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TA-54

MEMORANDUM

TO: Neelam Dhawan, Environmental Scientist and Specialist O
John Young, Head of Corrective Action for LANL
Permits Management Program

FROM: Kirby Olson, Environmental Scientist and Specialist O, KO
Permits Management Program

SUBJECT: Radiation Risk Assessments at MDA H at LANL

DATE: January 6, 2003

I have reviewed several portions of documents regarding tritium levels at MDA H. Both the May 2001 RFI Report for MDA H and the December 2001 Response to the RSI Request for the RFI Report for MDA H present a tritium screening action level based on an estimated annual dose of 15 mrem. As recommended in both OSWER Directive 9200.4-31P (December 1999, document EPA 540/R/99/006) and the accompanying cover memo for that directive, NMED assesses radionuclides using carcinogenic risk based on the radionuclide carcinogenic slope factors- not on comparison to annual dose guidelines. Risk from radionuclides can be calculated using the EPA Radionuclide Preliminary Remediation Goals (PRGs) for Superfund calculator (OSWER No. 9355.01-83A). The table accompanying that memo provides toxicity factors in risk per pCi for ingestion, inhalation, and external exposure which can be combined with site-specific parameters; the table also provides pre-calculated PRGs for various scenarios (residential, agricultural, and workers). The level of tritium reported in soil at MDA H on p.44 of the RFI (0.11 pCi/g) is well below the residential and outdoor worker levels for 10^{-6} risk given in the EPA table (2.28 pCi/g for residential and 4.23 pCi/g for the outdoor worker). The reported tritium activity in soil is at an acceptable level, but the documents to not provide the assessment in the acceptable format (risk instead of dose). There were also measurements of airborne concentrations of tritium at MDA H. At the bottom of page 2 of the August 6, 2002 HWB memo about MDA H, I provided the estimates of risk associated with inhalation of this tritium concentration; these risks estimates were below the NMED target risk goal of 10^{-5} risk. A copy of that memo is attached.

Attachments: OSWER Directive 9200.4-31P except and cover memo
August 6, 2002 HWB memo on addendum to the RFI report for MDA H.

11777

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

DEC 17 1999

MEMORANDUM

SUBJECT: Distribution of OSWER Radiation Risk Assessment Q & A's Final Guidance

FROM: Stephen D. Luftig, Director
Office of Emergency and Remedial Response (OERR)
Office of Solid Waste and Emergency Response

Stephen D. Page, Director
Office of Radiation and Indoor Air (ORIA)
Office of Air and Radiation

TO: Addressees

PURPOSE

The purpose of this memorandum is to transmit to you a final guidance document entitled: "Radiation Risk Assessment At CERCLA Sites: Q & A." The guidance provides answers to several common questions about radiation risk assessments at CERCLA sites. It should be especially useful to Remedial Project Managers (RPMs), On-Scene Coordinators (OSCs), and risk assessors.[1]

BACKGROUND

The U.S. Environmental Protection Agency (EPA) issued guidance entitled "Establishment of Cleanup Levels for CERCLA Levels for CERCLA Sites with Radioactive Contamination" (OSWER No. 9200.4-18, August 22, 1997). This 1997 guidance provided clarification for establishing protective cleanup levels for radioactive contamination at Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) sites. The 1997 guidance reiterated that cleanups of radionuclides are governed by the risk range for all carcinogens established in the NCP when ARARs are not available or are not sufficiently protective. Cleanup should generally achieve a cumulative risk within the 10^{-4} to 10^{-6} carcinogenic risk range based on the reasonable maximum exposure. The cleanup levels should consider exposures from all potential

[1]The attached document provides guidance on risk assessment issues involved at CERCLA sites and is consistent with the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). It does not alter the NCP expectations regarding treatment of principal threat waste and the use of containment and institutional controls for low level threat waste. Consistent with CERCLA and the NCP, response actions must attain or waive Applicable or relevant and appropriate requirements (ARARs). CERCLA response actions for contaminated ground water at radiation sites must attain (or waive as appropriate) the Maximum Contaminant Levels (MCLs) or non-zero Maximum Contaminant Level Goals (MCLGs) established under the Safe Drinking Water Act, where the MCLs or MCLGs are relevant and appropriate for the site.

pathways, and through all relevant media (e.g., soil, ground water, surface water, sediment, air, structures, etc.) The 1997 guidance also provides a listing of radiation standards that are likely to be used as ARARs to establish cleanup levels or to conduct remedial actions.

