

**ENVIRONMENTAL PROTECTION  
AGENCY**

**40 CFR Part 192**

[FRL 1454-8]

**Proposed Cleanup Standards for  
Inactive Uranium Processing Sites;  
Invitation for Comment**

**AGENCY:** U.S. Environmental Protection Agency.

**ACTION:** Proposed cleanup standards.

**SUMMARY:** The Environmental Protection Agency (EPA) is publishing for comment proposed environmental standards for the cleanup of open lands and buildings contaminated with residual radioactive materials (mainly tailings) from inactive uranium processing sites. These standards are being made immediately effective on an interim basis. (See Interim Standards published in the Final Rules section of the Federal Register.) EPA has developed these standards pursuant to Section 275(a) of the Atomic Energy Act, as added by Section 208(a) of Pub. L. 95-604. Title I of Pub. L. 95-604 requires the Department of Energy to conduct remedial actions for designated inactive uranium processing sites in accordance with standards promulgated by EPA.

The proposed cleanup standards require that remedial actions lower the concentration of radium in contaminated soil below specified levels. Limits are also proposed on the radon decay product concentration and gamma radiation in occupied or occupiable buildings affected by tailings.

Additional background material is given in a Draft Environmental Impact Statement which EPA is entering in the Docket simultaneously with this notice. In addition to this request for written comments, the Agency will shortly publish for comment proposed standards for the disposal of tailings from inactive processing sites. Shortly thereafter, we will announce the time and place of hearings at which interested persons may present comments on the proposed cleanup and disposal standards.

**DATE:** Comments should be received on or before June 23, 1980.

**ADDRESS:** Comments should be submitted to Docket No. A-79-25, which is located in the Environmental Protection Agency, Central Docket Section, Room 2903B, 401 M Street, S.W., Washington, D.C. 20460. Shortly, after we propose final disposal standards for inactive sites, single copies of the Draft

Environmental Impact Statement may be obtained by writing to the address given below.

**FOR FURTHER INFORMATION CONTACT:** Dr. Stanley Lichtman, Criteria & Standards Division (ANR-460), Office of Radiation Programs, U.S. Environmental Protection Agency, Washington, D.C. 20460; telephone number 703-557-8927

**SUPPLEMENTARY INFORMATION:**

**I. Introduction**

The proposed cleanup standards are part of the standards EPA is developing at the direction of Congress for remedial actions to protect public health, safety, and the environment from uranium mill tailings from inactive processing sites. There are two major parts of the remedial actions: cleanup and disposal. The cleanup process reduces the potential health consequences of tailings which have been dispersed from their original location on a tailings pile, or used in construction. Disposal is the operation which places the tailings themselves in a condition which will be safe for a long time. The disposal site may be at the original location of the tailings, or a new one.

This notice announces proposal of cleanup standards (Subpart B) for the inactive processing sites covered under Title I of Pub. L. 95-604, and solicits public comment on these standards. They are also being made immediately effective as interim standards for the remedial action program authorized by Title I, pending completion of the public comment and hearing process contemplated by Pub. L. 95-604. We are continuing to develop standards for disposal of tailings from inactive processing sites (Subpart A), and standards for tailings at active sites. We expect to propose disposal standards for inactive processing sites shortly, and to solicit public comments at that time. After they are published, we will hold hearings covering the proposed cleanup and disposal standards for inactive sites.

In order to carry out our responsibility under Pub. L. 95-604 to set generally applicable standards for uranium mill tailings, we have examined their potential public health and environmental impacts. This examination established the radiological and nonradiological characteristics of tailings which require control.

Tailings are hazardous primarily because: (1) Breathing radon and its decay products exposes the lungs to alpha particles; (2) the body may be exposed to gamma rays; (3) radioactive materials and nonradioactive toxic elements from tailings may be

swallowed with food and water. The radiation hazard from tailings lasts for many thousands of years, and nonradioactive toxic elements persist indefinitely. The longevity of these hazards played a major role in determining the proposed standards.

The most commonly used unit of exposure to radon decay products is working level months (WLM).<sup>1</sup> Gamma radiation doses are usually expressed in units of rads.<sup>2</sup>

Although the available data are consistent with many models, we believe that a linear, nonthreshold dose-effect relationship is a reasonable model for deriving estimates of risk to the general public. This model assumes that any radiation dose presents some risk to humans and that the risk is directly proportional to the damage demonstrated at higher doses. We recognize, however, that the data preclude neither a threshold for some types of radiation below which there is no damage to people, nor the possibility that low doses may do more damage to some people than the linear model implies.

