Barbara — Steve — Should we submit comments? Bob

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

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Dear Stakeholder:

The EPA published a notice in the Federal Register on September 5, 1996, announcing availability of draft "WIPP Subpart A Guidance." With that notice, EPA is inviting public comment on all aspects of the draft guidance. Because it is a non-binding, interpretive document, the "WIPP Subpart A Guidance" is not subject to notice-and-comment requirements under the Administrative Procedures Act. Nevertheless, the Agency is committed to providing opportunity for meaningful public input. Toward that end, EPA is providing copies of the draft directly to stakeholders who have demonstrated sustained interest in the oversight of the Waste Isolation Pilot Plant (WIPP). Attached for your review is the draft "WIPP Subpart A Guidance."

The EPA is developing this guidance to implement standards for management and storage of radioactive waste at the WIPP. The EPA's generally applicable standards at 40 CFR Part 191, Subpart A, limit radiation doses to the public from management of transuranic waste at disposal facilities operated by the Department of Energy (DOE). The Subpart A regulations apply to activities associated with receiving and emplacing the waste in the disposal system. (Limitations on radiation doses which may occur after closure of the disposal system are separately addressed by EPA's disposal regulations at Subparts B and C of 40 CFR Part 191, and by WIPP compliance criteria at 40 CFR Part 194.) The "WIPP Subpart A Guidance" describes the application of Subpart A to activities associated with the 25- to 30-year period during which packaged waste would arrive at the above-ground portion of the WIPP, be unloaded and prepared for emplacement in the underground repository, and ultimately lowered down a mechanical hoist and emplaced in the mined-out repository, if the WIPP is approved for use as a disposal system. The guidance does not establish binding rights or duties on EPA or on DOE.

As noted in the Federal Register, **comments must be submitted to EPA by October 7** in order to be considered in revising the guidance. **Comments should be submitted, in duplicate, to:**

**Betsy Forinash**
**Office of Radiation and Indoor Air (6602-J)**
**401 M Street, SW**
**Washington, DC 20460**
**Attn: WIPP Subpart A Guidance**

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# GUIDANCE FOR THE IMPLEMENTATION OF EPA's STANDARDS FOR MANAGEMENT AND STORAGE OF TRANSURANIC WASTE (40 CFR Part 191, Subpart A) at the WASTE ISOLATION PILOT PLANT

("WIPP Subpart A Guidance")

*DRAFT, August 23, 1996*

## NOTICE

The policies and interpretations described herein are intended solely to guide EPA's implementation of **40 CFR part 191, Subpart A** at the WIPP and do not represent final agency decisions. The document is not binding and EPA officials may decide to follow the guidance, or act at variance with the guidance, based on an analysis of specific circumstances.

## PUBLIC COMMENT REQUESTED

This document reflects EPA's preliminary views about how to implement Subpart A at the WIPP. EPA requests public comments to inform the development of EPA's implementation policies. EPA will fully consider public comments in further revising the guidance.

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# Section 1.0 Introduction

## Section 1.1 Purpose

The Environmental Protection Agency has developed this guidance to implement radiation protection standards for management and storage of radioactive waste at the Waste Isolation Pilot Plant (WIPP). The WIPP, located in southeastern New Mexico and operated by the Department of Energy (DOE), is a proposed facility for the disposal of transuranic radioactive waste. The WIPP is subject to EPA's general standards for radioactive waste management and storage found at Subpart A of 40 CFR Part 191 ("Subpart A"), which apply to facilities for the disposal of spent fuel, high-level or transuranic radioactive waste. This guidance describes how EPA intends to implement the generally applicable Subpart A standard at the WIPP, taking into account the facility's technical and operational characteristics. This guidance also addresses implementation requirements for Subpart A established under section 9 of the WIPP Land Withdrawal Act [See LWA[4], Section 9]

## Section 1.2 Applicability

The Subpart A standard limits radiation doses to members of the general public from *management and storage* of transuranic waste at disposal facilities such as the WIPP. Radiation doses and releases of radioactive material from *disposal* of radioactive waste are separately addressed by Subparts B and C of 40 CFR Part 191 (EPA's "disposal standards"). Disposal is defined as the "permanent isolation of . . . radioactive waste from the accessible environment with no intent of recovery . . . ." For a mined geologic repository like the WIPP, EPA has stated that disposal occurs when all of the shafts are backfilled and sealed. [See 50 FR 38084[1], §191.02(l).] For more detail on EPA's implementation of the disposal standards at the WIPP, see EPA's WIPP Compliance Criteria.[2]

Beginning upon first receipt of radioactive waste and up until the time when the shafts at the WIPP are backfilled and sealed, the WIPP would be subject to the requirements of Subpart A. Although transportation is specifically exempted under Subpart A, all other site activities prior to disposal are covered. These activities include storage of waste, defined to mean "retention of . . . radioactive wastes with the intent and capability to readily retrieve such . . . waste for subsequent use, processing, or disposal." [See §191.02(k).] In addition, Subpart A addresses any management "activity, operation or process (except transportation) conducted to prepare . . . radioactive waste for storage or disposal, or the activities associated with placing such . . . waste in a disposal system." [See §191.02(m).] Thus, if the WIPP is permitted to begin operation (according to EPA's disposal standards; see WIPP Compliance Criteria.), Subpart A and this guidance will apply to the DOE's estimated 25- to 30-year period during which packaged waste arrives at the above-ground portion of the WIPP, is unloaded and prepared for emplacement in

the underground repository, and ultimately is lowered down a mechanical hoist and emplaced in the mined-out disposal system.

