Event occur when it happened
- (d) Why won't a similar Event happen anywhere else

2.2 Scope of Review

In its Report, it is expected that the ITRB will:

- (a) identify any and all mechanism(s) of failure of the tailings storage facility;
- (b) identify any technical inputs that may have enabled or contributed to the mechanism(s) of failure. This may include an independent review of the design, construction, operation, maintenance and surveillance of the facility;
- (c) identify if any of the mechanism(s) of failure may be relevant to other TSF embankments at the Cadia Project;
- (d) identify any changes that could be considered to reduce the potential for future such occurrences; and
- (e) comment on CHPL/NML draft plans for restoration/repair, and future tailings operations.

2.3 Independent Technical Review Board members

The ITRB members are:

- (a) Dr. Norbert Morgenstern

(b) Dr. Dirk van Zyl

(c) John A Wates

(d) Mike Jefferies

The ITRB will be chaired by Dr. Norbert Morgenstern.

2.4 **Information to be provided to the ITRB**

The ITRB will be supplied with all available information necessary for achieving its purpose and performing its functions. Hatch will provide briefing information to the ITRB by 9 April 2018.

2.5 **Timeline**

It is anticipated that a site visit will be undertaken the week commencing the 16 April 2018.

It is recognised that the timeframe for preparation of the ITRB's Report will depend on the extent of investigation and testing required to confirm the mechanism(s) of failure. Following the site visit, it is expected that the date for production of a final draft report will be settled.

The site visit has been scheduled for 1 working week, including travel to and from site to Sydney. This period will allow the ITRB to visit the Event site and work with site and Hatch stakeholders to gain detailed insight into the Event. The ITRB are welcome to travel earlier and stay later if desired, and may also work in the Hatch office if you also see fit. The length of stay will be dependent upon each individual ITRB member as we are aware that you also have other commitments.

It would be expected that a 'Site Inspection' report would be produced for inclusion in the final Report, and that such report be made available to the broader working group including Hatch and Bob Thiele shortly after the site visit.

2.6 **Report and Purpose of the ITRB's Work Product**

The ITRB Report shall contain whatever figures, photographs or other materials that are necessary to assist a reader in understanding the key findings of the ITRB's assessment.

The Report (and any final draft of the Report) should be:

- marked "Privileged & Confidential" on each page;
- sent directly to Mark Brennan and Guy Dwyer of Ashurst Australia via email (mark.brennan@ashurst.com and guy.dwyer@ashurst.com)

The purpose of the Report is to enable CHPL and its parent, NML, to obtain legal advice in respect of CHPL's and NML's potential liabilities under various NSW statutes in respect of the Event and to assist in respect of anticipated legal proceedings which may arise in relation to this matter.

It is emphasised that, whilst the Work being undertaken by the ITRB has been commissioned under privilege, the ITRB's work is independent and the Report is to contain its independent comments, findings and conclusions.

It is further noted that CHPL or NML may (in its absolute discretion) voluntarily disclose the Report to any government agency, regulator or court, or be compelled by law to disclose the Report.

It is expected that during the course of the investigation, the ITRB will be working in a collaborative manner with Hatch and Bob Thiele and will provide updates on their progress.

2.7 Confidentiality and Client Legal Privilege

Your retainer to undertake the Work, and any resulting communications must remain strictly confidential as they are for the purpose of providing CHPL and NML with legal advice.

In discharging your instructions you, and those directed by you, agree to keep the information provided to you confidential and:

- not to use the documents or any information provided to you for the purposes of the Work for any purpose other than providing an expert opinion to us or to NML/CHPL;
- not to disclose, directly or indirectly, the content of documents or information provided to you for the purposes of the Work with the exception of the following:
 - disclosure for the purposes of your report, and discussing the report with Ashurst or relevant NML/CHPL personnel; and
 - disclosure as compelled by law;
- upon termination of the retainer, to return all documents and material which have been provided to you in connection with the Work.

The retainer and the Work should not be discussed other than with Ashurst Australia or relevant NML/CHPL personnel.

Please ensure that any documents you prepare in this matter for consumption by Ashurst or NML/CHPL are marked "Privileged & Confidential" and that any email correspondence you have with the abovementioned parties is similarly marked.

2.8 Limitations

The ITRB shall perform its duties without expressing any conclusions or recommendations regarding the potential civil or criminal liability of any person or organization. The ITRB shall further ensure that the conduct and activities of the inquiry does not in any way interfere with any other ongoing investigations undertaken by CHPL or NML.

A2. Composition of the ITRB

The ITRB was composed of the following members:

- Mr Michael Jefferies
- Dr Norbert R Morgenstern (Chair)
- Dr Dirk Van Zyl
- Mr John Wates

Short biographies for each of the members are as follows:

Michael Jefferies, MSc, BSc, P.Eng.

