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September 5, 2012

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Mr. David Cobrain
New Mexico Environment Department (NMED)
Hazardous Waste Bureau
2905 Rodeo Park Dr. E/Bldg 1
Santa Fe, NM 87505

RE: Evaluation of *Response to the Disapproval of the Lower Mortendad/Cedro Canyons Aggregate Area Investigation Report*, Los Alamos National Laboratory, New Mexico, dated June 13, 2012.

Dear Mr. Cobrain:

This letter serves as a deliverable and addresses the evaluation of Los Alamos National Laboratory's (LANL's) *Response to the Disapproval of the Lower Mortendad/Cedro Canyons Aggregate Area Investigation Report*, LANL, New Mexico (June 2012). As noted in an email dated August 24, 2012, Mr. Dan Comeau requested an evaluation of the responses to the risk assessment-related comments. With the exception of General Comments 1 and 4 discussed below, the responses to all other comments, and any subsequent revisions to the report were adequate as provided.

**General Comment No. 1:** LANL disagrees that the construction worker receptor at Lower Mortendad/Cedro Canyon Aggregate Area should be evaluated as current and reasonably foreseeable future land use does not involve site development or construction: future plans by LANL do not include construction at the Technical Area (TA)-05 sites. Exclusion of a future construction worker scenario is potentially concerning as inhalation toxicity for certain metals are more conservative than those for a resident. A review of exposure point concentrations for all the metals carried forward to the risk assessments were reviewed, and none of the inorganic constituents of concern have more stringent soil screening levels (SSLs) for the construction worker than the resident. Therefore, inclusion of the construction worker would likely not impact the overall results of the risk assessment. However to ensure consistency with past comments and requirement posed on other sites, NMED may wish to consider approval with the condition that LANL must reevaluate the construction worker scenario if future development occurs.

**General Comment No. 4:** For assessing the risk associated with chromium detections at the sites, LANL applied the SSL for chromium III instead of the more conservative SSL for chromium VI. LANL ascertained that chromium VI is not expected at the sites, and SSLs for chromium III would be a better comparison. In actuality, neither SSLs is appropriate for

35478

comparison soil data based on total chromium, as total chromium consists of a natural ratio of trivalent (III) and hexavalent (VI) chromium.

In the absence of speciation data to confirm the site ratios of chromium (tri- and hex) present in soil, the laboratory results for total chromium should be assumed as a mixture of chromium III and chromium VI. A more representative SSL for comparison with site data would have been to calculate a site-specific SSL for total chromium.

It is acknowledge that this issue of total chromium is a state-wide issue, where most facilities are analyzing soil for total chromium and not including specification as part of the analysis. With the exception of sites with a known history for hexavalent chromium, it is likely that total chromium is the predominant inorganic detected in soil. In order to clarify this reoccurring issue of how best to apply an SSL to total chromium data, a SSL based on the assumed natural ratio of trivalent to hexavalent chromium of 1:6 will be derived and included in the next revision of NMED's *Risk Assessment Guidance for Site Investigations and Remediation* (NMED, 2012).

In the meantime, the following table includes SSLs for chromium III, chromium VI, and total chromium. The SSLs for total chromium were calculated based on the methods and assumptions outlined in NMED (2012) using adjusted toxicity data assuming that the ratio of chromium VI to chromium III is 1 to 6.

Updated Soil Screening Levels for Chromium (2012)

| Chemical | Residential Soil (mg/kg) | End-point[a] | Industrial/ Occupational Soil (mg/kg) | End-point | Construction Worker Soil (mg/kg) | End-point | Tap Water (ug/L) | End-point |
|---|---|---|---|---|---|---|---|---|
| Chromium III | 1.17E+05 | nl | 1.70E+06 | nl | 4.65E+05 | nl | 5.48E+04 | n |
| Chromium VI | 2.97E+00 | c | 6.31E+01 | n | 6.56E+01 | c | 4.31E-01 | c |
| Chromium (Total)[b] | 2.08E+01 | c | 4.42E+02 | n | 1.34E+02 | n | 3.01E+00 | c |

[a] Soil screening level (SSL) based on n = noncarcinogenic endpoint; c = carcinogenic endpoint; nl = noncarcinogenic endpoint and SSL may exceed ceiling limit.

[b] The SSLs for chromium (total) were calculated via the methods and assumptions outlined in NMED's 2012 *Risk Assessment Guidance for Site Investigations and Remediation* using adjusted toxicity data assuming a CrVI:CrIII ratio of 1:6.

If these updated SSLs for total chromium were applied at sites evaluated at Lower Mortendad/Cedro Canyons Aggregate Area, the exposure point concentration (EPC) for chromium at SWMU 05-006(c) of 32.36 mg/kg would result in a residential carcinogenic risk estimate slight greater than the NMED target risk level of 1E-05. It should be noted that the current SSLs applied at the time the investigation report was written were based on the 2009 SSLs and as such, comparison to the updated 2012 SSL may not be appropriate. In comparing a SSL for total chromium based on 2009 toxicity data, a 2009 SSL for total chromium would have been 1.53 E+03 mg/kg and would not result in adverse risk for a resident.

In summary, while not in agreement with LANL that the SSL for trivalent chromium is appropriate, a comparison of site data to a SSL for total chromium (consistent with the 2009 SSLs) indicates there is no adverse risk to future residential receptors at SWMU 05-006(c).

It is suggested that in future reports, if chromium is identified as a contaminant of concern, site-specific speciation should be determined. In absence speciation data, an assumption that chromium is present as a mixture of both species and the SSL for total chromium should be applied.

Reference: New Mexico Environment Department (NMED), 2012. Risk Assessment Guidance for Site Investigations and Remediation. http://www.nmenv.state.nm.us/HWB/guidance.html

If you have any questions, please contact me at (801) 451-2864 or via email at paigewalton@msn.com.

Thank you,

Paige Walton

Paige Walton
AQS Senior Scientist and Program Manager

cc: Dan Comeau, NMED (electronic)
Joel Workman, AQS (electronic)
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