federal register

Friday
February 21, 1986

Part VI

Environmental Protection Agency

40 CFR Part 61

National Emissions Standards for Hazardous Air Pollutants; Standard for Radon-222 Emissions From Licensed Uranium Mill Tailings; Proposed Rule and Announcement of Public Hearing

ENVIRONMENTAL PROTECTION AGENCY

40 CFR Part 61

[AD-FRL 2961-8]

National Emissions Standards for Hazardous Air Pollutants; Standard for Radon-222 Emissions From Licensed Uranium Mill Tailings

AGENCY: Environmental Protection Agency (EPA).

ACTION: Proposed Rule and Announcement of Public Hearing.

SUMMARY: This proposed standard considers alternative work practice standards for limiting radon-222 emissions from tailings at licensed uranium mill sites. EPA is taking the action because EPA has preliminarily concluded that radon-222 emissions from uranium mill tailings cause significant risks to nearby people and to populations. The proposed rule is intended to reduce these risks to levels that are protective of public health with an ample margin of safety.

DATES: A public hearing on the proposed rule will be held on February 27 and 28, 1986, in Denver, Colorado. Interested parties are invited to testify. Requests to participate in the hearing should be made in writing by February 25, 1986. Written statements and comments on the proposed rule may be entered into the record by March 31, 1986.

ADDRESSES: The hearing will be held at the Holiday Inn, 1450 Glenarm Place, Denver, Colorado, from 9:00 a.m. to 5:00 p.m. each day. Requests to participate in the hearing should be made in writing to Richard J. Guimond, Director, Criteria and Standards Division (ANR-460), U.S. Environmental Protection Agency, Washington, DC 20460. All requests should include an outline of the topics to be addressed in the opening statements and the names of the participants. Presentations should be limited to 30 minutes. Please indicate a preferred date for testimony.

Comments should be submitted to: Central Docket Section (LE-131), U.S. Environmental Protection Agency, Washington, DC 20460, Attention: Docket No. A-79-11. The rulemaking docket, containing information used by EPA in developing the proposed standard, is available for public inspection between 8:00 a.m. and 4:00 p.m., Monday through Friday at EPA's Central Docket Section, West Tower Lobby, Gallery One, Waterside Mall, 401 M Street, SW., Washington, DC 20460. A reasonable fee may be charged for copying.

FOR FURTHER INFORMATION CONTACT: Terrence A. McLaughlin, Chief, Environmental Standards Branch, Criteria and Standards Division (ANR-460), Office of Radiation Programs, U.S. Environmental Protection Agency, Washington, DC 20460, (703) 557-8977.

SUPPLEMENTARY INFORMATION:

I. Supporting Documents

A draft background information document and a draft economic analysis have been prepared and are titled respectively "Draft Background Information Document—Proposed Standard for Radon-222 Emissions from Licensed Uranium Mill Tailings" (EPA 520/1-85-001) and "Draft Economic Analysis—Proposed Standard for Radon-222 Emissions from Licensed Uranium Mill Tailings" (EPA 520/1-86-002). Single copies of these documents may be obtained from the Program Management Office (ANR-458), Office of Radiation Programs, Environmental Protection Agency, Washington, DC 20460; (703) 557-9351.

The documents contain projections of radon-222 emissions and the resulting risks to nearby individuals and to populations due to the operation of the uranium milling industry, a description of radon-222 control technology and associated costs, and an environmental and economic analysis of the effects of alternative control strategies on the industry.

II. History of Standards Development

The Agency's standards for Nuclear Power Operation (40 CFR Part 190) issued under the Atomic Energy Act (42 FR 2858, January 13, 1977) limit the total individual radiation dose caused by emissions from facilities that make up the uranium fuel cyle, including licensed uranium mills. However, when 40 CFR Part 190 was promulgated, considerable uncertainty existed about the public health impact of existing levels of radon-222 in the air, as well as uncertainty about the best method for management of new man-made sourses of radon-222. EPA then exempted radon-222 from control since the problems associated with emissions of this radionuclide were sufficiently different from those of other radioactive materials associated with the fuel cycle to warrant separate consideration.

Control of radon-222 emissions from uranium mill tailings was later considered under the Uranium Mill Tailings Radiation Control Act (UMTRCA). EPA standards (50 CFR Part 192, subparts D and E) issued for the management of tailings at locations that are licensed by the NRC or the States under Title II of the UMTRCA, limit radon-222 emissions from mill tailings piles after closure of the facility (40 FR 45926; October 7, 1983). Included in these standards was an Agency commitment to issue an Advance Notice of Proposed Rulemaking under section 112 of the Clean Air Act to consider controlling radon-222 emissions from uranium mill tailings piles during the operational period of a mill. In 1977, Congress amended the Clean Air Act (the Act) to address airborne emissions of radioactive materials. The Administrator of EPA, after seeking public comment (44 FR 21704), April 11, 1979), then listed radionuclides as hazardous air pollutants under section 112 of the Act (44 FR 76738, December 27, 1979). EPA has promulgated emission standards for Department of Energy (DOE) facilities, NRC-licensed facilities and non-DOE Federal facilities, elemental phosphorus plants and underground uranium mines (50 FR 5190, February 6, 1985 and 50 FR 15386, April 17, 1985).

On October 31, 1984, EPA issued an Advance Notice of Proposed Rulemaking to inform interested parties that the Agency was considering issuing standards under the Clean Air Act to limit radon-222 emissions from licensed uranium mill tailings. (49 FR 43916, October 31, 1984). Subsequently, EPA entered into an agreement with the Sierra Club to promulgate such standards by May 1, 1986. This agreement was formalized as a Court stipulation by the United States District Court for the Northern District of California (Civil No. C-84-0656 WHO).

III. Comments Received in Response to the Advance Notice of Proposed Rulemaking

In its advance Notice of Proposed Rulemaking, the Agency requested information on:

(1) Radon-222 emissions from uranium mills;

(2) Applicable control options and strategies, including work practices;

(3) Feasibility and cost of control options and strategies;

(4) Local and regional impacts due to emissions of radon-222 for licensed uranium mills;

(5) Methods of determining compliance with a work practice type of standard; and

(6) Effect on the industry if controls are required.

