

# Technical Memorandum



**Date:** Tuesday, April 18, 2006  
**To:** Kevin Beauchamp, Golder Associates Ltd.  
**From:** David Sainsbury, Itasca Consulting Group, Inc.  
**Copy:** Mahesh Vidyasargar, MFG, Inc.  
Joe Maki, Michigan DEQ  
**Re:** Review of Eagle Project Geotechnical Study – Request for Clarification  
**Ref:** ICG06-2376-18TM

A review of the Eagle Project Geotechnical Study, conducted by Golder Associates Ltd, is currently being completed for the mine-permitting process conducted by the Michigan DEQ. Within the Golder Associates Report, “*Eagle Project Geotechnical Study*” (Golder, 2005)<sup>1</sup>, it is not clear which RMR classification system has been used throughout the study.

There are many different Bieniawski RMR classification systems. The two systems that are recognized as the standard reference for this work are RMR<sub>76</sub> (Bieniawski, 1976)<sup>2</sup> and RMR<sub>89</sub> (Bieniawski, 1989)<sup>3</sup>. The two systems differ in the weighting applied to joint spacing, joint condition and ground water condition. However, the underlying concept of each system is a rating that results in a maximum RMR of 100.

Within Appendix B of the report (Golder, 2005), a description of the RMR classification system is given which suggests that a 1973 version of Bieniawski’s RMR system was used. This system is consistent with RMR<sub>76</sub>. However, the rating system presented in Appendix B is not consistent with the rating system described within the text of the report, which appears to mix the different rock mass parameter ratings of both RMR<sub>76</sub> and RMR<sub>89</sub>, resulting in a maximum RMR of 105.

Clarification of the actual rock mass classification system used throughout the study is requested.

Sincerely,

A handwritten signature in black ink that reads "David Sainsbury".

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<sup>1</sup> Golder Associates (2005) *Eagle Project Geotechnical Study*. Golder Associates Report to Kennecott Exploration Company, 04-1193-020.

<sup>2</sup> Bieniawski, Z. T. (1976) “Rock Mass Classification in Rock Engineering,” in *Exploration for Rock Engineering : Proceedings of the Symposium on Exploration for Rock Engineering (Johannesburg, November 1976)*, pp. 97-106. Rotterdam: A. A. Balkema.

<sup>3</sup> Bieniawski, Z. T. (1989) *Engineering Rock Mass Classification*. Wiley, New York