

Johnson, Bill H (DNR)

From: Fred Marinelli <[REDACTED]>
Sent: Wednesday, August 29, 2012 12:29 PM
To: Carlson, Erik (DNR)
Subject: Fwd: FTB calc check

----- Forwarded message -----

From: Cory D. Anderson <[REDACTED]>
Date: Wed, Aug 29, 2012 at 10:47 AM
Subject: RE: FTB calc check
To: Fred Marinelli <[REDACTED]> "Peter J. Hinck" <[REDACTED]>
Cc: Paul Haby <[REDACTED]> Houston Kempton <[REDACTED]>

Fred, I will say that your point highlighted below is well taken and definitely needs some consideration. I think a big part of using the diffusion of the bentonite layer and the reaction rate of the tailings below is due to the simplification of assuming that the oxygen concentration at the boundary of the two layers is equal to atmospheric.

In reality, without an oxygen gradient through the bentonite layer, oxygen won't be pulled into the tailings as it's consumed. So this assumption is not right and is conservative. However, if we use atmospheric concentration of oxygen at the upper surface of the underlying tailings, AND the diffusion coefficient and reaction rate of the underlying tailings, the resulting depth of oxidizing tailings is no different with or without the bentonite layer.

I will work up a solution...probably tomorrow. Tina has let me know that there are other higher priorities for today which I need to focus on. But I'll get back to this ASAP.

Thanks Fred,

Cory D. Anderson

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resourceful. naturally.



From: Fred Marinelli [mailto:[REDACTED]]
Sent: Tuesday, August 28, 2012 6:25 PM
To: Cory D. Anderson; Peter J. Hinck

Cc: Fred Marinelli; Paul Haby; Houston Kempton
Subject: FTB calc check

Cory and Peter,

Please find two attached mathcad worksheets pertaining to the FTB North Beach during closure.

The first computes flow and sulfate concentration using equations presented in the Data Package and Waste Characterization reports. The values computed in the Mathcad worksheet compare favorably to values reported by GoldSim (blue values). I am however a bit confused over the equation used to compute the thickness (d) of the reaction zone in the NM tailings (below the bentonite-amended layer at ground surface). In the equation: $d = \sqrt{2 * D * C_o / r}$, I don't see a technical justification for using a diffusion coefficient (D) pertaining to the bentonite-amended layer and an O2 consumption rate (r) for oxygenated materials in the the non-amended NM tailings below the bentonite layer. Seems like apples and oranges to me. Cory, you are generally ahead of me on these things, so please help me out on this.

I did go ahead and develop an alternate calculation (other sheet), where the rate of SO4 generation is controlled by O2 diffusion through the bentonite-amended layer. Interested to know what you think of this.

Regards,

Fred

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Fred Marinelli

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