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November 4, 2008

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Mr. David Cobrain
Hazardous Waste Bureau
2905 Rodeo Park Dr. E/Bldg 1
Santa Fe, NM 87505



RE: Draft Technical Review Comments on the Pajarito Canyon Investigation Report, Los Alamos National Laboratory, New Mexico

Dear Mr. Cobrain:

Attached please find draft technical review comments on the *Pajarito Canyon Investigation Report*, Los Alamos National Laboratory, New Mexico (September 2008). Per request, the primary focus of the review was on the human health and ecological risk assessment portions of the report. As part of this review, the approved *Pajarito Canyon Biota Investigation Work Plan* (approved in May 2007) was used as a reference for the review of the ecological baseline risk assessment.

A primary concern with the human health risk assessment is that the assessment evaluates the receptor at individual locations throughout Pajarito Canyon. The assessment does not include a cumulative assessment of risk to a receptor exposed to multiple areas within the canyon. In addition, it appears that for the recreational receptor, separate risks were evaluated for exposure to surface water and sediments, but a cumulative risk was not determined. General comments have been drafted addressing these issues.

In reviewing the data provided in Appendix D, there appears to be a spike in water concentrations in several (most) locations around the mid 2007 timeframe. It was not clear the potential cause(s) for the increases during this timeframe. As the focus of this review was on the risk assessments, the State may wish to investigate these data in more detail. It is agreed that continued monitoring is needed for the area.

Volatile organic compounds (VOCs) were not evaluated in the assessment; the rationale being that VOCs do not represent a significant pathway. Given the low detection frequencies and low concentrations of VOCs, the exclusion of VOCs appears acceptable. As a side note, as noted in United States Environmental Protection Agency (USEPA) guidance for ecological risk assessments, VOCs can represent a potentially significant exposure pathway to wildlife through the inhalation of contaminated subsurface burrow air. In a recent study (*Using Artificial Burrows to Evaluate Inhalation Risks to Burrowing Mammals*, Integrated Environmental Assessment and Management Volume 4 Number 4, October 2008), artificial burrows can be

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used to assess burrow atmosphere to estimate risk for burrowing animals. The use of the artificial burrows was found to minimize uncertainty and is a cost effective way to collect data to assess this pathway. While VOCs are not a major concern for Pajarito Canyon, this study is interesting and may be useful at other sites where VOCs are a primary constituent of ecological concern.

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

Thank you,

Paige Walton
AQS Senior Scientist and Project Lead

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

**Draft Technical Review Comments on the Pajarito Canyon Investigation Report, Los
Alamos National Laboratory, New Mexico,
September 2008**

1. A primary concern with the human health risk assessment is that risks were evaluated for the receptor for given locations. The conclusion of the report is that since a person would not receive unacceptable risk at a specific location, no additional action or controls are required. However, the report does not address exposure to a person across multiple locations. With the exception of location TWN-1E, all risks were within acceptable levels for a residential scenario. However, please discuss whether risks would be different if exposure areas were to include a larger area than just a specific sample location.
2. For the recreational scenario, risks were determined separately for sediment and surface water. However, a recreational user could be exposed to contaminants in both sediment and surface water. While it is noted that exposure to sediment is the primary pathway of concern, cumulative risk must be assessed. Revise the report to include cumulative risk for the recreational scenario.
3. Section 5.2, Human Health Screening Levels, page 17. It is noted that if New Mexico specific soil screening levels (NMED SSLs) were not available, either United States Environmental Protection Agency (EPA) Region 6 media-specific screening levels (MSSLs) or EPA Region 9 preliminary remediation goals (PRGs) were applied. It is assumed that these data were applied as the risk assessment portion of this report was completed prior to July 2008. Please note that for future risk evaluations and/or future updates to this risk assessment, the new Regional Screening Levels (RSLs) supersede the previously used MSSLs and PRGs. (<http://www.epa.gov/region09/waste/sfund/prg/rsl-table.html>).
4. Section 5.2, Human Health Screening Levels, page 17. The target dose limit for the general public is 100 millirem per year (mrem/yr). While this number is based upon Department of Energy (DOE) Order 5400.5, this order also states (Section I.4) that “doses to individuals be within the appropriate dose limits for the individuals and that all exposures be ALARA [as low as reasonable achievable].” Please clarify that in addition to evaluation of dose, an evaluation was conducted to ensure that the principles of ALARA are also being met.
5. Section 5.4, Water Quality Standards and Screening Levels, pages 17 and 18. A list of water quality standards is provided to which the lowest values of the sources will be used for comparison against the constituents in groundwater to determine whether the constituent is a groundwater constituent of potential concern (COPC). However, in reviewing the data provided in the table associated with Section 6.3, it does not appear that the lowest groundwater standard was applied. For example, a maximum contaminant level (MCL) of 5 micrograms per liter ($\mu\text{g/L}$) was applied for benzene. However, for benzene, the Region 6 tap water MMSL is $0.35 \mu\text{g/L}$, the Region 9 PRG is also $0.35 \mu\text{g/L}$ and the 2008 RSL is $0.41 \mu\text{g/L}$. These data are all significantly lower than the MCL. This was noted for several inorganics (arsenic) and organics. Please review all data in the groundwater tables to ensure the more conservative (lower) standard was applied and modify the tables as warranted.

