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Part IV

**Environmental
Protection Agency**

40 CFR Part 61

**National Emission Standards for
Hazardous Air Pollutants:**

**Regulations of Radionuclides; Withdrawal
of Proposed Standards**

**Standards for Radon-222 Emissions from
Underground Uranium Mines and From
Licensed Uranium Mills; Advanced
Notices of Proposed Rulemaking**

ENVIRONMENTAL PROTECTION AGENCY**40 CFR Part 61**

[AD-FRL 2694-2]

National Emission Standards for Hazardous Air Pollutants; Regulation of Radionuclides**AGENCY:** Environmental Protection Agency (EPA).**ACTION:** Withdrawal of proposed standards.

SUMMARY: On April 6, 1983, the Environmental Protection Agency, pursuant to section 112 of the Clean Air Act, proposed standards for sources of emissions of radionuclides in four categories: (1) Elemental phosphorus plants; (2) Department of Energy (DOE) facilities; (3) Nuclear Regulatory Commission (NRC)-licensed facilities and non-DOE Federal facilities; and (4) underground uranium mines. In addition, the Agency decided not to propose standards for the following source categories of radionuclide emissions: (1) Coal-fired boilers; (2) the phosphate industry; (3) other extraction industries; (4) uranium fuel cycle facilities, uranium mill tailings, and management of high-level radioactive waste; and (5) low energy accelerators. The Agency is announcing the withdrawal of its four proposed standards for radionuclide emissions under Section 112 of the Clean Air Act and affirms its original decision not to regulate emissions from the other five source categories considered. The U.S. District Court for the Northern District of California has ordered EPA to take final action on its proposed standards by October 23, 1984.

DATE: This withdrawal is effective October 31, 1984.

ADDRESS: The rulemaking record is contained in Docket No. A-79-11. This docket 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, D.C. 20460. A reasonable fee may be charged for copying.

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SUPPLEMENTARY INFORMATION:**I. Supporting Documents**

A final Background Information Document has been prepared and single

copies may be obtained by writing the Program Management Office, Office of Radiation Programs (ANR-458), U.S. Environmental Protection Agency, Washington, D.C. 20460, or by calling (703) 557-9351. Please refer to "NESHAPS-Radionuclides: Background Information Document for Final Rules, Volumes 1 and 2 [EPA 520/1-84-022-1, EPA 520/1-84-022-2], October 1984. These documents comprise the integrated risk assessment performed to provide the scientific basis for this rulemaking. Volume 1 of the Background Information Document contains a complete description of the Agency's methodology used in its risk assessment of the hazards associated with airborne emissions of radionuclides. Volume 2 is devoted to a detailed description of how the Agency applied this methodology to each source category considered in this rulemaking. For each source category, this document describes the radionuclide emissions, estimated doses and risks to nearby individuals and to populations, description of current emission control technology, and descriptions and cost estimates of additional emission control technology.

The Agency's written responses to oral and written comments on the proposed standards have been placed in Docket No. A-79-11. Single copies of the Agency's responses may be obtained by writing the Program Management Office, Office of Radiation Programs (ANR-458), U.S. Environmental Protection Agency, Washington, D.C. 20460, or by calling (703) 557-9351. Please refer to "NESHAPS-Radionuclides: Response to Comments for Final Rules, Volumes 1 and 2" [EPA 520/1-84-023-1, EPA 520/1-84-023-2], October 1984.

II. History of Standards Development

In 1977, Congress amended the Clean Air Act (the Act) to address airborne emissions of radioactive materials. Before 1977, these emissions were either unregulated or were regulated under the Atomic Energy Act. Section 122 of the Act required the Administrator of EPA, after providing public notice and opportunity for public hearings (44 FR 21704, April 11, 1979), to determine whether emissions of radioactive pollutants "cause, or contribute to, air pollution which may reasonably be anticipated to endanger public health." On December 27, 1979, EPA published a notice in the Federal Register listing radionuclides as a hazardous air pollutant under section 112 of the Act (44 FR 76738). This action was based on the Agency's finding that studies of the biological effects of ionizing radiation indicated that exposure to radionuclides increases the risk of human cancer and

genetic damage. In addition, the Agency found that emissions data indicated that radionuclides are released into air from many different sources with the result that millions of people are exposed. To support these findings, EPA issued a report entitled "Radiological Impact Caused By Emissions of Radionuclides into Air in the United States, Preliminary Report," [EPA 520/7-79-006], Office of Radiation Programs, U.S. EPA, Washington, D.C., August 1979.

