



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

AUG 20 2002

OSWER No. 9200.1-34b

MEMORANDUM

SUBJECT: Distribution of OSWER Common Radionuclides Found at Superfund Sites Booklet
for the General Public

FROM: Michael B. Cook, Director *Elaine Davis for*
Office of Emergency and Remedial Response (OERR)
Office of Solid Waste and Emergency Response

Stephen D. Page, Director *Steve Page*
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 booklet entitled: "Common Radionuclides Found at Superfund Sites." The booklet provides information to help the general public understand more about the various common radionuclides that are found at Superfund sites across the nation. It answers such questions as: How can a person be exposed to the radionuclide?, How can it affect human health?, How does it enter and leave the body?, What levels of exposure result in harmful effects?, and What recommendations has the federal government made to protect human health from radionuclides? This booklet will be of interest to site decision makers and community relations coordinators at radioactively contaminated sites being addressed by the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA).¹

¹This booklet provides information on common radionuclides found 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.

Duplicate first page - Inserted to allow word searching



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

OSWER No. 9200.1-34b

MEMORANDUM

SUBJECT: Distribution of OSWER Common Radionuclides Found at Superfund Sites Booklet
for the General Public

FROM: Michael B. Cook, 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 booklet entitled: "Common Radionuclides Found at Superfund Sites." The booklet provides information to help the general public understand more about the various common radionuclides that are found at Superfund sites across the nation. It answers such questions as: How can a person be exposed to the radionuclide?, How can it affect human health?, How does it enter and leave the body?, What levels of exposure result in harmful effects?, and What recommendations has the federal government made to protect human health from radionuclides? This booklet will be of interest to site decision makers and community relations coordinators at radioactively contaminated sites being addressed by the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA).¹

¹This booklet provides information on common radionuclides found 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.

BACKGROUND

The U.S. Environmental Protection Agency (EPA) issued guidance entitled "Establishment of Cleanup 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 CERCLA sites. The guidance reiterated that cleanups of radionuclides are governed by the risk range for all carcinogens established in the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) when Applicable or Relevant and Appropriate Requirements (ARARs) are not available or are not sufficiently protective. 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. In calculating cleanup levels, one should include exposures from all potential pathways, and through all media (e.g., soil, ground water, surface water, sediment, air, structures, etc.) The 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.

This Common Radionuclides booklet 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 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 NCP at radioactively contaminated sites while incorporating the improvements to the Superfund program that have been implemented through Administrative Reforms.

Today's Common Radionuclides booklet is similar to a booklet issued by EPA entitled "Common Chemicals Found at Superfund Sites" (OSWER No. 9203.1-17, August 1994). This 1994 booklet contains information regarding common chemicals found at Superfund sites across the nation.

IMPLEMENTATION

For questions regarding radiation site policy and booklet for CERCLA cleanup actions, readers are referred to the RCRA/Superfund Call Center at 1-800-424-9346 or the Superfund Radiation web page at <http://www.epa.gov/superfund/resources/radiation/index.htm>. The subject matter specialists for this booklet are Ben Hull of ORIA and Stuart Walker of OERR.

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 and Senior Process Managers
OERR NARPM co-chairs

cc: Jim Woolford, FFRRO
Elizabeth Cotsworth, OSW
Craig Hooks, FFEO
Barry Breen, OSRE
Joanna Gibson, HOSC/OERR
Earl Salo, OGC
Jeff Josephson, Region II
Marianne Horinko, OSWER
Mike Shapiro, OSWER
Tom Dunne, OSWER
Jeff Denitt, OSWER

**MEMORANDUM OF UNDERSTANDING BETWEEN
THE ENVIRONMENTAL PROTECTION AGENCY AND
THE NUCLEAR REGULATORY COMMISSION**

**CONSULTATION AND FINALITY ON DECOMMISSIONING AND DECONTAMINATION OF
CONTAMINATED SITES**

I. Introduction

The Environmental Protection Agency (EPA) and the Nuclear Regulatory Commission (NRC), in recognition of their mutual commitment to protect the public health and safety and the environment, are entering into this Memorandum of Understanding (MOU) in order to establish a basic framework for the relationship of the agencies in the radiological decommissioning and decontamination of NRC-licensed sites. Each Agency is entering into this MOU in order to facilitate decision-making. It does not establish any new requirements or rights on parties not subject to this agreement.

