UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 6
1445 ROSS AVENUE, SUITE 1200
DALLAS, TX 75202-2733

Ste -
Please forward
to DOE/LANL or
respond to EPA by 3/13/98.
with rationale
Benito
2/10/98

February 5, 1998

Mr. Benito Garcia, Chief
Hazardous and Radioactive Materials Bureau
New Mexico Environment Department
P.O. Box 26110
Santa Fe, NM 87502

Re: TA-33 Potential Release Sites RFI Report
Los Alamos National Laboratory (EPA ID# NM0890010515)

Dear Mr. Garcia:

The Environmental Protection Agency (EPA) has reviewed the RFI Report for Potential Release Sites (PRSs) 33-002(b-c), 33-003(b), 33-004(k), 33-006(a), 33-008(a-b), 33-011(d), 33-013, and 33-017 located in Technical Area (TA) 33 at Los Alamos National Laboratory (LANL). The PRSs included in this report consist of inactive sumps, shot pads, landfills, drum storage areas and their associated outfalls.

EPA believes that a decision of No Further Action (NFA) is appropriate for three (3) of these sites. The remaining seven (7) require additional submitted information, consideration, or investigation. Significant radiological contamination has been detected at PRS 33-002(b), an inactive sump. Although radiological contamination is not subject to RCRA regulation, EPA recommends that NMED evaluate under a mixed-waste scenario if further investigation is required.

A noted deficiency of this report is that no evaluation of the impacts of these sites upon several canyon springs has been included. EPA believes that it is not appropriate to propose NFA for these sites until all potential vectors of exposure have been investigated and have been found to have no unacceptable risk to human health or the environment, regardless of if this information is submitted in conjunction with the TA-33 RFI Report or subsequent to investigations carried forth from work plans as approved in the Canyons Core Document.

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A review summary and a list of comments and deficiencies is attached. Should you have any questions, please contact Mr. David Vanlandingham at (214) 665-2254.

Sincerely,

David W. Neleigh, Chief
New Mexico and Federal
Facilities Section

Enclosures

Summary of EPA Review
RFI Report for TA-33 Potential Release Sites

PRS	Human Health NFA		Rationale for Recommendation of NFA Denial/Approval
	YES	NO	
33-002(b)		X	EPA recommends that NMED evaluate radiological contamination under a mixed-waste scenario.
33-002(c)		X	Deficiencies exist regarding delineation of chromium and PAH contamination.
33-003(b)		X	NFA recommendation pending submittal of additional field screening information.
33-004(k)	X		Permit modification will be requested because PRS cannot be found.
33-006(a)		X	Baseline risk assessment requested.
33-008(a)		X	Analysis of canyon springs requested.
33-008(b)		X	Analysis of canyon springs requested.
33-011(d)	X		Adequate investigation has revealed only isolated contamination which does not pose an unacceptable risk to human health.
33-013	X		Adequate investigation has revealed no contamination which would pose an unacceptable risk to human health.
33-017		X	Smaller PRSs included in PRS 33-017 must first be characterized.

List of Deficiencies and Comments
RFI Report for Technical Area 33 Potential Release Sites
Los Alamos National Laboratory (NM0890010515)

General Comments

1. Chromium concentrations, although always reported in the form of total Chromium, must always be considered to be in the hexavalent chromium form unless laboratory analysis proves justification for otherwise. The hexavalent chromium Screening Action Level (SAL) of 31mg/kg should also be used in subsequent screens and risk assessments.

2. 3.3.2 Risk Assessment.

The LANL document *Risk-Based Corrective Action Process* (LA-UR-96-2811)nor the Multiple-Chemical Evaluation (MCE) outlined in this document have been approved by the Administrative Authority. EPA believes that the misapplication of the MCE to phase I investigation results often eliminates contaminants of concern (COCs) from further investigation before the extent of contamination has been delineated. EPA believes that, after adequate site characterization, the simplest way to account for additive effects due to multiple constituents is to compare contaminant concentrations against respective SALs divided by 10.

3. The comparison of site data to industrial preliminary remediation goals (PRGs) in screening assessments is inappropriate. Screening assessments compare site data to background data and SALs under various scenarios of human health and ecological exposure. Furthermore, PRGs approved by EPA Region IX are not approved by Region VI.