Only the American Mining Congress responded to this request. It made three major points in its comments: (1) The Agency has no jurisdiction to issue standards that are effective within the boundaries of mill site locations or that

impose management, design or engineering requirements; (2) radon-222 emissions from tailings piles during the operational phase of uranium mills do not pose a significant risk of harm to public health or the environment; and (3) even if the potential risks from uncontrolled tailings could be characterized as significant, current Nuclear Regulatory Commission (NRC) standards and practices provide more than adequate protection to the public health and the environment.

The Agency considered these comments in the preparation of this proposed standard. In response to each point the Agency found:

(1) The 1977 Clean Air Act amendments give EPA and the States authority to regulate all airborne emissions of radioactive materials, including those occurring within site boundaries;

(2) The lifetime risk of lung cancer to a person living near a uranium mill is about one chance in one hundred and, even if a person lives near a pile only a few years, the risk is still significant; and

(3) Existing NRC standards and practices allow a lifetime risk of greater than one in one hundred to individuals living near the largest tailings piles. The number of fatal cancers each year to the U.S. population from all existing licensed piles is estimated to be between 3 and 6, depending on the condition of piles. Consequently, the Agency does not consider existing standards and practices to be sufficiently protective of public health.

The Agency preliminarily concluded that development of the standard should continue.

IV. Basic Terms Used in this Notice

Definitions of basic terms used in this notice are given below:

1. *Radon-222*—An inert radioactive gas.

2. *Radon-222 decay products*—The seven principal radionuclides that are produced as radon-222 decays to nonradioactive lead. Radon-222 short-lived decay products means the four radionuclides produced as radon-222 decays to lead-210.

3. *Mill tailings*—The waste resulting from conventional milling of uranium ore. Tailings are classified as either sands or slimes depending on size. Processing one ton of ore produces approximately one ton of tailings.

4. *Tailings pile*—The on-site waste impoundment in which tailings are deposited.

5. *Single cell disposal*—A method of tailings management which uses a large impoundment designed to contain all tailings generated during the lifetime of the mill. At the end of the mill life the impoundment is actively dewatered by means of pumps or allowed to air dry and then is immediately reclaimed.

6. *Phased disposal*—A method of tailings management and disposal which uses a series of small impoundments. Tailings are pumped to one impoundment until it is filled and then pumped to the next impoundment. The filled impoundment is dried, or allowed to dry naturally, and then immediately reclaimed.

7. *Continuous disposal*—A method of tailings management and disposal in which tailings are dewatered by mechanical methods soon after generation. The dried tailings are then placed in trenches or other disposal areas and immediately reclaimed.

8. *Covered or reclaimed*—Disposal of tailings to specifications required by 40 CFR Part 192 (UMTRCA).

9. *ALARA*—A practice in radiation protection which encourages that radionuclide emissions be kept "as low as reasonably achievable."

V. Summary of Proposed Standard

Based on currently available information, EPA has determined that it is not feasible to prescribe an emission standard for radon-222 emissions from uranium mills. Therefore, the Agency is proposing a work practice standard to limit radon-222 emissions from licensed uranium mills.

EPA is presenting three work practices, including improved methods of disposal for newly generated tailings, various timing requirements for use of these improved methods, and interim covers. The improved methods of disposal are a large single pile with immediate closure, phased disposal, and continuous disposal involving dewatering and covering of tailings. In addition EPA is considering alternatives allowing new tailings to be added to existing piles over a range of times, including 5 years, 10 years, 15 years and an indefinite period into the future. Costs and benefits are presented in supporting documents to assist those who wish to comment on a specific alternative. Multiple alternatives are proposed for public comment due to the Agency's desire to maximize information received through the public comment period before making a final decision.

In those cases where the Agency would ban the addition of tailings to a pile at a specified future date, the Agency would provide an exemption for existing tailings impoundments which are lined. However, any exemption must be approved by the Administrator. These lined impoundments are capable, in many cases, of maintaining a water cover over most of the tailings to control radon-222 emissions.

VI. Rationale for the Proposed Standard

A. Industry Description

Uranium milling involves the handling of large quantities of ore containing uranium and its decay products. The concentration of uranium and its decay products is about one thousand times greater in ore than in other rocks and soils. Conventional uranium milling involves the recovery of the uranium content of the ore by mechanical and chemical processes that generate waste tailings. The ore is first crushed, blended, and ground to the proper size for the leaching process which extracts uranium. Several leaching processes are used, including acid, alkaline, and a combination of the two. After uranium is leached from the ore, it is concentrated from the leachate through ion exchange or solvent extraction. The concentrated uranium is then stripped or extracted from the concentrating medium, precipitated, dried, and packaged. The depleted ore, in the form of tailings, is pumped to a tailings pile as a slurry mixed with water.

Since ore generally contains less than 0.5 percent uranium by weight, every ton of ore processed results in almost a ton of tailings. The tailings contain virtually all of the uranium decay products present in the ore, including thorium-230 and radium-226, which decay to radon-222. Previous risk analyses have shown that radon-222 is the most significant radionuclide released to air at uranium mills, and that the tailings pile is the most significant source of radon-222. [See draft Background Information Document—Proposed Standard for Radon-222 Emissions from Licensed Uranium Mill Tailings (EPA 520/1–86–001).]

The 26 licensed uranium mills in the United States are located in Colorado, New Mexico, South Dakota, Texas, Utah, Washington, and Wyoming. In addition, four mills have been licensed but not built, and one unconventional mill has had its license suspended. The milling industry is depressed due to a decline in the demand for uranium and competition from low-cost foreign sources. Three mills are actively processing ore; 17 are on standby and could process ore in the future if market conditions improve; six are being decommissioned and will no longer process ore. The 20 licensed mills that are actively processing ore or are on standby were considered in the

analyses reported in the supporting documentation. These 20 mills have about 35 tailings impoundments associated with them.

