

memorandum

file release

DATE: November 17, 1995

REPLY TO: Air, Water and Radiation Division: EH-412: Wallo:2025864996
ATTN OF:

SUBJECT: Application of DOE 5400.5 requirements for release and control of property containing residual radioactive material.

TO: Distribution

General

Field and program offices have requested additional clarification on several issues that relate to Order DOE 5400.5 requirements for control of residual radioactive material (Section II.5 and Chapter IV). The issues in question have to varying degrees been clarified in the proposed 10 CFR Part 834 ("Radiation Protection of the Public and Environment") and in an implementation guide on residual radioactive material being prepared for that rule. However, due to the delay in the final promulgation of that Part 834, the Office of Environment is providing the attached guidance which clarifies the issues identified. The attached interim guidance:

- 1) Describes the relationship of DOE standards for release of property containing residual radioactive material to Nuclear Regulatory Commission and State requirements for control of such material.
- 2) Provides an update on EH expectations about the use of surface contamination guidelines from DOE 5400.5 and associated guidance reports for release of property. Particular concern was expressed in regard to the limits for transuranics.
- 3) Provides guidance and clarification about requirements for tritium in property being released or reused.

If you have questions regarding the attached material please contact Mr. Andrew Wallo, EH-412 (202-586-4996, email "andrew.wallo@hq.doe.gov").

for Raymond F. Pelletier
Director
Office of Environmental Policy and Assistance

Attachment



Printed on recycled paper



12682

Program Offices

Al Knight, CI-20
Betty Nolan, CP-50
Dennis Miotla, DP-13
Richard Hahn, DP-22
Daniel Rhoades, DP-24
Bill Barker, DP-30
Ken Ferlic, DP-31
Roger Snyder, DP-32
William Roy-Harrison, DP-34
O.J. Lawrence, EE-64
Joe Fitzgerald, EH-5
Paul Seligman, EH-6
Mike Whitaker, EH-9
Pat Worthington, EH-12
C. Rick Jones, EH-52
Jim Disbrow, EI-523
Richard Guimond, EM-2
Randal Scott, EM-3
John Tseng, EM-4
Nick Delaplaine, EM-13
Jim Werner, EM-24
Suzanne Rudinski, EM-25
Steve Cowan, EM-30
Jay Rhoderick, EM-35
Jim Antizzo, EM-37
Jim Owendoff, EM-40
Jim Fiore, EM-42
Bill Wisenbaker, EM-43
Sally Robison, EM-44
Ralph Lightner, EM-45
Kelvin Keltner, EM-46
John Ahlquist, EM-46
Clyde Frank, EM-50
Tom Evans, EM-533
Jill Lytle, EM-60
Barry Clark, EM-62
Ellen Livingston-Behan, EM-70
Randy Kalreider, EM-72
Martha Crossland, EM-75
Kent Handcock, EM-77
Charles Billups, ER-8.2
Albert Evans, ER-13
Sat Goel, ER-14
David Goodwin, ER-20
Omer Goktepe, ER-22
Joseph McGrory, ER-23
Steven Rossi, ER-54
Robert Wood, ER-73
James Carney, ER-912
Craig Zamuda, FE-6
Phoebe Hamill, FE-222
N. L. Johnson, FE-33
R.D. Furiga, FE-40
Hal Delaplaine, FE-423
Max Clausen, FM-10
William Dennison, GC-11
Tom Evans, HR-33
Jim Fairbent, IS-60
Janie Benton, NE-33
Raj Sharma, NE-443
Robert Gisch, NE-60
Joanna Stancil, PA-3
David Moses, PO-60
Steve Brocoum, RW-22
Dwight Shelor, RW-30
Gerald Parker, RW-333
A.G. Joseph, LM-1
John Yates, LM-1
Rodney Adelman, PML [8G-027]