II. Purpose

The purpose of this MOU is to identify the interactions of the two agencies for the decommissioning and decontamination of NRC-licensed sites and to indicate the way in which those interactions will take place. Except for Section VI, addressing corrective action under the Resource Conservation and Recovery Act (RCRA), this MOU is limited to the coordination between EPA, when acting under its Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) authority, and NRC, when a facility licensed by the NRC is undergoing decommissioning, or when a facility has completed decommissioning, and the NRC has terminated its license. It continues a basic policy of EPA deferral to NRC decision-making in the decommissioning of NRC-licensed sites except in certain circumstances, and establishes the procedures to govern the relationship between the agencies in connection with the decommissioning of sites at which those circumstances arise.

III. Background

An August 3, 1999, report (106-286) from the House Committee on Appropriations to accompany the bill covering EPA's FY1999 Appropriations/FY 2000 budget request states:

Once again the Committee notes that the Nuclear Regulatory Commission (NRC) has and will continue to remediate sites under its jurisdiction to a level that fully protects public health and safety, and believes that any reversal of the long-standing policy of the Agency to defer to the NRC for cleanup of NRC's licensed sites is not a good use of public or private funds. The interaction of the EPA with the NRC, NRC licensees, and others, with regard to sites being remediated under NRC regulatory requirements—when not specifically requested by the NRC—has created stakeholder concerns regarding the authority and finality of NRC licensing decisions, the duration and costs of site cleanup, and the potential future liability of parties associated with affected sites. However, the Committee recognizes that there may be circumstances at specific NRC licensed sites where the Agency's expertise may be of critical use to the NRC. In

the interest of ensuring that sites do not face dual regulation, the Committee strongly encourages both agencies to enter into an MOU which clarifies the circumstances for EPA's involvement at NRC sites when requested by the NRC. The EPA and NRC are directed to report to the Committee on Appropriations no later than May 1, 2000, on the status of the development of such an MOU.

Since September 8, 1983, EPA has generally deferred listing on the CERCLA National Priorities List (NPL) those sites that are subject to NRC's licensing authority, in recognition that NRC's actions are believed to be consistent with the CERCLA requirement to protect human health and the environment. However, as EPA indicated in the Federal Register notice announcing the policy of CERCLA deferral to NRC, if EPA "determines that sites which it has not listed as a matter of policy are not being properly responded to, the Agency will consider listing those sites on the NPL" (see 48 FR 40658).

EPA reaffirms its previous 1983 deferral policy. EPA expects that any need for EPA CERCLA involvement in the decommissioning of NRC licensed sites should continue to occur very infrequently because EPA expects that the vast majority of facilities decommissioned under NRC authority will be decommissioned in a manner that is fully protective of human health and the environment. By this MOU, EPA agrees to a deferral policy regarding NRC decision-making without the need for consultation except in certain limited circumstances as specified in paragraphs V.C.2 and V.C.3.

One set of circumstances in which continued consultation should occur, pursuant to the procedures defined herein, relates to sites at which the NRC determines during the license termination process that there is radioactive ground-water contamination above certain limits. Pursuant to its License Termination rule, NRC applies a dose criterion that encompasses all pathways, including ground water. In its cleanup of sites pursuant to CERCLA, by contrast, EPA customarily establishes a separate ground-water cleanup standard in which it applies certain Maximum Contaminant Levels (MCLs, found at 40 CFR 141) promulgated for radionuclides and other substances pursuant to the Safe Drinking Water Act. NRC has agreed in this MOU to consult with EPA on the appropriate approach in responding to the circumstances at particular sites with ground-water contamination at the time of license termination in excess of EPA's MCLs or those sites for which NRC contemplates either restricted release or the use of alternate criteria for license termination, or radioactive contamination at the time of license termination exceeds the corresponding levels in Table 1 as provided in Section V.C.2.

