

From: Art Frye [artfrye@imperialmetals.com]
Sent: Wednesday, June 29, 2005 10:12 AM
To: 'Ken Brouwer'
CC: Ron Martel
Subject: RE: Freeboard at Polley

I would feel a lot better about this stuff if we had an actual survey of the water level that is tied in to a proper survey of the dam crest. Someone needs to do a level traverse around the dam noting any low spots tied into the original dam benchmarks and the current water level. Then once the staff gage is calibrated to this survey we could actually say with some confidence that we know what the freeboard is. GPS surveys are not accurate enough (for elevation) in cases like this.
Art

From: Ken Brouwer [mailto:kbrouwer@knightpiesold.com]
Sent: June 29, 2005 7:58 AM
To: Ron Martel
Cc: Howard Bradley; Terry Isaacs; Les Galbraith; Greg Johnston; Mark Burke
Subject: RE: Freeboard at Polley

101-1/10.01

Ron,

If the current water level is at 942.2, then adding the 1.4m allowance for PMP results in a minimum crest elevation of 943.6m. this implies that we only have 0.4 m of freeboard or just over 6 weeks (0.4/0.5*8 weeks) of capacity not 8 weeks. Also, I suspect that the crest may be a little low and not quite at 944 m in some places. If a detailed survey indicates that the lowest spot on the existing crest is 1/10th lower (ie 943.9 m instead of 944), then we only have 4 weeks to raise the crest. I suspect that this is actually the case and hence we may have **less than 4 weeks** to establish the required freeboard around the entire perimeter of the embankment.

Can we rely on the nominal 2 m high rockfill berm on the CBL for wave run-up protection in order to further reduce the freeboard requirement? This is **not recommended**. It is true that this interior berm would provide some redundancy in the event of a large storm, but should not be factored in as a design basis. It is my opinion that the greatest risk for tailings impoundment failure is due to overtopping due to inadequate capacity for storm water storage, and we should be working toward increasing the current freeboard rather than reducing it further.

It is important to recognize that the current design freeboard is based on an allowance for a PMP (Probable Maximum Precipitation) event that was determined several years ago. The methodologies for determining these extreme precipitation events has been refined over the last several years, and it will be necessary to re-define the PMP as part of the Dam Safety Reviews that are required by the Ministry of Mines. I suspect that this PMP event will increase as a result of this re-calculation. Also, it must be recognized that the Dam Safety requirements specify containment/control of the PMF (Probable Maximum Flood) rather than the PMP. The PMF includes the PMP event superimposed upon a significant accumulation of snow - ie it defines the maximum volume of water that occurs within the entire catchment area should the PMP occur in late winter or early spring of any year. Surface runoff diversion ditches above the TSF must also be assumed to breach, so the snow melt and runoff from the entire catchment area must be included in the PMF calculation. You will recall that in the early years of operation we kept an accurate account of the snow pack in the TSF catchment as we needed this water in freshet to support

the water balance. Therefore, we always retained enough storage capacity to collect the runoff and then we made an allowance for the PMP event on top of the snow melt. Hence, in the past we always maintained adequate freeboard for a PMF occurring on top of snow pack. The current water management strategy is significantly different as we are now dealing with a water surplus situation and as such, the snow pack accumulations typically aren't tracked and accounted for in the same manner as in previous years.

This requirement for inclusion of snow melt in the PMF is not necessary in the summer months, and we can still use a PMP freeboard allowance in the short term (ie this summer). However, we will need to review and increase this allowance before winter and implement a revised (increased) freeboard allowance prior to the formal Dam Safety Review to be completed next year.

In summary, I strongly recommend that the construction methods and schedule be developed in such a manner that will allow the freeboard allowance be increased as soon as possible. I will also review the PMP/PMF requirements in preparation for the required annual inspection of the TSF this summer.

As requested, we will also evaluate opportunities for use of PAG waste rock from the SE pit as a construction material in the upstream zone of the embankment. It is noted that the placement of a significant quantity of PAG waste rock within the tailings impoundment will also reduce the storage capacity available for tailings and the PMF, and will result in a requirement to increase the embankment crest elevation.

Best Regards,
Ken

-----Original Message-----

From: Ron Martel [mailto:rmartel@mountpolley.com]

Sent: Tuesday, June 28, 2005 9:19 PM

To: Ken Brouwer

Cc: Howard Bradley; Terry Isaacs; Terry Isaacs

Subject: Freeboard at Polley

Ken.

I as well like to think about this stuff before bed...

The current water elevation in the is TSF 942.175m...

With the 1.39m allowance for PMP (including freshet) and wave run-up...the adjusted elevation is 943.46m (say 943.5m)

Therefore, with little to no till placed this year...we must revisit our schedule...we have 0.5m to go before we enter our freeboard. This equates to approximately 8 weeks production (average weather conditions).

The test trial at the South Dam went very well... Zone U went in well and has similar characteristic as Tailings Cyclone sands. We would like to proceed along the Western Part of the Main Embankment, that is, raise the till core 2 meters and fill the upstream cell (100 to 150 m in length) to an elevation of 2m (i.e.. level with the till)... if we use this construction approach we might be at risk with respect to freeboard.

Here is the question, does the 15 to 18 m wide CBL zone complete with a nominal 2 meter high berm on the upstream side provide sufficient Wave runoff dissipation capacity to mitigate the 1

meter requirement in part or in full? Bare in mind the water is several hundred meters away (at the current water elevation)

In Quebec, I have seen break walls install in closed Tailings ponds to partly alleviate this requirement.

Ken, your thoughts are greatly appreciated...

PS. We have a tailings progress meeting tomorrow at 2:30 pm