Field Offices

N. S. Dienes, Albuquerque Operations Office
Rich Sena, Albuquerque Operations Office
C. L. Soden, Albuquerque Operations Office
Debbie Miller, Albuquerque Operations Office
Sally Arnold, Batavia Area Office
Gail Penny, Brookhaven Area Office
D.J. Cook, Central Training Academy, AL
M. Flannigan, Chicago Operations Office
Joel Haugen, Chicago Operations Office
Jack Craig, Fernald Area Office (FN)
Jerry Lyle, Idaho Operations Office
Gerald C Bowman, Idaho Operations Office
Donald MacDonald, Idaho Operations Office
Lisa Green, Idaho Operations Office
Walt Sato, Idaho Operations Office
Peggy Hinman, Idaho Operations Office
Kathy D. Izell, Nevada Operations Office
Don Elle, Nevada Operations Office
Joe Fiore, Nevada Operations Office
Steve Mellington, Nevada Operations Office
Robert Dempsey, Oak Ridge Operations Office
Peter Gross, Oak Ridge Operations Office
H. Wayne Hibbits, Oak Ridge Operations Office
Rodney R. Nelson, Oak Ridge Operations Office
L.K. Price, Oak Ridge Operations Office
Larry Radcliff, Oak Ridge Operations Office
Suzy Riddle, Oak Ridge Operations Office
Robert Sleeman, Oak Ridge Operations Office
Sue Smiley, Ohio Field Office (OH)
Don Alexander, Richland Operations Office
J. Bauer, Richland Operations Office
Gerald M. Bell, Richland Operations Office
Rudy Guercia, Richland Operations Office
Bob Holt, Richland Operations Office
R.D. Freeberg, Richland Operations Office
Frazier Lockhart, Rocky Flats Office
David Brockman, Rocky Flats Office
Jessie Roberson, Rocky Flats Office
David Ruscitto, Rocky Flats Office
Mark Silverman, Rocky Flats Office
E. Ballard, Oakland Operations Office
Jim Davis, Oakland Operations Office
Dave Osugi, Oakland Operations Office
Joe Juetten, Oakland Operations Office
Roger Little, Oakland Operations Office
Terry Vaeth, Oakland Operations Office
Thomas Heenan, Savannah River Operations Office
Tom Treger, Savannah River Operations Office
A.B.Gould, Savannah River Operations Office
Lenard Sjostrom, Savannah Operations Office
M.G. O'Rear, Savannah River Operations Office
E.A. Matthews, West Valley Area Office (WV)
Rob Waldman, Alaska Power Administration
Alex Crawley, Bartlesville Project Office
Thomas Wesson, Bartlesville Project Office
Alexandra Smith, Bonneville Power Administration, AJ
Thru: BPA, RM 8G033
John Ganz, Morgantown Energy Technology Center
Joseph Martin, Morgantown Energy Technology Ctr
Jim Killen, Naval Petroleum Reserves in California
D. Miles, Naval Petroleum Reserves in Wyoming,
Utah, & Colorado, Casper, WY
Melvin Keller, Pittsburgh Energy Technology Center
Earl Shollenberger, Pittsburgh Naval Reactors Office,
Thru: NE-60
Andrew Seepo, Schenectady Naval Reactors Office,
Thru: NE-60
Jim Lloyd, Southeastern Power Administration
Don Hayes, Southwestern Power Administration

Melissa Smith, Strategic Petroleum Reserve Project Management Office

Bill Karsell, Western Power Administration
Gerald Johnson, Manager, Amarillo Area Office

(AAO)
George Gartrell, Miamisburg Area Office (MB)
Earl Bean, Manager, Kansas City Area Office (KCAO)
Kathleen Carlson, Manager, Kirtland Area Office (KAO)
Jerry Bellows, Acting Manager, Los Alamos Area Office (LAAO)
Richard E. Glass, Manager, Pinellas Area Office (PAO)
Milton D. Johnson, Princeton Area Office
James R. Lampley, Manager, Grand Junction Projects Office
Phillip Hill, Livermore Site Office (LSO)
George E. Dials, Waste Isolation Pilot Plant Project Office (WIPP-AL)
Beth Bennington, WIPP Project Office (WIPP-AL)
A. R. Chernoff, Jr., Project Manager, Uranium Mill Tailings Remedial Action Project Office
Wendy Dixon, Yucca Mountain Project Office
Paul K. Kearns, Manager, NREL, Golden Office
Jeff Baker, NREL, Golden Office
Jim Doskocil, SSCPO
Ward Best, Ashtabula Area Office (AB)

cc: Other Organizations

National Low-Level Waste Management Program, EG&G Idaho
Hazardous Waste Remedial Action Program, (HAZWRAP)
Remedial Action Program Information Center
Center for Environmental Management Information

**Response to Questions and Clarification of Requirements and Processes:
DOE 5400.5, Section II.5 and Chapter IV Implementation
(Requirements Relating to Residual Radioactive Material)**



November 17, 1995

**Department of Energy
Office of the Assistant Secretary for Environment, Safety and Health
Office of Environment**

**Response to questions and guidance regarding implementation of
DOE 5400.5 Section II.5 and Chapter IV.**

DOE Radiological Release Criteria:

Order DOE 5400.5 chapters II and IV contain the Department's requirements for controlling and releasing property containing residual radioactive material. This guidance addresses release of non-real property and supplements information on release of structures.

The requirements for releasing real property, in lands and structures, are specifically documented in Chapter IV of DOE 5400.5 and additional guidance for applying the process is included in the "Manual for Implementing Residual Radioactive Material Guidelines Using RESRAD, Version 5.0," ANL/EAD/LD-2, September 1993 and related materials (see reference list). It is the responsibility of DOE field and, as appropriate, program offices to review and, where appropriate, approve measurement procedures and methodology and authorized limits for soil (lands) which meet DOE requirements for restricted or unrestricted use as specified in the Order and associated guidance. The information that follows relates primarily to the release non-real property including non-hazardous wastes, small items and equipment. The discussion relating to the use of DOE-approved surface contamination guidelines is also applicable to the release of structures.

DOE Requirements and Related Commercial Requirements:

Statement of Issue: Under the Atomic Energy Act of 1954 as amended, DOE has a responsibility to regulate the activities of its contractors and operations in a manner that protects the public and environment from radiation hazards associated with its operations. The Nuclear Regulatory Commission (NRC) and its Agreement States have similar authorities and responsibilities with regard to the commercial sector. In general, DOE requirements with regard to public and environmental protection are consistent with, and similarly protective as, those of the Nuclear Regulatory Commission and hence, are compatible with commercial standards. These include discharge limits as well as release limits. However, the residual radioactive material release limits for property are somewhat more complicated than effluent releases in that the property is likely being released to members of the general public.