A comparison to PRGs is not utilized in the screening assessment to determine contaminants of concern, but is utilized after the nature and extent of contaminants of concern have been delineated to serve as a point of comparison in the remedy management process. At that time, PRGs should be utilized at sites which only have one contaminant as the risk driver for clean-up.

Specific Comments

4. Table ES-1.

LANL suggests that NFA is appropriate for PRS 33-006(a) because constituents are below screening action levels (SALs). EPA believes that a site where constituents are found above background, even if below SALs, may require further sampling and analyses or a

baseline risk assessment. Contaminant concentrations below SALs may exceed the 10^{-4} to 10^{-6} risk range due to cumulative effects under certain exposure scenarios.

5. 4.3.3 PCB Analyses.

LANL states "overall, it appears that the field results tend to overestimate the results that would have been obtained if the samples had been submitted to a fixed laboratory." However, as LANL notes in the preceding paragraph, this overestimation appears to be a phenomenon which is only more likely to occur in samples which have laboratory results of less than 1mg/kg. EPA believes that inconsistencies between laboratory and field results typically become more frequent as sample concentrations approach the method detection limit and that these inaccuracies are not reflective of "overall" field and laboratory results.

6. 5.0 Site-specific Results, Conclusions, and Recommendations.

LANL claims that infrequent detections of PAHs without SALs at low concentrations do not represent an industrial release or a contamination problem posing a potential risk to human health or the environment. EPA believes that this statement minimizes potential risk and may discourage adequate site characterization under certain conditions. For instance, infrequent detection of PAHs in surface soils does not preclude the need for adequate vertical and lateral site characterization.

7. 5.0 Site-specific Results, Conclusions, and Recommendations.

EPA requests that LANL clarify the statement that "the evaluation of PAHs in this report is considered to be complete using only PAHs with available SALs." EPA believes that all detected contaminants must be evaluated in conjunction with their relative uncertainties.

8. 5.1.9 Human-Health Risk Assessment.

LANL states that "the highest (tritium) values are at depths of 4-15ft, with lower values both near the surface and below 15 feet." EPA believes that, although values below 15 feet are indeed lower than those at depths of 4-15ft, tritium concentrations are still in excess of ten times the SAL as deep as 45ft. Although tritium is not a RCRA constituent, EPA recommends that NMED evaluate these concentrations under a mixed-waste scenario to determine if the sump requires remedial action.

9. Table 5.1.9-1 Parameters used in RESRAD Model for PRS 33-002(b).

EPA recommends that NMED evaluate these parameters used to calculate radiological exposure. LANL uses $9m^2$ as the contaminated zone area, corresponding to the 10ft diameter of the sump. EPA believes that this estimate may not be adequate, as LANL has not sampled at depth radially outward from the sump to determine the lateral extent of contamination. EPA recommends that LANL further investigate PRS 33-002(b) to determine the lateral extent of contamination.

10. 5.1.9 Human-Health Risk Assessment.

EPA believes that if a dose assessment is conducted at a site, then "15 millirem per year (mrem/yr) effective dose equivalent (EDE) should generally be the maximum dose limit for humans. This level equates to approximately 3 X 10-4 increased lifetime risk and is consistent with levels generally considered protective in other governmental actions, particularly regulations and guidance developed by EPA in other radiation control programs (OSWER No. 9200.4-18)." A copy of guidance documents concerning EPA radiological assessment recommendations is enclosed.

11. 5.2.6 Evaluation of Radionuclides.

LANL does not carry forward plutonium in the screening process because concentrations are below SALs. EPA believes that any constituent found at levels above background, even if below SALs, should be carried forward in the screening process. However, because plutonium is not present at elevated levels within the sump itself and is not acting as a source of migrating contamination, further characterization of PRS 33-002(c) for plutonium is not necessary.

12. 5.2.7 Evaluation of Organic Chemicals.

LANL states that although three PAHs were found above their SALs, all were confined within the sump or at the interface. However, sampling for organics was performed only in the sump, and no where else in the vicinity of PRS 33-002(c). LANL has not adequately characterized this site for semivolatile organics to provide evidence to substantiate this claim.

13. 5.2.9 Human-Health Risk Assessment.