Past milling activities have generated about 175 million tons of tailings. Production at conventional mills peaked in 1980, when 21 mills recovered more than 17 thousand tons of uranium and generated more than 14 million tons of tailings. The industry is currently operating at less than 10 percent of capacity due to the depressed market. At this level of production, the industry is recovering about 1.8 thousand tons of uranium and generating about 1.4 million tons of new tailings annually. At full capacity, the industry could generate approximately 14 million tons of tailings a year.

B. Estimates of Exposure and Risk

Exposure estimates are based solely on radon-222 emissions from the tailings piles since emissions and risks from other parts of a uranium mill are small in comparison. Radon-222 emission rate estimates are based on the radium-226 concentration in the tailings using the relationships: One picocurie of radon-222 per square meter-second to one picocurie of radium-226 per gram of tailings. It is assumed that the radium-226 is evenly mixed throughout the tailings and that radon-222 is emitted from all exposed surfaces of tailings. The radium-226 content of the tailings is derived from the relationship: one-tenth of one percent of uranium in ore equals 280 picocuries of radium-226 per gram of ore.

Standard meteorological transport models are used to estimate radon-222 concentrations in air at various distances from the piles. Exposure to radon-222 decay products is then estimated from the radon-222 concentration in air. The final risk estimates are a product of the units of radon-222 decay product exposure levels and a risk factor that relates risk to a single unit of exposure.

Two summary measures are of particular interest: "nearby individual risk" and "total population impact." The former refers to the estimated increased lifetime risk to individuals who spend their entire life at the point where predicted concentrations of the pollutant are highest. Nearby individual risk is expressed as a probability; a risk of one in one thousand, for example, means that a person spending his lifetime at the point of maximum exposure has an estimated increased risk of developing a fatal cancer of one in one thousand. Estimates of nearby individual risk are upper bound estimates and must be interpreted cautiously.

The second measure, "total population impact," considers people exposed at all concentrations, low as well as high, and it considers people exposed throughout the United States, as appropriate. It is expressed in terms of annual number of cancer cases, and provides a measure of the overall impact on public health. A total population impact of 0.5 fatal cancer cases per year, for example, means that emissions of the specific pollutant are expected to cause one case of cancer every two years. At distance from a source, risks to specific persons are extremely small, but considering the total population exposed, the sums of these risks may be significant.

The two estimates together provide a better description of the magnitude and distribution of risk in a community than either number alone. "Nearby individual risk" tells us the highest risk, but not how many people may bear that risk. "Total population impact" describes the overall health impact on the entire exposed population, but not how much risk the most exposed persons may bear. Two sources of radionuclide or chemical emissions could have similar population impacts, but very different maximum individual risks, or vice versa. Both estimates are important and are used in making risk management decisions. The risk estimates should not be viewed as precise estimates of likely health damage, but rather as a general indication of a reasonable upper-limit estimate.

EPA's analysis of risks due to radon-222 emissions from existing uranium tailings piles concluded:

(a) Lung cancer caused by the short-lived decay products of radon-222 is the dominant radiation hazard from tailings. Estimated effects of gamma radiation and of long-lived decay products of radon-222 are less significant, although high gamma radiation exposures may sometimes occur.

(b) Individuals living near an uncontrolled tailings pile are subject to high risks due to radon-222 emitted from tailings. Radon-222 contained in the outside air enters homes and other structures built near the mill through doors and windows, as well as other openings in the structure. The resulting radon-222 decay products tend to concentrate indoors, thus exposing the occupants to potentially harmful levels of these radionuclides. It is estimated that persons living continuously next to some tailing sites can have lifetime lung cancer risks as high as about one in a hundred due to the radon-222 emissions from the tailings.

(c) Based on models for the risk to all exposed populations (local, regional, and national), about one to three fatal cancers per year are estimated from emissions of radon-222 from tailings at the 20 mill sites being considered here, if no controls are present. If the tailings at all sites were to dry out completely, this detriment is estimated to be about two to six fatal cancers per year. Approximately one-half of these deaths are estimated to occur within 80 kilometers of the tailings piles.

There is substantial uncertainty in these estimates because of uncertainties in the emission rates of radon–222 from tailings sites, the exposure people will receive from it decay products, and from incomplete knowledge of the effects on people due to these exposures. The values presented here represent best estimates based on current knowledge. Additionally, these estimates are based on current (1980 and 1983) pile sizes and geographical distributions of populations. As populations increase in the future, the estimated impacts will be larger.

Several factors suggest that actual exposure levels to nearby individuals will be lower than those estimated. In estimating exposure, the most exposed individuals are hypothetically subjected to the maximum annual average concentration of the emissions for 24 hours every day for 70 years (roughly a lifetime). This does not consider, for instance, the fact that most people in their daily routines move in and out of the specific areas where the radon–222 decay product concentrations are the highest or that tailings may be reclaimed before a lifetime exposure occurs.

Much more is known about the risks from exposure to radiation than exposure to most chemicals. While there is uncertainty in risk estimates from assessments of chemical emissions and radionuclide emissions, there is likely to be much less uncertainty in estimates of risk from radionuclide emissions because of the extensive data base on human exposure to radiation. Therefore, a risk estimate of one in one thousand resulting from exposure to radionuclides is likely to be more accurate than the same estimate for chemical exposures. Estimates of risk from radionuclides are much less likely to exaggerate hypothetical maximum risks than are estimates made for chemical exposure.

C. Control Technology

Water is very effective in controlling radon–222 emissions. It is estimated that saturated tailings and tailings covered with a thin layer of water emit only two percent of the radon–222 emitted by dry tailings. Deeper water covers (greater

than about 1 meter) effectively eliminate radon–222 emissions.

For most existing piles, radon–222 control using a water cover is not viable because keeping the tailings saturated or covered with water causes serious ground water contamination at most locations. Also, some tailings piles' retention dikes were not designed to retain water since they lack clay cores. However, if impermeable liners are placed on the sides and bottom of tailings impoundments, water cannot easily escape. Thus, ground water resources are protected and the pile can successfully be covered with water to prevent emissions of radon–222. Only five of the 35 existing impoundments considered in developing this rule have synthetic liners.