IV. Principles

In carrying out their respective responsibilities, the EPA and the NRC will strive to:

1. Establish a stable and predictable regulatory environment with respect to EPA's CERCLA authority in and NRC's decommissioning of contaminated sites.
2. Ensure, to the extent practicable, that the responsibilities of the NRC under the AEA and the responsibilities of EPA under CERCLA are implemented in a coordinated and consistent manner.

V. Implementation

A. Scope

This MOU is intended to address issues related to the EPA involvement under CERCLA in the cleanup of radiologically contaminated sites under the jurisdiction of the NRC. EPA will continue its CERCLA policy of September 8, 1983, which explains how EPA implements deferral decisions regarding listing on the NPL of any sites that are subject to NRC's licensing authority. The NRC's review of sites under NRC jurisdiction indicates that few of these sites have radioactive ground-water contamination in excess of the EPA's MCLs. At those sites at which NRC determines during the license termination process that there is radioactive ground-water contamination above the relevant EPA MCLs, NRC will consult with EPA and, if necessary, discuss with EPA the use of flexibility under EPA's phased approach to addressing ground-water contamination. NRC has agreed in this MOU to consult with EPA on the appropriate approach in responding to the circumstances at particular sites where ground-water contamination will exceed EPA's MCLs, NRC contemplates either restricted release or the use of alternate criteria for license termination, or radioactive contamination at the time of license termination exceeds the corresponding levels in Table 1 as provided in Section V.C.2.

B. General

Each agency will keep the other agency generally informed of its relevant plans and schedules, will respond to the other agency's requests for information to the extent reasonable and practicable, and will strive to recognize and ameliorate to the extent practicable any problems arising from implementation of this MOU.

C. NRC Responsibilities

1. NRC will continue to ensure remediation of sites under its jurisdiction to a level that fully protects public health and safety.
2. For NRC-licensed sites at which NRC determines during the license termination process that there is radioactive ground-water contamination in excess of EPA's MCLs, or for which NRC contemplates either restricted release (10 CFR 20.1403) or the use of alternate criteria for license termination (10 CFR 20.1404), NRC will seek EPA's expertise to assist in NRC's review of a decommissioning or license termination plan. In addition, NRC will consult with EPA if either the planned level of residual radioactive soil concentrations in the proposed action or the actual residual level of radioactive soil concentrations found in the final site survey exceed the radioactive soil concentration in Table 1. With respect to all such sites, the NRC will consult with EPA on the application of the NRC decommissioning requirements and will take such action as the NRC determines to be appropriate based on its consultation with EPA. For example, if NRC determines during the license termination process that there will be radioactive ground-water contamination in excess of EPA's MCLs at the time of license termination, then NRC will discuss with EPA the use of flexibility under EPA's phased approach for addressing ground-water contamination. If NRC does not adopt recommendations provided by the EPA, NRC will inform EPA of the basis for its decision not to do so.