Since issuance of the 1997 guidance, regional staff have requested additional guidance on specific Superfund process and requirements related to radiation cleanups. Today's guidance responds to these requests.

The attached final Risk Q & A fact sheet is part of a continuing effort between the Office of Emergency and Remedial Response (OERR) and the Office of Radiation and Indoor Air (ORIA) to provide updated guidance for addressing radioactively contaminated sites that is consistent with our guidance for addressing chemically contaminated sites, except to account for the technical differences between radionuclides and chemicals. This effort is intended to facilitate compliance with the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) at radioactively contaminated sites while incorporating the improvements to the Superfund program that have been implemented through Administrative Reforms.

Two issues addressed in this Risk Q & A should be noted here. First, the answer to question 32 in the Risk Q & A is intended to further clarify that 15 millirem per year is not a presumptive cleanup level under CERCLA, but rather site decision-makers should continue to use the risk range when ARARs are not used to set cleanup levels. There has been some confusion among stakeholders regarding this point because of language in the 1997 guidance. EPA is issuing further guidance today to site decision makers on this topic. This Risk Q&A clarifies that, in general, dose assessments should only be conducted under CERCLA where necessary to demonstrate ARAR compliance. Further, dose recommendations (e.g., guidance such as DOE Orders and NRC Regulatory Guides) should generally not be used as to-be-considered material (TBCs). Although in other statutes EPA has used dose as a surrogate for risk, the selection of cleanup levels for carcinogens for a CERCLA remedy is based on the risk range when ARARs are not available or are not sufficiently protective. Thus, in general, site decision-makers should not use dose-based guidance rather than the CERCLA risk range in developing cleanup levels. This is because for several reasons, using dose-based guidance would result in unnecessary inconsistency regarding how radiological and non-radiological (chemical) contaminants are addressed at CERCLA sites. These reasons include: (1) estimates of risk from a given dose estimate may vary by an order of magnitude or more for a particular radionuclide, and; (2) dose based guidance generally begins an analysis for determining a site-specific cleanup level at a minimally acceptable risk level rather than the 10^{-6} point of departure set out in the NCP.

Second, it is important that data that support remedial decisions be of known and acceptable quality. There are a number of EPA guidances available that may aid the decision maker in gathering data of acceptable quality. One such guidance is the Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM). The determination of what data are needed is a site-specific decision and it is the responsibility of the site decision-maker (e.g., RPM, OSC) to use the tools that are most appropriate for that situation.

United States Environmental Protection Agency | Office of Emergency and Remedial Response | Office of Radiation and Indoor Air | Directive 9200.4-31P EPA 540/R/99/006 December 1999

Radiation Risk Assessment At CERCLA Sites: Q & A

NOTICE: The policies set out in this document are intended solely as guidance to U.S. Environmental Protection Agency (EPA) personnel; they are not final EPA actions and do not constitute rulemaking. These policies are not intended, nor can they be relied upon, to create any rights enforceable by any party in litigation with the United States. EPA officials may decide to follow the guidance provided in this document, or to act at variance with the guidance, based on analysis of specific-site circumstances. EPA also reserves the right to change the guidance at any time without public notice.

