ᑭᖅᓪᓗᒥᐅᓇᐅᔭᖅ ᑲᑎᒪᔨᖏᑦᑐᖅ
Kivalliq Inuit Association
ᑎᑎᕆᑲᐅᓯᒪᔪᑉ/P.O. Box 340, ᑲᑎᒪᓂᓂᕆᑲ Rankin Inlet, Nunavut X0C 0G0
ᐅᕆᓴᑕ/Tel: (867) 645- 2800 ᓯᑲᔨᑯᑦ/Fax: (867) 645-2348 Toll free: 1-800-220-6581

Nunavut Water Board
Box 119
Goa Haven, NU
X0B 1J0

Re: KIA Report, Meadowbank Project Water License application to NWB

Enclosed is the KIA/NTI Report for the Water License Application submitted to NWB by Meadowbank Mining Corporation for the Meadowbank Gold Project.

We KIA/NTI greatly appreciate the opportunity to collaborate with the review of the MMC's type A Water License application.

Thank you

Luis Manzo
Director of Lands
Kivalliq Inuit Association

Report of Technical Review of the Type A Water License Application for Meadowbank Mining Corporation, Meadowbank Gold Project
NWB Reference: 2AM-MEA

December 13, 2007

Technical support (consultants)
J. Campbell, P.Geo.
A. Sexton, P. Geo.

TABLE OF CONTENTS

1.0 INTRODUCTION

This review is related to the Type A Water License Application submitted to the Nunavut Water Board (NWB) by Meadowbank Mining Corp. (MMC) for the Meadowbank Gold Project. This review was completed by GeoVector Management Inc. (GeoVector) on behalf of the Kivalliq Inuit Association (KivIA).

GeoVector's approach to this review was to compare MMC's plans in the Water License Application against the recommendations and conditions made by NIRB in their project approval of the FEIS to ensure that MMC is compliant with NIRB's ruling. The format of this report follows the significant issues raised by GeoVector in its review of the FEIS, and our determination as to whether the modified designs in the Application recognizes information gaps and/or engineering issues identified in the FEIS review.

GeoVector is pleased to report that most of the issues raised by GeoVector during the FEIS, or identified as conditions to NIRB's approval, have been addressed. With that said, this report outlines a few significant issues that could be improved before, or during construction and operation. GeoVector does not feel it has the authority to recommend design changes or operating procedure changes to NWB for the Water License Application, but we offer alternative suggestions for resolving perceived shortcomings that KIA may want to bring to NWB's attention.

2.0 SPECIFIC ISSUES

There are 4 areas of outstanding issues that are discussed in detail on the following pages:

1. Dewatering Dike Design
2. Central Dike (Tailings) and Tailings Area Design
3. ARD/ML in Waste Rock, Tailings and Water Quality Predictions
4. Abandonment & Closure

2.1 Dewatering Dike Design

The dewatering dike design is reasonably conservative but more details on the proposed actual construction need to be presented, in particular:

2.1.1 **Lake Bed Sediments** - The dewatering dikes are proposed to be built on lakebed sediment which have unknown load-bearing characteristics and are not frozen. The data collected on lakebed sediments indicate that they are weak and of limited thickness. It is projected that these sediments will be displaced and/or incorporated into the dike rockfill. However, some of the data from boreholes indicates a stiff clay layer on the lakebed which may affect rock berm stability on a local basis. MMC's expert reviewer suggests that during construction there may be a need to flatten the design slopes due to the variability of lakebed conditions. This reviewer also suggests, and GeoVector concurs, that additional boreholes be used to more accurately determine the distribution and thickness of this stiff clay layer in order to better determine the extent of change to the dewatering dike design.

2.1.2 **Boulder Distribution** - The boulder distribution within the till below the dewatering dikes is unknown and can only reasonable be determined once excavation and dike construction is undertaken. A higher than planned boulder distribution will affect the construction schedule in that it may take longer to construct certain sections of the cut-off wall. GeoVector suggest that a more conservative worst case construction schedule be presented with implications of its cascading effects on other work schedules.

2.1.3 **Till Source and Quality** - The quality and source of the almost 600,000 m3 of till that is required for the till cores of the dewatering dikes. In terms of quality the data collected from site confirms that the till is of variable hydraulic conductivity and cannot be relied upon as an impervious layer for cut-off wall construction. This was in evidence for work completed on the runway extension where the near surface soil and till flowed when thawed. The till could have a higher moisture content than is considered optimal. GeoVector suggests that additional consolidation testing for the wet till is required to determine the magnitude of potential problems with till settlement and consolidation rates. For the source of till it is stated that there will be sufficient till available from the pre-stripping of the North Portage and Third Portage deposits. GeoVector would like to see more detail on the location of these till sources, specifically map locations with expected volumes and quality of till, and a quarrying schedule of the various till types to achieved the desired homogenous dyke core quality material.

2.1.4 **Dike Seepage** - Seepage volumes are predicted to range from 820 m3/day (East Dike) to 1900 m3/day (Goose Island Dike). These volumes can create potential for long term degradation of the seepage controls that are being put in place. A program to delineate and mitigate increased dike seepage over time has been tabled by MMC. GeoVector recommends that an independent "dike safety review committee" should be formed to monitor all aspects of dike construction and performance during operational life. Any deficiencies found in design, construction materials, or during operations should be reported to the monitoring committee. This committee would have the authority to recommend changes to rectify

deficiencies. The value of this committee is that the members would be able to view the broad issues associated with the dikes without being burdened by day to day operational issues that sometimes mask problems or delay response.