3. NRC will defer to EPA regarding matters involving hazardous materials not under NRC's jurisdiction.

D. EPA Responsibilities

1. If the NRC requests EPA's consultation on a decommissioning plan or license termination plan, EPA will provide, within 90 days of NRC's notice to EPA, written notification of its views on the matter.
2. Consistent with this MOU, EPA agrees to a policy of deferral to NRC decision making on decommissioning without the need for consultation on sites other than those presenting the circumstances described in Sections V.C.2 and V.C.3. The agencies will consult with each other pursuant to the provisions of this MOU with respect to those sites presenting the circumstances described in Sections V.C.2 and V.C.3. EPA does not expect to undertake CERCLA actions related to radioactive contamination at a site that has been decommissioned in compliance with the NRC's standards, including a site addressed under Section V.C.2, despite the agencies decision to engage in consultation on such sites. EPA's deferral policy, and its expectation of not taking CERCLA action, continues to apply to sites that are covered under Section V.C.2.
3. For NRC-licensed sites presenting the circumstances described in Section V.C.2 and for which NRC has not adopted the EPA recommendation, EPA will consult with NRC on any CERCLA actions EPA expects to take if EPA does not agree with the NRC's decision.
4. EPA will resolve any CERCLA concerns involving hazardous substances outside of NRC's jurisdiction at NRC licensed sites, including concerns involving hazardous constituents that are not under the authority of NRC. As provided in Section V.D.2, EPA under CERCLA will defer or consult with NRC as appropriate regarding matters involving AEA materials under NRC's jurisdiction.

E. Other Provisions

1. Nothing in this MOU shall be deemed to establish any right nor provide a basis for any action, either legal or equitable by any person, or class of persons challenging a government action or failure to act.
2. Each agency will appoint a designated contact for implementation of this MOU. The designated individuals will meet at least annually or at the request of either agency to review NRC-licensed sites that meet the criteria for consultation pursuant to Section V.C.2. The NRC designated contact is the Director, Office of Nuclear Materials Safety and Safeguards, and the EPA designated contact is the Director Office of Emergency and Remedial Response, or as each designee delegates.
3. This MOU will remain in effect until terminated by the written notice of either party submitted six months in advance of termination.
4. Within six months of the execution of this MOU, each party will revise its guidance to its Headquarters and Regional Offices to reflect the terms of this MOU.

5. If differences arise that cannot be resolved by senior EPA and NRC management within 90 days, then either senior EPA or NRC management may raise the issue to their respective agency head.

Section VI. Corrective Action under RCRA

Some NRC sites undergoing decommissioning may be subject to cleanup under RCRA corrective action authority. This authority, administered either by EPA or authorized states, requires cleanup of releases of hazardous waste or constituents at hazardous waste treatment, storage or disposal facilities. NRC sites subject to RCRA corrective action will be expected to meet RCRA cleanup standards for chemical contamination within EPA's jurisdiction. EPA Office of Solid Waste's policy is to encourage regional and State program implementers to coordinate RCRA cleanups with decommissioning, as appropriate, at those NRC sites subject to EPA's corrective action authority.¹

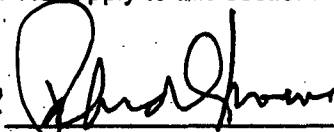
EPA will continue to support coordination of cleanups under the RCRA corrective action program with decommissioning at NRC sites consistent with its March 5, 1997 policy. In addition, under RCRA the majority of States are authorized to implement the corrective action requirements. States are not signatories to this MOU; however, EPA will encourage States to act in accordance with this policy where they have responsibility for RCRA corrective action at NRC sites undergoing decommissioning.

Items 1 and 3 of the "Other Provisions" of Section V.E. apply to this section.

 SEP 30 2002

Christine T. Whitman
Administrator
US Environmental Protection Agency

Date



Richard A. Meserve
Chairman
US Nuclear Regulatory Commission

October 9, 2002
Date

¹See letter from Elizabeth Cotsworth, Acting Director, Office of Solid Waste to James R. Roewer, USWAG, dated March 5, 1997.

5. If differences arise that cannot be resolved by senior EPA and NRC management within 90 days, then either senior EPA or NRC management may raise the issue to their respective agency head.

