TRONOX

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Mr. Brian Rakvica, P.E.
Nevada Division of Environmental Protection
1771 East Flamingo, Suite 121-A
Las Vegas, NV 89119-0837

Subject: NDEP Facility ID H-000539 – Tronox (formerly Kerr-McGee) ECA – Tronox Response to NDEP Comments of September 6, 2005 Regarding the *Conceptual Site Model*

Dear Mr. Rakvica:

Tronox LLC (formerly Kerr-McGee Chemical LLC) has undertaken an Environmental Conditions Assessment (ECA) for the Henderson, Nevada facility as directed by Nevada Division of Environmental Protection (NDEP). Integral to that investigation is understanding site conditions. Towards this end a *Conceptual Site Model* (CSM) has been developed for the site and this was forwarded to NDEP earlier this year. NDEP commented on the CSM and the then Kerr-McGee Chemical LLC (now known as Tronox LLC) responded to NDEP's comments. NDEP provided additional comments regarding the CSM on September 6, 2005 and this correspondence responds to those comments.

Feel free to call me at (702) 651-2234 if you have any questions regarding this correspondence. Thank you.

Sincerely,

Susan Crowley
Staff Environmental Specialist, CEM 1428

Overnight Mail

CC: Public Repository
Jennifer Carr, NDEP
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Todd Croft, NDEP
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Val King, NDEP
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Craig Wilkinson, TIMET
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Pat Corbett, Kerr-McGee
John Dixon, Kerr-McGee
Brad Dougherty, AIG
Dave Gerry, ENSR
Ed Krish, ENSR
Tom Reed, Kerr-McGee
Don Shandy, Kerr-McGee
Rick Stater, Kerr-McGee

Attachment

Attachment A

1. **NDEP Comment:** Response 1c and 4, as discussed previously, KM should plan on completing a data validation report for the data sets to be used in the development of the CSM and other project documents. Please note that data validation is not only applicable to risk assessment.

   Tronox Response: *Tronox will include the data usability report (ENSR June 2005) as an appendix to the revised CSM. This report evaluated the data used for the CSM based on use for site characterization, remediation, and risk assessment. Tronox understands that data validation and data quality review are important aspects of the site assessment and remediation process and that these activities will be an integral part of future investigative efforts.*

2. **NDEP Comment:** Response 5, KM states that soils data will be added to the plates for chromium, TPH and manganese. All available soils data should be used in the development of the CSM.

   Tronox Response: *Comment noted. All of the data found in the files reviewed were used for the development of the CSM. Data gaps will be identified, and addressed in future investigative work.*

3. **NDEP Comment:** Response 11, please explain if and when KM plans to start collecting TDS data as part of the quarterly sampling.

   Tronox Response: *Tronox will start collecting TDS data beginning with the annual May 2006 sampling event and will continue to follow this constituent.*

4. **NDEP Comment:** Response 24 (and related comments), where a data gap is identified (e.g.: site characterization incomplete), please make this clear in the text of the report.

   Tronox Response: *Data gaps will be identified in Chapter 8 and, where appropriate, within the previous chapters' texts describing the site conditions. Generally, the data gaps will be addressed on a Site-wide basis as opposed to a LOU by LOU basis.*

5. **NDEP Comment:** Response 38 (and related comments), chromium (and other chemicals) can be compared to a threshold concentration, however, this concentration should have a basis (e.g.: USEPA Region IX PRGs, SSLs or similar).

   Tronox Response: *Comment noted.*

6. **NDEP Comment:** Response 55, the NDEP disagrees with KM's proposal to omit this discussion. The data collected for airborne manganese are useful and should be discussed in the CSM. It is suggested that the data be retained and discussed in the CSM in a modified format.

   Tronox Response: *The information will be retained, in a modified format.*

7. **NDEP Comment:** Response 65, it is suggested that if KM would like to include any discussions relating to background that the NDEP-approved ENVIRON data set be used. Also, to be noted, the BMI/TIMET data set may be approved before the CSM is revised and this could also be used.

   Tronox Response: *Comment noted. In addition, information from Tronox's Upgradient Investigation, and others, may be used if approved and available as a revised CSM is published.*

8. **NDEP Comment:** Response 76b, it is suggested that KM contact BMI to obtain the detection limits.

   Tronox Response: *Kerr Mc-Gee will contact BMI and request this data.*

9. **NDEP Comment:** Response 77c (and related comments), please note that the NDEP prefers the presentation of the SQL (when available) as the detection limit.