Mr Jefferies has been a registered Canadian Professional Engineer since 1978. Principal employment: 10 years hydrocarbon industry as owner's engineer (Gulf Canada Resources); 20 years consulting engineering (Golder Associates); 10 years other (contracting / independent); also, Visiting Professor (U. Manchester) concurrent with consulting engineering. Experience predominantly in offshore platforms (deployment and operation), earthfill & rockfill dams (design & construction; performance review; remediation; and safety assessment); ground modification (densification and grouting); and, quantitative risk analysis (financial, strategic & environmental). Contributions to technology include eighty-seven peer-reviewed publications and the book '*Soil Liquefaction, a critical state approach*', work that has attracted more than 5000 citations. These technical contributions have been further recognized by: the Canadian Geotechnical Society's Fall/2012 Cross-Canada Lecturer; the Slovenian Geotechnical Society's Sukjle Lecturer 2014; the UK Institution of Civil Engineers with a Telford Premium in 2017; and, the South African Institution of Civil Engineers Jennings' Lecturer in 2018. Reviewer for all major geotechnical journals, and member of editorial board for *Geotechnical Research*; contributor to published standards and practice guides for cone penetration testing (ASTM), compaction grouting (ASCE) and hydraulic fill construction (CIRIA).

Dr Norbert R Morgenstern, CM, AOE, FRSC, FCAE, FRAE, DSC, PhD, BAsC, P.Eng.

Dr Morgenstern, Distinguished University Professor Emeritus at the University of Alberta, is an international authority on geotechnical engineering and a highly sought-after consultant. As an educator, researcher and practitioner, the international scope of his experience spans over 40 countries on 6 continents. Among his recognitions, he is an elected a Fellow of the Royal Society of Canada and the Canadian Academy of Engineering. He is also a Foreign Associate of the US National Academy of Engineering, a Foreign Member of the Royal Academy of Engineering (UK) and a Foreign Fellow of the National Academy of Engineering of India. He has been inducted into the Alberta Order of Excellence and the Order of Canada for his outstanding achievements in and life-long contributions to geotechnical engineering. He has received honorary degrees from the University of Toronto, Queen's University and the University of Alberta. Moreover, he is an Honorary Professor at Zhejiang University, PRC.

Dr Dirk Van Zyl, PhD, BSc, MS, MBA, P.Eng., P.E.

Dr Van Zyl has more than 40 years' experience in research, teaching and consulting in tailings, mine rock and heap leach management and is a Professor of Mining Engineering at the Norman B. Keevil Institute of Mining Engineering at the University of British Columbia. He has more than 100 publications to his credit; these include papers and book chapters. He has also presented numerous short courses on tailings, heap leach design, mining environmental management and mine closure in the US and abroad. Dirk serves on a number of international review boards and panels related to tailings management for mine development and operations as well as comprehensive mine closure projects.

John Wates, BSc, MSc, MBA

Mr Wates is a geotechnical and tailings consultant. He has in excess of 40 years of experience in tailings and industrial waste. After more than 20 years with Golder Associates he moved to operations with Fraser Alexander, a mining services company that operates more than 100 tailings facilities on behalf of mining companies where he currently serves as the non-executive chairman. John has specialised in paste and thickened tailings and has authored peer reviewed and conference papers on his field of expertise. He is currently involved in senior review of tailings projects and serves on more than 15 independent tailings review boards across the globe.

A3. Organisation of Study

The organization for the study of the NTSF embankment failure is depicted in Figure A3-1.

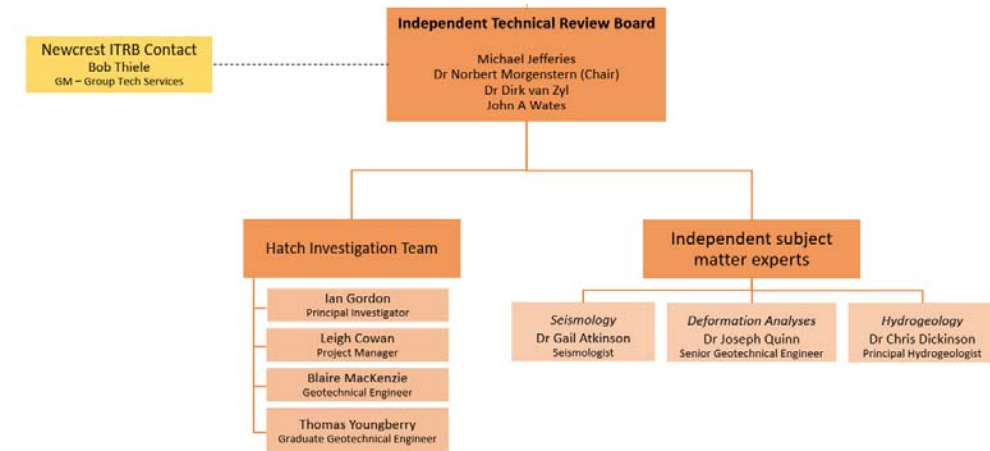


Figure A3-1: Organization for Study of NTSF Embankment Failure

Additional biographies of those who contributed to this study follow:

A3.1 Hatch

- Ian Gordon
- Leigh Cowan
- Blaire Mackenzie
- Tom Youngberry

Short biographies for each of the members are as follows:

Ian Gordon, MSc, MEng, BSc, MIEAust CPEng, RPEQ

Mr Gordon, formerly Geotechnical Lead Hatch Brisbane has 45 years experience in geotechnical investigation, analysis and design for civil and mining infrastructure projects. Over the last 38 years, he has specialised in the investigation and design of dams for both water supply and hydroelectricity, tailings storage facilities, river diversions and flood protection levees. This experience has included all facets of project development and in the case of tailings storage facilities has also included supervision of construction, tailings management studies, dam safety reviews, peer reviews and closure studies. In addition, Ian's experience also includes the investigation and design of molten slag facilities, processing plant foundations and the geotechnical aspects of major linear infrastructure including roads and railways. Ian's experience extends throughout Australia, South East Asia and the Pacific, Africa and South America.

Leigh Cowan, BEng, MIEAust CPEng

Mr Cowan is a Project Manager with 27 years international experience in engineering and Project Management, predominantly in the infrastructure and mining sectors with specialisation in tailings & residue facilities and infrastructure projects from Feasibility & Conceptual phases through Project Implementation to Commissioning and Handover. His projects are characterised by co-operative and productive client relationships and excellent safety, cost and schedule outcomes. Project Management leadership has spanned from conceptual phases, through FEL stages and construction to commissioning and handover. Most of his experience is in heavy industrial green field development and brown field projects within mining and refining plants in Iron Ore and Light Metals, with recent experience in the Oil & Gas Sector and in Light Rail Transit infrastructure projects.

Blaire MacKenzie, MEng, BAsC, P.Eng., MIEAust CPEng

Ms MacKenzie has over 9 years of consulting engineering experience with a diverse background in applying the principles of geological, geotechnical, and environmental engineering to the design and construction of large-scale mining engineering projects in Australia and Canada. Her experience includes engineering design of tailings dams, water retention dams, earthworks construction, geotechnical investigations, site characterizations, instrumentation planning, installing, repair and monitoring, slope stability assessments, groundwater seepage analyses, and project management. She has participated in geotechnical projects related to tailings and waste management with project maturity ranging from pre-feasibility through to construction, operations and closure.

Thomas Youngberry, BEng

Mr Youngberry is a graduate geotechnical engineer with experience in investigation, design and analysis of tailings and water dams, earthfill levees and civil infrastructure. His career to date has involved consulting work in general geotechnical engineering with a focus on dam engineering as well as foundation design and estimation for a piling contractor.

A3.2 Subject Matter Experts

- Gail Atkinson
- Chris Dickinson
- Joseph Quinn

Short biographies for each of the members are as follows:

Dr Gail Atkinson, Ph.D, P.Geo., FRSC

Dr Atkinson conducts research at the engineering-seismology interface. She has authored over 200 research articles on earthquake ground motions and seismic hazards and has also been active in the development of seismic design regulations for buildings, dams and nuclear power plants. Professor Atkinson has served as President of both the Seismological Society of America and the Canadian Geophysical Union, is a member of the U.S. National Earthquake Prediction Evaluation Council, and a Fellow of Royal Society of Canada. She held a Canada Research Chair in Seismic Hazards and Ground Motions from 2007-2014 and an NSERC Industrial Research Chair in Hazards from Induced Seismicity from 2013-2018.

Chris Dickinson, MAIG RPGeo

Mr Dickinson has over 25 years' experience as a geologist, nearly all of which is as a consulting hydrogeologist for the mining industry in Australia, Asia, the Pacific and Canada. His experience includes hydrogeological conceptualisation, design and assessment for all aspects of mining operations including seepage assessments for mine waste facilities (tailings and waste rock), dewatering, depressurisation and water supply, supporting design for geotechnical, geochemical and environmental projects, monitoring, technical and compliance reporting. Chris provides technical direction and review on hydrogeological projects internationally and throughout the company and has successfully led numerous multi-disciplinary geoscience and engineering teams on a variety of projects.

Dr. Joseph Quinn, Ph.D, P.Geo., P.Eng

Dr Quinn is a senior geotechnical engineer with Klohn Crippen Berger (KCB) with experience in site characterization, tailings dam design and operations, seismic hazard analysis, advanced tailings dam stability, deformation and seismic response analysis, and seepage modeling. Joseph has worked on tailings dam design, deformation and seismic hazard assessments for sites in Alberta, British Columbia, Saskatchewan, Ontario, Peru, Minnesota, Arizona, Alaska, Ecuador, Argentina, Brazil and Papua New Guinea. Joseph is currently the manager of KCB's UK operations.

A3.3 Study Commissioning and Co-ordination

The study was commissioned by Ashurst Australia, the ITRB reported to Ashurst Australia and NML provided co-ordination of the study.