The Subpart A standard limits radiation doses to the general public from management and storage of radioactive waste, with some restrictions on its applicability. As noted above, transportation is specifically exempted from coverage under Subpart A. (Transportation of transuranic waste to the WIPP is regulated by the U.S. Nuclear Regulatory Commission and the U.S. Department of Transportation.) In addition, the applicability of Subpart A (and thus this guidance) is limited in other ways by the regulatory language and several definitions in 40 CFR Part 191. For example, the standard addresses only radiation doses from material and activities at the disposal site; it does not apply to radiation doses from any sources other than the facility (such as doses from natural background radiation). Similarly, Subpart A limits doses to the general public, and does not address occupational radiation exposure or dose to workers on site performing management or storage activities.

# Section 2.0 General Compliance Issues

## Section 2.1 Summary of statutory and regulatory requirements

The WIPP is regulated under §191.03(b) of Subpart A, which applies to management and storage of radioactive waste at disposal facilities operated by the Department of Energy (and not regulated by the Nuclear Regulatory Commission or Agreement States). Section §191.03(b) states that management and storage of transuranic waste at DOE facilities

> "shall be conducted in such a manner as to provide reasonable assurance that the combined annual dose equivalent to any member of the public in the general environment resulting from discharges of radioactive material and direct radiation from such management and storage shall not exceed 25 millirems to the whole body and 75 millirems to any critical organ."

Section 9 of the WIPP Land Withdrawal Act (LWA) directs EPA to conduct oversight of the WIPP's compliance with all applicable environmental laws and regulations biennially, in particular compliance with Subpart A and authorities EPA to call for remedial measures if it determines that WIPP does not comply with Subpart A

Implementation of this general standard at the WIPP requires interpretation of several definitions in Subpart A. Discussion and interpretation of such terms are presented in this section of the guidance. For the full regulatory text of Subpart A, see Appendix A of this guidance; for a list of pertinent definitions, see Appendix B.

## Section 2.2 Guiding principles

In developing this guidance for Subpart A EPA has been guided by the overarching goal to ensure protection of human health and the environment. EPA has looked to other relevant EPA radiation protection programs in developing guidance for Subpart A. Several other factors influenced EPA's decision-making. These are described below.

## Section 2.2.1 Consistency with other applicable or relevant requirements

An important basis for the radiation dose limits in Subpart A is compatibility with related radiation protection standards. During promulgation of Subpart A, it was determined that for DOE facilities, the most relevant existing standards were limitations on air emissions of radionuclides. Thus, the DOE-facility limits established for Subpart A in 1985 were derived directly from related radiation protection standards then in effect under the Clean Air Act (CAA). [See 50 FR 38070.] There are some important distinctions between Subpart A and the CAA standards for DOE facilities (at 40 CFR Part 61, Subpart H). Unlike CAA standards, Subpart A is not limited to consideration of air emissions. Also, note that because the CAA standards were revised (after promulgation of 40 CFR Part 191) to reflect limits in terms of "effective dose equivalent," the Subpart A limits are no longer strictly comparable to those in the current CAA standards. [See 54 FR 51654-51715.[3]]

The EPA believes that the central goal of compatibility with relevant radiation standards remains appropriate. In particular the Agency believes that the CAA standards are a useful source of information regarding Subpart A implementation, especially because air emissions are considered to be the major pathway for release at the WIPP, and the technical basis for the original (1985) CAA standards remains valid. [See 50 FR 38070.] In addition, EPA has developed methodologies for determining and reporting compliance which have been successfully implemented at numerous facilities across the country. In fact the DOE already submits reports to EPA regarding compliance of the WIPP with the CAA standards and has instituted monitoring at the WIPP in accordance with CAA requirements and guidance. [See Memorandum of Understanding.[4]] The EPA determined that it is both effective and efficient to make use of these existing monitoring and reporting mechanisms. Therefore, where appropriate, the Agency has been guided by EPA's radioactive emissions standards for DOE facilities under the CAA. The EPA policies expand on the CAA approach as necessary for the WIPP. For similar reasons, EPA's recommendations are as consistent as possible with other relevant and applicable requirements at the WIPP for monitoring and reporting -- notably Clean Water Act (CWA) and Resource Conservation and Recovery Act (RCRA) requirements, and DOE Orders.

## Section 2.2.2 Use the simplest model which addresses the problem

Consistent with a tiered compliance approach for CAA requirements and with recommendations from national radiation advisory organizations [See NCRP Commentary No. 3.[5]], EPA recommends that compliance should be demonstrated using the simplest methods

or models which address the problem. In implementing Subpart A at the WIPP, EPA interprets the phrase "reasonable assurance" to mean that DOE should demonstrate only that radiation doses to the general public are below the regulatory limits. That is, the Agency does not intend that DOE must produce realistic estimates of dose to the public under actual operating conditions if compliance can be demonstrated using unrealistic conservative assumptions (including "worst case"). For example, if doses would fall below regulatory limits even if all the waste received at the WIPP during a year were assumed to be released directly to the air and inhaled completely by an individual, it would not be necessary to conduct sophisticated modeling to account for dispersion of air emissions. The guidance reflects EPA's adherence to this philosophy, and the Agency has explicitly highlighted some cases where it could be appropriate to apply simplifying assumptions.

## Section 2.3 Scope of activities considered in determining compliance with dose limits

The Subpart A standard limits doses from management and storage of transuranic waste at the WIPP. Management and storage are comprised of any and all activities or processes (except transportation) conducted to store waste, to prepare waste for storage or disposal, and to place waste in a disposal system. [See §191.02.] For implementing Subpart A at the WIPP, EPA interprets these definitions to mean that all activities at the WIPP must be considered in determining compliance. Specifically, this means that activities in all facilities, both at above-ground locations and in the underground disposal system, are included under the standard. In addition, EPA considers arrival or receipt of waste within the defined site, inspection of containers on vehicles, and unloading of waste from trucks or trains to be waste management activities and not "transportation." Finally, consistent with EPA's radionuclides CAA requirements, the standard includes releases from accidents as well as from normal operations. [See 54 FR 51657.]