INTRODUCTION

Some sites on the U.S. Environmental Protection Agency's National Priorities List (NPL) are radioactively contaminated. To assist in the evaluation and cleanup of these sites and surrounding areas under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA or Superfund), EPA's Office of Emergency and Remedial Response (OERR) and the Office of Radiation and Indoor Air (ORIA) have developed guidance for conducting radiation risk assessments during the remedial investigation/feasibility study (RI/FS) process. This guidance is provided primarily in the multi-part document, *Risk Assessment Guidance for Superfund, Volume I, Human Health Evaluation Manual* (*RAGS*). Guidance specific to radiation risk includes:

- Chapter 10, "Radiation Risk Assessment Guidance," of *RAGS* Part A (U.S. EPA, 1989a) which covers data collection and evaluation, exposure and dose assessment, toxicity assessment, and risk characterization for sites contaminated with radioactive substances;

- Chapter4, "Risk-based PRGs for Radioactive Contaminants," of *RAGS* Part B (U.S. EPA, 1991a) which presents standardized exposure parameters and equations that should generally be used for calculating preliminary remediation goals (PRGs) for radionuclides under residential and commercial/industrial land use exposure scenarios [the equations for residential land use will be updated shortly with a new soil screening guidance for radionuclides (U.S. EPA, 1998d)];

- Appendix D, "Radiation Remediation Technologies," of *RAGS* Part C (U.S. EPA, 1991b) which provides guidance on using risk information to evaluate and select remediation technologies for sites with radioactive substances; and

- *RAGS* Part D, *Standardized Planning, Reporting, and Review of Superfund Risk Assessments* (U.S. EPA, 1998a), which provides guidance on standardized risk assessment planning, reporting, and review throughout the CERCLA process (Radionuclides Worksheet to be developed).

In addition to *RAGS*, EPA has published several other guidance documents and OSWER Directives concerning risk assessment methods for radioactive and nonradioactive contaminants. Attachment 1 presents a bibliography of selected Agency guidance documents on risk assessment. OSWER Directives specific to radioactive contaminants include:

- OSWER No. 9200.4-18, *Establishment of Cleanup Levels for CERCLA Sites with Radioactive Contamination* (U.S. EPA 1997a), which provides guidance for establishing protective cleanup levels for radioactive contamination at CERCLA sites; and

- OSWER No. 9200.4-25, *Use of Soil Cleanup Criteria in 40 CFR Part 192 as Remediation Goals for CERCLA Sites* (U.S. EPA 1998c), which provides guidance regarding the circumstances under which the subsurface soil cleanup criteria in 40 CFR Part 192 should be considered an applicable or relevant and appropriate requirement (ARAR) for radium or thorium in developing a response action under CERCLA.

Overall, the process for assessing radionuclide exposures and radiation risks presented in *RAGS* and in supplemental guidance documents parallels the process for assessing risks from chemical exposures. Both types of assessments follow the same four-step evaluation process (exposure assessment, toxicity assessment, risk characterization, ecological assessments), consider similar exposure scenarios and pathways (except the external "direct exposure" pathway which is unique to radiation), determine exposure point concentrations, and provide estimates of cancer risks to humans.

However, several aspects of risk assessment for radioactive contaminants do differ substantially from those considered for chemical contaminants. Occasionally these differences—in measurement units, exposure terms and concepts, field and laboratory procedures and detection limits, and toxicity criteria, among others—have led to questions concerning the Agency's recommended approach for addressing radionuclide contamination and risk and the cleanup of CERCLA radiation sites.

IMPLEMENTATION

For questions regarding radiation site policy and guidance for CERCLA cleanup actions, readers are referred to the RCRA/Superfund Hotline at 1-800-424-9346. The subject matter specialists for this fact sheet are Stuart Walker of OERR and Dr. Kung-Wei Yeh of ORIA.

Attachments

Addressees:

National Superfund Policy Managers
Superfund Branch Chiefs (Regions I-X)
Superfund Branch Chiefs, Office of Regional Counsel (Regions I-X)
Radiation Program Managers (Regions I, IV, V, VI, VII, X)
Radiation Branch Chief (Region II)
Residential Domain Section Chief (Region III)
Radiation and Indoor Air Program Branch Chief (Region VIII)
Radiation and Indoor Office Director (Region IX)
Federal Facilities Leadership Council
OERR Center Directors

cc:

Jim Woolford, FFRRO
Elizabeth Cotsworth, OSW
Craig Hooks, FFEO
Barry Breen, OSRE
Joanna Gibson, HOSC/OERR
Earl Salo, OGC
Bob Cianciarulo, Region I

ual risk typically presented in Superfund risk assessments represents a measure of the high-end individual exposure and risk. While the RME estimate remains the primary scenario for risk management decisions, additional risk descriptors may be included to describe site risks more fully.