Earthen covers are also effective in controlling radon–222 if they are thick enough. It is estimated that one third meter of earthen material reduces radon–222 emissions by about 20 percent, one meter by about 65 percent and three meters about 95 percent, on the average. The amount of moisture held in this material determines its effectiveness in delaying the movement of radon–222. Since clay material (fine size particles) retain moisture much better than sandy materials (larger size particles), clays are more effective in controlling radon–222 than sands. The major problem with earthen covers when used on an interim basis is that their retention value is negated once additional tailings are placed on top of them, as frequently occurs at an operating mill. However, earthen covers should be effective on an interim basis when covering those portions of a pile that will not be used for extended periods.

Federal standards for disposal (reclamation) of tailings piles (40 CFR Part 192 and 10 CFR Part 40) require that disposal methods be designed so that radon–222 emissions do not exceed 20 pico-curies per square meter-second averaged over the entire tailings area for one thousand years. The Agency expects this to be accomplished in most cases by grading the tailings to gentle slopes, placing a cover of about three meters of earthen material over the tailings, and fortifying this cover with rock (rip rap) and gravel to last a long time. In a few existing cases, additional stabilization may be needed to assure long-term protection against flooding. The licensing agencies (NRC and the States) will approve disposal plans and the timing of reclamation. Currently, no licensed tailings impoundments have been disposed of.

The Agency reviewed various options for controlling radon–222 emissions from currently licensed piles. It was concluded that two options were available. First, earthen covers could be placed over dry tailings beaches and over embankments constructed of sand tailings. Dry beaches typically cover 60% of the total tailings area during the operating phase of a mill and may cover significantly larger areas during periods of extended shutdown. Twelve tailings piles constructed early in the industry's history have sand tailings embankments which, if covered with earth, would have reduced radon–222 emissions. Water covers were judged impractical unless the pile has an impermeable liner. Where there is a liner, piles tend to remain saturated with water and radon–222 emissions are greatly reduced.

Second, use of existing tailings piles could be terminated. The pile would then be disposed of expeditiously, following dry out. Newly generated tailings would then be managed by one of the three methods discussed below. It is estimated that radon-222 emissions are about 7,000 curies per year for an average site under typical operating conditions. Emissions would increase to about 12,000 curies per year when the piles dry out. Disposal of the tailings to Federal standards would reduce emissions to about 440 curies per year. Different termination times were considered as options in estimating the residual risk.

The Agency reviewed technologies that would reduce radon-222 emissions during the operating phase of a new uranium mill tailings pile. Three methods were selected for analysis: single cell impoundment; phased disposal; and continuous disposal.

Single cell impoundment

Using this method of disposal, a large impoundment would be constructed of earthen materials with clay cores and an impermeable liner. This impoundment would cover about 120 acres and have capacity to store all tailing generated during the life of the mill. [Previous NRC and EPA analyses assume the lifetime of the average uranium mill to be 15 years.] This design permits the impoundment to retain water without contaminating ground water.

During the operating life of the mill, the tailings would be covered with water thus minimizing radon-222 emissions. During the five-year dry out period necessary to allow final reclamation, the Agency estimates radon-222 emissions would gradually increase until they were similar to emissions from existing dry piles. Once the pile was dry, disposal to Federal standards would be performed immediately.

The Agency estimates radon-222 emissions would be about 800 curies per year during the operational period of the mill and about 2,500 curies per year during the dry out period for a total of 24,000 curies over the lifetime of the pile. If the tailings were not covered, emissions would be about 4,200 curies per year. Emissions would be about 300 curies per year, once the pile has been disposed of in accordance with existing Federal standards.

Phased Disposal

In this disposal scheme, series of small impoundments would be constructed over the lifetime of the mill. Each small impoundment would be constructed with clay-core earthen dikes or in an excavated pit and would have an impermeable liner. As each impoundment filled it would be dried out and covered with earthen materials immediately. The total area of all impoundments would be about 120 acres at the end of the average mill's lifetime. The design permits the use of a water cover over all tailings without the risk of contaminating ground water. It also greatly reduces the amount of unreclaimed tailings at the end of mill's lifetime because only one or two small impoundments would still require closure.

Radon-222 emissions are estimated to average about 700 curies per year over the lifetime (15 years use and 5 years dry out) of the mill; total emissions would be about 14,000 curies of radon-222.

Continuous Disposal

This disposal method calls for tailings to be dewatered as they are generated, placed in pits or on pads, and covered with about three meters of earthen materials on a continuous basis. Disposal pits or pads would be constructed with impermeable liners. This method would rely on the thick earthen cover to reduce radon-222 emissions, rather than water as in the previous two methods. The total area having covered tailings at the end of a mill's lifetime would be limited to about 120 acres. Since this method does not rely on water to reduce emissions of radon-222, the potential for ground water contamination is negligible.

The Agency estimates that only about ten acres of tailings would not be covered at any given time during operations. This method would have an average emission rate of about 500 curies per year for a total lifetime emission of about 10,000 curies.

D. The Proposed Standard

EPA is proposing a number of work practice standards for radon-222 emissions from licensed uranium mill tailings. Based on currently available information, EPA believes that it is not feasible to prescribe an emissions standard since most of the radon-222 emitted by a uranium mill comes mainly from the surface of mill tailings piles. A typical pile may be hundreds of acres in area and emissions from its surface cannot be controlled through a conveyance designed and constructed to emit or capture radon-222. EPA, however, requests comments specifically on whether an emission standard or standards for some tailings piles is appropriate in some circumstances. For instance, is an emission standard appropriate in the case of existing piles that are on standby for long periods?

The Agency has drafted a proposed rule that encompasses a range of alternative work practices considered feasible to control radon-222 emissions from uranium mill tailings.

The proposed rule displays, in the format of a rule, the alternatives considered. The Agency believes that the best way to explain these alternatives is to pose a series of questions with alternative answers followed by a discussion.

1. New Tailings Management

Should uranium mill tailings generated in the future be managed differently than in the past? If so, what improved methods should be used? The three alternatives considered are the single cell impoundment, phased disposal, and continuous disposal.