EPA disagrees with LANL's statement that the concentrations of PAHs found at PRS 33-002(c) not indicate that PAHs were used at the site. LANL should explain what level of PAH contamination would suggest that PAHs were actually released to the environment and provide adequate technically defensible documentation. EPA

believes that benzo(a)pyrene at concentrations of almost ten times the SAL is indicative of a release.

14. 5.2.11 Conclusion and Recommendation.

EPA requests that LANL submit technically defensible documentation to show what levels of PAHs are consistent with industrial sites.

15. 5.2.11 Conclusion and Recommendation.

Chromium and PAH contamination has not been shown to be confined to the sump. See comment 12.

16. 5.2.11 Conclusion and Recommendation.

See comment 10 regarding radiological dose assessment.

17. 5.3.7 Evaluation of Organic Chemicals.

EPA requests that LANL provide the section from the RFI Workplan which specifies that only samples with screening results above 1mg/kg be submitted for laboratory analysis.

18. 5.3.8 Risk-Based Screening Assessment.

Because PCBs were not laboratory analyzed, LANL cannot assume that PCBs in the positive detect field screening samples were below the 1mg/kg SAL. If LANL provides the information requested in comment 17, then further PCB analysis is not necessary, and a recommendation of No Further Action (NFA) at PRS 33-003(b) is appropriate.

19. 5.5 PRS 33-006(a)

LANL's statement that "no HE was detected in any sample" is incorrect. TNB and DNB, degradation products of HE, were detected.

20. 5.5.3 Previous Investigation.

The risk assessment for PRS 33-006(a) cannot be found in the section of the December 1995 RFI Report which LANL supplied. The risk assessment for PRS 33-006(a) was actually not performed and Section 5.5.7.2 makes comparisons to the risk assessment for PRS 33-010(c): "No risk assessment was performed for this PRS because the risk assessment for PRS 33-010(c) indicated elevated uranium and copper posed no unacceptable risk." In fact, EPA commented in

June of 1996 that PRS 33-010(c) did pose a risk and recommended a cleanup of chunks of uranium and copper.

Given the contamination area size and the number of constituents present, EPA recommends that LANL conduct a conservative human-health baseline risk assessment of the cumulative effects of all constituents (including copper, uranium, and HE compounds) of PRS 33-006(a) and submit it for regulatory review. Impacts to the springs found in Chaquehui and White Rock Canyons should be studied, and any analytical data on these springs should be submitted. The 1994 data which was deemed valid should also be included.

21. 5.5.11 Conclusion and Recommendation.

EPA believes that the majority of initial 1994 HE data was invalid because the samples severely exceeded laboratory holding times. Further justification of its use by LANL is unnecessary.

22. 5.6.9 Human-Health Risk Assessment.

LANL states that the PAHs found above SALs at PRS 33-008(a) do not indicate a "significant contaminant release scenario or potential human-health concern at an industrial facility such as TA-33." EPA disagrees, as the odor of creosote was noted in the sampling log during sampling, levels of PAHs are present in some areas at up to 40 times the SAL, and the studies of impacts of this landfill upon springs found in Chaquehui and White Rock Canyons are not included in this report. It is understandable that any remedial actions at this PRS would probably create unnecessary exposure; however, EPA requests that this information be provided so that EPA can be assured that contamination associated with PRS 33-008(a) poses no unacceptable risk to human health or the environment before recommending NFA.

23. 5.7.9 Human-Health Risk Assessment.

EPA requests that studies of the impacts of this landfill upon canyon springs be submitted. EPA must be assured that contamination associated with PRS 33-008(b) poses no unacceptable risk to human health or the environment before recommending NFA.

24. Figure 5.8.2-1.

"Lead" listed at sample AAA6866 should be underlined to denote a lead concentration exceeding SAL.

25. Table 5.8.6-1.

EPA requests that footnotes "a" and "b" be explained.

26. 5.8.11 Conclusion and Recommendation.

EPA believes that LANL has satisfactorily demonstrated through two phases of investigation that lead and uranium contamination at this site is random and isolated and poses little threat to human health or the environment. Furthermore, lead contamination would be expected to only be present in approximately the top one foot of soil. EPA recommends human-health NFA for PRS 33-011(d). However, EPA still requests that an ecological assessment be submitted for the site.