Q30. Should the collective risk to populations be estimated along with that to individual receptors?

A. Risk to potential individual receptors is the primary measure of protectiveness under the CERCLA process (i.e., the target range of 10^{-6} to 10^{-4} lifetime excess cancer risk to the RME receptor). As noted in Q28, however, Agency guidance (U.S. EPA, 1992e) also indicates that the collective risk to the potentially exposed population and to important subgroups of the population also should be evaluated where possible. Consideration of population risk provides additional input to risk management decisions; such considerations may be either qualitative or quantitative depending on the availability of data and the magnitude of projected population risk.

Q31. How should uncertainty in estimates of radiation risk be addressed in the risk characterization report?

A. Consideration of uncertainty in estimates of risks from potential exposure to radioactive materials at CERCLA sites is essential for informed risk management decisions. *RAGS* and subsequent guidance (U.S. EPA, 1992e, 1995b) stress the importance of a thorough presentation of the uncertainties, limitations, and assumptions that underlay estimates of risk. Either qualitative or quantitative evaluation may be appropriate, depending on the availability of data and the magnitude of predicted risk. In either case, the evaluation should address both uncertainty (i.e., "the lack of knowledge about specific factors, parameters, or models") and variability (i.e., "observed differences attributable to true heterogeneity or diversity in a population or exposure parameter"). Estimates of potential risk should include both central tendency estimates (median, mean) and high-end estimates (e.g., RME or 95th percentile).

Table 2. Comparison of Radiation Risk Estimation Methodologies: Slope Factors vs Effective Dose Equivalent

Parameter	Slope Factor Approach	Effective Dose Equivalent x Risk Factor Approach
Competing Risks	• Persons dying from competing causes of death (e.g., disease, accidents) are not considered susceptible to radiogenic cancer. • Probability of dying at a particular age from competing risks is considered based on the mortality rate from all causes at that age in the 1989-1991 (previously 1979-1981) U.S. population.	• Competing risks not considered.
Risk Models	• Age-dependent and gender-dependent risk models for 14 cancer sites are considered individually and integrated into the slope factor estimate.	• Risk estimate averaged over all ages, sexes, and cancer sites.
Genetic Risk	• Genetic risk is not considered in the slope factor estimates; however, ovary is considered as a potential cancer site.	• Effective dose equivalent (EDE) value includes genetic risk component.
Dose Estimates	• Low-LET and high-LET dose estimates considered separately for each target organ.	• Dose-equivalent includes both low-LET and high-LET radiation, multiplied by appropriate Quality Factors.
RBE for high-LET (alpha) radiation	• 20 for most sites (8 prior to 1994) • 10 for breast (8 prior to 1994) • 1 for leukemia (1.117 prior to 1994)	• 20 (all sites)
Organs Considered	• Estimates of absorbed dose to 16 target organs/tissues considered for 13 specific cancer sites plus residual cancers.	• EDE (ICRP, 1979) considers dose estimates to 6 specific target organs plus remainder (weighted average of 5 other organs).
Lung Dose Definition	• Absorbed dose used to estimate lung cancer risk computed as weighted sum of dose to tracheobronchial region (80%) and pulmonary lung (20%).	• Average dose to total lung (mass weighted sum of doses to the tracheobronchial region, pulmonary region, and plumonary lymph nodes).
Integration Period	• Variable length (depending on organ-specific risk models and consideration of competing risks) not to exceed 110 years.	• Fixed integration period of 50 years typically considered.
Dosimetric / Metabolic Models	• Metabolic models and parameters for dose estimates follow recent recommendations of the ICRP series of documents on age-specific dosimetry (ICRP, 1989, 1993, 1995a, 1995b), where available; previous estimates based primarily on ICRP 30 (ICRP, 1979).	• Typically employ ICRP Publication 30 (ICRP, 1979) models and parameter for radionuclide uptake, distribution, and retention.