It is clear that past practices using unlined impoundments with dams made of mill tailings will not be allowed in the future due to other existing EPA and NRC requirements. However, there remains considerable licensed capacity in existing impoundments, many of which are unlined. Some have dams made of tailings.

The Agency estimated the costs and benefits of the alternatives based on a scenario that describes how the industry might operate over the next 100 years. A base situation was used for comparison that assumed single large impoundments were constructed, operated for 15 years, dried for 5 years and then remained on standby uncovered for an additional 40 years. The number of new single large impoundments required was estimated using a scenario for yellowcake demand based primarily on the Department of Energy's low growth projections for the nuclear power industry with reasonable assumptions made as to the amount of uranium required to be produced by uranium mills located in the United States. These estimates cannot be made precise due to the numerous assumptions necessary to make distant future projections.

The continuous method of disposal is the alternative that avoids the most fatal cancers (about 276) in the industry scenario selected, but is the most uncertain alternative because it has never been carried out in practice. However, this method has been licensed for use by State regulatory agencies and NRC requires its consideration. The assumption that 10 acres of dry tailings are exposed at one time, the efficiency and reliability of dewatering equipment and the costs of this alternative are quite uncertain. However, this alternative may be the most protective of groundwater, which is a very serious problem with some existing systems.

Phased disposal is intermediate in avoiding fatal cancers (about 268), appears to be the least costly and is the latest technology licensed by the NRC and Agreement States that has been used by industry. The Agency considered a series of 20-acre impoundments for analysis which is somewhat smaller than those phased systems now in use.

The single large impoundment is the least protective of public health (about 251 fatal cancers avoided) and between the others in cost. The practicality of maintaining the integrity of the liner in a large pond for 15 years (as opposed to 3 years for each cell of the phased disposal) is uncertain. Failures in liners for both this alternative method and the phased disposal alternative (to a lesser degree) can lead to groundwater contamination and costly measures to mitigate such groundwater contamination. Such costs were not considered quantitatively in the Agency's analyses.

2. Timing of New Tailings Management by an Improved Method

Should mill operators be required to begin managing new tailings by an improved method? As alternatives EPA is considering requiring mill operators to manage new tailings with improved methods immediately, in five years (a three-year requirement plus a potential waiver of compliance for two additional years), in ten years (eight plus two), in fifteen years (thirteen plus two) and no specific timing requirement (existing piles would be closed at the end of their useful life).

The Agency estimated the costs and benefits of the timing alternatives with respect to existing piles by comparing them to a base situation which assumed that existing piles reached the end of their useful lives over the next 15 years, then dried out over the next 5 years and remained unreclaimed for the next 40 years. This condition is considered conservative, but could arise if existing mills and, thus their tailings, are kept on standby on and off for extended periods as has happened in the past, since operators have a strong economic incentive to delay reclamation.

The costs attributed to an alternative are due to actions being required sooner in time than might ordinarily have occurred (i.e., the opportunity value of the money required to cover piles that might not have been required for about 40 years later), the costs of replacement impoundments for the capacity of the existing piles that could no longer be used, and costs of interim covers when considered. Costs of remedial actions required when groundwater is contaminated were not estimated.

As might be expected, as the time for managing the new tailings by a new method is extended, less public health protection is afforded. If an immediate change to a new method is made, then about 177 fatal cancers would be averted. In a five-year time frame about 158 would be avoided, about 140 for 10 years, and about 121 for 15 years. Also, the present value costs decrease as the time is extended. The costs involve a component for replacing lost pile capacity (to the extent that capacity is projected to be used before reclamation) and a component for disposal of the tailings pile earlier than would normally be done.

There may also be important implications for groundwater contamination. Management of tailings piles under improved methods will require opening piles at new locations. What are the groundwater implications of this requirement? What are other environmental implications of opening other tailings piles? At the same time, the Agency is concerned that groundwater contamination could be exacerbated by any extended use of the existing unlined tailings impoundments. It is estimated that 95% of the groundwater contamination is caused by seepage of water used to pump tailings to the pile during mill operation. At every mill tailings site studied for potential groundwater contamination such contamination has been found. The earliest practical time to design, license by the Nuclear Regulatory Commission and build a new lined tailings impoundment is approximately three years and perhaps longer if extensive NEPA review is required. We

specifically request comment on the groundwater issue.

3. Interim Earth Cover of Existing Tailings

Should an immediate interim earth cover be used to decrease radon–222 emissions at existing piles until final cover at disposal? If so, how much? The Agency has considered: (1) One-third meter of earth cover on the top, dry portions of existing piles with no requirement to shift to new tailings management techniques; (2) one meter of earth cover on the top, dry areas and sides (if sides are constructed of tailings) of existing piles with no requirement to shift to new tailings management techniques; and (3) interim cover of one meter as in (2) above but with newly generated tailings being managed by a new technology in fifteen years, ten years, five years, and at promulgation.

The Agency estimated the costs and benefits of these alternatives with respect to existing piles in a fashion equivalent to the anlysis for the required use of new management methods for newly generated tailings. For those cases where no requirement for improved management methods for new tailings was specified, a five-year dry out and forty years lag to disposal were assumed. The assumed time lag to disposal may be a conservative assumption, but there are some very old piles in existence and there is considerable economic incentive for owners to delay final disposal. If capacity remains for an existing pile, an owner avoids economic loss by remaining open. Also, postponing final closure costs reduces present value costs of closure.

The number of fatal cancers avoided for each of the alternatives increase in order of the alternative given; from about 30 deaths avoided for one-third meter of earth cover, about 114 avoided deaths for one meter of cover, about 159 avoided deaths for one meter of cover and requirement of 15 years to improve management methods, about 166 avoided deaths for one meter and a 10-year requirement, about 174 avoided deaths for one meter and a 5-year requirement, and about 182 avoided deaths for one meter and immediate new tailings management by improved methods.

As would be expected, costs rise with, but not in proportion to, the rise in fatal cancers avoided. The alternatives with an application of a single interim cover can be more costly than those without. If the pile is used to manage new tailings, then multiple interim covers are required, raising costs and lowering benefits.

