From: "David Harpley" <david@canadianzinc.com>
Subject: Fwd: RE: Y14103320-01 Prairie Creek, Clarification for DAR content
Sent date: 05/31/2015 05:21:37 PM
To: "Sachi De Souza"<sdesouza@reviewboard.ca>
Cc: "Alan Taylor" <alan@canadianzinc.com>

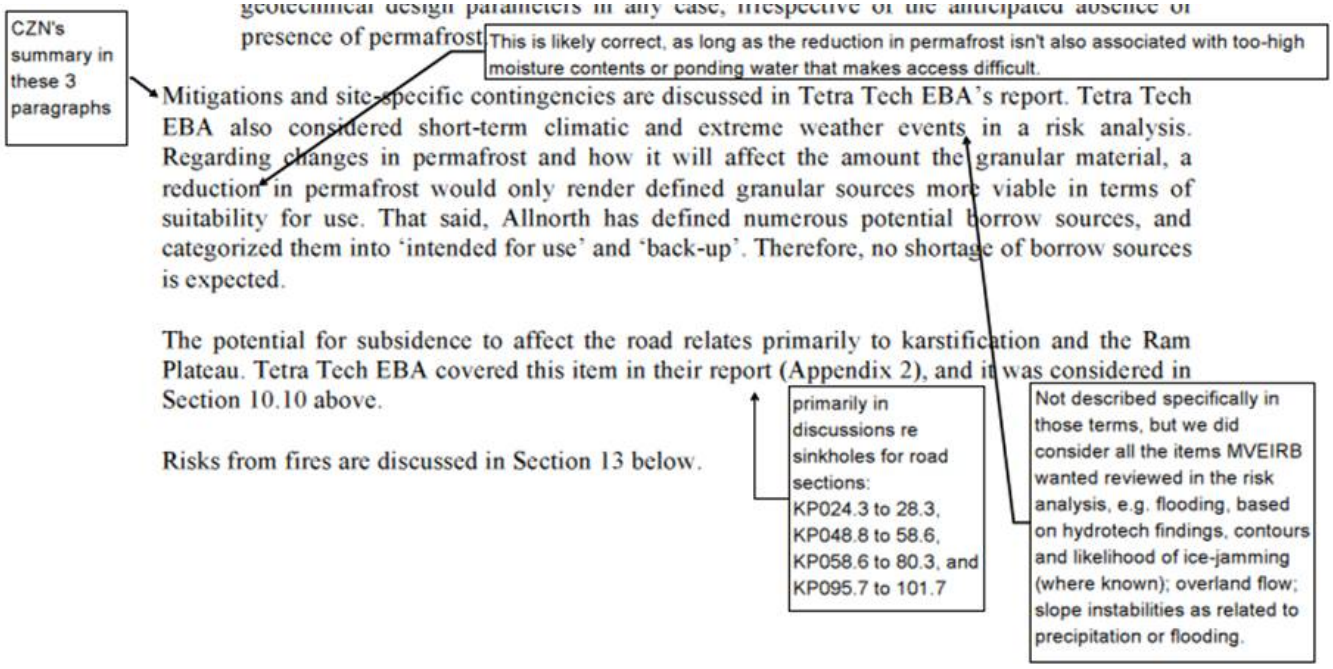
FYI
--
David Harpley
VP Environmental & Permitting Affairs
Canadian Zinc Corporation
Office 604 688 2001, Home Office 604 594 3855
----- Forwarded message from "Kors-Olthof, Rita" <Rita.Kors-Olthof@tetratech.com> -----

Date: Sun, 31 May 2015 23:23:28 +0000
From: "Kors-Olthof, Rita" <Rita.Kors-Olthof@tetratech.com>
Reply-To: "Kors-Olthof, Rita" <Rita.Kors-Olthof@tetratech.com>
Subject: RE: Y14103320-01 Prairie Creek - RE: Clarification for DAR content
To: "David Harpley (david@canadianzinc.com)" <david@canadianzinc.com>
Cc: "Alan Taylor (alan@canadianzinc.com)" <alan@canadianzinc.com>, "Jones,Kevin" <Kevin.Jones@tetratech.com>

Hi David,

As requested, I have checked CZN's DAR and Allnorth's report for consistency with ours, based on a keyword search in the DAR, and a search for items that I discussed with Allnorth for their report. I did not do an exhaustive read-through. I have noted a few differences as listed below, but none of these seem insurmountable.