For both chemical carcinogens and radionuclides, extrapolation from high dose and dose rate exposure is generally required to estimate risks of low-level exposures. This extrapolation typically constitutes the greatest source of uncertainty. For chemical carcinogens, additional uncertainty may be introduced due to extrapolation of animal data to humans. Slope factors for both radionuclides and chemicals are used to estimate incremental cancer risk, which typically represents a small increment over a relatively high baseline incidence. Other sources of uncertainty may include that associated with instrumentation and measurements used to characterize the nature and extent of radionuclides of concern, and the parameters used to characterize potential exposures of current and future receptors (e.g., intake rates, frequency of exposure).

Probabilistic Risk Assessment (PRA) may be used to provide quantitative estimates of the uncertainties in the risk assessment. However, probabilistic estimates of risk should always be presented as a supplement to - not instead of - the deterministic (i.e., point estimate) methods outlined in *RAGS Part A*. A tiered approach is often useful, with the rigor of the analysis dependent on the magnitude of predicted risk. Factors to be considered in conducting a probabilistic analysis typically should include the sensitivity of parameters, the correlation or dependencies between parameters, and the distributions of parameter values and model estimates. Detailed guidance on this topic is provided in *Use of Probabilistic Techniques (Including Monte Carlo Analysis) in Risk Assessment* (U.S. EPA 1997c) and *Guiding Principles for Monte Carlo Analysis* (U.S. EPA 1997d).

Q32. When should a dose assessment be performed?

OSWER Directive 9200.4-18 (U.S. EPA 1997a) specifies that cleanup levels for radioactive contamination at CERCLA sites should be established as they would for any chemical that poses an unacceptable risk and the risks should be characterized in standard Agency risk language consistent with CERCLA guidance. **Cleanup levels not based on an ARAR should be based on the carcinogenic risk range (generally 10^{-4} to 10^{-6}, with 10^{-6} as the point of departure and 1×10^{-6} used for PRGs) and expressed in terms of risk (# x $10^{-\#}$).** While the upper end of the risk range is not a discrete line at 1×10^{-4}, EPA generally uses 1×10^{-4} in making risk management decisions. A specific risk estimate around 10^{-4} may be considered acceptable if based on site-specific circumstances. For further discussion of how EPA uses the risk range, see OSWER Directive 9355.0-30, Role of the Baseline Risk Assessment in Superfund Remedy Selection Decisions (U.S. EPA 1991d). In general, dose assessment used as a method to assess risk is not recommended at CERCLA sites.

Please note that the references to 15 mrem/yr in OSWER Directive 9200.4-18 are intended as guidance for the evaluation of potential ARARs and TBCs, and should not be used as a TBC for establishing 15 mrem/yr cleanup levels at CERCLA sites. **At CERCLA sites dose assessments should generally not be performed to assess risks or to establish cleanup levels** except to show compliance with an ARAR that requires a dose assessment (e.g., 40 CFR 61 Subparts H and I, and 10 CFR 61.41).

Q33 How and when should exposure rate be used to estimate radionuclide risks?

As discussed previously (see Q24 and Q27), EPA recommends that estimates of radiation risk should be derived using slope factors, in a manner analogous to that used for chemical contaminants. However, there may be circumstances where it is desirable to also consider estimates of risk based on direct exposure rate measurements of penetrating radiation. Instances where it may be beneficial to also use direct measurements for assessing risk from external exposure to penetrating radiation include:

- During early site assessment efforts when the site manager is attempting to communicate the relative risk posed by areas containing elevated levels of radiation,
- As a real-time method for indicating that remedial objectives are being met during the conduct of the response action. The use of exposure rate measurements during the conduct of the response actions may not decrease the need for a final status survey.
- When risk estimates developed during a risk assessment may underestimate the level of risk posed by radionuclides. An example of this situation would be where the source of the radiation is highly irregular (inside a contaminated structure) instead of being an infinite plane, which is the standard assumption used during risk assessments.