A number of concerns and uncertainties arise from the consideration of interim earth cover. The interim cover would have to be immediate to be effective, coverage of steep tailings dams may not be practical, there may be extensive maintenance requirements, and such requirements may prove difficult to implement and enforce.

The use of an interim cover implies that *all* existing piles would have to place earth cover immediately (perhaps with a waiver of compliance for two years). The immediate cost to industry is $34 to $110 million, the value of which would probably be lost when final disposal takes place. This is because most piles should be recontoured before final cover is added. In addition, interim covers on the tops of piles could be lost if the pile is reactivated.

The use of interim cover for control of radon–222 has not been practiced. There are concerns regarding the difficulties of covering steep tailings slopes and the expected need for frequent inspection and repair of erosions caused by wind and water.

EPA would have to enter into an agreement with the NRC in order to avoid inconsistent duplication of requirements for NRC licensees. NRC requires cover for different purposes such as prevention of wind blown tailings to meet 40 CFR Part 190 or heavier earth covers to compress the tailings and thus dewater. Also, for NRC Agreement States that license such sites under their own laws, the Agency would have to decide if the States' rules were compatible with EPA's. Thus, there is the potential for unnecessary duplication of regulation and inspection. For the final rule, EPA will estimate the effects of current NRC requirements.

4. Selection of a Final Rule

The Agency has arrayed the alternatives in Tables 1 and 2, in which is presented the basic information on benefits and costs for each alternative and combinations of alternatives. Additional details may be found in the economic assessment produced during the development of this rule. In selecting the final rule, EPA will consider risks, feasibility, and cost.

Additionally, an extremely important consideration is the risk to individuals living near tailings piles. A survey conducted in 1983 found a small number of occupied dwellings within two kilometers of existing tailings piles. For current conditions of partial water cover on the piles, individual maximum lifetime risks are estimated to be as high as one in one hundred with the potential to two in one hundred if the piles were allowed to completely dry out. If interim covers were placed on the dry portions of the piles as they currently exist, a one-third meter cover could reduce the maximum individual risks to about eight in one thousand; a one meter cover to about four in one thousand; and final cover of approximately three meters to about five in ten thousand. Only a few piles actually expose people to such risks. Most tailing piles are in remote areas.

Another consideration is the impact of this rule on groundwater protection. Contamination of groundwater has been discovered at sites that have been investigated for contamination and there is no reason to believe that such contamination does not exist at all tailing piles that are unlined. Radionuclides, selenium arsenic, sulfate, molybdenum, and other contaminants have been found. Remedial actions have been taken at some sites by drilling wells to interdict groundwater and pump it back to the pond. In one case city water was provided to about 200 people and the use of wells stopped.

BILLING CODE 6560-50-M

Table 1

Benefits and Costs of
Alternative Work Practices - Interim Cover Not Included (a)

Alternative	Population Benefit		Other Benefits	Present Value of Costs ($ Million)		Annualized Cost ($ Million)	
	Deaths Avoided	Time Span (years)		5% Discount	10% Discount	5% Discount	10% Discount
Work practices for existing piles - Cease placing tailings on piles at:							
15 years	120	60	Increasing protection of ground water depending on time.	179	89	9.4	9.0
10 years	140	60		280	170	14.8	17.0
5 years	158	60		424	311	22.4	31.2
Promulgation	177	60		608	538	32.1	54.0
Work practices for new piles:							
Single large pile	251	100	No large tailings pile to reclaim.	25.6	3.4	1.3	0.3
Phased disposal	268	100		22.2	-13.4	1.1	-1.3
Continuous disposal	276	100		94.8	8.3	4.8	0.8

(a) Numbers are given in three significant figures for comparison purposes only.

Table 2

Benefits and Costs of
Alternative Work Practices - Interim Cover Included (a)

Alternative	Population Benefit		Other Benefits	Present Value of Costs ($ Million)		Annualized Cost ($ Million)	
	Deaths Avoided	Time Span (years)		5% Discount	10% Discount	5% Discount	10% Discount
Work practices for existing piles - Cease placing tailings on piles at:							
Not specified - 1 foot cover	30	60	Increasing protection of ground water depending on time.	34	28	1.8	2.8
Not specified - 1 meter cover	114	60		110	90	5.8	9.0
15 years - 1 meter cover	159	60		283	177	15.0	17.8
10 years - 1 meter cover	166	60		380	256	20.1	25.6
5 years - 1 meter cover	174	60		523	396	27.6	39.7
Promulgation - 1 meter cover	182	60		640	570	33.8	57.2

(a) Interim covers placed as soon as possible. Numbers are given in three significant figures for comparison purposes only.

BILLING CODE 6560-50-C

E. Request for Comments

EPA is particularly interested in receiving comments and recommendations on the following issues:

1. Is it feasible to dewater (or dry) tailings, as would be required under the continuous disposal alternative? What percent of water by volume can be removed from the associated waste? To the Agency's knowledge, dewatering large volumes of uranium mill wastes is unproven technology. The Agency specifically requests information related to tailings dewatering from pilot plants, laboratory experiments, or other feasibility studies.

2. What is the minimum period for the design, licensing, and construction of new tailings management processes? The Agency considers a three-year period reasonable, based on two years for the design and licensing phase and one year for construction. The views of the regulatory agencies (NRC and the States) are of interest to the Agency, particularly the experience gained in previous licensing actions.

3. Is the size limit of 20 acres for the phased disposal method reasonable? This limit was selected from previous NRC and EPA analyses. The assessment presented in the Background Information Document indicates this limit provides significant radon-222 control without a cost penalty. The Agency is particularly interested in any studies that support a different maximum size for this phased disposal method.

4. Are current levels or potential increases in levels of radionuclide or other contaminants in ground water around uranium mills sufficiently elevated to warrant immediate termination of pumping tailings into unlined impoundments? Ground water contamination is occurring at all tailings sites where groundwater has been evaluated and the existing impoundment has no liner. The most effective long-term solution to this problem, other than pumping and treatment, is to stop placing tailings into unlined impoundments. The Agency requests more information on concentration levels of hazardous constituents in ground water around uranium mills and the potential public health and environmental effects. Also, information is needed on the impact on the uranium industry if this action is taken.

