From:	Lindsay Newland Bowker
To:	Thomas Eastler; DEP, MiningComments2016
Subject:	Re: State of the Art Review Paste BackFill (Mixing cement with Tailings) Very Important ARD Management Technique
Date:	Monday, September 19, 2016 3:59:27 PM

Dear Dr. Eastler,

I happened to stumble into this wonderful current authoritative bibliograhy and analysis of paste back fill so am also adding to the miningcomments for the official public record by way of addressing your specific inquiry about this technology and explaining its relevance at our VMS deposits here in Maine where, as at Bald Mountain, the face of the pit would need to be somehow sealed almost immediately after being exposed to weather (see Mark Stebbins for the detailed analysis of this done for SRK). As I recalled from my research on Bathurst, lots of issues about its efficacy for high ARD generating surfaces, arsenic and additionally the cold wet weather as we have in Maine.

Under the pl 2011 C. 653 standard of "proven efficacy of technology" this bibliography and analysys suggests past backfill might not be considered to satisfy for the exposed pit walls. Until there is a specific extraction plan there is no way to say how it would fare in an underground approach at Bald. .

This is a major emerging issue globally as miners increasingly seek permission to use old open pits as temporary and permanent tailings facilities as is being done by Lundin at the Eagle mine which also has high ARD issues. (I haven't yet read the technical reports on the geochemistry and texture of the tailings, their ARD potential etc. or on what Lundin has done to prepare the old Humboldt open pit as a tailings depository. I suspect they are simply keeping it in the Humboldt pit under water cover with no other sealants (eg paste backfill).

Perhaps your students would enjoy tangling with this as well as it illustrates how the efficacy of any given technology depends so much on geochemistry, geology, climate and so many other features of a given deposit.

We will face greater challenges in making this determination because there are so few comparables fr us to look at..very few VMS deposits have been economically mined and I am not sure how many of this very few have any experience at all with paste back full.

Obviosuly it is not enough to say it worked at a Porphyry deposit in New Mexico. That statutory standard of proven efficacy of technology has been avoided by DEP in its several attempts to write implementing rules. Working through the caveats and findings of this excellent bibliography

begins to flesh out what constitutes "proven efficacy". At a minimum it would seem "similar geology, geochemistry and climate" would be a standard to start with and give a hand hold on how to work through it with a prospective applicant case by case.

Trust this is helpful and refer you to the compilers and analysts of this excellent paste backfill state of the art review for any technical questions you might have. Maybe they would even do a skype visit with you and your students to answer your questions and also with the BEP.

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On Mon, Sep 19, 2016 at 11:50 AM, Lindsay Newland Bowker <lindsaynewlandbowker@gmail.com> wrote:

> Dear Dr. Eastler:
>
> The technique you referred to in the course of hearings is called ***"paste backfilling***" and is used primarily to seal the walls of underground excavation tunnels.
>
> Although the science is not yet in, it was recommended as essential to sealing the face of the open pit walls at Bald (because the groundwater runs right through it and because the walls would be strongly reactive if not immediately covered would immediately start non stoppable acid generation.
>
> Bathurst used this technique ad it is beginning to break down because it doesn't perform well where there is high ARD (the cement itself is neutralizing but if the acide levels are high .
>
> Use and effectiveness of paste backfill is a key issue (especially n he incrrsaingly prevalanet use of old open pits for deposition..a highly questionable practice that is being used for the Eagle)

I can't refer you right off hand to my prior research and have not compiled a bibliography on paste back fill for open pits, underground walls, or for closure. There is quite a bit though and given your interest in this important technology it would be a huge contribution to the present process if you and and your stdents could cmpileand analyze where the industry is on paste back fill and share that with DEP and your fellow Board Members.

If I run across anything I'll send it along.

Important to note though Dr. Eastler that paste backfll applications use only a tiny proportion of tailings. It isn't economically or otherwise feasible to dispose of all 22 million tonnes of tailings at Bald Mountain as paste back fill.

Good luck with your present deliberation . It was heartening to see the immense courtesy and mutual respect with which the Board and witnesses exchanged their questions and concerns.
Best Regards,

Lindsay

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