When developing risk estimates under any of these situations, risk factors from "Estimating Radiogenic Cancer Risks, EPA 402-R-93-076" or HEAST plus shape & area factor, should be used in conjunction with the measured dose rate to develop a risk estimate for external exposure to penetrating radiation.

Direct radiation exposure rate measurements may provide important indications of radiation risks at a site, particularly during early investigations, when these may be the first data available. However, such data may only reflect a subset of the radionuclides and exposure pathways of potential concern (e.g., only external exposure from gamma-emitting radionuclides in near-surface soil), and may present an incomplete picture of site risks (e.g., risk from internal exposures, or potential increased future risks from radionuclides in subsurface soils). In most cases, more accurate estimation of radiation risks will require additional

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MEMORANDUM

TO: Dave Cobrain, Santa Fe Group Manager
John Young, Head Of Corrective Action for LANL
Neelam Dhawan, Environmental Scientist and Specialist O,
Permits Management Program

FROM: Kirby Olson, Environmental Scientist and Specialist O,
Permits Management Program

SUBJECT: Draft Addendum to the RFI Report for MDA H at TA 54
Task # LANL-01-001

DATE: August 6, 2002

I reviewed sections 4.1 and 4.2, the human health and ecological screening risk assessment sections of the RFI addendum. These sections evaluate concentrations of tritium measured at breathing zones over the site and concentrations of VOCs in pore gas (vapor phase contamination) at 50 feet below ground surface. The reported tritium concentrations reflect levels to which receptors may be directly exposed at the surface through inhalation over time and can be evaluated as such for carcinogenic risk. The concentrations of VOCs in pore gas at 50 ft below ground surface do not represent a direct exposure route; the site is to be capped and does not have buildings over the vapor contamination into which vapor phase contaminants may migrate. The most likely potential exposure pathway to this VOC contamination would be a short term exposure if the soil were excavated.

LANL compared the soil vapor concentrations to the OSHA 8 hour time weighted average (TWA) levels. These are levels judged acceptable for workers in particular industries; but they are based on different risk criteria than are used in RCRA and Superfund; OSHA risk criteria also vary from one chemical to another. In the table below I have compared the maximum concentration in pore gas for each chemical to minimal risk levels (MRLs) generated by ATSDR for both acute (less than 14 days) and intermediate/chronic (greater than 14 days) exposures. These MRLs are designed to protect the general public from potential noncancer health effects resulting from acute or chronic exposure. The MRLs are based on the most sensitive endpoints seen in studies; they are not expected to correspond to a level that causes harm. I have also compared the maximum

concentration in pore gas for each chemical to the EPA RfCs (when available) and EPA ambient air screening levels. These levels correspond to an excess cancer risk of 1 in 10^{-6} for lifetime exposure to that air concentration. These screening levels would generally be used only for comparison to surface air concentrations over a site released for residential use.

Contaminant	**Benzene**	**Methylene chloride**	**Toluene**	**1,1,1 Trichloroethane (TCA)**	**trichloroethylene**
Max concentration in pore gas (table 2.5-5)	34 ppb 110 ($\mu g/m^3$)	17 ppb 59 ($\mu g/m^3$)	2300 ppb 8800 ($\mu g/m^3$)	26 ppb 140 ($\mu g/m^3$)	20 ppb 110 ($\mu g/m^3$)
ATSDR acute MRL	50 ppb	600 ppb	1000 ppb	2000 ppb	2000 ppb
ATSDR chronic or intermediate MRL	4 ppb	300 ppb	80 ppb	700 ppb	100 ppb
EPA RfC (for residential)	Under review	No data	400 ($\mu g/m^3$)	No data	No data
EPA Region 6 ambient air level (AAL) ($\mu g/m^3$)	0.25 ($\mu g/m^3$)	4.1 ($\mu g/m^3$)	400 ($\mu g/m^3$)	1000 ($\mu g/m^3$)	1.1 ($\mu g/m^3$)
A.A.L. endpoint	cancer	Cancer	cancer	noncancer	cancer

The maximum concentrations in pore gas of all these VOCs except toluene are below the ATSDR acute MRLs. This would indicate that future short term exposure to those VOCs due to accidental excavation is unlikely to result in harm to workers or the public. The toluene concentrations seen at depth could potentially represent a risk (MRLs are conservative) and controls might be necessary to address this. All of the VOCs exceed the ambient air levels for chronic residential exposure.