Section 61.3 of 10 CFR Part 61 states that:

"(a) No person may receive, possess, and dispose of radioactive waste containing source, special nuclear or by-product material at a land disposal facility unless authorized by a license issued by the Commission pursuant to this part, or unless exemption has been granted by the Commission under §61.6 of this Part."

Many of the states' have enacted legislation that specifically preclude the disposal of any radioactive material, or formerly regulated radioactive material, except in disposal facilities designed and licensed for radioactive waste. The words "formally regulated" have apparently

been included to preclude the disposal of "Below Regulatory Concern" materials according to a draft policy that at one time had been published by the Nuclear Regulatory Commission.

The DOE field elements have asked EH to explain the relationship between DOE release criteria and policy and the requirements established for the commercial sector and non-DOE materials.

Analysis and response: The discussion and analysis to follow is limited to radiological protection. All DOE facilities and operations must conform to applicable external regulatory requirements. There are three general situations for which the DOE radiological criteria may be used. They are:

- 1) Application of DOE-derived and -approved radiological release criteria for disposal of material and property in a DOE-operated onsite landfill.
- 2) Application of DOE-derived and -approved radiological release criteria for disposal of material and property in a public or offsite landfill.
- 3) Application of DOE-derived and -approved radiological release criteria for sale or transfer of property to members of the public.

DOE On-site Landfill:

In situation 1) the Department has the responsibility and authority to establish limits for protection of the public and environment either in the form of radionuclide release criteria or waste acceptance criteria for disposal of materials in a DOE onsite landfill. Disposal of such material must conform to the requirements of Order DOE 5400.5 (and, when promulgated, as final rule 10 CFR Part 834) and applicable portions of Order DOE 5820.2A. DOE must establish limits such that doses to the public will be as far below the dose limits in DOE 5400.5 (or 10 CFR Part 834, as appropriate) as is practicable. This is determined on the basis of the ALARA Process (As Low As Reasonable Achievable process, see DOE March 1991 environmental ALARA guidance). The criteria should be such that it is not likely that disposal of materials into the landfill will result in a future requirement for remediation of the landfill subject to Chapter IV of DOE 5400.5. In making this determination, consideration should also be given to radionuclide limits established in CERCLA and RCRA corrective action Records of Decisions in neighboring areas of the site. To assure that these requirements and goals are achieved, authorized radiological limits for material sent to a DOE landfill (which is not an authorized low-level waste disposal facility) must be approved by DOE and should be:

- o Selected (and approved by DOE) on the basis of an assessment under the ALARA process to optimize the balance between risks and benefits including costs and collective doses and selected to ensure that individual doses to the public are less than 25 mrem in a year with a goal of a few millirem in a year or less.

- o Evaluated to ensure ground water will be protected in a manner consistent with the objectives of the site's Ground-Water Protection Program objectives (DOE 5400.1) and/or applicable Federal or State requirements.
- o Evaluated to verify that release of the landfill property would not be expected to require remediation under DOE 5400.5 requirements for release of property containing residual radioactive material giving due consideration to experience gained from past or on going CERCLA or RCRA cleanup actions.

The ALARA process should consider factors such as estimated concentrations in waste, total activity (source term) being or likely to be disposed in the landfill, fraction of total waste containing residual radioactivity, estimated individual doses from expected or likely use scenarios, an estimate or assessment of collective doses in relation to other alternatives and potential impacts on natural resources such as ground water. In considering and assessing dose factors such as land use plans and site maintenance, benchmark cleanup standards, special waste form characteristics, and so forth may be considered in the development of authorized limits and acceptance criteria. The detail and complexity of the analysis should be commensurate with potential risks and costs, i.e., if potential individual and collective doses are very low a semi-quantitative or screening analysis may be acceptable (see DOE environmental ALARA guidance). However, other factors may also be important in determining the level of detail needed to approve such limits. For example, although screening analyses (conservative bounding estimates) of activity and potential doses that demonstrate low risk potential may be adequate to show that ALARA has been implemented, they are likely to significantly overestimate residual activity. The use of bounding estimates without adequate documentation of uncertainties or likely doses or quantities of material may result in misleading documentation that in turn could lead to costly and unnecessary investigations in the future. Therefore, it is recommended that procedures be established to document source term estimates as realistically as practicable or that bounding estimates be qualified with a discussion of uncertainty or estimates of expected quantities of residual radioactive material. Documentation supporting the authorized limits or acceptance criteria and disposal records should be sufficient to ensure that the site will not have to be remediated in the future or even unnecessarily surveyed to document its radiological condition.

