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Directive no. 9200.4-25

**MEMORANDUM**

**SUBJECT:** Use of Soil Cleanup Criteria in 40 CFR Part 192 as Remediation Goals for CERCLA sites

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

Larry Weinstock, Acting Director   
Office of Radiation and Indoor Air

**TO:** Addressees

**PURPOSE**

This memorandum addresses the use of the soil cleanup criteria in 40 CFR Part 192 when setting remediation goals at CERCLA sites with radioactive contamination. In particular, it clarifies the intent of 40 CFR Part 192 in setting remediation levels for subsurface soil. It does not address the applicability or intent of other standards contained in 40 CFR Part 192, nor does it address setting remediation goals for contaminated media other than soil.

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)



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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<sup>1</sup> (TBCs). The determination of whether a requirement is applicable, or relevant and appropriate, must be made on a site-specific basis (see 40 CFR Part 300.400(g)).

On January 5, 1983, EPA promulgated in Subpart B of 40 CFR Part 192 (48 FR 590 to 606) *Standards for Cleanup of Land and Buildings Contaminated with Residual Radioactive Materials from Inactive Uranium Processing Sites*. These standards were developed pursuant to Section 275 of the Atomic Energy Act (42 U.S.C. 2022), as amended by Section 206 of the Uranium Mill Tailings Radiation Control Act of 1978 (42 U.S.C. 7918).

These standards were developed specifically for the cleanup of uranium mill tailings at 24 sites designated under Section 102(a)(1) of UMTRCA (Title I sites). The purpose of these standards was to limit the risk from inhalation of radon decay products in houses built on land contaminated with tailings, and to limit gamma radiation exposure of people using contaminated land (see 48 FR 600). The list of 24 Title I sites is a closed set chosen in 1979 that cannot be added to. It includes the so-called "vicinity" sites at which cleanup of specified off-site properties for unrestricted use is authorized.

Subpart B of 40 CFR Part 192 contains two different soil standards. The concentration criterion for surface soil (5 pCi/g of radium-226) is a health-based standard. The relevant source of health risk for surface soil is exposure to gamma radiation, which is the basis for this standard. This basis is noted in the preamble to the final rule (see 48 FR 600) and is discussed in greater detail in the Final Environmental Impact Statement (FEIS) which was conducted as part of the rulemaking process (see the FEIS at pp. 57, 111-112, and 134-137). This standard for a single radioisotope (radium-226) was developed to control the hazard from gamma radiation.

The concentration criterion for subsurface soil in Subpart B (15 pCi/g of radium-226) is not a health-based standard, but rather was developed for use in limited circumstances, explained below, to allow the use of field measurements rather than laboratory analyses to determine when buried tailings had been detected. The basis for this criterion is documented in the materials accompanying the promulgation of Subpart B (see 48 FR 600, the FEIS at pp. 134-137 and D-51 to D-52, and *Findings of an Ad Hoc Technical Group on Cleanup of Open Land Contaminated with Uranium Mill Tailings, EPA, 1981, Docket A-79-25*).

The criterion for subsurface soil was derived as a tool for use in locating and remediating discrete deposits of high activity tailings (typically 300-1,000 pCi/g) in subsurface locations at mill sites or at vicinity properties. The criterion for subsurface soil in Subpart B was originally

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<sup>1</sup>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.

proposed as 5 pCi/g (46 FR 2562). The criterion in the final rule was changed, not because of a reassessment of the level of contamination that would present a threat to health, but rather in order to reduce the cost to DOE of locating buried tailings; EPA's analysis found that by cleaning up this highly active waste, located using the 15 pCi/g finding tool, DOE would achieve essentially the same degree of cleanup that would result at the Title I sites as originally proposed under the 5 pCi/g criterion (see 48 FR 600 and FEIS p. D-51).