## Section 2.4 Media considered in determining compliance

The Subpart A standard limits radiation doses to members of the public in the general environment. According to §191.02(o), the general environment is comprised of "the total terrestrial, atmospheric, and aquatic environments outside sites within which any activity, operation or process associated with the management and storage of . . . radioactive waste is conducted." Therefore, Subpart A addresses potential exposures from releases to air, soil, surface water, and groundwater.

In this guidance, EPA has chosen to emphasize potential doses from releases via the air pathway. The guidance provides detailed expectations for monitoring and modeling of air emissions because numerous analyses of radioactive waste disposal facilities in general, and of the WIPP in particular, have identified air emissions as the major pathway of concern. For example, in a conditional RCRA No-Migration Determination, the Agency concluded that the

only plausible pathway for transport beyond the unit boundary during the test phase is by air emissions through the underground exhaust shaft. [See 55 FR 47704.[6]] Because management and storage of waste at the WIPP includes similar activities to those considered in earlier analyses, and because of the relatively short time-frame proposed for operation of the WIPP, EPA believes that the air pathway is the credible pathway to be considered for implementing Subpart A.

Consideration of air emissions as the only credible release mechanism does not limit consideration of exposure points or exposure mechanisms via other media. The most plausible release points are through the air pathway from either the underground exhaust shaft or the ventilation system of the waste handling building. However, exposure of individuals may occur in several ways from an air release: from inhaling contaminated air, from being immersed in a plume of radioactive particles, from ingesting soil on which contaminated particles have been deposited, from swimming in ponds in which radionuclides have been deposited, etc. In addition, individuals potentially could be exposed directly to radiation from materials on site, if they are not shielded sufficiently. The EPA's air emissions modeling allows for consideration of all these exposure pathways; see Section 2.7.1 for further discussion of modeling.

During the management and storage of radioactive waste at the WIPP, EPA expects the DOE to monitor both the expected air exhaust pathways and to perform environmental monitoring to confirm these as the only potential release pathways. (See Section 3.1.1(5) for more detail.)

## Section 2.5 Boundary for compliance

The regulatory language of Subpart A addresses doses to members of the public in the general environment. As discussed above, the general environment includes all media *outside* the regulated site. A site is defined as "an area contained within the boundary of a location under the effective control of persons possessing or using . . . radioactive waste that are involved in any activity, operation, or process covered by this Subpart." [See §191.02(n).] This definition is important because DOE does not need to address doses to members of the general public located *within* the regulated site. The EPA does not believe that ownership or administrative control over an area constitutes "effective control." On the other hand, all the buildings, structures, and operations within a contiguous area should be included in the site. [See 54 FR 51665.]

Based on current management practices at the WIPP, EPA interprets the site on the surface to be a fenced zone known by DOE as the "property protection area," shown as the shaded area in Figure 1. This area is fenced, and any visitors must pass through a security checkpoint before entering the facilities within. The EPA also considers all areas of the underground disposal system to be under the effective control of the Department. Other areas, such as the "Land Withdrawal Area," are not effectively controlled because land is available for uses such as grazing, or because barriers do not actively deter trespassing. (EPA is requesting

comment on whether there is another intermediate boundary between the security fence and the Land Withdrawal Area over which DOE has effective control.) Thus, DOE must consider exposures to all individuals at the surface, outside the area shown shaded in Figure 1.