Off-site Landfills:

In situation 2) DOE establishes and approves authorized limits and associated survey and release protocol for material that will be disposed in a non-DOE landfill. The recommended criteria for such a situation are similar to those established for release of property except that there is an additional consideration. Many local landfills have waste acceptance criteria or are subject to State requirements for radioactive material. In addition to meeting DOE requirements to establish authorized limits and survey, review and documentation protocols that ensure doses are as far below the primary dose limit as is practicable, authorized limits and release protocol must meet acceptance criteria and State requirements for the subject landfills. To ensure that these requirements and goals are achieved, authorized limits for

material sent to a non-DOE landfill (which is not an authorized low-level waste disposal facility) should be:

- o Selected (and approved by DOE) on the basis of an assessment under the ALARA process to optimize the balance between risks and benefits including costs and collective doses and to ensure that individual doses to the public are less than 25 mrem in a year with a goal of a few millirem in a year or less.
- o Evaluated to ensure that ground water will be protected in a manner consistent with the objectives of the applicable State regulations and guidelines.
- o Assessed to ensure that release of the landfill property would not be expected to require remediation under DOE 5400.5 or other applicable requirements for release of property containing residual radioactive material as a result of DOE disposals. 100 mrem
per year
- o Coordinated with and acceptable to the landfill operator implementing the acceptance criteria and State representatives responsible for implementing solid waste regulations to ensure that DOE releases do not violate landfill-specific radiological protection requirements.

Equipment and Personal Property:

Under situation 3) the Department transfers ownership (either by sale or other means) to members of the public or releases personal property from DOE radiological control. Although DOE and DOE contractors are exempt from 10 CFR Part 61 and 10 CFR Part 20, individuals receiving the subject material are not. The Department will not transfer licensable materials to members of the public who are not licensed to receive them. Therefore, as part of the process for developing authorized limits for residual radioactive material and the associated survey and review protocol to ensure that release material and property are acceptable for public use, the Department must ensure that such property and material do not contain licensable amounts or concentrations of radionuclides. Therefore, the following criteria should be implemented to comply with DOE 5400.5 residual radioactive material requirements:

- o Authorized limits for property must ensure that doses to the public from all sources are less than the primary dose limit for all sources (100 mrem in a year).
- o Authorized limits for the property must be developed and approved by DOE consistent with the ALARA process. Appropriate protocols for survey and review of the release of such property must accompany the approval of the authorized limits. These limits shall be based on a documented finding that they are as low as practicable as determined through the ALARA process with a goal being to maintain individual doses low in comparison to background (e.g., a few millirem in a year or less). In any

case, the limits must be a fraction (e.g., 1/4 or less of the primary dose limit for the public). ALARA analysis should be consistent with the March 1991 DOE environmental ALARA guidance.

- o To ensure that DOE releases do not violate NRC licensing requirements, authorized limits for the release of property from DOE control should be coordinated with, and found acceptable to, appropriate Agreement State representatives or, where appropriate, NRC.

The all source criterion may be assumed satisfied if the ALARA criterion and its associated dose constraint and goals are adequately addressed. Generally, the use of the surface contamination guidelines discussed below will not require a quantitative dose assessment or detailed ALARA analysis; however, a qualitative review should be done and documented to determine if it is practicable to set authorized limits for surfaces lower than the guideline values.

DOE Approval of Authorized Limits and Measurement Protocols for Release:

While application, implementation and approval of authorized limits for property subject to surface contamination (consistent with guidelines described below) are the responsibility of DOE field and program elements, DOE 5400.5 requires EH-1 approval of authorized limits for residual radioactive material in mass or volume. However, authorized limits and survey protocol for residual radioactive material in mass or volume or surface contamination limits in lieu of Table 1 may be derived and approved by DOE field office managers without EH-1 written approval if:

- 1) The applicable criteria above are appropriately addressed;
- 2) Based on a realistic but reasonably conservative assessment of potential doses, it is demonstrated to the satisfaction of the responsible field office manager, that:
 - o the release or releases of the subject material will not cause a maximum individual dose to a member of the public in excess of 1 mrem in a year or a collective dose of more than 10 person-rem in a year;
 - o a procedure is in place to maintain records of the releases consistent with DOE 5400.5 requirements and that survey or measurement results are reported consistent with the data reporting guidelines in the DOE November 1992 radiological survey guidance and DOE/EH-173T; and
- 3) A copy of the authorized limits, measurement/survey protocols and procedures, supporting documentation including a statement that the ALARA process requirements have been achieved, and appropriate material documenting any necessary coordination with the state(s)

or NRC are provided to the Office of Environment, EH-4, at least 40 working days prior to the authorized limits becoming effective.

- o EH-4 will provide written notification to the field office of the receipt of the material and
- o notify the field, if the authorized limits or supporting material are not acceptable, within 20 days of receipt, otherwise the authorized limits (including any conditions or limitations set forth by the approving DOE field elements) may be considered approved without written EH-1 approval.

Field office elements may request technical assistance in the review or development of such authorized limits; however, such assistance should be requested as early as possible in the process but at least 90 working days before the desired implementation date for the authorized limits. Nothing in this guidance should be construed to override or replace the need for field elements to coordinate or consult with DOE program offices having jurisdiction over actions or portions of the actions covered by the authorized limits. Authorized limits for residual radioactive material in mass or volume that do not meet the field approval criteria stated above must be approved by EH-1. It is recommended that the DOE elements responsible for requesting EH approval, coordinate the analyses with EH-412, the Air, Water and Radiation Division prior to submitting the request to EH-1.

