Partial Response to the "Notice of Disapproval [for the] North Canyons Investigation Report, Los Alamos National Laboratory EPA ID No: NM0890010515, HWB-LANL-09-029," Dated August 19, 2009

INTRODUCTION

To facilitate review of this response, the New Mexico Environment Department's (NMED's) comments are included verbatim. Los Alamos National Laboratory's (LANL's or the Laboratory's) responses follow each NMED comment.

NMED Comment

1. *Screening levels used in the NCIR for the residential receptor were primarily based on the 2006 NMED soil screening levels (SSLs). While differences in screening levels between the 2006 SSLs and the 2009 SSLs exist, the overall conclusions of the risk assessment using the 2009 data would be the same as those applying the 2006 data. Similarly, for comparison of surface water concentrations, tap water screening levels from the Environmental Protection Agency (EPA) Regional Screening Level (RSL) tables were applied. If a datum was not available, a maximum contaminant level (MCL) was applied. While there would be no change in conclusions within the risk assessment when using New Mexico-specific tap water screening levels, the Permittees must apply New Mexico-specific screening levels over RSLs (where available) in future reports. A specific response to this comment is not required.*

LANL Response

1. No response is required.

NMED Comment

2. *Typically, a comparison of soil/sediment concentrations to soil-to-groundwater screening levels is conducted to assess whether there is potential for contaminants to migrate to groundwater. Neither a qualitative nor quantitative analysis of this pathway was provided in the NCIR. While groundwater was not identified as a complete exposure pathway for the recreational receptor, the potential for groundwater contamination via migration from soil/sediment must be addressed by the Permittees because no further evaluation of the individual Solid Waste Management Units (SWMUs) and/or Areas of Concern (AOCs) that are potential sources for contamination in the upper portions of the canyons is planned.*

LANL Response

2. The Laboratory proposes that direct monitoring of alluvial groundwater is the best means of measuring the potential for contaminants in sediment to affect groundwater. The investigation of the North Canyons includes installation and monitoring of an alluvial well in Rendija Canyon above the Guaje Canyon confluence. As described in a letter submitted by the Laboratory to the NMED on February 20, 2009, the installation of this well is on hold pending final transfer of a land parcel from the U.S. Forest Service to Los Alamos County. The parcel encompasses the location of the planned alluvial well. Once the land is transferred, the Laboratory will request that Los Alamos County

approve access for installation of the alluvial well. The completed well will be incorporated into the annual "Interim Facility-Wide Groundwater Monitoring Plan."

NMED Comment

3. *The primary current and future receptors for the human health risk assessment were identified as recreational. The residential risk scenario was considered for background purposes only. As noted in Section 1.4 of the report, portions of the North Canyons downstream from SWMUs and AOCs are used by the Pueblo de San Ildefonso for various cultural activities, including hunting. Several of the constituents of concern (COCs) carried forward in the risk assessment have a tendency to bio-accumulate. As such, risks to the residents of the Pueblo de San Ildefonso via ingestion of potentially contaminated game must be evaluated (specifically a subsistence hunting scenario) as hunting is a current and reasonably foreseeable future land use in the North Canyons. Revise the NCIR accordingly.*

LANL Response

3. The Laboratory proposes that the "resource-user" scenario be evaluated as a supplemental exposure scenario in Appendix E-3. The Laboratory has previously evaluated a resource-user scenario in the Los Alamos and Pueblo Canyons Investigation Report (LAPCIR) (LANL 2004, 087390) that includes exposure to contaminants through plant and meat pathways. Under this approach, risks would be calculated for all chemicals of potential concern (COPCs) in all reaches. This information would address the potentially bioaccumulative contaminants discussed in this comment. To facilitate NMED's review of this scenario, information on the exposure pathways and parameters has been compiled from the LAPCIR and is included in this response. Table 1 is an overview of the exposure pathways for the resource-user scenario. Table 2 presents the exposure parameters for soil and water pathways for the resource-user scenario. Table 3 lists the residual radioactivity (RESRAD) input values for the resource-user scenario. Tables 1, 2, and 3 were originally presented as Tables 8.2-1, E-5.3-1, and E-5.3-2 in the LAPCIR (LANL 2004, 087390). These tables contained information on the resource user as well as the other exposure scenarios evaluated in that report.

Table 1
Site-Specific Exposure Scenarios
and Complete Exposure Pathways

Exposure Pathways	Exposure Scenarios
	Resource User
Incidental ingestion of soil	X[a]
Inhalation of dust	X
Dermal contact with soil	X
Ingestion of fruits and vegetables	X
Ingestion of meat	X
Ingestion of alluvial groundwater	—[b]
Dermal contact with alluvial groundwater	—
Ingestion of surface water	X
Dermal contact with surface water	X
External irradiation	X

[a] X = Identification of resource user.