   Tronox Response: *Comment noted.*

10. **NDEP Comment:** Response 96, the NDEP disagrees with KM's response and provides the following comments:
    a. Please provide copies of the references cited in this response (for record keeping purposes of the NDEP).
    b. KM states that "water from precipitation is held within the root zone where it is removed by evapotranspiration", this statement implies that there are roots within the root zone. A vast majority of the KM site does not contain plants. Please explain the relevance of this statement as it applies to the KM site.
    c. KM references reports that were generated for the Yucca Mountain site which is vastly different than the KM site. The Yucca Mountain site is located in rural Nevada with a very deep water table. The KM site is located in an urban environment with dense population and a relatively shallow water table. It is likely that the hydrologic environment in these two areas behaves in a very different manner. Overland transport of storm water onto the BMI Complex from the surrounding urban areas has been noted and likely influences the percolation of rainwater into the subsurface.

d. KM states "areas that have a soil or alluvial depth of less than 5 meters (16.5 feet) and within active stream channels, rainwater could infiltrate and percolate to the water table, possibly driving contaminants with it." This does not respond to the NDEP's original comment which discusses infiltration into subsurface soils and the vadose zone. KM's statement also does not address the presence of preferential pathways within the subsurface environment (e.g.: geologic or anthropogenic).
e. The NDEP has responded to this issue as raised by other BMI Companies, a few examples of the NDEP's position on this subject are provided below:
    i. NDEP letter to Stauffer dated July 23, 2003, Page 5, Response to Comment 5: *Copies of the Scanlon, et al., 1990 paper and the Gee et. al. 1994 paper were provided to the NDEP to support statements in the RAS report for the former ACD Plant. The Scanlon, et al., 1990 paper could not be adequately reviewed because pages are missing. The Gee et. al. 1994 paper was provided to support the assertion in the RAS that "arid areas have such high rates of evapotranspiration relative to recharge that the net recharge into the vadose zone is zero"* **(KM should note that this statement is very similar to the position that is being asserted by KM to the NDEP).** *A review of the Gee et. al. 1994 paper does not appear to confirm the above statement. In fact the reference can be used to show that recharge could be significant. The paper states the following: "Results from independent studies at three desert sites in the western USA show the relative influence of soils and plants in reducing the potential for recharge. Vegetation appeared to be the primary control of water balance at these desert sites. Significant water accumulation in soils was observed at all three sites when plants were removed. Water accumulation and deep drainage accounted for as much as 50% of the annual precipitation at the Las Cruces and Hanford sites. Elevated water storage in bare soils persisted at Beatty for > 3 yr, even during years with below-normal precipitation, while water was quickly removed by evapotranspiration on an adjacent vegetated site." As previously noted by the NDEP, and acknowledged by Stauffer in their response to comment 4, vegetation does not appear to be present at the site to any extent that would influence evapotranspiration. The potential for recharge to occur appears to be significant. Without additional data, the amount of potential recharge that may occur cannot be estimated with reasonable accuracy. The facility-wide CSM needs to address this issue.*

ii. NDEP letter to Stauffer dated July 23, 2003, *the response continues to state, "With respect to potential infiltration, it appears that little or no vertical infiltration occurs based on observations in the field during storm events. For example, during a storm event in August of 1983, heavy rainfall occurred for about 20 minutes. Overland flow was observed after 5 minutes of heavy rainfall and continued for about 20 minutes until the heavy rainfall ceased. A field geologist scraped away the wet surface sediment to see how far the wetting front had penetrated. He recalled that it had penetrated less than one-inch bgs, and there was a sharp edge noted between the wet and dry sand. This thunderstorm only generated runoff and did not generate any significant infiltration of water." While interesting, this study does not follow any scientific process and cannot be used to justify that infiltration doesn't occur. There is no supporting documentation regarding rainfall intensity, location of observations, condition of surface, etc. This study also contradicts the results of other studies in the arid southwest that were completed using scientific methods over a period of time. For example, USGS 1991 (see reference below) observed that after 3.5 inches of rainfall during the two-month period from July 1984 to August 1984, water levels in well PG220 (located in the Upper Ponds) rose 5 feet and peaked in June 1985, about 10 months later. This 5-foot rise in the water table occurred during the summer months when evaporation rates are typically high. Reference: USGS, 1991. Changes in Water Levels and Water Quality in Shallow Ground Water, Pittman-Henderson Area, Clark County, Nevada, Resulting from Diversion of Industrial Cooling Water From Ditch to Pipeline in 1985. Water-Resources Investigations Report 89-4093, page 15. The response continues to state, "The average rainfall in the area is about 4 inches. Assuming a 100% infiltration (0% runoff, 0% evaporation), this is only enough water to saturate about 12 to 16 inches of soil or bring about 30 or so inches of soil to field capacity. A 50-foot soil column with 25% porosity would take about 12.5 feet water to saturate; one foot of water would create about 2% soil moisture." This analysis is incomplete as it does not consider infiltration during heavy rainfall events and water accumulating below the evaporative zone over the long term. The analysis is also inconsistent with many other long-term studies that have been conducted for waste disposal sites in the arid southwest (see comment 9 in NDEP's letter dated August 29, 2001, comments 9 and 12 in this set of comments and the above paragraph). It should be noted that the ambient soil moisture content measured in other parts of the BMI complex (e.g., Upper Ponds) ranges from approximately 5% to approximately 12%.* **The NDEP has mentioned this reference to KM in the past.**