6. Section 8.1.1.2, Literature for Known Ecological Effects, pages 58 and 59. As noted in the *Pajarito Canyon Biota Investigation Work Plan* (Table D-6.0-1, COPECs by Analytical Suite), polynuclear aromatic hydrocarbons (PAHs) are identified as contaminants of potential ecological concern (COPECs) for several receptors including the American robin, plants, Montane shrew, earthworm, and deer mouse. It is noted that Table D-6.0-1 indicates that PAHs are a preliminary COPEC, pending evaluation of additional data from sampling of TWN-1E. The discussion of PAHs detected in sediments provided in Section 7.1.2.2 (pages 30 and 31) of this report indicates that PAHs were detected. While there is some uncertainty associated with the average concentration of PAHs due to infrequency of detection, there are suspected source(s) for PAHs due to site activities and therefore, PAHs should be included in the ecological assessment for appropriate receptors. Clarify the rationale used to determine how PAHs were or were not retained as a COPEC for the above receptors.
7. Section 8.1.1.3, Conceptual Site Model, page 59. The evaluation of the surface water pathway is unclear as presented in the report. As noted in Section 8.1.1.1 (page 56) “no COPECs were retained for the evaluation of surface water”. However, Section 8.1.1.3 of the report indicates that alluvial groundwater mixes with surface water and that surface water COPECs would also include alluvial groundwater COPECs. While COPECs for both surface water and sediments may be similar, various receptors are exposed to both sediment and surface water. It appears that while surface water was identified as a complete pathway, the pathway was not qualitatively assessed. Sufficient justification for exclusion of surface water has not been provided; revise the report to include uptake and ingestion of surface water or provide additional justification as to the reasonableness of exclusion of this pathway.
8. Section 8.1.2.2, Nest Box Studies, page 61. It is noted that due to small sample sizes, egg and insect samples were only analyzed for metals. In reviewing concentrations of various contaminants in insects as provided in the *Pajarito Canyon Biota Investigation Work Plan*, it is noted that metals represent a large percentage of concentration. However, polychlorinated biphenyls (PCBs) and semi-volatile organic compounds (SVOCs) were also detected in insects. With only data for metals, there is no way to assess what contaminants have the greatest impact on the nest box studies. Discuss the uncertainty associated the nest box studies being based solely on a qualitative analysis for metals.
9. Section 8.1.3.2, Concentrations of COPECs in Prey for the Southwestern Willow Flycatcher, pages 65 and 66. It is noted that the hazard quotients (HQs) for the insect or earthworm pathway generally predicted a lower potential adverse ecological effect than the screening against the ecological screening levels (ESLs). However, as noted in Section 8.1.2.2, insect samples from the nest box studies only included the analysis of metals. Thus, the calculated HQs for insects most likely are an underestimation of actual risk as the HQs do not take into account organics in insects. Discuss this uncertainty and how the exclusion of organic data in insects may impact subsequent evaluation of HQs.
10. Section 8.2.1, Problem Formulation, page 78. A child recreational user was deemed not appropriate for this area due to the steepness of many parts of the canyon and due to restricted access. However, unless controls are or will be in place limiting all access to a

child recreational user, it is reasonable to assume that a child could gain access to areas of Pajarito canyon. Revise the risk assessment to include a child recreational user.

11. Section 8.2.3.1, Exposure Scenario Description, page 80. Exposure to storm water was not assessed as the frequency of exposure is not sufficient to sustain chronic exposures. Based upon a review of storm water data, significant concentrations of contaminants have been detected. Discuss the potential for exposure to storm water and associated acute effects due to accidental ingestion and dermal exposure.
12. Section 8.2.4, Toxicity Assessment, page 82. It is noted in the text that screening levels applied for the risk assessment were taken from sources dated 2004 to 2006 and that updates to toxicity data may have occurred. It is the responsibility of the facility to evaluate the appropriateness of screening levels and assess whether updated toxicity data should be applied (guidance provide equations for calculating site-specific screening levels or for updating levels with new data). Provide a discussion of screening levels used in this assessment that are based on outdated toxicological data. In addition, it is noted that the differences in slope factors and reference doses were to be provided in Tables 8.2-9 and 8.2-10. These tables do not contain these comparisons. Clarify the location of these data.
13. Table E-2.1-1. Please change the number format for risk from date to scientific notation to reflect a 1E-05 risk level.
14. Table E-2.1-5. An oral reference dose (RfD) is listed as not available (na) for chloroform and RDX. However, the Integrated Risk Information System (IRIS) does provide RfDs for both of these constituents (1.0E-02 mg/kg-day for chloroform and 3.0E-03 mg/kg-day for RDX). Clarify why these data were not included in the table.
15. Table E-2.1-5. This table lists the oral slope factor (SF_o) for chloroform as $8.05E-2$ (mg/kg-day)⁻¹ (reference IRIS). However, IRIS lists the SF_o for chloroform as $1.0E-02$ (mg/kg-day)⁻¹. Please clarify the SF_o applied for chloroform.