[b] — = Incomplete pathway.

Table 2
Exposure Parameters for Soil and Water Risk Calculations

Parameter	Unit	Resource-User RME*	
		Value	Notes/References
IR_adult	mg/d	100	EPA 1991 (note 2)
EF_adult	d/yr	75	(note 18)
ED_adult_carc	yr	30	EPA 1991
ED_adult_nc	yr	30	EPA 1991
Inh_adult	m^3/hr	1.6	EPA 1997a (note 19)
ET_adult	hr/d	1	(note 20)
PEF	m^3/kg	10,000,000	(note 7)
SA_adult	cm^2	5700	EPA 2001 (note 8)
AF_adult	mg/cm^2-d	0.07	EPA 2001 (note 9)
IR_veg	g/kg-d	1.2	EPA 1997b (note 10)
IR_fruit	g/kg-d	1.4	EPA 1997b (note 10)
fract_veg	unitless	0.1	(note 21)
fract_fruit	unitless	0.1	(note 21)
depth_cz	m	1	(note 12)
depth_root	m	1	(note 12)
IR_meat	g/kg-d	2.2	EPA 1997b (note 22)
fract_meat	unitless	1	(note 23)
fract_range	unitless	1	(note 23)
ET_in	hr/d	0	(note 20)
ET_out	hr/d	1	(note 20)
SWIng_adult	L/d	0.2	EPA 1997a (note 50)
ET_sw_adult	hr/d	1	(note 51)
EF_sw_adult	d/yr	20	(note 51)
EF_swderm_adult	d/yr	20	(note 51)
SA_sw_adult	cm^2	2130	EPA 2001 (note 56)
BW_adult	kg	70	EPA 1991 (note 13)
AT_carc	yr	70	(note 14)
AT_adult_nc	yr	30	equal to exposure duration
EF_plant	d/yr	365	(note 15)
BW_plant	kg	60	(note 16)
UR_fodder	kg/d	50	Baes et al. 1984 (note 24)
UR_soil	kg/d	0.1	(note 25)
EF_meat	d/yr	365	(note 15)
BW_meat	kg	60	(note 16)
DRF	unitless	0.7	Yu et al. 1993 (note 17)

* RME = Reasonable maximum exposure.

Notes for Table 2:

2. Recommended value for general use. More recent guidance (EPA 1997a) suggests 50 mg/d as a central tendency value but provides no guidance for an upper-bound value.
7. Particulate emission factor (PEF) calculated for a 30-acre source. Calculation documented in worksheet "PEF."
8. Recommended value for both RME and central tendency estimate residential conditions; Risk Assessment for Superfund (RAGS), Part E, Section 3.2 (Sept 2001).
9. Recommended RME value; RAGS, Part E, Section 3.2 (Sept 2001). Adult adherence factor value based on 50th percentile for high-exposure activity (gardening).
10. 75th percentile of seasonally adjusted consumer intake of homegrown vegetables and fruits for western United States. Corrected by 18% average preparation loss for corn, pumpkin, peppers, and tomatoes (Tables 13-33 and 13-7) and by 23% average preparation loss for apples, pears, and peaches (Tables 13-33 and 13-6).
12. Specifying equal values for root zone and contaminated zone implies 100% of garden plant and fruit tree roots occurs in contaminated soil.
13. More recent guidance (EPA 1997a) recommends 71.8 kg. The older estimate is used for consistency with EPA derivation of toxicity values in Integrated Risk Information System (IRIS).
14. Recent guidance (EPA 1997c) recommends 75 yr. A 70-yr lifetime is used for consistency with EPA derivation of toxicity values in IRIS.
15. An exposure frequency of 365 d/yr is used for biotic products because intake values are annual averages.
16. From guidance in EPA 1997b, Section 9.2.2. Used for radionuclide dose calculations only.
17. Applies assumption that indoor external irradiation is 70% of ambient level; Yu et al. 1993, p. 130.
18. Assumes an individual is in the affected area 3 d every 2 wk, 50 wk/yr.
19. Recommended value for adults engaged in short-term moderately strenuous activities, such as fast walking or slow running, wood working, yard work, etc. (Table 5-23).
20. Best professional judgment for a protective estimate of time spent hiking outdoors in affected area.
21. Assumes 10% of homegrown fruits and vegetables that might be consumed in a year are instead gathered from wild plants in affected area.
22. 75th percentile value of annual-average home-produced beef intake for western United States, corrected by 24% mean preparation loss for beef; Tables 13-36 and 13-5.
23. Protectively assumes that affected area is 100% of cattle range and that no supplemental feed is used.
24. Wet feed consumption rate; Baes et al, p. 49.
25. Accounts for direct soil ingestion by cattle during grazing; value suggested by Española Natural Resource Conservation Service Office.
50. From Table 3-27, hourly water intake rates for young adult males per activity level. RME value corresponds to medium activity at 85 degrees,
51. Best professional judgment corresponding to drinking water ingestion and dermal water contact on 10% of site visits; 1 h of wet skin is assumed for dermal contact.
56. Based on the 50th percentile area of hands and feet for male and female adults; Exhibit C-1 of EPA 2001.

