



MEMORANDUM

TO Rick Schryer - Fortune Minerals Limited

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CC Jen Gibson

FROM Ken Bocking

PROJECT No. 09-1373-1004.9600

**UNDERTAKING #6
CO-DISPOSAL FACILITY COVERS**

During Day 3 of the Technical Sessions for the NICO Project, the Mackenzie Valley Environmental Impact Review Board asked Fortune Minerals Limited (Fortune) to submit a description of the types of covers that have been utilized on existing co-disposal facilities, including the materials used, the depths of the covers (layers), and the nature of their performance (criteria).

The undertaking is in reference to the document on case histories (Golder 2012) of co-disposal facilities that Fortune provided to the Technical Meeting on 8 February 2012. The document provided case history descriptions of 8 specific co-disposal facilities.

Table 1 provides a summary of the nature of the covers proposed at the 8 co-disposal facilities. With respect to Case History No. 6, the unnamed mine in South Africa, there was no information available on any intended cover. Cover design concepts have been developed at the other 7 sites. These concepts are quite diverse, because each cover design reflects site specific conditions and objectives.

None of the 8 case histories are for facilities that have actually closed. Nunavik is currently under construction; the other 7 mines are currently in operation. As a result, there is little or no data available on the construction of the covers and no post-closure monitoring data.

Reference

Golder (Golder Associates Ltd.). 2012. Technical Memorandum: Co-disposal Practices in Mine Waste Management. Prepared for Fortune Minerals Limited.



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Table 1: Summary of Co-Disposal Facility Covers

Case History #	Mine Site	Cover Design	Cover Design Objectives
1	Neves Corvo Mine, Portugal	A layer of mine rock (at least 1 m thick for trafficability) to be placed over paste tailings deposit, overlain by 0.5 m layer of capillary break material, and topped with a final 0.5 m layer of engineered subsoil to support growth of native vegetation.	<ul style="list-style-type: none"> • Not intended to reduce infiltration since “normal infiltration” will not increase impacts on groundwater compared with pre-existing sub-aqueous deposition. • Capillary Break to isolate the surface vegetation growth layer from underlying mine rock. • Vegetation for aesthetics and to prevent erosion.
2	Green’s Creek, Alaska, USA	Composite soil cover. Surface to be re-vegetated.	<p>The soil cover will serve to:</p> <ul style="list-style-type: none"> • reduce Infiltration; • reduce oxygen ingress; and • resist erosion.
3	Cerro de Maimon, Dominican Republic	A deposit of clean waste rock will be placed over the underlying PAG tailings and PAG mine rock. Top soil will be placed on the final surface to support vegetation.	The surface deposit of clean mine rock is designed to increase infiltration which will keep the PAG tailings in a saturated state.
4	Krumovgrad, Bulgaria	Single layer of soil placed progressively over the outer face of mine rock and re-vegetated.	The co-disposal facility is designed to be free-draining, with ongoing monitoring of seepage. The soil cover is designed to support vegetation for aesthetic purposes.
5	Nunavik Nickel Mine, Quebec	Geomembrane capped with a layer of clean rock. Cover is considered “temporary” and will be redundant once the co-disposal facility freezes back.	<ul style="list-style-type: none"> • The temporary cover is designed to reduce oxygen ingress to the PAG tailings. • The co-disposal facility will freeze back permanently.
6	Unnamed Mine, South Africa	A deposit of mine rock will eventually overly the tailings. The mine is still in operation and no cover for the mine rock has been designed to date.	No information.
7	Brukung Remediation Project, Australia	Soil cover that will support vegetation over a storage layer of porous rock fill that is to be artificially flooded to keep the underlying co-disposed PAG wastes saturated.	<p>Soil cover designed to:</p> <ul style="list-style-type: none"> • decrease evaporative losses from the porous rock; and • support vegetation for habitat. <p>The porous rock fill layer is designed to store seasonal runoff to keep the underlying wastes saturated.</p>
8	Snap Lake, Northwest Territories	A cover of non reactive rock.	<p>Prevention from:</p> <ul style="list-style-type: none"> • erosion; and • animal intrusion. <p>Co-disposed wastes are benign.</p>

PAG = Potentially Acid Generating; m = metre