- CZN's excerpts from our text appear to be almost without exception copy-pasted. On p. 276 of the DAR, there is a short section not copy-pasted but a summary, which I have marked with callouts as to the items referenced.



In general, CZN's summary is consistent with our observations and recommendations.

Tetra Tech EBA and Allnorth had some detailed discussions about the design and construction implications of permafrost along the route. Allnorth's permafrost summary is therefore generally consistent with our permafrost-related observations and the intent of our recommendations. For one item in this section, on p.47 of their text (p. 56 of Appendix 1A pdf), however, we would be more inclined to emphasize the need for site-specific design, rather than suggesting "typical" cut slopes:

5. The "Northern Land Use Guidebook" suggests steep cut slope on permafrost terrain. The theory behind this approach is to minimize the initial mineral soils exposure and disturbance thereby potentially reducing the short term thawing of permafrost. However, with this approach it is expected there will be additional longer term maintenance of the ditches and cross drainage culverts as the slopes settle to a natural stable state during the thawing process. Generally this report reflects this approach with typical cut slopes at 1:1 or steeper however a final design and approach will also reflect unique site and soil conditions.

Site-specific details on soil types and ice content would be collected prior to detailed design and used to confirm the proposed cut slope angles. The design would also allow for permafrost if present, including mitigation of exposure and thawing which may not stabilize. Allnorth have retained the intent that the configuration will be fine-tuned during detailed design, which is good.

Similar text appears on p. 10 of the Allnorth report (p. 19 of pdf), in the general discussion of road construction techniques, as shown below. Again, they have retained the intent that the configuration can be fine-tuned during detailed design. We have clarified in our own text INAC's specific guidelines and augmented it with TAC 2010 possibilities, along with some cautions regarding site-specific conditions.

To minimize impacts related to permafrost, the standard approach taken regarding the cut slope angle will be 1:1 with some variability depending on soil type and site conditions. This approach is intended to minimize the initial mineral soils exposure and disturbance, thereby potentially reducing the short term thawing of permafrost. It is expected that there will be a need for longer term maintenance of the ditches and cross drainage culverts as the slopes settle to a natural stable state and the thawing of any permafrost stabilizes.

There are occasional references in Allnorth's report, some of which have been transcribed into CZN's report, to fill or corduroy as "insulation," e.g. on p.234 of CZN report. We would like to emphasize that the primary intent of these materials is not as insulation, nor would they necessarily help to prevent or reduce permafrost thaw. We anticipate that appropriate use of fill-only construction and corduroy will be a cost-effective way to help reduce disturbance to or flexing of the subgrade, and mitigate the effects of thaw, including possible differential movements in the road grade or TTF pad. The design of embankment fills, with or without corduroy, would need to be based on site-specific information. We've addressed these ideas in general terms in our mitigations section, which has been imported into the DAR.

For the design of cut slopes and fill slopes, Allnorth refers to the BC Ministry of Forests, Lands and Natural Resources Engineering Handbook, excerpts of which they have inserted in their report. Some of the suggested cut slope and particularly fill slope angles may be somewhat steeper than what we would usually recommend for long-term stability. In our conversation, Allnorth noted that any significant or consistent flattening of proposed slopes may have an effect on the necessary ROW width, thus affecting total disturbed area. We agreed that sliver fills should be avoided, and that there might be sections that could benefit from additional toe support to limit fill extents. Again, the necessary slope configurations are to be determined on a site-specific basis during detailed design.

"Overburden" has been defined it in our respective texts as material that is considered to be unsuitable within the road grade, but there is some variation in what should be considered "unsuitable" aside from organics and woody debris. Specific material types constituting "unsuitable" materials would be identified along the route during detailed design, as this will vary somewhat according to location along the road, as well as the use for which they are proposed.

We believe that these and possible other differences in the texts can be addressed by specifying that the Tetra Tech EBA report governs on permafrost-related questions. For other items that do not necessarily correspond exactly between Tetra Tech EBA's report, Allnorth's report and/or the DAR, we anticipate that such items can be easily reconciled during detailed design, for example, such items as fill/cut slope angles, or precise road locations, or what exactly constitutes "overburden" at any particular road section. If there are still questions that cannot be resolved, then the team would be pleased to respond to those questions.

Thanks,
Rita

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