27. Figure 5.9.2-1.

LANL should add tritium contamination found in sample AAA2036 in the 1993 sampling campaign to this figure.

28. 5.9.11 Conclusion and Recommendation.

EPA recommends human-health NFA for PRS 33-013 because an adequate phase II investigation has revealed that RCRA constituents are not present at levels above background which would pose an unacceptable risk to human health. However, EPA still requests that an ecological assessment be submitted for the site.

29. 5.10.11 Conclusion and Recommendation.

LANL has proposed PRS 33-017 for NFA while proposing that PCB contamination be addressed in one campaign at overlapping PRSs 33-012(a) and C-33-001. EPA believes that "No Further Action" means no further action is required at the indicated site. However, further investigation is needed at PRSs 33-012(a) and C-33-001, which are not exclusive of PRS 33-017. Granting NFA at PRS 33-017 does not ensure the Administrative Authority that further investigation will take place; in fact, it implies that this site has been adequately characterized by LANL and is known not to pose an unacceptable human health and ecological risk. For this reason, EPA believes that human health and the environment are better protected in scenarios where a site is located within another site either by retaining the original PRS or SWMU designation and proposing NFA for all sites simultaneously when appropriate or by combining the sites through HSWA permit modification.

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

Signed by Steve Luftig & Larry Weinstock on August 22, 1997

OFFICE OF
SOLID WASTE AND EMERGENCY
RESPONSE

OSWER No. 9200.4-18

MEMORANDUM

SUBJECT: Establishment of Cleanup Levels for CERCLA Sites with Radioactive Contamination

FROM: Stephen D. Luftig, Director *s/Stephen D. Luftig*
Office of Emergency and Remedial Response

Larry Weinstock, Acting Director *s/Larry Weinstock*
Office of Radiation and Indoor Air

TO: Addressees

PURPOSE

This memorandum presents clarifying guidance for establishing protective cleanup levels[1] for radioactive contamination at Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) sites. The policies stated in this memorandum are inclusive of all radioactive contaminants of concern at a

[1]This directive provides guidance on cleanup levels expressed as a risk, exposure, or dose level and not as a soil concentration level. The concentration level for various media, such as soil, that corresponds to a given risk level should be determined on a site-specific basis, based on factors such as the assumed land use and the physical characteristics (e.g., important surface features, soils, geology, hydro geology, meteorology, and ecology) at the site. This guidance does not alter the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) expectations regarding treatment of principal threat waste and the use of containment and institutional controls for low level threat waste.

site including radon.[2] The directive is limited to providing guidance regarding the protection of human health and does not address levels necessary to protect ecological receptors.
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This document provides guidance to EPA staff. It also provides guidance to the public and to the regulated community on how EPA intends that the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) be implemented. The guidance is designed to describe EPA's national policy on these issues. The document does not, however, substitute for EPA's statutes or regulations, nor is it a regulation itself. Thus, it cannot impose legally-binding requirements on EPA, States, or the regulated community, and may not apply to a particular situation based upon the circumstances. EPA may change this guidance in the future, as appropriate.

BACKGROUND

All remedial actions at CERCLA sites must be protective of human health and the environment and comply with Applicable or Relevant and Appropriate Requirements (ARARs) unless a waiver is justified. Cleanup levels for response actions under CERCLA are developed based on site-specific risk assessments, ARARs, and/or to-be-considered material[3] (TBCs).

A listing is attached of radiation standards that are likely to be used as ARARs to establish cleanup levels or to conduct remedial actions. Cleanup standards have been under development by EPA under the Atomic Energy Act (AEA) and will be ARARs under certain circumstances if issued.

ARARs are often the determining factor in establishing cleanup levels at CERCLA sites. However, where ARARs are not available or are not sufficiently protective, EPA generally sets site-specific remediation levels for: 1) carcinogens at a level that represents an excess upper bound lifetime cancer risk to an individual of between 10^{-4} to 10^{-6}; and for 2) non-carcinogens such that the cumulative risks from exposure will not result in adverse effects to human populations (including sensitive sub-populations) that may be exposed during a lifetime or part of a lifetime, incorporating an adequate margin of safety. (See 40 CFR 300.430(e)(2)(i)(A)(2).) Since all radionuclides are carcinogens, this guidance addresses carcinogenic risk. If

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[2]Since radon is not covered in some Federal radiation regulations it is important to note that the cleanup guidance clarifications in this memorandum include radon. Attachment A is a listing of standards for radionuclides (including radon) that may be applicable or relevant and appropriate requirements (ARARs) for Superfund sites.