Guidelines for Property:

Surface Contamination Guidelines:

Statement of issue: DOE guidelines for release of residual radioactive material on surfaces are incomplete; the values for transuranics and alpha emitters are not included. EH-41 was requested to clarify existing guidance for the use of these guidelines.

Response: DOE 5400.5 Figure IV-1 includes surface guidelines for radionuclides other than transuranics and alpha emitters (Row 1 of Figure IV-1¹) and tritium. The only DOE-approved guidelines for release of property and material having residual surface concentrations of transuranics and the row 1 alpha emitters are contained in DOE/CH/8901, June 1989, see DOE 5400.5 Section IV.2, and were first approved for DOE-wide application in 1984 (memorandum from J. R. Maher to distribution, March 15, 1984). These values are consistent with NRC guidance ("Guidelines for Decontamination of Facilities and Equipment Prior to Release for Unrestricted Use or Termination of Licenses for Byproduct, Source and Special Nuclear Material," July 1992 and "Termination of Operating Licenses for Nuclear Reactors," Regulatory Guide 1.86, June 1964). The Surface Concentration Guidelines are restated in Table 1.

¹Transuranics, I-125, I-129, Ra-226, Ac-227, Ra-228, Th-228, Th-230, Pa-231.

Field offices may approve authorized limits and survey protocol that meet these requirements. ALARA process requirements apply in addition to the guidelines restated in Table 1; however, in most cases, the ALARA requirements can be satisfied with a semi-quantitative or qualitative assessment.² Although full optimization studies are likely to be unnecessary because use of the surface guidelines generally ensure individual and collective doses will be low, it is desirable, where practicable, to estimate or bound potential individual doses and collective doses to the public associated with the release or annual releases (if the authorized limit will be applied to operational releases) and include the estimates in the documentation supporting the authorized limits. This may be important when the authorized limits are developed as part of a process for releasing non-real property on a regular basis over a long operational period. The level of detail should be commensurate to the potential doses. Qualitative screening estimates are adequate if they project collective doses to be less than 10 person-rem in total or annually. The attached reference list includes several reports and dose assessment tools which may be useful in computing or bounding doses.

Volume and Mass Contamination and Alternate Surface Limits: DOE has no DOE-wide approved guidelines for release of non-real property or structures containing residual radioactive material in mass or volume. Authorized limits for property subject to contamination in mass or volume must be derived consistent with the ALARA process and approved by DOE headquarters (EH-1) consistent with DOE 5400.5, Section II.5.c and this guidance (see "DOE Approval of Authorized Limits" above). Similarly, authorized limits for surface contamination different than those previously discussed may be approved by DOE on a case-by-case basis using the ALARA process. Authorized limits for the release of non-real property such as equipment or a number of similar items may be developed and approved by the Department. Guidance for the development of necessary protocols is also contained in the "Environmental Implementation Guide for Radiological Survey Procedures," Section 4.5, which was released for comment and use on November 30, 1992.

Tritium:

Statement of Issue: DOE surface guidelines in DOE 5400.5 do not specifically address tritium (³H). EH was requested to indicate whether the guidelines for beta emitters apply to tritium or if other values are applicable.

Response: Because tritium typically penetrates material it contacts, the surface guidelines in Figure IV-1 are not directly applicable to tritium contamination. Furthermore, the measurement of "fixed" tritium on surfaces at these levels is problematic. As a result, the

² While DOE has reviewed the surface contamination guidelines in the table and determined that they are protective, the level of protection is not necessarily uniform and hence, although the ALARA assessment may be qualitative or at most semi-quantitative, the level of detail should be commensurate with the potential maximum dose associated with the release. Radionuclides such as Th-232, Ra-226, and natural uranium have potential maximum doses up to a few mrem/year while I-129, Th-230, and Sr-90 have potential maximum doses of much less than 0.1 mrem/year. Release of property that meet the guidelines for the latter radionuclides justify very minimal ALARA consideration.

beta emitter values were not specifically recommended for tritium. The Department has reviewed the analysis conducted by the DOE Tritium Surface Contamination Limits Committee in the report, "Recommended Tritium Surface Contamination Release Guides", February 1991, and have assessed potential doses associated with the release of property containing residual tritium. The Department recommends the use of 10,000 dpm/100 cm² as an interim guideline for removable tritium. This guideline for removable surface contamination ensures that non-removable fractions and contamination in mass will not cause unacceptable exposures. The measurements should be conducted by a standard smear measurement³ but using a wet swipe or piece of styrofoam. If the property has been recently contaminated or recently decontaminated, followup measurements (smears) should be conducted at regular time intervals to ensure that there is not a build-up of contamination over time.

General Issues and Coordination:

The Department is presently conducting analyses, developing methodologies and working with EPA and NRC to develop more risk-based values that will ultimately replace (or confirm) the values in Figure IV-1, DOE/CH-8901, and the interim tritium limit discussed above. However, in the interim, the Department has determined that although the current levels are not internally consistent they are protective of the public and environment and can, therefore, continue to be used in the establishment of authorized limits for release at DOE facilities.

The Department also permits case-by-case determination of other limits where they are based on an ALARA process assessment and ensure that doses to the public will be as far below the DOE dose limits and constraints as is practicable. The derivation and DOE approval of such authorized limits should be consistent with the criteria discussed above. EH and EM have provide various tools (models, codes and handbooks) to support these analyses. They are listed in the references.