The main danger from breathing radon decay products is induction of lung cancer by alpha radiation. Gamma rays, while less harmful per rad than alpha radiation, can also cause cancers, teratogenesis, and genetic damage. Our health risk estimates are based on our review of epidemiological studies conducted in the United States and other countries of underground miners of uranium and other metals who have been exposed to radon decay products, and on two reports, "The Effects on Population of Exposure to Low Levels of Ionizing Radiation" (1972) and "Health Effects of Alpha Emitting Particles in the Respiratory Tract" (1976) by the Advisory Committee on the Biological Effects of Ionizing radiation of the National Academy of Sciences (the BEIR Committee). Information in the report of

<sup>1</sup> A working level (WL) is any combination of short-lived radon decay products in one liter of air that will result in the ultimate emission of alpha particles with a total energy of 130 billion electron volts. The working level expresses a concentration of radioactivity in the air, not how much radiation a person receives. One WLM means exposure to 1 WL for 170 hours, the number of working hours in a month, based on a 40-hour working week.

<sup>2</sup> A rad measures the energy absorbed per unit mass; one rad is 100 ergs absorbed per gram. A rad is more fundamentally related to biological damage than a WLM, but it is convenient to state radon decay product exposure in WLM's because most of the data on their health effects comes from studies of uranium miners and is stated in WLM's. However, miners breathe more as they work than people breathe on the average. Allowing for this, one can show (see EPA 620/4-76-013, July 1976) that continuous exposure to 1 WL for an average person corresponds to 27 WLM in a year. One WLM is roughly equivalent to 0.5 rad to the lung.

Natural or contaminated soils which have 5 pCi of radium per gram of soil for several feet down can also give exposure rates from gamma radiation<sup>4</sup> of about 80 mR/yr. The exposure rates are proportional to the concentration of radium, and decrease as the layer of radium-containing material becomes thinner, or is covered over by other materials. Therefore, cleanup standards for open land must take account of both the level of radium concentration and the thickness of the contaminated layer.

Locating contaminated soils with concentrations less than 5 pCi/gm would require extensive surveys and lengthy measurement procedures. Increasingly large land areas would need to be stripped in order to lower the radioactivity much below 5 pCi/gm. Doing this would provide very little gain in health protection, since such slightly contaminated soils are usually thin layers containing little total radium. Therefore, in order to keep sampling costs within reason, and to avoid having to clean large areas which contain little radioactivity, the proposed standard requires that for any open land contaminated with tailings, the average radium concentration shall not be more than 5 pCi/gm after cleanup. The contamination which remains after such cleanup will have less than 5 times the radon release of average soils. It could also cause a gamma radiation dose of less than 80 millirad per year to a person who spends 100 percent of the time outdoors on the site. These levels of radon emission and gamma radiation are within the variations that occur in undisturbed land areas. We believe that the actual radon and gamma ray levels after cleanup will usually be much less than the maximum possible under these standards.

For contaminated material located more than 1 foot beneath the surface of open land, our proposed standard requires cleanup if the average radium concentration over any 15 cm thickness is greater than 5 pCi/gm. Practical measurement instruments could not find buried material of this concentration in any thinner layer. We expect this standard for buried material will mostly apply to defining the edges of buried tailings deposits, because the radium concentration in tailings is usually much higher than 5 pCi/gm.

Surveys at inactive processing sites indicate that it should cost little more to implement the proposed cleanup standard than one permitting residual

contamination levels 2 to 4 times higher. The proposed cleanup standard is EPA's judgment of the most stringent uniform cleanup condition that may reasonably be required for all the inactive mill sites.

We expect that the rules developed to implement this standard will relate the concentration of radium in soil to other conveniently measured quantities. We also expect that appropriate sampling techniques will be established to locate and identify tailings material, to determine its concentration of radium, and to verify compliance with the standard. Any such rules must insure that the standard is not met by dispersing the material to achieve a lower concentration.

#### *Proposed Cleanup Standards for Indoor Radon Decay Product Concentration*

Even normal levels of indoor radon decay product concentrations are harmful. We believe that Congress intended that people should not have to bear an unreasonable increase in this risk because of tailings.