[3]To-be-considered material (TBCs) are non-promulgated advisories or guidance issued by Federal or State governments that are not legally binding and do not have the status of potential ARARs. However, TBCs will be considered along with ARARs as part of the site risk assessment and may be used in determining the necessary level of cleanup for protection of health and the environment.

non-carcinogenic risks are posed by specific radionuclides, those risks should be taken into account in establishing cleanup levels or suitable remedial actions. The site-specific level of cleanup is determined using the nine criteria specified in Section 300.430(e)(9)(iii) of the NCP.

It is important to note that a new potential ARAR was recently promulgated : NRC's Radiological Criteria for License Termination (See 62 FR 39058, July 21, 1997). We expect that NRC's implementation of the rule for License Termination (decommissioning rule) will result in cleanups within the Superfund risk range at the vast majority of NRC sites. However, EPA has determined that the dose limits established in this rule as promulgated generally will not provide a protective basis for establishing preliminary remediation goals (PRGs) under CERCLA.[4] The NRC rule set an allowable cleanup level of 25 millirem per year (equivalent to approximately 5×10^{-4} increased lifetime risk) as the primary standard with exemptions allowing dose limits of up to 100 millirem per year (equivalent to approximately 2×10^{-3} increased lifetime risk). Accordingly, while the NRC rule standard must be met (or waived) at sites where it is applicable or relevant and appropriate, cleanups at these sites will typically have to be more stringent than required by the NRC dose limits in order to meet the CERCLA and NCP requirement to be protective.[5] Guidance that provides for cleanups outside the risk range (in general, cleanup levels exceeding 15 millirem per year which equates to approximately 3×10^{-4} increased lifetime risk) is similarly not protective under CERCLA and generally should not be used to establish cleanup levels.

The lack of a protective comprehensive set of regulatory cleanup levels for radiation, together with the possibility of confusion as to the status of other Federal Agency regulations and guidance as ARARs or TBCs, may cause uncertainty as to the cleanup levels deemed protective under CERCLA. Until a protective comprehensive radiation cleanup rule is available, this guidance clarifies the Agency's position on CERCLA cleanup levels for radiation.

OBJECTIVE

This guidance clarifies 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. This is to say, such cleanups should generally achieve risk levels in the 10^{-4} to 10^{-6} range. EPA has a consistent methodology for assessing cancer risks and determining PRGs at CERCLA sites no matter the type of contamination.[6] Cancer risks for radionuclides should generally be estimated using the slope factor approach identified in this methodology. Slope factors were developed by EPA for

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[4]See letter, Carol Browner, Administrator, EPA, to Shirley Jackson, Chairman, Nuclear Regulatory Commission, February 7, 1997.

[5]See attachment B for a detailed discussion of the basis for the conclusion that the dose limits in the NRC rule are not adequately protective.

[6]U.S. EPA, "Risk Assessment Guidance for Superfund Volume I Human Health Evaluation Manual (Part A) Interim Final," EPA//540/1-89/002, December 1989. U.S. EPA, "Risk Assessment Guidance for Superfund: Volume I - Human Health Evaluation Manual (Part B, Development of Risk-based Preliminary Remediation Goals", EPA/540/R-92/003, December 1991.

more than 300 radionuclides in the *Health Effects Assessment Summary Tables* (HEAST).[7] 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.

Historically, radiation exposure and cleanup levels have often been expressed in units unique to radiation (e.g., millirem or picoCuries). It is important for the purposes of clarity that a consistent set of existing risk-based units (i.e., # $x10^{-\#}$) for cleanups generally be used. This will also allow for ease and clarity of presenting cumulative risk for all contaminants, an objective consistent with EPA's policy on risk characterization.[8]

Cancer risk from both radiological and non-radiological contaminants should be summed to provide risk estimates for persons exposed to both types of carcinogenic contaminants. Although these risks initially may be tabulated separately, risk estimates contained in proposed and final site decision documents (e.g., proposed plans, Record of Decisions (RODs), Action Memos, ROD Amendments, Explanation of Significant Differences (ESDs)) should be summed to provide an estimate of the combined risk to individuals presented by **all** carcinogenic contaminants.

