From: Greg Thompson [mailto:gthompson@houstoneng.com]
Sent: Tuesday, May 19, 2015 11:29 AM
To: Steffen, Donn
Subject: RE: Hydraulic Impact Analysis - Coyote Creek Mine Proposed Haul Road

Donn,

Thank you for giving me the opportunity to conduct the hydraulic analysis on Coyote Creek. Since the presentation includes many images and graphics, the file size gets to be too large to email. Please reference the PDF using the ftp site link below:

Coyote Creek – Mercer County WRD 5-15-2015.pdf (36 MB)

When I was out to review the proposed haul road site and visit with Casey about some of the historic flooding characteristics, I couldn't help but notice the erosion that has occurred in the bypass channel. As a water resources engineer, I felt obligated to bring up some of the concerns I had, specifically because the head cutting has extended upstream to the County Road 25 crossing with Coyote Creek.

Since the bypass channel replaced 4,500 feet of low flow channel with the ~750 foot bypass channel, the creek slope through this area is steeper than it was originally. The channel slope is steeper than it can maintain with the given type of channel bed material. This is causing "head cutting" of the channel where the rolling rapids erode the creek bed. This will continue moving upstream until the channel flattens to a slope that won't erode the soil materials. There are a few items to consider in the future regarding the head cutting:

1. The erosion through this area will cause soil particles to be suspended in the flow which will eventually deposit at some location downstream. This deposition could occur near the proposed haul road culverts, but it could also remain suspended all of the way to the Knife River. I suggested that the effects of the erosion be monitored in the future so it doesn't reduce the capacity of the downstream channel or culverts.
2. I expect the head cutting to continue migrating upstream which could introduce problems with the foundations of upstream structures such as the bridge along CR 25. The head cutting should be addressed if any improvements are made to any structures upstream of the bypass channel.
3. I am unsure of the fish migrating patterns through Coyote Creek, but since the creek drains to the Knife and Missouri Rivers, I'd imagine the it could be used for spawning habitat. Often times abrupt vertical changes in river profiles prevent fish from further upstream migration. However, properly designed rock drop structures are often used to maintain channel grade while continuing to allow fish migration. I also suggested fish migration should be considered with the current condition of the system and with any future modifications.

I believe this covers most of the points I made after the presentation.

Please let me know if I can be of any further assistance to you and your team.

Thanks,

Greg Thompson, PE CFM
Principal/Project Manager
Houston Engineering, Inc.
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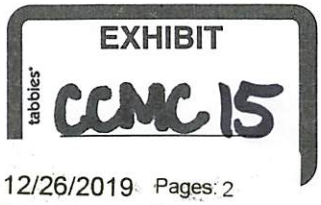

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From: Steffen, Donn [mailto:Donn.Steffen@nacoal.com]
Sent: Monday, May 18, 2015 5:29 PM
To: Greg Thompson
Subject: Hydraulic Impact Analysis - Coyote Creek Mine Proposed Haul Road

Good afternoon Greg,

Thanks for presenting the results of the hydraulic impact analysis that Houston Engineering performed for Coyote Creek Mining Company's proposed haul road across Coyote Creek to the Mercer County Water Resource Board on May 14, 2015. Can we get a copy of your PowerPoint presentation in PDF format?

After your presentation to the Board you brought up some stability concerns with the bypass channel that the Voigts constructed in 2011. Some of the concerns were related to potential deposition, head cutting and effects on fish. Can you summarize the concerns that you discussed with the Mercer County Water Resource Board at the May 14, 2015 meeting.

Sincerely,

Donn Steffen, P.E.
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