northgate
environmental management, inc.

From: Deni Chambers, CEM
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Date: December 2, 2010

To: Shannon Harbour, PE
Nevada Division of Environmental Protection

RE: *Nevada Division of Environmental Protection (NDEP) Response to: Technical Memorandum: Response to Request for Description of Slope Cutting in the Vicinity of the PRP (Inlet/Outlet) Water Lines*, dated November 29, 2010,

and

NDEP-TRX-NGEM Webex to discuss Environmental Covenants and PRP Pipe Lines, December 2, 2010

On behalf of Tronox LLC (Tronox), Northgate Environmental Management (Northgate) has reviewed the Nevada Division of Environmental Protection (NDEP) comments on the above technical memo and as discussed during the above conference call, and has prepared the following response.

1. *General comment: NDEP additionally reviewed the following Deliverables for information concerning the area in the vicinity of the "PRP lines":*

    a. *Section 2.2.15 and Figures 2, 3, and 19: Environmental Covenants, Institutional and Engineering Control Plan, Tronox LLC, Henderson, Nevada (dated November 19, 2010)*

    b. *Figure 19: Update to Environmental Covenants, Institutional and Engineering Control Plan, Tronox LLC, Henderson, Nevada dated November 19, 2010 (dated November 24, 2010)*

    Response: Tronox understands that NDEP reviewed the noted documents as part of reviewing the PRP Inlet/Outlet Pipe Memorandum.

2. *TRX should at a minimum provide the following information and data:*
    a. *Depth to the PRP lines.*

    b. *Calculations supporting a minimum setback of 10 feet from the PRP lines.*

    c. *Calculations supporting a minimum slope of 3:1 for the PRP lines.*

Response:

a. The approximate depth of the PRP lines are shown on Cross-Sections A-A', B-B', and C-C' (see attached figures). This depth is approximately 3.5 feet below current ground surface. Potholing by the Contractor indicates that the lines are two 12" diameter HDPE pipelines sometimes side-by-side and sometimes one pipeline vertically over the other.

b. The 10-foot distance from the mapped centerline of the pipelines to the top of the cut slope was based on the following factors:

- The importance of these lines to the groundwater treatment system operations and the need to avoid damaging the lines during excavation;
- The level of confidence in knowing the location and depth of the lines; and
- The need to maintain sufficient soil cover around the lines to resist forces due to static pressure and momentum reactions caused by water flow.

The 10-foot setback was based on the professional judgment and experience of Northgate and Las Vegas Paving (Contractor), in order to remove as much impacted soil as possible, while maintaining a reasonable safety factor, considering the above factors.

Establishing a temporary cut slope setback was discussed in the *Errata to the Excavation Plan for RZ-D*, dated September 27, 2010. NDEP acknowledged that a temporary setback would be necessary to facilitate remediation until final setbacks could be established and approved. The basis of the final approval was to be based on NDEP approval of the *Slope Stability Memorandum* which was conditionally approved by NDEP on November 24, 2010. Since the excavation in the area of the WC ponds began the week of November 1, Tronox evaluated the PRP Pipeline conditions and the above considerations and selected a temporary setback as shown on the attached Figures 2, 3, and 4. These distances were less than those proposed in the September 27th Errata, as acknowledged by NDEP. Tronox recognizes that the temporary setbacks from the PRP pipelines were not approved by NDEP, but Tronox proceeded with the temporary setback in order to complete RZ-D remediation in an attempt to meet the project schedule.

Tronox feels that the temporary setbacks from the PRP Pipelines are reasonable, protective of the Site workers, public health and safety, and were successful in allowing nearby excavation without damage to these important pipelines. The area around the WC ponds will be subject to the institutional and engineering controls contained in the *Environmental Covenant Plan (IC/EC) Plan* and will be overlain by an engineering control and the limits marked as required by NDEP.

The estimated volume of soil left in-place outside of the 3:1 subsurface slope is approximately 7,500 cubic yards, of which an estimated one-quarter could not be physically removed because it is supporting the PRP pipelines, as shown on Figure 3. This estimated volume is approximately 1.4 percent of the estimated soil requiring remediation left in-place in pond embankments and under the ponds

c. The cut slope inclination of 3:1 was based on the slope stability analysis for the subsurface cut slopes. The calculation for the 3:1 subsurface cut slopes are contained in the October 18th Slope Stability Memorandum.

3. *TRX should provide discussion on the feasibility of alternative excavation procedures or equipment that would allow for excavation to continue as approved. (e.g. air knifing, phased excavation, etc.)*

Response: Tronox has consulted further with the Contractor regarding excavating closer to the pipelines. The Contractor has told Tronox that in order to excavate closer to the pipelines they will have to perform extensive uncovering of the lines to establish pipeline locations and depths. This operation is delicate work and will take Contractor time and forces.

The Contractor could use other measures, such as air knifing, to expose the pipelines in lieu of conventional excavation for exploration purposes. Excavating in sections to reduce impacts to the pipelines is not considered feasible due the flexibility of the pipelines and the need for full support and constraint, since the pipelines will remain in service. It is essential to maintain the elevation of the pipelines and prevent sagging to avoid air locking.

Attachments (4)

1 PRP Pipeline

2 Cross Section A-A'

3 Cross Section B-B'

4 Cross Section C-C'