When examining the costs and benefits of alternative standards ranging from 5 to 30 pCi/g, the analysis for the final rulemaking found that the amount of buried tailings to be removed varies only slightly with the limit selected (see 48 FR 600). This indicates that there was expected to be little subsurface contamination ranging from 5 to 30 pCi/g at the Title I sites regulated under this rule. The rule was not developed for situations where significant quantities of contamination exist between 5 and 30 pCi/g. EPA considered significant residual contamination of up to 15 pCi/g of radium-226 to generally be hazardous to build on, but concluded that there would be very little contamination in this range at Title I sites. A concentration of 15 pCi/g was considered likely to occur only in thin layers at the edges of more concentrated deposits that would be cleaned up under a 15 pCi/g criterion (see FEIS p. 136-137). EPA's analysis for the rule determined that a 5 pCi/g, rather than 15 pCi/g, criterion for subsurface soil "would require more skill and training of personnel, and greater use of expensive measuring techniques, but cleanup would only be marginally more complete" (see FEIS p. 136). The 15 pCi/g criterion is therefore only suitable for use, as a cost effective tool to locate and remediate radioactive waste, when most or all subsurface contamination is at a level greater than 30 pCi/g and is not expected to be significantly admixed with clean soil. In this situation, removing all subsurface contamination detected at 15 pCi/g or above will reduce residual contamination to nearly zero.

The 5 pCi/g and 15 pCi/g standards were initially developed for a single radioisotope (radium-226) to control the hazard from radiation. In Subpart E of 40 CFR Part 192 (48 FR 45947) *Standards for Management of Thorium Byproduct Materials Pursuant to Section 84 of the Atomic Energy Act of 1954, as Amended*, EPA determined that these standards were suitable for remediation of radium-228 at Title II sites (see 48 FR 45944 and the FEIS for *Standards for the Control of Byproduct Materials from Uranium or Processing (40 CFR 192) Volume I, Appendix G: Thorium Mill Tailings*).

Attainment of the 5 pCi/g and 15 pCi/g UMTRCA standards was intended to signify that a Title I site had been cleaned up to a level suitable for unrestricted use. However, in Subpart C of 40 CFR Part 192, alternative site-specific standards may be established under some special circumstances that allow the selection and performance of remedial actions that come as close as reasonably achievable to meeting the UMTRCA standards. In general, these "supplemental standards" were not expected to be used often. They were designed for situations in which worker safety would be adversely impacted or clearly greater environmental harm would result from the remedial action necessary to attain the standards, for situations in which the materials

do not pose a clear present or future hazard and improvements could be achieved only at unreasonably high cost, or where concentrations of other radionuclides are sufficiently high to constitute a significant radiation hazard.

### **OBJECTIVE**

The objective of this memorandum is to provide guidance regarding the circumstances under which the soil cleanup criteria in 40 CFR Part 192 should be considered an ARAR in developing a response action under CERCLA.

### **IMPLEMENTATION**

The following subsections will clarify the use of 40 CFR Part 192 in setting remediation levels for subsurface soil.

#### **UMTRCA AS AN APPLICABLE REQUIREMENT**

The standards contained within Subpart B of 40 CFR Part 192 are potentially applicable requirements only for the Title I sites designated under Section 102(a)(1) of UMTRCA. The standards contained within Subparts D and E of 40 CFR Part 192 are potentially applicable requirements only for the Title II sites designated under Section 206 of UMTRCA.

#### **UMTRCA AS A RELEVANT AND APPROPRIATE REQUIREMENT**

If the contaminants at a site are the same (i.e., radium-226, radium-228, and/or thorium) and the distribution of contamination is similar to that existing at Title I sites as described in 40 CFR Part 192 (i.e., little subsurface contamination from 5 to 30 pCi/g), then the 15 pCi/g standard is a potentially relevant and appropriate requirement for the site. As explained above, under these circumstances the 15 pCi/g standard would be expected to achieve an actual subsurface cleanup level of below 5 pCi/g in practice.

If it is determined, either in the course of further study, or even during remedial action, that subsurface contamination exists at a level between 5 pCi/g to 15 pCi/g averaged over areas of 100 square meters (the averaging areas provided for in the Part 192 rules), this indicates that conditions at the site are probably not sufficiently similar to an UMTRCA site to consider the subsurface contamination standard under 40 CFR Part 192 a relevant and appropriate requirement. If such a finding had been made, the ARAR determination should be reconsidered and a cleanup level for the subsurface contamination may have to be established based on a site-specific risk assessment.