While risk-based standards are being developed NRC and its Agreement States are continuing to conduct site specific reviews and approvals consistent with the Commission's existing guidance (see attached October 25, 1995, letter Weber, NRC, to Wallo, DOE, commenting on this guidance). However, in coordinating with Agreement States or NRC, it may be useful for DOE elements to be aware of NRC's proposed 15 mrem/year dose constraint. Although this is only a proposed standard, the Commission has issued several draft guidance documents which may provide useful information in developing DOE survey protocols (see references). NUREG-1500 and NUREG-5512 may also be useful in benchmarking DOE dose assessments.

³See Section 4.2, Page 4.12, "Environmental Implementation Guide for Radiological Survey Procedures," November 1992, distributed for use and comment to Distribution for Raymond F. Pelletier, Office of Environmental Guidance, November 30, 1992.

Table 1. Surface Activity Guidelines
Allowable Total Residual Surface Activity (dpm/100 cm²)⁴

Radionuclides ⁵	Average ^{6,7}	Maximum ^{8,9}	Removable ^{9,9}
Group 1 - Transuranics, I-125, I-129, Ac-227, Ra-226, Ra-228, Th-228, Th-230, Pa-231	100	300	20
Group 2 - Th-natural, Sr-90, I-126, I-131, I-133, Ra-223, Ra-224, U-232, Th-232	1000	3000	200
Group 3 - U-natural, U-235, U-238, and associated decay products, alpha emitters	5000	15000	1000
Group 4 - Beta-gamma emitters (radionuclides with decay modes other than alpha emission or spontaneous ¹⁰ fission) except Sr-90 and others noted above	5000	15000	1000
Tritium (applicable to surface and subsurface) ¹¹	N/A	N/A	10000

⁴ As used in this table, dpm (disintegrations per minute) means the rate of emission by radioactive material as determined by counts per minute measured by an appropriate detector for background, efficiency, and geometric factors associated with the instrumentation.

⁵ Where surface contamination by both alpha- and beta-gamma-emitting radionuclides exists, the limits established for alpha- and beta-gamma-emitting radionuclides should apply independently.

⁶ Measurements of average contamination should not be averaged over an area of more than 1 m². For objects of smaller surface area, the average should be derived for each such object.

⁷ The average and maximum dose rates associated with surface contamination resulting from beta-gamma emitters should not exceed 0.2 mrad/h and 1.0 mrad/h, respectively, at 1 cm.

⁸ The maximum contamination level applies to an area of not more than 100 cm².

⁹ The amount of removable material per 100 cm² of surface area should be determined by wiping an area of that size with dry filter or soft absorbent paper, applying moderate pressure, and measuring the amount of radioactive material on the wiping with an appropriate instrument of known efficiency. When removable contamination on objects of surface area less than 100 cm² is determined, the activity per unit area should be based on the actual area and the entire surface should be wiped. It is not necessary to use wiping techniques to measure removable contamination levels if direct scan surveys indicate that the total residual surface contamination levels are within the limits for removable contamination.

¹⁰ This category of radionuclides includes mixed fission products, including the Sr-90 which is present in them. It does not apply to Sr-90 which has been separated from the other fission products or mixtures where the Sr-90 has been enriched.

¹¹ Property recently exposed or decontaminated, should have measurements (smears) at regular time intervals to ensure that there is not a build-up of contamination over time. Because tritium typically penetrates material it contacts, the surface guidelines in group 4 are not applicable to tritium. The Department has reviewed the analysis conducted by the DOE Tritium Surface Contamination Limits Committee ("Recommended Tritium Surface Contamination Release Guides," February 1991), and has assessed potential doses associated with the release of property containing residual tritium. The Department recommends the use of the stated guideline as an interim value for removable tritium. Measurements demonstrating compliance of the removable fraction of tritium on surfaces with this guideline are acceptable to ensure that non-removable fractions and residual tritium in mass will not cause exposures that exceed DOE dose limits and constraints.

References:

Requirements:

Order DOE 5400.5, Radiation Protection of the Public and Environment, Department of Energy, Feb. 8, 1990, Revise Jan. 7, 1992 (change 2).

Surface Guidelines:

NRC publication, Guidelines for Decontamination and Decommissioning of Facilities and Equipment Prior to Release for Unrestricted Use or Termination of Licenses for Byproduct, Source or Special Nuclear Material, U.S. Nuclear Regulatory Commission, July 1984.

NRC Regulatory Guide 1.86, Termination of Operating Licenses for Nuclear Reactors, U.S. Nuclear Regulatory Commission, June 1976.

DOE/CH-8901, Manual for Implementing Residual Radioactive Material Guidelines - A Supplement to the U.S. Department of Energy Guidelines for Residual Radioactive Material at FUSRAP and SFMP Sites, Department of Energy, June 1989.

DOE Guidance Memorandum, "Unrestricted Release of Radioactively Contaminated Personal Property", J. Maher, DOE Office of Nuclear Safety, Mar. 15, 1984.