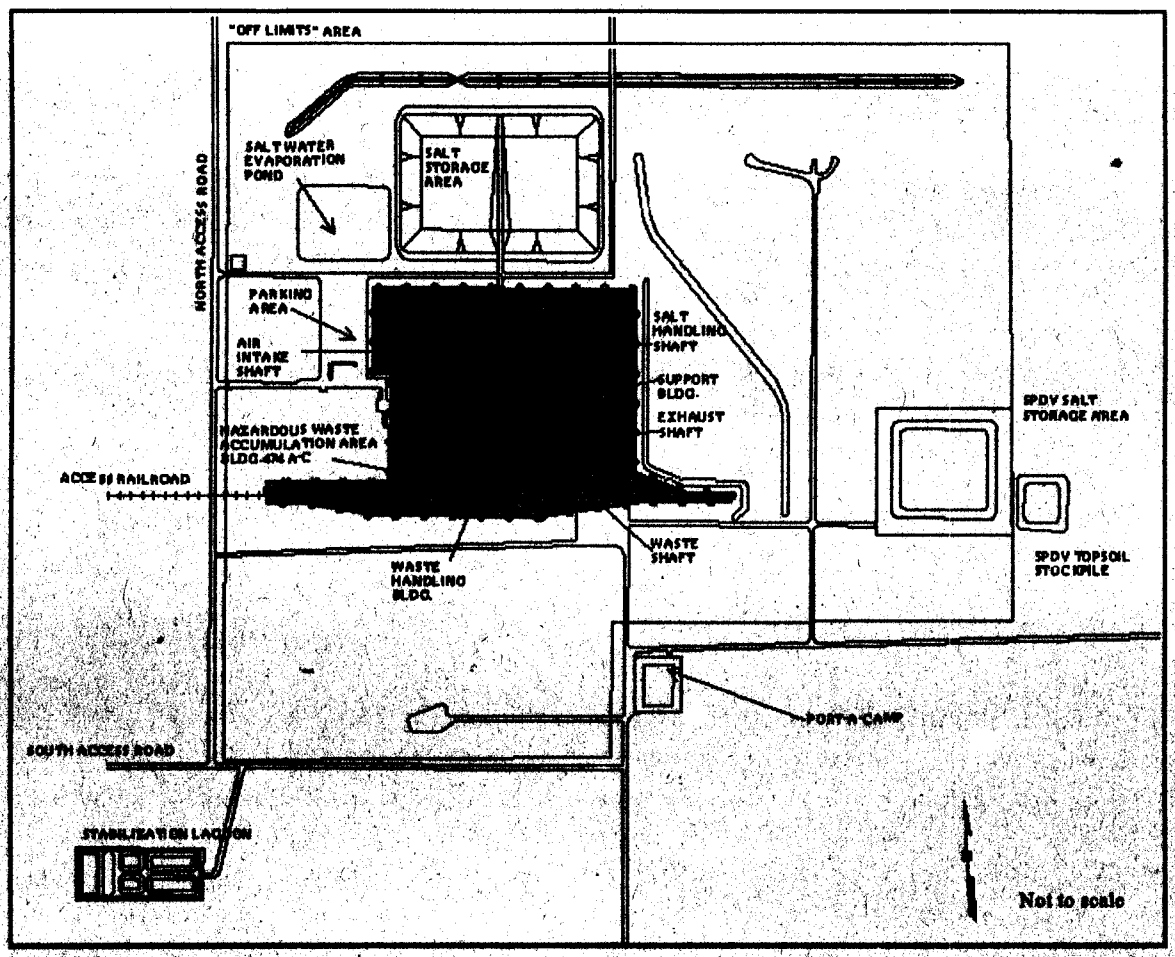


**Figure 1**: Boundary for WIPP Subpart A Compliance (Shaded area, known as "property protection area)

## Section 2.6 Identification of the exposed individual for determining compliance

### Section 2.6.1 Location of maximally exposed individual

Subpart A states that radiation doses to "any member of the public" from waste management and storage must not exceed specified levels. [See §191.03(b).] Consistent with the radionuclide CAA requirements, the Agency believes it is most appropriate to consider doses to the maximally exposed individual when determining compliance. [See 40 CFR 61.94(a).] Thus, compliance with the standard would be determined by calculating the highest annual dose equivalent to any member of the public at any offsite point where there is a residence, school, business, or office. At the WIPP, consideration of businesses should include activities such as grazing, mining, or oil drilling in the vicinity of the site. Note that the location of the maximally exposed individual is the location where an actual individual lives or works who receives the maximum annual dose from the source.

In implementing Subpart A at the WIPP, EPA expects DOE to analyze potential exposure pathways and then to examine demographic information and to conduct field investigations to

identify the locations of actual individuals who could be exposed via those pathways. As a conservative simplifying assumption, DOE could conduct separate analyses of potential doses received from each exposure pathway, then assume that the protected individual resides at the single geographic point on the surface where the maximum dose would be received. This dose can be calculated by summing the dose from all pathways to calculate the maximum dose to an individual at the single geographic point. This is not the same as simply adding the maximum for each individual from pathways since those maximums could be at different locations. This approach is similar to that adopted in EPA's regulations for *disposal* of waste at the WIPP. [See WIPP Compliance Criteria, §§194.51-52] It would not be an appropriate model simplification to assume *a priori* that the maximally exposed individual is located at the site boundary (i.e., the "property protection area" described in the previous section). Such an assumption is not necessarily conservative, depending on how meteorological conditions affect plume behavior or where surface and underground water sources are accessible.

### Section 2.6.2 Personal parameters

In evaluating doses to the maximally exposed individual, DOE may assume that the individual exhibits personal characteristics of the "reference man." These values are incorporated into default parameters for the computer program CAP88-PC, recommended by EPA for use regarding Subpart A at the WIPP. [See *User's Guide.*]

## Section 2.7 Calculation of dose

### Section 2.7.1 Dose equivalent

Results of dose calculations must be presented in terms of combined annual dose equivalent. The EPA expects DOE to provide both whole body dose equivalent and critical organ dose equivalents for the maximally exposed individual (or a hypothetical individual conservatively located at a point of higher exposure). Results in terms of effective dose equivalent will not be considered valid for comparison with the Subpart A limits.

### Section 2.7.2 Committed dose

Consistent with radionuclide CAA requirements, compliance doses are *committed* dose from an annual exposure during the compliance period. In all compliance assessments for Subpart A, DOE is expected to consider committed doses in order to account for biological half-life of radionuclides that are inhaled or ingested. That is, calculated doses are expected to include both doses from direct exposure during the year, and also the predicted dose equivalent to a tissue or organ over the time period after an intake of radionuclides into the body. CAP88-PC, the computer program recommended by EPA for Subpart A at the WIPP, automatically calculates committed dose equivalents to organs. [See *User's Guide.*]

## Section 2.7.3 Modeling

The EPA expects dose calculations used to comply with this standard to be done using a computer program. The EPA recommends that CAP88-PC be used to perform dose calculations. CAP88-PC uses a modified Gaussian plume equation to estimate the average dispersion of radionuclide air releases. The program computes radionuclide concentrations in air, rates of deposition on ground surfaces, concentrations in food, and intake rates to people from ingestion of food produced in the assessment area. Estimation of the radionuclide concentrations in produce, leafy vegetables, milk and meat consumed by humans are made. Dose and risk are estimated by combining the inhalation and ingestion intake rates, air, and ground surface concentrations. [See *User's Guide*.]

CAP88-PC output presents both the dose equivalent and the effective dose equivalent. Calculation of doses and risks are based on standardized conversion factors and organ weighting factors from EPA and from the International Commission on Radiation Protection (ICRP). Consistent with CAA requirements, the model calculates the annual dose equivalent to be the committed dose from one year's exposures. The model output also specifies the location of the maximally exposed individual and estimated radionuclide concentrations at various locations from air, dry deposition, wet deposition, and ground deposition concentrations. [See *User's Guide*.] EPA reserves the right to approve alternate computer program used to perform dose calculations.