Section VI. Corrective Action under RCRA

Some NRC sites undergoing decommissioning may be subject to cleanup under RCRA corrective action authority. This authority, administered either by EPA or authorized states, requires cleanup of releases of hazardous waste or constituents at hazardous waste treatment, storage or disposal facilities. NRC sites subject to RCRA corrective action will be expected to meet RCRA cleanup standards for chemical contamination within EPA's jurisdiction. EPA Office of Solid Waste's policy is to encourage regional and State program implementers to coordinate RCRA cleanups with decommissioning, as appropriate, at those NRC sites subject to EPA's corrective action authority.¹

EPA will continue to support coordination of cleanups under the RCRA corrective action program with decommissioning at NRC sites consistent with its March 5, 1997 policy. In addition, under RCRA the majority of States are authorized to implement the corrective action requirements. States are not signatories to this MOU; however, EPA will encourage States to act in accordance with this policy where they have responsibility for RCRA corrective action at NRC sites undergoing decommissioning.

Items 1 and 3 of the "Other Provisions" of Section V.E. apply to this section.

Christine T. Whitman Date
Administrator
US Environmental Protection Agency

Richard A. Meserve Date
Chairman
US Nuclear Regulatory Commission

MOU Table 1: Consultation Triggers for Residential and Commercial/Industrial Soil Contamination

Except for radium-226, thorium-232, or total uranium, concentrations should be aggregated using a sum of the fraction approach to determine site specific consultation trigger concentrations. This table is based on single contaminant concentrations for residential and commercial/industrial land use when using generally accepted exposure parameters. Table users should select the appropriate column based on the site's reasonably anticipated land use.

Radionuclide	Residential Soil Concentration	Industrial/Commercial Soil Concentration
H-3	228 pCi/g	423 pCi/g
C-14	46 pCi/g	123,000 pCi/g
Na-22	9 pCi/g	14 pCi/g
S-35	19,600 pCi/g	32,200,000 pCi/g
Cl-36	6 pCi/g	10,700 pCi/g
Ca-45	13,500 pCi/g	3,740,000 pCi/g
Sc-46	105 pCi/g	169 pCi/g
Mn-54	69 pCi/g	112 pCi/g
Fe-55	269,000 pCi/g	2,210,000 pCi/g
Co-57	873 pCi/g	1,420 pCi/g
Co-60	4 pCi/g	6 pCi/g
Ni-59	20,800 pCi/g	1,230,000 pCi/g
Ni-63	9,480 pCi/g	555,000 pCi/g
Sr-90+D	23 pCi/g	1,070 pCi/g
Nb-94	2 pCi/g	3 pCi/g
Tc-99	25 pCi/g	89,400 pCi/g
I-129	60 pCi/g	1,080 pCi/g
Cs-134	16 pCi/g	26 pCi/g
Cs-137+D	6 pCi/g	11 pCi/g
Eu-152	4 pCi/g	7 pCi/g
Eu-154	5 pCi/g	8 pCi/g

MOU Table 1: Consultation Triggers for Residential and Commercial/Industrial Soil Contamination

Except for radium-226, thorium-232, or total uranium, concentrations should be aggregated using a sum of the fraction approach to determine site specific consultation trigger concentrations. This table is based on single contaminant concentrations for residential and commercial/industrial land use when using generally accepted exposure parameters. Table users should select the appropriate column based on the site's reasonably anticipated land use.

Radionuclide	Residential Soil Concentration	Industrial/Commercial Soil Concentration
Ir-192	336 pCi/g	544 pCi/g
Pb-210+D	15 pCi/g	123 pCi/g
Ra-226	5 pCi/g	5 pCi/g
Ac-227+D	10 pCi/g	21 pCi/g
Th-228+D	15 pCi/g	25 pCi/g
Th-232	5 pCi/g	5 pCi/g
U-234	401 pCi/g	3,310 pCi/g
U-235+D	20 pCi/g	39 pCi/g
U-238+D	74 pCi/g	179 pCi/g
total uranium	47 mg/kg	1230 mg/kg
Pu-238	297 pCi/g	1,640 pCi/g
Pu-239	259 pCi/g	1,430 pCi/g
Pu-241	40,600 pCi/g	172,000 pCi/g
Am-241	187 pCi/g	568 pCi/g
Cm-242	32,200 pCi/g	344,000 pCi/g
Cm-243	35 pCi/g	67 pCi/g