DOE Committee Report, Recommended Tritium Surface Contamination Release Guides, DOE Tritium Surface Contamination Limits Committee, Feb. 1991.

ALARA:

DOE Guidance: DOE Guidance on the Procedures in Applying the ALARA Process for Compliance with DOE 5400.5, Department of Energy, Office of Environmental Guidance, March 8, 1991.

ANL/EAD/LD-2, Manual for Implementing Residual Radioactive Material Guidelines Using RESRAD, Version 5.0, Chapters 1 and 5 and App. M, September 1993.

Measurement and Data Reporting:

DOE Manual for Use and Comment, Environmental Implementation Guide for Radiological Survey Procedures, Department of Energy, Office of Environmental Guidance, Nov. 1992

DOE/EH-0173T, Environmental Regulatory Guide for Radiological Effluent Monitoring and Environmental Surveillance, Department of Energy, Jan. 1991.

NUREG/CR-5849, Manual for Conducting Radiological Surveys in Support of License Termination, U.S. Nuclear Regulatory Commission, June 1992.

NUREG-1505, Draft Report, A Nonparametric Statistical Methodology for the Design and Analysis of Final Status Decommissioning Surveys, U.S. Nuclear Regulatory Commission, August 1995.

NUREG-1506, Draft Report, Measurement Methods for Radiological Surveys in Support of New Decommissioning Criteria, U.S. Nuclear Regulatory Commission, August 1995.

Dose Factors:

EPA-520-1-88-020, Federal Guidance Report No. 11, Limiting Radionuclide Intake and Air Concentrations and Dose Conversion Factors for Inhalation, Submersion and Ingestion, Environmental Protection Agency, Sept. 1988.

EPA 402-R-93-081, Federal Guidance Report No. 12, External Exposure to Radionuclides in Air, Water and Soil, Environmental Protection Agency, Sept. 1993.

Tools for Dose Assessment:

ANL/EAD/LD-2, Manual for Implementing Residual Radioactive Material Guidelines Using RESRAD, Version 5.0, Published by Argonne National Laboratory and prepared by ANL and DOE staff, September 1993.

ANL/EAIS-8, Data Collection Handbook to Support Modeling the Impacts of Radioactive Material in Soil, Argonne National Laboratory, April 1993.

ANL/EAIS/TM-103, A Compilation of Radionuclide Transfer Factors for Plant, Meat, Milk and Aquatic Food Pathways and Suggested Default Values for the RESRAD Code, Argonne National Laboratory, August 1993.

PNL-8724, Radiation Dose Assessments to Support Evaluations of Radiological Control Levels for Recycling or Reuse of Material and Equipment, Pacific Northwest Laboratory, July 1995.

ANL/EAD.LD-3, RESRAD-Build: A Computer Model for Analyzing the Radiological Doses Resulting from the Remediation and Occupancy of Buildings Contaminated with Radioactive Material, Argonne National Laboratory, November 1994.

NUREG-1500, Working Draft Regulatory Guide on Release Criteria for Decommissioning: NRC's Staff's Draft for Comment, U.S. Nuclear Regulatory Commission, August 1994.

NUREG-5512, Residual Radioactive Contamination From Decommissioning - Technical Basis for Translating Contamination to Annual Total Effective Dose Equivalent, Pacific Northwest Laboratory for the Nuclear Regulatory Commission, October 1992.

Appendix I Background and Summary Information

This guidance was prepared in response to several memorandum and phone requests from the field. Ultimately, EH will be responding to these as part of the promulgation of 10 CFR Part 834, "Radiation Protection for the Public and Environment." However, due to the delay in issuing the final rule, we are issuing this interim guidance for continued implementation of DOE 5400.5 until the rule becomes effective.

The Department's current requirements call for the establishment of DOE approved authorized limits for release of property containing residual radioactive material. The principal DOE 5400.5 requirements for the establishment of release limits are that the releases subject to the authorized limits not cause members of the public to receive doses in excess of the dose limits provided in the Order and that any doses be maintained as low as practicable as determined by the As Low As Reasonably Achievable (ALARA) process. These authorized limits must also be appropriately coordinated with the Nuclear Regulatory Commission (NRC) and Agreement States to ensure they are consistent with commercial standards.

The order established a procedure for developing authorized limits for soil and guidelines for surface contamination. However, because the Department had no procedures or specific criteria for property having contamination in mass, Order DOE 5400.5 required EH-1 approval of any authorized limits established for radionuclide contamination in mass. This was done to ensure DOE-wide consistency and to ensure processes resulted in protective requirements. Since 1990, EH in coordination with EM have developed tools and criteria to assist the field in developing such limits. Working together, EH and the field have gained considerable experience in implementing the process. As a result, this guidance permits the field to approve authorized limits and releases that meet DOE 5400.5 requirements without written EH-1 concurrence if the following conditions are also met:

1) Based on a realistic but reasonably conservative assessment of potential doses, it is demonstrated to the satisfaction of the responsible field office manager or the program office, that:

- o the release or releases of the subject material will not cause a maximum individual dose to a member of the public in excess of 1 mrem in a year or a collective dose of more than 10 person-rem in a year;
- o the releases and authorized limits will be appropriately documented; and

2) A copy of the authorized limits, measurement/survey protocols and procedures, supporting documentation including a statement that the ALARA process requirements have been achieved, and appropriate material documenting any necessary coordination with the State(s) or NRC are provided to the Office of Environment, EH-4, at least 40 working days prior to the authorized limits becoming effective.