For the same reasons, the 15 pCi/g standard should not generally be considered relevant and appropriate as a standard for backfill material. Since EPA's expectation in promulgating Part 192 was that cleanups of subsurface soil contamination would, in practice, achieve a

protective level of 5 pCi/g under the circumstances presented at UMTRCA sites, it would not generally be appropriate to allow backfilling with material with concentrations higher than 5 pCi/g.

#### **WHERE UMTRCA IS NOT AN ARAR**

If the radioactive contamination at the site is unlike that at the uranium mill tailings sites regulated under 40 CFR 192, in that significant subsurface contamination exists at a level between 5 pCi/g to 30 pCi/g, the use of the 15 pCi/g standard is not generally appropriate.

In this situation, we recommend 5 pCi/g as a suitable cleanup level for subsurface contamination, if a site-specific risk assessment demonstrates that 5 pCi/g is protective<sup>2</sup>, on the basis that the preamble to 40 CFR 192 indicates that even with a standard of 15 pCi/g, almost all contamination was expected to be remediated to a level of 5 pCi/g. The level of 5 pCi/g was the actual health-based level that was expected to be achieved when implementing 40 CFR 192.

#### **WHERE RADIUM-226, RADIUM-228, AND/OR THORIUM ARE COMMINGLED**

Because the risk from uranium and thorium byproducts is additive, and because the 5 pCi/g and 15 pCi/g standards are based on total acceptable risk, whenever the 5 pCi/g and/or 15 pCi/g standards are used as relevant and appropriate requirements (or TBC's) at CERCLA sites with some combination of radium-226 and radium-228, these soil standards should apply to the combined level of contamination of radium-226 and radium-228.

It should be noted that to meet a permanent clean-up objective for radium-226 and radium-228 of 5 pCi/g, there needs to be reasonable assurance that the preceding radionuclides in the series will not be left behind at levels that will permit the combined radium activity to build-up to levels exceeding 5 pCi/g after completion of the response action. At a minimum, this would generally mean that thorium-230 (the parent of radium-226) and thorium-232 (the parent of radium-228) should be cleaned up to the same concentrations as their radium progeny. Therefore, whenever the 5 pCi/g and/or 15 pCi/g standards are used as relevant and appropriate requirements (or TBC's) at CERCLA sites with some combination of thorium-230 and thorium-232, these soil standards should apply to the combined level of contamination of thorium-230 and thorium-232.

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<sup>2</sup>For further information regarding protective cleanups at CERCLA sites, see the memo from Stephen D. Luftig and Larry Weinstock to the Regions; "Establishment of Cleanup Levels for CERCLA Sites with Radioactive Contamination" (OSWER Directive 9200.4-18), August 22, 1997.

## **SUPPLEMENTAL STANDARDS**

If supplemental standards in 40 CFR Part 192, Subpart C, are used in conjunction with the above standards for the remediation of soil, institutional controls should generally be included as a component of cleanup alternatives in order to ensure the response will be protective over time.<sup>3</sup> The requirement for 5-year reviews (see 40 CFR 300.430(f)(4)(ii)) would apply if the use of supplemental standards were to result in waste being left on-site at levels that would require limited use and restricted exposure to ensure protectiveness.

## **FURTHER INFORMATION**

The subject matter specialists for this directive are Stuart Walker of OERR (703-603-8748) and John Karhnak of ORIA (202-564-9280). General questions about this directive, should be directed to 1-800-424-9346.

### **Addressees**

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<sup>3</sup>For further information regarding protective cleanups at CERCLA sites, see the memo from Stephen D. Luftig and Larry Weinstock to the Regions; "Establishment of Cleanup Levels for CERCLA Sites with Radioactive Contamination" (OSWER Directive 9200.4-18), August 22, 1997.