References for Table 2:

EPA 1991.U.S. Environmental Protection Agency. "Risk Assessment Guidance for Superfund: Volume I - Human Health Evaluation Manual Supplemental Guidance Standard Default Exposure Factors." OSWER Directive 9285.6-03. Office of Emergency and Remedial Response, Washington, D.C.

EPA 1997a. U.S. Environmental Protection Agency. "Exposure Factors Handbook, Volume I, General Factors." EPA/600/P-95/002Fa. Office of Research and Development, Washington, D.C.

EPA 1997b. U.S. Environmental Protection Agency. "Exposure Factors Handbook, Volume II, Food Ingestion Factors." EPA/600/P-95/002Fb. Office of Research and Development, Washington, D.C.

EPA 1997c. U.S. Environmental Protection Agency. "Exposure Factors Handbook, Volume III, Activity Factors." EPA/600/P-95/002Fc. Office of Research and Development, Washington, D.C.

EPA 2001. U.S. Environmental Protection Agency. "Risk Assessment Guidance for Superfund (RAGS), Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment) Interim." EPA/540/R/99/005, OSWER 9285.7-02EP, September 2001.

Baes, C.F. III, Sharp, R.D., Sjoreen, A.L., and Shor, R.W. 1984. "A Review and Analysis of Parameters for Assessing Transport of Environmentally Released Radionuclides through Agriculture." ORNL-5786. Oak Ridge National Laboratory, Oak Ridge, Tennessee.

Yu et al. 1993. "Manual for Implementing Residual Radioactive Material Guidelines Using RESRAD, Version 5.0. Environmental Assessment Division," Argonne National Laboratory, Argonne, Illinois.

NMED 2000. New Mexico Environment Department, Hazardous Waste Bureau and Ground Water Quality Bureau. "Voluntary Remediation Program Technical Background Document for Development of Soil Screening Levels, December 18, 2000."

EPA 2002. U.S. Environmental Protection Agency. "Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites." OSWER 9355.4-24, Office of Solid Waste and Emergency Response, December 2002

Table 3
RESRAD Input Values for Calculations of RBCs

Parameter	Resource User RME
Inhalation rate (m^3/yr)	1025
Mass loading (g/yr)	0.0001
Indoor time	0.0
Outdoor time	0.00856
Produce consumption (kg/yr)	57
Fraction produce on-site	0.1
Meat consumption (kg/yr)	48
Fraction meat on-site	1.0
Soil ingestion[a] (g/yr)	585[b]

[a] The soil ingestion rate is defined to compensate for the time-based occupancy factor applied by RESRAD in calculating exposure from the soil ingestion pathway. Site-related soil ingestion is calculated as ([daily overall soil ingestion rate/daily overall soil exposure period] × annual on-site exposure frequency)/annual site utilization fraction.

[b] Calculated as follows: [(0.1 g/d/1.5 h/d) × 75 h/yr)]/0.00856 annual site utilization fraction. 1.5 h/d is an estimate of time spent outdoors for an adult (EPA 1997, 066598).

