From: Desbarats, Alexandre [Desbarat@NRCan.gc.ca]
Sent: Wednesday, April 09, 2003 7:29 AM
: 'Colleen English'
Cc: Burgess, Margo; Ramsey, John
Subject: Diffusion issue
(Colleen : Please forward to Robin)

Dear Robin,

I had a chance yesterday afternoon after the conference call to review my analysis of pressure measurements from the 2001 AEP in light of the information provided to me just before the call, in the power-point slides. As a result, I now have a better understanding of how the measurements were performed : I had assumed that pressures were referenced to a datum at the mid-point elevation of each test interval along the borehole whereas, in fact, all pressures in a borehole were referenced to the same gauge datum in the drift. The consequence of this is that I accounted for the vertical column of water in the borehole twice thereby overestimating the head by a small amount which is nonetheless quite significant in the present context. Therefore, I am much more optimistic that my concern about the existence of a demonstrable downward head gradient can be quite readily addressed without extensive reworking of the data.

I propose that you contact Lee/Don with the following outline of what NRCan requires in terms of additional information to allay concerns about upward diffusion :

1. Prepare, for each borehole of the 2001 AEP, a table showing .
   - test interval
   - test interval elevation datum (Z)
   - pressure as measured (P in m H20)
   - total head (H = gauge datum + P)
   - apparent downward gradient J = (LL - H)/(LL - Z) where LL is lake level

I now expect that only a handful of measurements will show a zero gradient whereas the large majority will make the case for a downward gradient quite compelling.

2. It has to be recognized that the downward gradients identified in 1) are the result of the natural, or background, gradient and an "artificial" gradient induced by mine dewatering during the AEP. Therefore, DBCMI should provide a brief analysis of the results from 1) that gives an estimate of the actual background gradient which is of interest in post-closure scenarios.

3. Although I am now just about convinced of a downward head gradient in the rock mass beneath Snap Lake, I have a remaining minor concern : Since these head gradients in the rock mass are quite low, would the gradients in the flooded drifts not be even lower given the lower resistance to flow ? If so, upward diffusion from backfilled stopes via flooded drifts could be an issue. I realize that estimating post-closure flow in flooded drifts is very difficult but I think that some sort of brief analysis is required to completely wrap up the upward diffusion issue.

I have discussed these comments with John Ramsey and we agreed that NRCan's official position would be that our concern about upward diffusion could be considered resolved by a satisfactory response as outlined above.
I would be happy to answer any questions from Lee or Don directly if that helps expedite a resolution of the issue.

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Yours sincerely,

Alexandre (Alec) Desbarats