## Section 2.7.4 Exposure parameters

In determining the dose which the maximally exposed individual receives, EPA expects that models will incorporate appropriate and technically supported exposure parameters. It will be considerably easier to implement Subpart A if compliance can be demonstrated using conservative simplifying assumptions such as assuming that the maximally exposed individual resides at the identified location continuously for a 70-year lifetime. The EPA recommends use of such conservative assumptions wherever possible. However, because the concept of the maximally exposed individual is based on the philosophy that exposure to real persons be considered, some departures from conservative exposure parameters can be justified. For example, since compliance is on an annual basis, should some individual come to leave his or her residence located in the area of maximum concentration, that difference in exposure could be accounted for, provided that the change in residence can be documented.

The Agency expects that exposure parameters will be no less conservative than the following standard parameters derived from default values for CAA dose modeling [See *User's Guide*.]:

- For a maximally exposed individual located at a residence, assume continuous exposure (24 hours per day).

- For a maximally exposed individual located at a business, office, or school, assume exposure of 8 hours per day.
- Individuals consume 2 liters per day of drinking water from an underground source of drinking water.
- Assume lifetime of 70.8 years.
- Assume inhalation rate for air to be 9.167E+5 $cm^3$/hr.
- Assume ingestion rate of meat to be 85.0 kg/yr.
- Assume ingestion rate of leafy vegetables to be 18.0 kg/yr.
- Assume ingestion of milk to be 112.0 liter/yr.
- Assume ingestion rate of produce to be 176.0 kg/yr.

Parameters should be adjusted if site-specific information indicates that rates would be less conservative than the default values at the WIPP.

# Section 3.0 Compliance

## Section 3.1 Air

To determine compliance with 40 CFR Part 191, Subpart A, EPA expects radionuclide emissions to be determined and the combined annual dose equivalent to any member of the public calculated using EPA-approved sampling procedures, computer model CAP88-PC, or other procedures for which EPA has granted prior approval.

### Section 3.1.1 Air emission monitoring methods and test procedures

The EPA expects radionuclide emission rates from point sources (stacks and vents) to be measured in accordance with the following requirements or other procedures for which EPA has granted prior approval:

(1) EPA expects effluent flow rate measurements to be made using the following methods:

(i) EPA expects reference Method 2 of Appendix A to 40 CFR Part 60 to be used to determine velocity and volumetric flow rate for stacks and large vents.

(ii) EPA expects reference Method 2A of Appendix A to 40 CFR Part 60 to be used to measure flow rates through pipes and small vents.

(iii) EPA expects the frequency of the flow rate measurements to depend upon the variability of the effluent flow rate. For variable flow rates, continuous or frequent flow rate measurements are to be made. For relatively constant flow rates only periodic measurements are necessary.

(2) EPA expects radionuclides to be directly monitored or extracted, collected and measured using the following methods:

(i) EPA expects reference Method 1 of Appendix A to 40 CFR Part 60 to be used to select monitoring or sampling sites.

(ii) EPA expects the effluent stream to be directly monitored continuously with an in-line detector or representative samples of the effluent stream to be withdrawn continuously from the sampling site following the guidance presented in ANSI N13.1-1969 "Guide to Sampling Airborne Radioactive Materials in Nuclear Facilities" (including the guidance presented in Appendix A of ANSI N13.1). The requirements for continuous sampling are applicable to batch processes when the unit is in operation. Periodic sampling (grab samples) may be used only with EPA's prior approval. Such approval may be granted in cases where continuous sampling is not practical and radionuclide emission rates are relatively constant. In such cases, EPA expects grab samples to be collected with sufficient frequency so as to provide a representative sample of the emissions.

(iii) EPA expects radionuclides to be collected and measured using procedures based on the principles of measurement described in Appendix B, Method 114 of 40 CFR Part 61. Use of methods based on principles of measurement different from those described in Appendix B, Method 114 of 40 CFR Part 61 needs to have prior approval from the Administrator. EPA reserves the right to approve measurement procedures.

(a) The Shrouded Probe collection method has been approved by the EPA as an alternative method. Guidance for the use of the Shrouded Probe may be found at "An Explanation of Particle Sampling in a Moving Gas Stream Within a Duct Using an Unshrouded and Shrouded Probe", by Larry Gray, attachment to letter by Mary Nichols dated November 10, 1994.

(iv) EPA expects a quality assurance program to be conducted that meets the performance requirements described in Appendix B, Method 114 of 40 CFR Part 61.

(3) When it is impractical to measure the effluent flow rate at an existing source in accordance with the requirements of Section 3.1.1(1) or to monitor or sample an effluent stream at an existing source in accordance with the site selection and sample extraction requirements of Section 3.1.1(2) , the facility owner or operator may use alternative effluent flow rate measurement procedures or site selection and sample extraction procedures provided that:

(i) It can be shown that the requirements of Section 3.1.1(1) or (2) are impractical for the effluent stream.

(ii) The alternative procedure will not significantly underestimate the emissions.

(iii) The alternative procedure is fully documented.

(iv) The owner or operator has received prior approval from EPA.

(4) (i) EPA expects radionuclide emission measurements in conformance with the requirements of Section 3.1.1 to be made at all release points which have a potential to discharge radionuclides into the air in quantities which could cause an combined annual dose equivalent in excess of 1% of the standard. EPA expects all radionuclides which could contribute greater than 10% of the combined annual dose equivalent for a release point to be measured. With prior EPA approval, DOE may determine these emissions through alternative procedures. For other release points which have a potential to release radionuclides into the air, EPA expects periodic confirmatory measurements to be made to verify the low emissions.