5. Are there any unidentified public health or environmental problems with evaporation ponds? Both the phased disposal and continuous disposal methods require evaporation ponds to dispose of excess water. The Agency believes most existing evaporation ponds have synthetic liners to prevent infiltration of hazardous constituents into ground water. However, some of these ponds may contain significant quantities of tailings, which are likely to be carried over from the impoundment area. The Agency seeks any information that may be pertinent to the potential public health and environmental impact from evaporation ponds at uranium milling sites.

6. Are interim controls for tailings piles a practical alternative? In particular, can dikes made of tailings sands be successfully covered on an interim basis? If so, are there maintenance problems? If not, what risks would result if they remain uncovered? Also, are dry tailings beach areas frequently flooded with additional tailings, or does a dry beach tend to remain dry until the end of impoundment design capacity? The Agency believes a variety of tailings management practices are conducted, so that in some cases interim controls would be effective for only a few years while in other cases interim controls would be effective until closure. Any information that pertains to the effectiveness of interim controls or engineering and maintenance problems is requested.

7. EPA's assessment of the costs and benefits associated with the enactment of UMTRCA assumed that existing piles would be promptly closed and covered when they are no longer of use. However, for the analysis of the costs and benefits of the various regulatory alternatives for licensed uranium mill tailings piles, the Agency has altered this assumption to reflect a 40 year lag before existing piles, once they are no longer used, are covered with the final covers prescribed by UMTRCA. Furthermore, the Agency has assumed in its analysis of the various regulatory options for licensed uranium mill tailings piles that if these regulations prevent further use of existing tailings piles, those existing piles will be promptly covered with the final covers prescribed by UMTRCA. The opportunity costs and the reductions in health effects which result from the moving forward in time of the application of UMTRCA final covers are significantly large contributors to the costs and benefits, respectively, of the various regulatory options. Therefore the specific assumptions made concerning the likely promptness of UMTRCA compliance under various regulatory scenarios may strongly influence the estimated costs and benefits of the regulatory options.

The Agency seeks comments on two questions: Is it reasonable to assume, as a reference case condition, a 40 year lag before compliance with UMTRCA once an existing pile is no longer used? Is it reasonable to assume that once existing piles are no longer used they will be promptly covered with the final covers prescribed by UMTRCA?

8. Tables 1 and 2 show the costs and risk reductions associated with ceasing to place tailings in existing piles at different points in time. The risk reductions of the alternative options for ceasing to place tailings on existing piles reflect the assumption that the earlier the date that new tailings cannot be added to existing piles, the earlier those piles will be covered under current UMTRCA requirements. The costs of these alternatives are attributable to (1) the increased cost of final cover under current UMTRCA requirements caused by incurring these costs sooner, (2) the cost of pile capacity replacement where current useable capacity was eliminated by the work practice requirements, and (3) the cost of interim covers where considered. EPA invites comment on the extent to which the timing of UMTRCA requirements should be factored into the decision-making associated with the choice of a control option.

VII. Miscellaneous

A. Docket

The docket is an organized and complete file of all information considered by EPA in the development of this proposed standard. The docket allows interested persons to identify and locate documents so they can participate effectively in the rulemaking process. It also serves as the record for judicial review.

Transcripts of the hearings, all written statements, the Agency's response to comments, and other relevant documents will be placed in the docket and will be available for inspection and copying during normal working hours.

B. Executive Order 12291

Under Executive Order 12291, issued February 17, 1981, EPA must judge whether a rule is a "major rule" and, therefore, subject to the requirement of a Regulatory Impact Analysis. EPA has determined that this rule is not a major rule as defined in section 1(b) of the Executive Order because the annual effect of the rule on the economy will be less than $100 million per year. Also, it will not cause a major increase in costs or prices for any geographic region. Further, it will not result in any significant adverse effects on

competition, employment, investment, productivity, innovation, or the ability of United States enterprises to compete with foreign enterprises in domestic or foreign markets. Under Executive Order 12291, this proposed rule was submitted to the Office of Management and Budget (OMB) for review. Any comments from OMB to EPA and any response to those comments are included in the docket.

C. Paperwork Reduction Act

The proposed rule does not impose any reporting or recordkeeping requirements on operators or unranium mills tailings piles. (However, if the interim control alternative is selected, there will be reporting and recordkeeping requirements and Form SF 83 will be submitted to OMB.)

D. Regulatory Flexibility Analysis

Section 603 of the Regulatory Flexibility Act, 5 U.S.C. 603, requires EPA to prepare and make available for comment an "initial regulatory flexibility analysis" in connection with any rulemaking for which there is a statutory requirement that a general notice of proposed rulemaking be published.

However, section 604(b) of the Regulatory Flexibility Act provides that section 603 "shall not apply to any proposed . . . rule if the head of the Agency certifies that the rule will not, if promulgated have a significant economic impact on a substantial number of small entities."

EPA believes this proposed rule will have little or no impact on small business because the total costs associated with the standards will have relatively little impact on the total cost of producing uranium oxide.

For the preceding reasons, I certify that this rule, if promulgated, will not have a significant economic impact on a substantial number of small entities.

List of Subjects in 40 CFR Part 61

Air pollution control, Hazardous materials, Asbestos, Beryllium, Mercury, Vinyl chloride, Benzene, Arsenic and Radionuclides.

Dated: February 14, 1985.

Lee M. Thomas,

Administrator.

PART 61—[AMENDED]

It is proposed to amend Part 61 of Chapter 1 of title 40 of the Code of Federal Regulations as follows:

1. The authority Citation for Part 61 continues to read as follows:

Authority: Secs. 112 and 301(a) Clean Air Act, as amended [42 U.S.C. 7412, 7601 (a)].

2. By adding a new Subpart W to read as follows:

Subpart W—National Emission Standard for Radon-222 Emissions From Licensed Uranium Mill Tailings

Sec.

Subpart W—National Emission Standard for Radon-222 Emissions From Licensed Uranium Mill Tailings

§ 61.250 Applicability.

This subpart applies to licensed sites that manage uranium byproduct materials during and following the processing of uranium ores, commonly referred to as uranium mills and their associated tailings.