Documents Reviewed:

1) Final Report of Technical Review of the Final Environmental Impact Statement for Cumberland Resources Meadowbank Gold Project, GeoVector Management Inc., March 8, 2006. 1 volume
2) Detailed Design of Dewatering Dikes, Meadowbank Gold Project, Golders Associated Ltd., March 13, 2007. 3 volumes
3) Expert Review of Meadowbank Tailings and Dewatering Dike Designs, Letter from Norbert R. Morgenstern, March 30, 2007. 9 pages.
4) Meadowbank Gold Project, Type A Water License Application, Meadowbank Mining Corporation, August, 2007, 123 pages.
5) Meadowbank Gold Project, Operational ARD/ML Sampling and Testing Plan, Meadowbank Mining Corporation, August, 2007, 23 pages.
6) Meadowbank Gold Project, Mitigative Measures for Potential Seepage from Tailings Facility, Golder Associates, August 23, 2007, 11 pages.

2.2 Central (Tailings) Dike Design and Tailings Area Design

The Central Dike design has been changed such that it does not rely on a processed till core, but on impervious geo-textile materials. This addresses one of the greatest potential concerns from seepage of contaminated water during mine operation and after closure.

A potential issue still exists with the Central Dike and with the bottom of the tailings area leaking due to incomplete freezing of the bottom of the tailings area. The dike is being constructed on a known fault the extends through the entire length of the tailings area, and that fault has hydraulic connection to surrounding lakes. During operations this fault could conduct tailings contamination into the pits under the bottom of the tailings dike, and on closure into the rehabilitated lakes either through the dyke or through the bottom of the tailings due to the higher elevation of the tailings area (147m) in relation to lake level (132m).

GeoVector suggests that the proposed program by MMC to delineate and mitigate increased dike seepage should include the independent dike safety review committee, again with authority to recommend changes to rectify deficiencies. GeoVector also suggests that a “worst case” plan be prepared for implementation if monitoring indicates the possibility of incomplete freezing of the tailings area on closure.

Documents Reviewed:

1) Final Report of Technical Review of the Final Environmental Impact Statement for Cumberland Resources Meadowbank Gold Project, GeoVector Management Inc., March 8, 2006. 1 volume
2) Detailed Design of Central Dike, Meadowbank Gold Project, Golders Associated Ltd., March 16, 2007. 3 volumes
3) Expert Review of Meadowbank Tailings and Dewatering Dike Designs, Letter from Norbert R. Morgenstern, March 30, 2007. 9 pages.
4) Meadowbank Gold Project, Type A Water License Application, Meadowbank Mining Corporation, August, 2007, 123 pages.

5) Meadowbank Gold Project, Mitigative Measures for Potential Seepage from Tailings Facility, Golder Associates, August 23, 2007, 11 pages.
6) Meadowbank Gold Project, Fault Testing and Monitoring Plan, Meadowbank Mining Corporation, August, 2007, 9 pages.

2.3 ARD/ML in Waste Rock, Tailings and Water Quality Predictions

MMC has committed to re-evaluate the characterization of all mine waste materials for ARD, ML and non-metal constituents and re-evaluate rock disposal practices within two (2) years of commencing operations. This work will be completed by sampling of the waste rock and tailings. Any preventive or control measures required will be incorporated into the Waste Management Plan in order to better manage ARD/ML for the mine waste materials.

As part of MMC's plan it will be necessary to closely monitor the thermal characteristics of the mine waste storage areas in order to evaluate the thermal modeling that predicts that the mine waste storage areas will freeze within two (2) years of placement (BGC, 2004). If this thermal modeling is deficient and the waste materials do not freeze then one of the potential consequences may be an inadequate prediction of the water quality. This could result in a negative effect on the perceived impacts and mitigation plans required for ARD/ML in waste rock and the overall water quality during mining operations and post-closure.

Therefore, it GeoVector suggests that rather than waiting 2 years that monitoring should for ARD, ML and non-metal constituents and re-evaluation of rock disposal practices commence immediately at start of operations.

Documents Reviewed:

1) Final Report of Technical Review of the Final Environmental Impact Statement for Cumberland Resources Meadowbank Gold Project, GeoVector Management Inc., March 8, 2006. 1 volume.
2) Meadowbank Gold Project, Type A Water License Application, Meadowbank Mining Corporation, August, 2007, 123 pages,.
3) Meadowbank Gold Project, Mitigative Measures for Potential Seepage from Tailings Facility, Golder Associates, August 23, 2007, 11 pages.
4) Meadowbank Gold Project, Operational ARD/ML Sampling and Testing Plan, Meadowbank Mining Corporation, August, 2007, 23 pages.
5) Meadowbank Gold Project, Water Quality and Flow Monitoring Plan, Meadowbank Mining Corporation, August, 2007, 58 pages.

2.4 Abandonment & Closure

GeoVector feels MMC has put together a plausible outline of an abandonment plan based on current knowledge. With that said it is difficult, given the possible "adaptive engineering changes", to firmly define an abandonment plan at this time. It is suggested that MMC should provide an annually revised abandonment plan during operational life. This plan would reflect the growing knowledge of the challenges abandonment will face. These annual plans should then be reviewed by an independent committee, preferably made up of at least some members of the dike reviewing committee, as they will be familiar with the most important issues. This committee would have authority to direct further study into problematic issues and/or offer alternative solutions to these problems.

Documents Reviewed:

1) Final Report of Technical Review of the Final Environmental Impact Statement for Cumberland Resources Meadowbank Gold Project, GeoVector Management Inc., March 8, 2006. 1 volume.
2) Meadowbank Gold Project, Type A Water License Application, Meadowbank Mining Corporation, August, 2007, 123 pages,.
3) Meadowbank Gold Project, Preliminary Closure & Reclaimation Plan, Meadowbank Minng Corporation, August, 2007, 77 pages.