(ii) To determine whether a release point is subject to the emission measurement requirements of Section 3.1.1, it is necessary to evaluate the potential for radionuclide emissions for that release point. In evaluating the potential of a release point to discharge radionuclides into the air for the purposes of this section, EPA expects the estimated radionuclide release rates to be based on the discharge of effluent stream that would result if all pollution control equipment did not exist, but the facilities operations were otherwise normal.

(5) Environmental measurements of radionuclide air concentrations at the critical receptor locations may be used as an alternative to air dispersion calculations in demonstrating compliance with the standard if the owner or operator meets the following criteria:

(i) EPA expects the air at the point of measurement to be continuously sampled for collection of radionuclides.

(ii) Those radionuclides released from the facility, which are major contributors to the annual dose equivalent, are expected to be collected and measured as part of the environmental measurement program.

(iii) EPA expects radionuclide concentrations which would cause an annual dose equivalent of 10% of the standard to be readily detectable and distinguishable from background.

(iv) EPA expects a quality assurance program to be conducted that meets the performance requirements described in 40 CFR Part 61, Appendix B, Method 114.

(v) Use of environmental measurements to demonstrate compliance with the standard is subject to prior approval of EPA. EPA expects applications for approval to include a detailed description of the sampling and analytical* methodology and show how the above criteria will be met.

# Section 4.0 Reporting and Record Keeping

## Section 4.1 Reporting

The EPA expects compliance with this standard to be determined by calculating the highest combined annual dose equivalent to any member of the public in the general environment. The EPA expects DOE to submit an annual report to both EPA headquarters and Region 6 offices by June 30 which includes the results of the monitoring and the dose calculations as described in Section 3.0 (Determining Compliance) for the previous calendar year.

In addition to the monitoring results and dose calculations described in Section 3.0, EPA expects an annual report to include the following information:

(1) The name and location of the facility.
(2) A list of the radioactive materials used at the facility.
(3) A description of the handling and processing that the radioactive materials undergo at the facility.
(4) A list of the stacks or vents or other points where radioactive materials are released to the terrestrial, atmosphere, and aquatic environments.
(5) A description of the release controls that are used on each stack, vent, or other release points and an estimate of the efficiency of each control device.
(6) Distance from the points of release to the nearest member of the public in the general environment and the nearest farms producing vegetables, milk, and meat outside the effective control boundary.
(7) The values used for all other user-supplied input parameters for the computer models (e.g., meteorological data) and the source of these data.
(8) The results of the compliance calculations that show compliance with the standard.
(9) A brief description of all construction and modifications which were completed in the calendar year for which the report is prepared.
(10) Each report is to be signed and dated by the manager in charge of the WIPP facility.

## Section 4.2 Record keeping

The DOE is expected to maintain records documenting the source of input parameters including results of all measurements upon which they are based, the calculations and/or

analytical methods used to derive values for input parameters, and procedures used to determine the combined annual dose equivalent. This documentation is to be sufficient to allow the Agency to verify the correctness of the determination made concerning the WIPP's compliance with Subpart A. These records are expected to be kept on site at the facility for at least five years and upon request be made available for inspection by the Agency.

# Section 5.0 Remedies for Noncompliance

## Section 5.1 Increased reporting

If the facility is not in compliance with the emission limits on 191.03 (b) in the calendar year covered by the report, then EPA expects the facility to commence reporting to the Agency on a monthly basis the information listed in Section 4.1. These reports will start the month immediately following the submittal of the annual report for the year in noncompliance and will be due 30 days following the end of each month. This increased level of reporting will continue until the Administrator has determined that the monthly reports are no longer necessary.

In addition to all the information required in Section 4.1, EPA expects monthly reports to also include information on all controls or other changes in operation of the facility that will be or are being installed to bring the facility into compliance.

## Section 5.2 Remedial plan

The Agency also expects the Department to submit a remedial plan within six months as required by the WIPP Land Withdrawal Act (LWA) in Section (9)(c): *Determination of Noncompliance During the Disposal Phase and Decommissioning Phase*. (It should be noted that the definition of the term "disposal" in the LWA differs from that in Subpart A, and does encompass the operational time period for which the WIPP is regulated under Subpart A.) If the Administrator of EPA determines during operation or decommissioning that the WIPP does not comply with Subpart A (or other applicable regulations), Section (9)(c) requires DOE to submit a remedial plan that describes actions the DOE will take to comply with Subpart A. [See LWA.[8]]

The Agency expects the remedial plan to include the Department's planned approach to bring the facility into compliance. The EPA expects DOE to submit any such plan to both EPA headquarters and Region 6 offices as soon as possible after any determination of noncompliance is made.

## Section 5.3 Consequences of Noncompliance

If the Agency does not receive the remedial plan in 6 months after a determination of noncompliance or the Agency finds that a remedial plan is inadequate to bring the WIPP facility

into compliance then the Agency expects the Department to retrieve any transuranic waste and any material contaminated by such waste from the underground at WIPP to the extent practicable [See LWA[8], Section (9)(c)(2)].

The Agency expects the DOE to submit a complete retrieval plan after the Agency determines that retrieval is necessary and to implement the retrieval plan as so as possible.

## Citations


[1] 40 CFR Part 191: Environmental Standards for the Management and Disposal of Spent Nuclear Fuel, High-Level and Transuranic Radioactive Wastes; Final Rule. Federal Register, Vol. 50, No. 182, pp. 38066-38087: Thursday, September 19, 1985.

[2] 40 CFR Part 194: Criteria for the Certification and Recertification of the Waste Isolation Pilot Plant's Compliance With the 40 CFR Part 191 Disposal Regulations; Final Rule. Federal Register, Vol. 61, No. 28, pp. 5224-5244: Friday, February 9, 1996.

[3] 40 CFR Part 61: National Emission Standards for Hazardous Air Pollutants; Radionuclides; Final Rule and Notice of Reconsideration. Federal Register, Vol. 54, No. 240, pp. 51654-51715: Friday, December 15, 1989.