iii. NDEP letter to Stauffer dated August 29, 2001, *Second bullet: High evaporation rates can prevent surface water from infiltrating beyond certain depths. However, a maximum evaporative zone depth exists beyond which evaporation will not remove moisture from soil. At sites where vegetation is absent (which appears to be the case for the site), the effects of evaporation are generally limited to the upper portion of the soil column. For example, the USGS has shown that the water content in the uppermost 4 feet of soil can increase at an arid site in the Mojave Desert when vegetation is removed (Andraske, B.J., et. al., Waste Burial in Arid Environments-Application of Information From a Field Laboratory in the Mojave Desert, Southern Nevada, USGS Fact Sheet FS-179-95). The USGS has also shown that the potential for deep percolation does exist in an arid climate, in spite of high annual evaporative demands (Nichols, W.D., 1987, Geohydrology of the unsaturated zone at the burial site for low-level radioactive waste near Beatty, Nye County, Nevada: U.S. Geological Survey Water-Supply Paper 2312, 57 p.). The extent to which rainfall percolates through the soil column below the maximum evaporation depth, during ponding or high intensity rainfalls, does not appear to have been evaluated at the site. If evaporation rates are used to justify that infiltration of precipitation does not occur beyond a certain depth, a quantitative evaluation, which considers site-specific conditions, needs be performed.*

iv. These are a few examples of NDEP's responses to the same issue as raised at the Stauffer site. The NDEP has also covered this issue at length with BMI/BRC and can provide additional examples, however, it is the belief of the NDEP that further response from the NDEP is unnecessary. If KM would like to continue to discuss this topic the NDEP can provide additional documentation that supports the NDEP's position.

Tronox Response: *(10 a) Copies of the referenced material will be sent to NDEP.*

Tronox Response: *(10 b) The statement pertains to the research completed by Flint et al., as it relates to vegetation which is present. It is acknowledged that there is little vegetation covering the Site.*

Tronox Response: *(10 c) Comment noted.*

Tronox Response: *(10 d) The statement is acknowledging that the areas below stream channels could be preferential pathways for surface water to percolate through the vadose zone to the water table. The statement also acknowledges that contaminants could be carried or driven by the infiltrating water.*

Tronox Response: *(10 e) Comment noted. Tronox will include this pathway.*

11. **NDEP Comment:** Response 106a, KM should also review and incorporate the data collected by others (e.g.: SNWA).

    Tronox Response: *Pertinent, available data regarding the Las Vegas Wash will be presented in tables and in the text.*

12. **NDEP Comment:** Response 107, please provide the appropriate reference in the report so that the reviewer can locate this information and review it (if necessary).

    Tronox Response: *The reference is http://www.cityofhenderson.com/planning/Maps/zoning.pdf. This will be included in the text.*

13. **NDEP Comment:** Response 112, it is not reasonable to expect the reviewer to seek out bills of lading and waste manifests to determine the composition of site-related wastes. Understanding and presenting the composition of these wastes is important in the development of a comprehensive CSM.

    Tronox Response: *This table is from the Kleinfelder 1993 Phase I report. It is based upon an extensive search of Tronox's records and anecdotal information provided by knowledgeable persons interviewed. It is acknowledged that the records do not provide extensive data pertaining to the composition of site related wastes*

14. **NDEP Comment:** Response 113b, please note that the toxicity of phosphorous is significantly different than white phosphorous. It is suggested that this entry be deleted.

    Tronox Response: *The reference to White Phosphorous and the accompanying EPA PRGs for White Phosphorous will be taken off the table.*

15. **NDEP Comment:** Response 113d, there are PRGs that are applicable to DDD and DDE and these should be added to Table 6.

    Tronox Response: *DDD and DDE are on Table 6 but appear to be out of alphabetical order. This will be rectified.*

16. **NDEP Comment:** Response 119, it is recommended that the bold type be retained, however, a note should be added that explains the significance of the bold type on this table.

    Tronox Response: *A note will be added that states "Detected values are shown in* ***bold*** *type."*