NMED Comment

4. *For the screening evaluations, lead was retained as a noncarcinogen and a hazard quotient was calculated and summed with other noncarcinogens. The result is an overestimation of noncarcinogenic risk. Lead screening levels are based on blood lead levels, unlike most noncarcinogens which have screening levels based on more traditional toxicological data (e.g., no observed adverse effect levels). Lead must therefore be evaluated independently. Because exclusion of lead from the hazard indices will not result in changes to the overall conclusions of the risk screening, a revision to the NCIR is not required. Future evaluations must assess lead independently from noncarcinogens.*

LANL Response

4. The target tissue associated with a COPC is not considered in the initial screening to determine whether a hazard exists. The initial screening involves the comparison of all COPC exposure concentrations with their respective soil screening levels (SSLs) for a given scenario. Lead has SSLs from NMED and the U.S. Environmental Protection Agency (EPA) for residential, industrial, and construction worker exposures and from the Laboratory for the recreational exposure that are based on the blood lead level of 10 µg/dL using EPA's Integrated Exposure Uptake Biokinetic model. These SSLs were calculated to compare with soil concentrations and to determine if the blood lead level is greater than 10 µg/dL for the receptor. A comparison of site concentrations with these screening levels using the ratio or hazard quotient (HQ) approach as the initial step is therefore appropriate and is consistent with the use of screening levels as specified in NMED and EPA screening guidance and the Compliance Order on Consent.

The HQ for lead is an indication of whether the blood lead level criterion is exceeded for a given scenario and receptor. Inclusion of the lead HQ in the derivation of a hazard index (HI) is appropriate for a screening assessment as long as lead is not driving the risk (i.e., the lead HQ and the site HI are less than 1.0). This indicates that the blood lead level of 10 µg/dL is not exceeded, and no additional evaluation is necessary. If the HQ for lead exceeds 1.0, then the blood lead level is greater than 10 µg/dL, and an independent assessment of lead is warranted. If the HI exceeds 1.0 and lead was a major contributor, separate evaluation of the blood lead level also is warranted. If the HI without lead does not exceed 1.0 and the lead level is less than the SSL (blood lead level of 10 µg/dL is not exceeded), there is no unacceptable risk for any COPC. This is the case for North Canyons: lead was a COPC for one reach with a recreational HQ <0.1 and therefore does not need an independent assessment. Risk evaluations in future reports (aggregate area and canyons) will include an independent assessment of lead if the screening results indicate this is warranted.

NMED Comment

5. *A thorough review of available ecological toxicity has not been conducted, resulting in the omission of several constituents of ecological concern (COECs) from being qualitatively evaluated in the ecological assessments (see Table 8.1-31) presented in NCIR. Only data that are currently provided in the ECORISK database were applied. As noted in comments provided by NMED for previous canyon and aggregate area investigations, exclusion of data from the ECORISK database is not sufficient justification for exclusion of the evaluation of a COEC. While Section 8.1.8 of the report indicates there are uncertainties associated with the exclusion of certain chemicals due to lack of toxicity reference data in the ECORISK database, there is no discussion in the NCIR concerning how the overall conclusion may be influenced. The Permittees must provide a more detailed discussion of how exclusion of the COECs listed in Table 8.1-31 potentially impacts the risk evaluations.*

LANL Response

5. The report will be revised to include a more detailed discussion of the chemicals of potential ecological concern (COPECs) without ecological screening levels (ESLs) in the ECORISK Database. The Laboratory has implemented an approach that searches online toxicity databases (e.g., EPA's ECOTOX Database and Oak Ridge National Laboratory Risk Assessment Information System) to find relevant toxicity information to address this uncertainty. Toxicity data have been obtained for several COPECs and receptors as a result of the online database searches, and interim ESLs have been calculated. The ESLs are termed "interim" because they are not yet in the ECORISK Database. Once the development process is completed, the interim ESLs will be finalized and included in the appropriate revision to the ECORISK Database. In the absence of a chemical-specific ESL, COPEC concentrations can be compared with ESLs for a surrogate chemical. Comparison to surrogate ESLs provides an estimate of potential effects of a chemically related compound and a line of evidence to indicate the likelihood that ecological receptors are potentially impacted. However, some COPECs without ESLs do not have chemical-specific toxicity data or surrogate chemicals to be used in the screening assessments and cannot be assessed quantitatively for potential ecological risk. These COPECs are often infrequently detected across the site and are evaluated qualitatively in the absence of any other information.

NMED Comment

6. *There is a paragraph duplication at the top of page 54 of the NCIR; it begins with, "The EPA software…" which is repeated again several lines later in the same paragraph. Delete the unnecessary text.*

LANL Response

6. The text will be deleted.

REFERENCES

EPA (U.S. Environmental Protection Agency), August 1997. "Exposure Factors Handbook, Volume III, Activity Factors," EPA/600/P-95/002Fc, Office of Research and Development, Washington, D.C. (EPA 1997, 066598)

LANL (Los Alamos National Laboratory), April 2004. "Los Alamos and Pueblo Canyons Investigation Report," Los Alamos National Laboratory document LA-UR-04-2714, Los Alamos, New Mexico. (LANL 2004, 087390)