[4] Memorandum of Understanding Between the U.S. Environmental Protection Agency and the U.S. Department of Energy concerning The Clean Air Act Emission Standards for Radionuclides: 40 CFR Part 61 including Subparts H, I, Q & T. Signed by Mary D. Nichols, EPA Assistant Administrator for Air and Radiation: September 29, 1994. Signed by Tara O'Toole, DOE Assistant Secretary for Environment, Safety, and Health: April 5, 1995.

[5] NCRP Commentary No. 3: Screening Techniques for Determining Compliance with Environmental Standards -- Releases of Radionuclides to the Atmosphere. National Council on Radiation Protection and Measurements, Bethesda (MD): March 31, 1986.*

[6] Department of Energy Waste Isolation Pilot Plant: Notice of Final No-Migration Determination. Federal Register, Vol. 55, No. 220, pp. 47700-47721: Wednesday, November 14, 1990.

[7] EPA, Air and Radiation (LVF). *User's Guide for CAP88-PC*, Version 1.0. EPA Document Number 402-B-92-001: March 1992.

[8] Waste Isolation Pilot Plant Land Withdrawal Act. Public Law 102-579: October 30, 1992.


* Copies may be obtained from NCRP, 7910 Woodmont Avenue, Bethesda, MD 20814, phone (301) 657-2652.

## References

*An Explanation of Particle Sampling in a Moving Gas Stream Within a Duct Using an Unshrouded and Shrouded Probe*. By Larry Gray (EPA), attachment to letter by Mary Nichols dated November 10, 1994.

*Determination of Stack Gas Velocity and Volumetric Flow Rate (Type S Pitot Tube).* Appendix A, Method 2 of 40 CFR Part 60: Standards of Performance for New Stationary Sources.

*Direct Measurement of Gas Volume Through Pipes and Small Ducts.* Appendix A, Method 2A of 40 CFR Part 60: Standards of Performance for New Stationary Sources.

*Guide to Sampling Airborne Radioactive Materials in Nuclear Facilities*. ANSI N13.1-1969(including the guidance presented in Appendix A of ANSI N13.1).

*Sample and Velocity Traverses for Stationary Sources.* Appendix A, Method 1 of 40 CFR Part 60: Standards of Performance for New Stationary Sources.

*Test Methods for Measuring Radionuclide Emissions from Stationary Sources.* Appendix B, Method 114 of 40 CFR Part 61: National Emissions Standards for Hazardous Air Pollutants.

# Appendix A

**SUBCHAPTER F--RADIATION PROTECTION PROGRAMS**

**PART 191--ENVIRONMENTAL RADIATION PROTECTION STANDARDS FOR MANAGEMENT AND DISPOSAL OF SPENT NUCLEAR FUEL, HIGH-LEVEL AND TRANSURANIC RADIOACTIVE WASTES**

**Subpart A--Environmental Standards for Management and Storage**

Sec.
191.01 Applicability.
191.02 Definitions.
191.03 Standards.
191.04 Alternative standards.
191.05 Effective date.

**Authority:** The Atomic Energy Act of 1954, as amended; Reorganization Plan No. 3 of 1970; and the Nuclear Waste Policy Act of 1982

**Subpart A--Environmental Standards for Management and Storage**

**§ 191.01 Applicability**

This Subpart applies to:

(a) Radiation doses received by members of the public as a result of the management (except for transportation) and storage of spent nuclear fuel or high-level or transuranic radioactive wastes at any facility regulated by the Nuclear Regulatory Commission or by Agreement States, to the extent that such management and storage operations are not subject to the provisions of Part 190 of title 40; and

(b) Radiation doses received by members of the public as a result of the management and storage of spent nuclear fuel or high-level or transuranic wastes at any disposal facility that is operated by the Department of Energy and that is not regulated by the Commission or by Agreement States.

**§ 191.02 Definitions**

Unless otherwise indicated in this Subpart, all terms shall have the same meaning as in Subpart A of Part 190.

(a) "Agency" means the Environmental Protection Agency.

(b) "Administrator" means the Administrator of the Environmental Protection Agency.

(c) "Commission" means the Nuclear Regulatory Commission.

(d) "Department" means the Department of Energy.

(e) "NWPA" means the Nuclear Waste Policy Act of 1982 (Pub. L 97-425).

(f) "Agreement State" means any State with which the Commission or the Atomic Energy Commission has entered into an effective agreement under subsection 274b of the Atomic Energy Act of 1954, as amended (68 Stat. 919).

(g) "Spent nuclear fuel" means fuel that has been withdrawn from a nuclear reactor following irradiation, the constituent elements of which have not been separated by reprocessing.

(h) "High-level radioactive waste," as used in this Part, means high-level radioactive waste as defined in the Nuclear Waste Policy Act of 1982 (Pub. Law 97-425).

(i) "Transuranic radioactive waste," as used in this Part, means waste containing more than 100 nanocuries of alpha-emitting transuranic isotopes, with half-lives greater than twenty years, per gram of waste, except for: (1) High-level radioactive wastes; (2) wastes that the Department has determined, with the concurrence of the Administrator, do not need the degree of isolation required by this Part; or (3) wastes that the Commission has approved for disposal on a case-by-case basis in accordance with 10 CFR Part 61.

(j) "Radioactive waste," as used in this Part, means the high-level and transuranic radioactive waste covered by this Part.

(k) "Storage" means retention of spent nuclear fuel or radioactive wastes with the intent and capability to readily retrieve such fuel or waste for subsequent use, processing, or disposal.