A standard should have the following characteristics:

1. Unambiguous. It should be clear whether or not a situation meets the standard.
  2. Risk-related. It should limit the harm done to people.
  3. Cost-related. The cost should be related to the amount of injury prevented.
  4. Practical. It must be possible to accomplish the requirements in a reasonable time with the techniques and personnel available.
- We considered expressing the cleanup standard for indoor radon decay products in terms of the
1. Quantity or concentration of tailings near the building;
  2. Gamma radiation level in the building;
  3. Amount by which the indoor radon decay product concentration exceeds the level it would be if no tailings were present in or near the building;
  4. Amount by which the indoor radon decay product concentration exceeds what the average level in similar buildings in the areas would be if there were no tailings in the region;
  5. Radon decay product concentration in the building.

Alternatives 1 and 2 are not strongly risk-related or cost-related because there is no known way to deduce the indoor radon decay product concentration from them.

Alternative 3 is impractical because there is no known way to determine what the indoor radon decay product concentration would be if no tailings were present in or near a building

except by removing all the tailings. Thus, under this alternative, one would have to perform the remedial action in order to determine if the building was eligible for remedial action.

Alternative 4 is impractical and ambiguous because it will be too difficult to establish which buildings that are not affected by tailings are "similar" to a given building that is affected. This is because indoor radon concentrations vary significantly with building location, design, materials, and patterns of use. The reasons for these variations are not well understood.

Alternative 5 is unambiguous, practical, cost-related, and directly related to the total risk to people living in the building. We have thus chosen to base our standard on it.

We believe that the proposed remedial action level of 0.015 WL (including background) for occupied or occupiable buildings is the most protective level that can be justified for the Pub. L. 95-604 remedial action program. It is about the same as that applied to homes and schools over the last seven years in the Grand Junction remedial action program, because the action level there was 0.01 WL above an "average" background value taken as 0.007 WL. Experience in the Grand Junction program indicates that it is usually technically and financially practical to lower concentrations greater than 0.017 WL when the high working levels are due to residual radioactive materials from uranium processing sites. 0.017 WL is practically indistinguishable from our level of 0.015 WL. In some situations, a lower action level might be justified. However, since studies of normal houses with basements in Grand Junction, New York State, and New Jersey indicate that at least 10 percent are above 0.015 WL, it would often be fruitless to try to reduce levels significantly below 0.015 WL, it would often be fruitless to try to reduce levels significantly below 0.015 WL by removing tailings.

Although indoor radon decay product levels much higher than 0.015 WL can occur without the presence of uranium mill tailings, these proposed cleanup standards are explicitly for remedial actions at sites designated under Pub. L. 95-604.<sup>5</sup> Pub. L. 95-604 is clearly directed at potential health problems due to tailings, and not to similar hazards from other causes. The proposed cleanup standard therefore applies only when there is reason to believe that the

<sup>4</sup>The roentgen (R) is a unit measuring the electrical charge that gamma rays release in air. A milliroentgen (mR) is one thousandth of a roentgen. Exposing body tissue to 1 mR of gamma radiation produces a dose of approximately 1 mrad.

<sup>5</sup>In particular, the remedial action standard should not necessarily be taken as an appropriate design goal for indoor radon decay product concentration in new housing.

### Exceptions

We believe that our proposed standards are the strictest that are justified for general application at all the inactive uranium processing sites covered by Pub. L. 95-604. However, providing greater protection may be reasonable at specific sites. Therefore, we urge the implementers to lower the residual risk as far below the required level as is reasonably achievable.

In the decades since tailings at inactive sites were deposited, weather and people have created a wide range of problems needing remediation. There may be exceptional circumstances for which the standards are unreasonably strict, such as when some clearly undesirable health or environmental side-effects would be caused by meeting them. For example, when tailings are not accessible to the equipment needed for their removal, or where workers might be endangered in trying to remove them, application of the standards should be reconsidered. Similarly, disturbing scarce desert vegetation and soils may not be justified where the standards are only slightly exceeded.

We do not consider cost a reason for noncompliance unless the cost to comply is very high or the benefit is very small. For example, it may not make sense to spend a great deal of money to clean up an infrequently occupied building where the standards are only slightly exceeded.

In order to allow for reasonable implementation of Pub. L. 95-604 in all of the varied circumstances, we are proposing criteria which the implementers may use to determine whether particular circumstances are exceptional. In such exceptional cases, DOE may select and perform remedial actions which come as close to meeting the standards as is reasonable. In the selection of such remedial actions, DOE shall ask any property owners and occupants for their comments, the concurrence of NRC shall be required, and DOE shall inform EPA.