The maximum tritium concentration measured in air at the site was 54.5 pCi/m^3. Using the EPA final radionuclide PRG calculator cancer slope factor for inhaled tritium of 1.99×10^{-13} risk/pCi and the NMED SSL exposure parameters, the lifetime excess cancer risk for a resident associated with chronic exposure to this concentration of tritium in air would be 2.3×10^{-6}. For an outdoor industrial worker using NMED default values, the lifetime excess cancer risk associated with exposure to this concentration of tritium in air would be 1.4×10^{-6}. Using the 95% UCL of the mean for the tritium concentration (17.1 pCi/m^3), the projected potential risk to the resident or worker would be 7.1×10^{-7} and 4.3×10^{-7}, respectively. The risk due to the measured concentrations of tritium in air at this site is below the NMED risk guideline for both the industrial and residential scenarios.

The ecological screening compared concentrations of contaminants in surface sediment in the channel to LANL ESLs for ecological receptors. Selenium exceeded the ESL for plants, generating an HQ of 4.2. Considering that the background concentration of selenium is 3 times the selenium ESL for plants and that this ESL is the only one which generated an HQ greater than one; the HQ of 4.2 probably does not represent a prediction of ecological risk from selenium at this site.

ATTACHEMENT

1. Section 2.2, Channel Sediments, Page 6;
Include in the discussion the fact that sediment sample taken in March 2001 had to be collected again in September 2002 because the sample was not analyzed for alpha spectroscopy, gamma spectroscopy, strontium 90 and tritium as specified in the supplemental RFI sampling plan submitted to NMED. Also, include the communication record (dated September 26, 2002) that documented the communication between the Permittees and NMED in the Addendum to the RFI Report as an Appendix.

2. Section 2.5.1.1, Evaluation of Tritium Data, Page 6-7;
LANL Statement: "Tritium was detected in both pore gas samples collected at the 50-ft depth from both new boreholes".
NMED Comment: There is a discrepancy between the above statement and Table 2.5-2 on page 7. According to the Table 2.5-2, tritium was detected in pore gas at 98 and 245 feet in boreholes 54-15461 and 54-15462 respectively. Additionally, Table 2.5-2 on Page 7 of the Draft Addendum to the RFI Report for MDA H (June 2002) reports that pore gas samples were taken at 50 ft for both the boreholes. Clarify the discrepancy.

3. Table 2.5-9, Page 16;
Table 2.5-9 reports a value of 12 pCi/m^3 for tritium for sample taken on 12/17/01, whereas the table in the Draft Addendum to the RFI Report for MDA H (June 2002) reported that no samples were taken at that time because of LANL winter closure. Clarify, if the sample was indeed collected on 12/17/01 and was erroneously reported as 'no sample taken' in the draft report.

4. Section 4.1, Human Health Screening Assessment, Page 18;
LANL Statement: "Both the average and maximum tritium concentrations are below the target dose of 15 mrem/yr, which is recommended by EPA for dose based decisions (EPA 1997, 58693) and by DOE for the unconditional release of real property (DOE 2000, 67153)."
NMED Comment: NMED evaluates risk to human health based on lifetime carcinogenic risk and not based on dose per year. Revise risk assessment to include the risk based on lifetime carcinogenic risk. NMED recommends using EPA guidance entitled "Soil Screening Guidance for Radionuclides: User's Guide and Technical Background Document Final Guidance" October 2000. OSWER Directive 9355.4-16, NTIS Order Number (PB2000 96330) to calculate risk for tritium.