(l) "Disposal" means permanent isolation of spent nuclear fuel or radioactive waste from the accessible environment with no intent of recovery, whether or not such isolation permits the recovery of such fuel or waste. For example, disposal of waste in a mined geologic repository occurs when all of the shafts to the repository are backfilled and sealed.

(m) "Management" means any activity, operation, or process (except for transportation) conducted to prepare spent nuclear fuel or radioactive waste for storage or disposal, or the activities associated with placing such fuel or waste in a disposal system.

(n) "Site" means an area contained within the boundary of a location under the effective control of persons possessing or using spent nuclear fuel or radioactive waste that are involved in any activity, operation, or process covered by this Subpart.

(o) "General environment" means the total terrestrial, atmospheric, and aquatic environments outside sites within which any activity, operation, or process associated with the management and storage of spent nuclear fuel or radioactive waste is conducted.

(p) "Member of the public" means any individual except during the time when that individual is a worker engaged in any activity, operation, or process that is covered by the Atomic Energy Act of 1954, as amended.

(q) "Critical organ" means the most exposed human organ or tissue exclusive of the integumentary system (skin) and the cornea.

**§ 191.03 Standards.**

(a) Management and storage of spent nuclear fuel or high-level or transuranic radioactive wastes at all facilities regulated by the Commission or by Agreement States shall be conducted in such a manner as to provide reasonable assurance that the combined annual dose equivalent to any member of the public in the general environment resulting from: (1) Discharges of radioactive material and direct radiation from such management and storage and (2) all operations covered by Part 190; shall not exceed 25 millirems to the whole body, 75 millirems to the thyroid, and 25 millirems to any other critical organ.

(b) Management and storage of spent nuclear fuel or high-level or transuranic radioactive wastes at all facilities for the disposal of such fuel or waste that are operated by the Department and that are not regulated by the Commission or Agreement States shall be conducted in such a manner as to provide reasonable assurance that the combined annual dose equivalent to any member of the public in the general environment resulting from discharges of radioactive material and direct radiation from such management and storage shall not exceed 25 millirems to the whole body and 75 millirems to any critical organ.

**191.04 Alternative Standards**

(a) The Administrator may issue alternative standards from those standards established in 191.03(b) for waste management and storage activities at facilities that are not regulated by the Commission or Agreement States if, upon review of an application for such alternative standards:

(1) The Administrator determines that such alternative standards will prevent any member of the public from receiving a continuous exposure of more than 100 millirems per year dose equivalent and an infrequent exposure of more than 500 millirems dose equivalent in a year from all sources, excluding natural background and medical procedures; and

(2) The Administrator promptly makes a matter of public record the degree to which continued operation of the facility is expected to result in levels in excess of the standards specified in 191.03(b).

(b) An application for alternative standards shall be submitted as soon as possible after the Department determines that continued operation of a facility will exceed the levels specified in 191.03(b) and shall include all information necessary for the Administrator to make the determinations called for in 191.04(a).

(c) Requests for alternative standards shall be submitted to the Administrator, U.S. Environmental Protection Agency, 401 M Street, SW., Washington, DC 20460.

# Appendix B

## Definitions

*Committed dose equivalent* means the predicted dose equivalent to a tissue or organ over a 50-year period after an intake of a radionuclide into the body. It does not include dose contributions from radiation sources external to the body. Committed dose equivalent is expressed in units of rem (or sievert (Sv)). (1 rem = 0.01 Sv)

*Critical organ* means the most exposed human organ or tissue exclusive of the integumentary system (skin) and the cornea.

*Disposal* means permanent isolation of spent nuclear fuel or radioactive waste from the accessible environment with no intent of recovery, whether or not such isolation permits the recovery of such fuel or waste. For example, disposal of waste in a mined geologic repository occurs when all of the shafts to the repository are backfilled and sealed.

*Dose equivalent* means the product of absorbed dose and appropriate factors to account for differences in biological effectiveness due to the quality of radiation. The unit of the dose equivalent is the rem (or sievert)

*General environment* means the total terrestrial, atmospheric, and aquatic environments outside sites within which any activity, operation, or process associated with the management and storage of spent nuclear fuel or radioactive waste is conducted.

*Management* means any activity, operation. or process (except for transportation) conducted to prepare spent nuclear fuel or radioactive waste for storage or disposal, or the activities associated with placing such fuel or waste in a disposal system.

*Maximally-exposed individual* means the estimated location of where at least one individual resides who has the highest risk of the maximum dose.

*Member of the public* means any individual except during the time when that individual is a worker engaged in any activity, operation, or process that is covered by the Atomic Energy Act of 1954, as amended.

*Radionuclide* means any nuclide that emits radiation. (A nuclide is a species of atom characterized by the constitution of its nucleus and hence by the number of protons, the number of neutrons, and the energy content.)

*Radioactive waste*, as used in this part, means the high-level and transuranic radioactive waste covered by this part.

*Spent nuclear fuel* means fuel that has been withdrawn from a nuclear reactor following irradiation, the constituent elements of which have not been separated by reprocessing.

*Site* means an area contained within the boundary of a location under the effective control of persons possessing or using spent nuclear fuel or radioactive waste that are involved in any activity, operation or process covered by this Subpart.

*Storage* means retention of spent nuclear fuel or radioactive wastes with the intent and capability to readily retrieve such fuel or waste for subsequent use, processing, or disposal.

*Transuranic radioactive waste*, as used in this part, means waste containing more than 100 nanocuries of alpha emitting transuranic isotopes, with half-lives greater than twenty years, per gram of waste, except for: (1) High-level radioactive waste; (2) wastes that the Department has determined, with the concurrence of the Administrator, do not need the degree of isolation required by this part; or (3) wastes that the Commission has approved for disposal on a case-by-case basis in accordance with 10 CFR Part 61.

*Whole body* means all human organ or tissue exclusive of the intergumentary system (skin) and the cornea.