**Note.**—The costs and benefits of these standards are discussed in the Draft Environmental Impact Statement. However, neither our issuance of interim cleanup standards nor the remainder of our program to set remedial action standards for Pub. L. 95-604 require preparation of an economic analysis under Executive Order 12044. We expect the costs of the remedial action program in any calendar year to be less than the \$100 million criterion EPA has established (44 FR 30988-30998, May 29, 1979) for requiring an economic analysis.

Dated: April 14, 1980.

Douglas M. Costle,  
Administrator.

The Administrator of the Environmental Protection Agency hereby proposes to add a Part 192 to Title 40 of the Code of Federal Regulations as follows:

### PART 192—ENVIRONMENTAL PROTECTION STANDARDS FOR URANIUM MILL TAILINGS

#### Subpart A—[Reserved]

#### Subpart B—Environmental Standards for Cleanup of Open Lands and Buildings Contaminated with Residual Radioactive Materials from Inactive Uranium Processing Sites

- Sec.  
192.10 Applicability.  
192.11 Definitions.  
192.12 Standards.  
192.13 Effective date.

#### Subpart C—Exceptions

- 192.20 Criteria for exceptions.  
192.21 Remedial actions for exceptional circumstances.

#### Table A—[Reserved] Table B

(Authority: Section 275 of the Atomic Energy Act of 1954, (42 U.S.C. 2022), as amended by the Uranium Mill Tailings Radiation Control Act of 1978, Pub. L. 95-604.)

#### Subpart A—[Reserved]

#### Subpart B—Environmental Standards for Cleanup of Open Lands and Buildings Contaminated with Residual Radioactive Materials from Inactive Uranium Processing Sites

##### § 192.10 Applicability.

This subpart applies to open lands and buildings which are part of any processing site designated by the Secretary of Energy under Pub. L. 95-604, Section 102. Section 101 of Pub. L. 95-604, states that "processing site" means—

(a) Any site, including the mill, containing residual radioactive materials at which all or substantially all of the uranium was produced for sale to any Federal agency prior to January 1, 1971 under a contract with any Federal agency, except in the case of a site at or near Slick Rock, Colorado, unless—

(1) Such site was owned or controlled as of January 1, 1978, or is thereafter owned or controlled, by any Federal agency, or

(2) A license (issued by the (Nuclear Regulatory) Commission or its predecessor agency under the Atomic Energy Act of 1954 or by a State as permitted under section 274 of such Act)

for the production at such site of any uranium or thorium product derived from ores is in effect on January 1, 1978, or is issued or renewed after such date; and

(b) Any other real property or improvement thereon which—

- (1) Is in the vicinity of such site, and  
(2) Is determined by the Secretary, in consultation with the Commission, to be contaminated with residual radioactive materials derived from such site.

Any ownership or control of an area by a Federal agency which is acquired pursuant to a cooperative under this title shall not be treated as ownership or control by such agency for purposes of paragraph (a)(1) of this section. A license for the production of any uranium product from residual radioactive materials shall not be treated as a license for production from ores within the meaning of paragraph (a)(2) of this section if such production is in accordance with section 108(b).

##### § 192.11 Definitions.

(a) Unless otherwise indicated in this subpart, all terms shall have the same meaning as defined in Title I of the Uranium Mill Tailings Radiation Control Act of 1978.

(b) *Remedial action* means action performed under Section 108 of the Uranium Mill Tailings Radiation Control Act of 1978.

(c) *Open land* means any surface or subsurface land which is not a disposal site and is not covered by a building.

(d) *Working Level (WL)* means any combination of short-lived radon decay products in one liter of air that will result in the ultimate emission of alpha particles with a total energy of 130 billion electron volts.

(e) *Dose equivalent* means absorbed dose multiplied by appropriate factors to account for differences in biological effectiveness due to the type and energy of the radiation and other factors. The unit of dose equivalent is the "rem."

(f) *Curie (Ci)* means the amount of radioactive material which produces 37 billion nuclear transformations per second. One picocurie (pCi) =  $10^{-12}$  Ci.

##### § 192.12 Standards.

Remedial actions shall be conducted so as to provide reasonable assurance that—

(a) the average concentration of radium-226 attributable to residual radioactive material from any designated processing site in any 5 cm thickness of soils or other materials on open land within 1 foot of the surface, or in any 15 cm thickness below 1 foot, shall not exceed 5 pCi/gm.

(b) The levels of radioactivity in any occupied or occupiable building shall