Section 122(c)(2) of the Act directed that, after having listed radionuclides as a hazardous air pollutant, EPA enter into an interagency agreement with the Nuclear Regulatory Commission with respect to those facilities under NRC jurisdiction. Such a memorandum of understanding was effected on October 24, 1980, and was subsequently published in the Federal Register (45 FR 72980, November 3, 1980). When EPA began developing standards for Department of Energy facilities, a similar memorandum of understanding was negotiated with DOE and signed in October 1982. Copies of both these memoranda have been placed in the Docket for public review.

On April 6, 1983, EPA announced its proposed standards for sources of emissions of radionuclides from four categories: (1) Elemental phosphorus plants; (2) DOE facilities; (3) NRC-licensed facilities and non-DOE Federal facilities; and (4) underground uranium mines. Several additional source categories emitting radionuclides were identified in the notice. However, the Agency concluded that good reasons existed to propose not to regulate these categories, which included: (1) Coal-fired boilers; (2) the phosphate industry; (3) other extraction industries; (4) uranium fuel cycle facilities, uranium mill tailings, and management of high-level radioactive waste; and (5) low energy accelerators (48 FR 15076, April 6, 1983). At the time of proposal, it was thought that these nine source categories were all that potentially released radionuclides to air at levels that could warrant regulatory attention. In support of these proposed standards and determinations, EPA published a draft report entitled "Background Information Document, Proposed Standards for Radionuclides," [EPA 520/1-83-001], Office of Radiation Programs, U.S. EPA, Washington, D.C., March 1983.

Following publication of the proposed standards, EPA conducted an informal public hearing in Washington, D.C., on April 28 and 29, 1983. The comment period was held open an additional 30 days to receive written comments. Subsequently, EPA received a number of

requests to extend the time for submission of public comments and to conduct a public hearing outside of Washington, D.C., on the proposed standards to accommodate those were unable to attend the first hearing. In response to these requests, EPA extended the comment period by an additional 45 days and held another informal public hearing in Denver, Colorado, on June 14, 1983 (48 FR 23665, May 26, 1983).

EPA has considered and responded to all written and oral comments; a copy of the Agency's responses is in the Docket. The Background Information Document has been revised and published in final form. In addition, a final economic analysis of the impact of the proposed standards for elemental phosphorus plants has been completed and placed in the Docket (Refer to "Regulatory Impact Analysis of Emission Standards for Elemental Phosphorus Plants," October 1984). The final report on control technology for radionuclide emissions to air at Department of Energy facilities has been published and a copy is available in the Docket. (Refer to "Control Technology for Radioactive Emissions to the Atmosphere at U.S. Department of Energy Facilities," [PNL-4621], October 1984).

In response to requests for wider scientific review of the Agency's risk assessment, the Administrator in December 1983, formed a Subcommittee on Risk Assessment for Radionuclides within the Agency's Science Advisory Board (SAB) to review the scientific basis for the proposed standards. This review is discussed in more detail in Section IV of this notice. On the basis of the Subcommittee's review, the final Background Information Document has been rewritten to incorporate recommendations made by the Subcommittee. The revised Background Information Document presents an integrated risk assessment following the format and methodology suggested by the Subcommittee, to the extent possible.

On February 17, 1984, the Sierra Club filed suit to compel final action in the U.S. District Court for the Northern District of California, pursuant to the citizens' suit provision of the Act (*Sierra Club v. Ruckelshaus*, No. 84-0656 WHO). In August 1984, the Court granted the Sierra Club's summary judgment motion and ordered EPA to take final action on its proposed standards by October 23, 1984. On September 14, 1984, the Administrator requested that the Court delay its deadline until January 1985 to him enable him to personally evaluate the

merits of the criticisms and suggestions presented by the Subcommittee. This request was denied.