IMPLEMENTATION

The approach in this guidance should be considered at current and future CERCLA sites for which response decisions have not been made.

Overall Exposure Limit:

Cleanup should generally achieve a level of risk within the 10^{-4} to 10^{-6} carcinogenic risk range based on the reasonable maximum exposure for an individual. The cleanup levels to be specified include exposures from all potential pathways, and through all media (e.g., soil, ground water, surface water, sediment, air, structures,

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[7]U.S. EPA, "Health Effects Assessment Summary Tables FY-1995 Annual," EPA/540/R-95/036, May 1995; and U.S. EPA, "Health Effects Assessment Summary Tables FY-1995 Supplement," EPA/540/R-95/142, Nov. 1995.

[8]For further discussion of EPA's policy, see memorandum from EPA Administrator Carol Browner entitled: "EPA Risk Characterization Program," March 21, 1995.

biota). As noted in previous policy, "the upper boundary of the risk range is not a discrete line at 1 x 10^{-4}, although EPA generally uses 1 x 10^{-4} in making risk management decisions. A specific risk estimate around 10^{-4} may be considered acceptable if justified based on site-specific conditions".[9]

If a dose assessment is conducted at the site[10] then 15 millirem per year (mrem/yr) effective dose equivalent (EDE) should generally be the maximum dose limit for humans. This level equates to approximately 3 x 10^{-4} increased lifetime risk and is consistent with levels generally considered protective in other governmental actions, particularly regulations and guidance developed by EPA in other radiation control programs.[11]

Background Contamination:

Background radiation levels will generally be determined as background levels are determined for other contaminants, on a site-specific basis. In some cases, the same constituents are found in on-site samples as well as in background samples. The levels of each constituent are compared to background to determine its impact, if any, on site-related activities. Background is generally measured only for those radionuclides that are contaminants of concern and is compared on a contaminant specific basis to cleanup level. For example, background levels for radium-226 and radon-222 would generally not be evaluated at a site if those radionuclides were not site-related contaminants.

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[9]Memo from Assistant Administrator Don Clay to the Regions; "Role of the Baseline Risk Assessment in Superfund Remedy Selection Decisions'" OSWER Directive 9355.0-30; April 22, 1991.

[10]Cleanup levels not based on ARARs should be expressed as risk, although levels may at the same time be expressed in millirem.

[11]Further discussion and analysis of the basis for this recommendation is contained in the materials in the docket for the AEA standard under development by EPA, which is available at the following address: U.S. EPA, 401 M Street, S.W., Room M1500, Air Docket No. A-93-27, Washington D.C. 20460. The material is also available via computer modem through the Cleanup Regulation Electronic Bulletin Board (800-700-7837 outside the Washington area and 703-790-0825 locally), or on-line through the Radiation Site Cleanup Regulation HomePage (http://www.epa.gov/radiation/cleanup/). Cleanup levels based on some older ARARs that use a 25/75/25 mrem/yr standard (i.e., 25 mrem/yr to the whole body, 75 mrem/yr to the thyroid, and 25 mrem/yr to any other critical organ) may appear to permit greater risk than those based on 15 mrem EDE but on average correspond to approximately 10 mrem/yr EDE, using current risk methodologies. Similarly, ARARs based on a 25/75 mrem/yr standard used as an ARAR (i.e., 25 mrem/yr to whole body and 75 mrem/yr to any critical organ) would on average correspond to those cleanups based on 15 mrem/yr EDE. (See also "Comparison of Critical Organ and EDE Radiation Dose Rate Limits for Situations Involving Contaminated Land;" Office of Radiation and Indoor Air; April 1997.) See also Attachment B.