EH has worked with the field on several efforts to establish authorized limits for release of recyclable property and the disposal of slightly contaminated material in DOE on-site landfills. These activities have provided a high degree of public protection and produced significant cost savings. Examples include:

- o Recycle of LBL Copper - Maximum dose to 0.15 mrem (less than 0.05% of the typical background dose and likely individual doses would be much less), collective dose 72 person-mrem, savings - \$247,000 plus a reduction in environmental impacts resulting from recycling.
- o Authorized limits for commercial reuse of explosives from DOE Pantex facility - Maximum dose 0.005 mrem, collective dose $<2 \times 10^{-3}$ person-mrem, savings \$1,000,000 annually plus reduction in annual emissions associated with alternative disposal process.
- o Disposal of roofing material in Hanford Central Landfill - Maximum dose to the public 0.001 mrem per year, qualitative estimate of collective dose was a few person-mrem per a few hundred years - savings \$345,000.

This process does not establish a de minimis for radioactivity in that the release of these materials will continue to be controlled by DOE field office personnel and will require their approval. It ensures protective and consistent application of the requirements by permitting the field offices authority to approve releases at very low doses. It provides EH time to intervene if a problem is identified. It permits establishment of a tracking system to allow EH to distribute useful information throughout the DOE complex and to provide better comments on related EPA efforts to developed national standards while reducing the review burden on the complex. It does not prohibit releases at protective but more cost-beneficial levels that are above the levels that the field may approve which are but instead, requires a greater level of review for such approvals. The process and requirements are consistent with Nuclear Regulatory Commission requirements and will be appropriately coordinated with external regulators. It will help streamline the regulatory function of the Department and reserve EH resources for only potentially higher risk issues.

In addition to the resources and cost savings associated with the revised process, a clear structured approach to control and release of material will result in improved environmental protection. The lack of adequate guidance and a clear process has been a root cause of previous incidents where DOE facilities have inappropriately released radioactive material. When consistent, clear and logical processes are not implemented, some facilities have developed their own procedures and policies that have resulted in inconsistent and undocumented releases. The guidance in this memorandum will further DOE efforts to resolve these problems and ensure that public protection is integrated into facility operations rather than addressed as an after thought.



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

October 25, 1995

Dr. Andrew Wallo
U.S. Department of Energy
Forrestal Building
EH-09
Washington, DC 20545

Dear Dr. Wallo:

In response to your facsimile request, we have performed a review of the Department of Energy's (DOE) guidance to its field offices on the implementation of DOE release criteria set forth in Order 5400.5. As you know, the release of any contaminated material to an unlicensed party involves technical and policy concerns that are not completely addressed by existing Nuclear Regulatory Commission guidance.

Recognizing the incomplete nature of existing regulations and guidance, we agree that DOE field offices should coordinate with the Agreement States or NRC, as well as other applicable regulatory authorities (e.g., State permitting agencies) to ensure that the site specific release limits and the survey and review protocols are appropriate and acceptable. We also believe your application of the ALARA process is reasonable for establishing authorized limits for material either sent to a non-DOE landfill or transferred to the public. However, as you know, a 15 mrem/yr dose constraint is currently included within our proposed rule on radiological criteria for decommissioning. Your upper bound constraint level of 25 mrem/yr for release of property to a landfill or the public could be viewed as being inconsistent with this proposed value, even though we recognize that the calculated radiological impacts from actual releases are typically well below this value. With regard to the collective dose constraint imposed on the release of surface-contaminated property, we were not able to make a judgement, without further information on assessment methods, on the appropriateness of using the 10 person-rem as a threshold value, below which only qualitative screening would be required.

The case-by-case decisions that NRC has made in releasing land and structures for unrestricted public use have been typically related to NRC's Site Decommissioning Management Plan sites. Release criteria have been those in the "Action Plan to Ensure Timely Cleanup of Site Decommissioning Management Plan Sites" (57 FR 13389-13392) or have been justified as being consistent with these criteria (See SECY-94-145 enclosed). These criteria include surface contamination guidelines in Regulatory Guide 1.86. In the few instances where radioactive material has been or is being considered for transfer to unlicensed entities on a case-by-case basis, impact analyses have been performed and accepted by appropriate approval authorities. These analyses generally indicate extremely small (i.e., less than 1 mrem/year) annual individual exposures and minimal collective exposures.

A. Wallo

- 2 -

As you know, the criteria in NRC's proposed decommissioning rule, when finalized, will replace the above guidance, but only for release of lands and structures. Both EPA and NRC have then indicated that a proposed recycle rule will be developed.

As with the "decommissioning" rule, the applicable dose criteria will be the subject of considerable debate. It is likely that the criteria in the decommissioning rule could influence the selection of criteria for this recycle rule.

I hope this response has been responsive to your request.

Sincerely,



Michael F. Weber, Chief
Low-Level Waste and Decommissioning
Projects Branch
Division of Waste Management
Office of Nuclear Material Safety
and Safeguards