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C.O. BRAWNER ENGINEERING LTD.
Consulting Geotechnical Engineers

Suite 502, 100 Park Royal South
WEST VANCOUVER, B.C., CANADA V7T 1A2

Telephone: (604) 922-3717
(604) 987-2771
Fax: (604) 925-1366

FACSIMILE COVER SHEET

Fax No.: 952-0481

Date: October 13, 1995

Time: 9:14am

To: Tim Eaton

From: C.O. Brawner, P. Eng.

Total number of pages including cover sheet 4.

Message:

Dear Tim:

Attached are my review comments on the Knight & Piesold design report for the Mt. Polly project.

Sorry for the delay. The OMAI failure in Guyana has taken considerable time including three trips to the mine in 6 weeks!

I have not inspected the tailings site in the field. I suggest I accompany you on your next site visit before snowfall.

Regards

C.O. Brawner, P. Eng.

◆ Original to follow

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October 13, 1995

Mine Review and Permitting Branch
Ministry of Energy, Mines & Petroleum Resources
4th. Floor - 1810 Blanshard St.
Victoria, B.C.
V8V 1X4

Attn: Mr. Tim Eaton, P. Eng.
Manager, Geotechnical Engineering

Dear Mr. Eaton:

Re: Mt. Polly Tailings Dam

Further to the request of George Headley and instructions for a review of the proposed Mt. Polly tailings dam, I submit the following comments.

General

The plan is to develop three pits. From environmental, volume storage and tailings dam height considerations it is recommended that Imperial Metals be requested to review in detail the potential to mine the pit sequentially and place tailings in them on completion of Pit 1 followed by Pit 2. The stability and environmental benefits are significant. There may also be a cost saving.

Site Investigation

Only one drill hole appears to have been drilled in the main embankment area. In B.C. valleys there is always the possibility of buried high permeability zones. It is recommended that 2 more boreholes to expand the geotechnical information be drilled and tested.

Glacio-fluvial Sediments in the Tailings Basin

It is noted that obtaining good compaction and density of the till liner over the sediments will be difficult due to poor underlying support of the sediments.

Has removal of the sediments been considered so the liner is not required?

If the liner is placed it is suggested that a seepage cutoff be excavated and backfilled through the sediments near the upstream toe of the main embankment.

Excavate all weak soil to at least 10m upstream of the upstream toe of the main dam.

Underdrains

The design of all drain pipe must have sufficient strength to resist full earth load.

All drain lines that exit the dams must be designed so they can be cleaned for distances of about 100m.

All culverts and drain lines must be designed or protected from icing up in the winter.

Seepage Collection Pond

In the event that Imperial Metals may find more ore and tailings volume increase, the dam should only be increased in height by the downstream method. To allow for this the seepage collection pond should be located so such change will not encroach on the pond.

Filter Design

Filter gradation is required to be shown. The design must be conservative.

Random Fill

Provide the range of acceptable gradation.

Compaction

Substantial direction is made to the use of vibrating compactors. This method usually develops a moisture profile in the lift and brings fines to the surface. Whenever vibrating compactors are used the surface must be scarified prior to placing the next lift.

Where soils to be compacted contain a moderate clay fraction it is better to use a heavy grid or club foot compactor. The grid roller is the most versatile, being suitable to all soil and gradations and can be pulled at a faster speed than other types for equivalent density.

Groundwater Monitoring Wells

Provide the location of these wells. Several must be downstream. List test requirements.

Compaction Tests

Why is Modified Proctor density used as the reference? Standard Proctor density is more common. A higher moisture content can be tolerated with Standard Proctor criteria. Over-compaction results in a brittle dam structure with limited flexibility to deal with differential settlement.

Seepage Collection Pond Dam

Consider a low permeability cut-off under the dam.

Stockpile Stabilization Materials for Urgent Use

Develop stockpiles of artificial membranes, filter cloth, short horizontal drains, filter materials, sand bags *etc*, for use if unexpected events occur such as:

- dam overflow control if massive precipitation or runoff occurs;
- piping or seepage control from the dam slope, toe or valley floor develops;
- tension cracks develop in the dam.

Modified Centerline Design

The design proposed entails some of the compacted main dam to be constructed over loose to medium dense tailings. With this design variability in consolidation characteristics would be expected. This could lead to tension cracks near the top of the main dam and generally parallel to C.L. Stability analysis should allow for 10m deep tension cracks filled with water.

Vibratory compaction of the beach should also be considered for the beach zone in the zone downstream of the S.O.L. to ensure low compressibility results.

Winter Operation

Describe winter operation for disposal.

If you have any questions please contact me.

I suggest these comments also be forwarded to Imperial Metals so they can be sure the points raised are addressed.

Yours truly,

C.O. Brawner, P. Eng.

COB/pm