In certain situations background levels of a site-related contaminant may equal or exceed PRGs established for a site. In these situations background and site-related levels of radiation will be addressed as they are for other contaminants at CERCLA sites.[12]

Land Use and Institutional Controls:

The concentration levels for various media that correspond to the acceptable risk level established for cleanup will depend in part on land use at the site. Land uses that will be available following completion of a response action are determined as part of the remedy selection process considering the reasonably anticipated land use or uses along with other factors.[13] Institutional controls (ICs) generally should be included as a component of cleanup alternatives that would require restricted land use in order to ensure the response will be protective over time. The institutional controls should prevent an unanticipated change in land use that could result in unacceptable exposures to residual contamination, or at a minimum, alert future users to the residual risks and monitor for any changes in use.

Future Changes in Land Use:

Where waste is left on-site at levels that would require limited use and restricted exposure to ensure protectiveness, EPA will conduct reviews at least once every five years to monitor the site for any changes including changes in land use. Such reviews should analyze the implementation and effectiveness of any ICs with the same degree of care as other parts of the remedy. Should land use change in spite of land use

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[12]For further information regarding EPA's approach for addressing background at CERCLA sites see: National Oil and Hazardous Substances Pollution Contingency Plan, 55 FR 8717-8718, March 8, 1990; U.S. EPA "Guidance on Remedial Actions for Contaminated Ground Water at Superfund Sites," EPA/540/G-88/003, December 1988, pg. 4-9; U.S. EPA "Soil Screening Guidance: User's Guide," EPA/540/R-96/018, April 1996, pg. 8; and U.S. EPA "Risk Assessment Guidance for Superfund Volume I Human Health Evaluation Manual (Part A)," EPA/540/1-89/02, December 1989, pp. 4-5 to 4-10 and 5-18 to 5-19. It should be noted that certain ARARs specifically address how to factor background into cleanup levels. For example, some radiation ARAR levels are established as increments above background concentrations. (See attached chart for a listing of radiation standards that are likely to be used as ARARs.) In these circumstances, rather then follow the general guidance cited above, background should be addressed in the manner prescribed by the ARAR ARARs, such as 40 CFR 192, are available to establish cleanup levels for those naturally occurring radionuclides that pose the most risk (such as radium-226 or Thorium in soil, and indoor radon) when those radionuclides are site related contaminants.

[13]In developing Land use assumptions, decision makers should consult the guidance provided in the memorandum from Elliott Laws A.A., OSWER entitled: "Land Use in the CERCLA Remedy Selection Process" (OSWER Directive No. 9355.7-04), May 25, 1995.

restrictions, it will be necessary to evaluate the implications of that change for the selected remedy, and whether the remedy remains protective (e.g., a greater volume of soil may need to be removed or managed to achieve an acceptable level of risk for a less restrictive land use).

Ground Water Levels:

Consistent with CERCLA and the NCP, 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. This will typically be the case where ground waters are a current or potential source of drinking water.[14] The ARARs should generally be attained throughout the plume (i.e., in the aquifer).

Modeling Assessment of Future Exposures:

Risk levels, ground water cleanup, and dose limits should be predicted using appropriate models to examine the estimated future threats posed by residual radioactive material following the completion of the response action.[15] The modeling assessment should: (1) assume that the current physical characteristics (e.g., important surface features, soils, geology, hydrogeology, meteorology, and ecology) will continue to exist at the site; (2) take into account for each particular radionuclide that is a site-related contaminant, the following factors:

- radioactive decay and the ingrowth of radioactive decay products when assessing risk levels;
- the year of peak concentration in the ground water when assessing protection (e.g., remediating previous contamination and preventing future contamination) of ground water, and;
- the year of peak dose when assessing dose limits; and,

(3) model the expected movement of radioactive material at the site both within media (i.e., soil, ground water, surface water, sediment, structures, air, biota) and to other media.

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[14]In making decisions on ground water protection, decision makers should consult the guidance provided in "Presumptive Response Strategy and Ex-Situ Treatment Technologies for Contaminated Ground Water at CERCLA Sites" (OSWER Directive No. 9355.7-04) October 1996.

[15]For further information regarding the basis for this recommendation, see U.S. EPA, "Risk Assessment Guidance for Superfund Volume I Human Health Evaluation Manual (Part A) Interim Final," EPA//540/1-89/002, December 1989, pp. 10-22 and 10-24.

FURTHER INFORMATION

The subject matter specialists for this directive are Jeffrey Phillips of OERR and John Karhnak of ORIA. General questions about this directive, should be directed to 1-800-424-9346.

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