§ 61.251 Definitions.

As used in this subpart, all terms not defined here shall have the meaning given them in the Clean Air Act or Subpart A of Part 61. The following terms shall have the following specific meanings given below:

(a) "Covered" or "reclaimed" means to cover with earth sufficient to meet Federal standards for the management of uranium byproduct materials pursuant to section 84 of the Atomic Energy Act of 1954, as amended.

(b) "Dewatered" means to remove the water from recently produced tailings by mechanical or evaporative methods such that the remaining water does not exceed 30 percent by weight.

(c) "Licensed site" means the area contained within the boundary of a location under the control of persons generating or storing uranium byproduct materials under a license issued pursuant to section 89 of the Atomic Energy Act of 1954, as amended. This includes such areas licensed by Agreement States, i.e., those States which have entered into an effective agreement under section 274(b) of the Atomic Energy Act of 1954, as amended.

(d) "Liner" means the material placed in the bottom and sides of a waste management area. This material must meet the requirements of 40 CFR Parts 264.220, 264.221, 264.300, and 264.301.

(e) "New tailings" means uranium tailings produced after the promulgation of this rule.

(f) "Single cell impoundment" means a method of tailings management which uses a large lined impoundment designed to contain all tailings generated during the lifetime of the mill. At the end of the mill life the impoundment is actively dewatered by means of pumps or allowed to air dry, and immediately reclaimed.

(g) "Phased disposal" means a method of tailings management and disposal which uses lined impoundments, no greater than 20 acres in area, which are filled, dried, and immediately reclaimed to Federal standards in series.

(h) "Continuous disposal" means a method of tailings management and disposal in which tailings are dewatered by mechanical methods immediately after generation. The dried tailings are then placed in trenches or other disposal areas and immediately reclaimed.

(i) "Uranium byproduct material" or "tailings" means the wastes produced by the extraction or concentration of uranium from any ore processed primarily for its source material content. Ore bodies depleted by uranium solution extractions and which remain underground do not constitute byproduct material for the purposes of this subpart.

§ 61.252 Standard.

[Note.—A final rule will be made by selecting one of the various alternatives or combination of alternatives placed in each of the brackets.]

(a) Owners or operators of licensed uranium mill sites subject to this subpart shall process new tailings by [single cell impoundment; phased disposal; continuous disposal]. An exception is granted to new tailings added to existing piles as allowed by paragraph (b) of this section.

Alternative 1

[(b)(1) Owners or operators of licensed uranium mill sites subject to this subpart shall not add new tailings to any existing tailings pile after the effective date of this paragraph. For existing tailings piles, owners or operators shall begin negotiating a reclamation plan and an agreement to implement the plan with the Nuclear Regulatory Commission within one year of the effective date of this subsection. The effective date of this subsection shall be [at promulgation of this rule; three (3) years from May 1, 1986; eight (8) years from May 1, 1986; thirteen (13) years from May 1, 1986; or indefinite].

[(2) An exception with regard to continued use of an existing tailings pile may be granted upon petition to the Administrator provided the existing tailings pile has an impermeable liner.]

Alternative 2

[(b)(1) Owners or operators of licensed uranium mill sites subject to

this subpart shall not add new tailings to any existing tailings pile after the effective date of this paragraph. For existing tailings piles, owners or operators shall begin negotiating a reclamation plan and an agreement to implement the plan with the Nuclear Regulatory Commission within one year of the effective date of this subsection. The effective date of this subsection shall be [at promulgation of this rule; three (3) years from May 1, 1986; eight (8) years from May 1, 1986; thirteen (13) years from May 1, 1986; or indefinite].

[(2) An exception with regard to continued use of an existing tailings pile may be granted upon petition to the Administrator provided the existing tailings pile has an impermeable liner.]

(3) Owners or operators of existing tailings piles shall add an interim cover by May 1, 1987. This interim cover shall consist of no less than [one-third (0.33) meter of earth on all dry areas on top of the pile; one (1) meter of earth on all dry areas on top of the pile and on the sides of the piles where sides are constructed of tailings sands.]

§ 61.253 Recordkeeping and reporting requirements.

There are no recordkeeping or reporting requirements associated with §§ 61.252(a) and 61.252(b), alternative 1, of this subpart. Section 61.252 (b), alternative 2, has the following recordkeeping and reporting requirements:

(a) Records of the application of interim covers required under § 61.252 (b), alternative 2 shall be maintained as described below:

(1) A current map of each tailings pile showing the locations of dry, wet, and ponded areas and the interim covers.

(2) A record of interim cover applied including depth, approximate moisture content, date of application, location of application.

(3) A record of past (last 5 years) operations that placed tailings on the pile.

(4) A record of inspections made to insure the integrity of the interim cover.

(b) An owner or operator of an uranium mill site subject to the requirements of § 61.252(b), alternative 2 shall submit a certification to the Administrator by May 1, 1987, and annually thereafter. This certification shall be based on information concerning the calendar year immediately preceding. The certification shall consist of a statement that the interim cover requirements of § 61.252(b), alternative 2, have been implemented.

If a waiver of compliance is granted, this certification is to be submitted on a date scheduled by the Administrator.

§ 61.254 Source reporting and waiver requests.

(a) Source reporting is not required since the information is a matter of public record for licensed uranium mill sites.

(b) An owner or operator of an existing uranium mill site (i.e., existing source) unable to operate in compliance with the standard prescribed under this subpart may request a waiver of compliance with such standard for a period not exceeding two years from the effective date. Any request shall be in writing and shall include the following information:

(1) The reasons for requesting the waiver:

(2) A schedule for achieving compliance with this subpart, including the steps which will be taken to come into compliance and a date by which each step will be achieved; and

(3) Interim emission control steps that will be taken during the waiver period.

(c) Changes in the information provided under paragraph (a) of this section shall be provided to the Administrator within 30 days after such change, except that if changes will result from modification of the source, as defined in § 61.02, the provisions of §§ 61.07 and 61.08 are applicable.

[FR Doc. 86-3834 Filed 2-20-86; 8:45 am]
BILLING CODE 6560-50-M