On August 24, 1984, EPA announced in the Federal Register the availability of new technical information (49 FR 33695). The public was encouraged to comment on this new information which included the Final Report of the SAB Subcommittee, transcripts of all public meetings of the Subcommittee, information presented to the Subcommittee, and technical information relevant to elemental phosphorus plants and underground uranium mines. This new information was available in the Docket on September 7, 1984. The Agency's responses to these comments are included in Volume 2 of "NESHAPS-Radionuclides: Response to Comments for Final Rules."

III. Summary of the Final Actions.

On April 6, 1983, the Agency proposed standards for sources of emissions of radionuclides in four categories: (1) Elemental phosphorus plants; (2) DOE facilities; (3) NRC-licensed facilities and non-DOE Federal facilities; and (4) underground uranium mines. For DOE facilities, the Agency proposed an emission limit not to exceed an amount that causes a dose equivalent rate of 10 mrem/y to the whole body and 30 mrem/y to any organ of any individual living nearby. For NRC-licensees and non-DOE Federal facilities, the Agency proposed an emission limit not to exceed an amount that causes a dose equivalent rate of 10 mrem/y to any organ of any member of the public. The emission limit proposed for elemental phosphorus plants was 1 Ci/y of polonium-210.

For all three of these source categories, the Administrator has determined that current practice provides an ample margin of safety in protecting the public health from the hazards associated with exposure to airborne radionuclides, and has therefore decided to withdraw the proposed standards.

In the case of underground uranium mines, the Agency proposed a standard to limit the annual average radon-222 concentration in air due to emissions from an underground mine to 0.2 pCi/1 above background in any unrestricted area. The Agency is also withdrawing this proposed standard because it has concluded, for the reasons discussed below, that it did not meet the legal requirements of Section 112. The Agency has received additional technical information that suggests the possibility of using bulkheading and other techniques to control radon emissions.

However, pursuing this course of action was not advocated or even suggested in the proposal. Indeed, the information available to EPA at the time of proposal indicated that these techniques were costly and "not very effective" and the Agency dismissed these techniques as the basis for an emission standard (48 FR 15083, col. 3). Since that time, new information suggests that conclusion may be erroneous. Technical information on which the base of final regulation or a proposal is not yet available; further work is needed to demonstrate how to set such a regulation at some future time. Therefore, the Agency is publishing, simultaneously with this notice, an Advance Notice of Proposed Rulemaking for Radon-222 Emissions from Underground Uranium Mines to solicit additional information on control methods, such as bulkheading and other forms of operational controls for radon-222 emissions from these mines. Such an approach could avoid many of the technical and legal difficulties pose by EPA's proposed standards.

In addition to the four source categories for which EPA did propose standards, the Agency has made a final determination not to regulate the following five source categories: (1) Coal-fired boilers; (2) the phosphate industry; (3) other extraction facilities; (4) uranium fuel cycle facilities; uranium mill tailings, and management of high-level radioactive waste; and (5) low energy accelerators. The Agency did not receive any new information during the public comment period that convinced it of a need for regulation of any of these five categories. Therefore, the Administrator affirms the original decision not to regulate these sources, believing that adequate public health protection exists to satisfy the requirements of the Clean Air Act.

When the Agency promulgated its standards for active uranium mill tailings (40 CFR 192, Subparts D and E), it decided that the control of the radon-222 emissions from the active uranium mill tailings piles could more appropriately be considered under the Clean Air Act, rather than the Uranium Mill Tailings Radiation Control Act. The preamble to the final uranium mill tailings standards noted that work practice standards were probably the most practical way to control radon emissions at active uranium mills. Consequently, EPA is issuing, simultaneously with this notice, an Advance Notice of Proposed Rulemaking for Radon-222 Emissions from Licensed Uranium Mills.

The withdrawal of the proposed standards for elemental phosphorus plants, Department of Energy facilities, Nuclear Regulatory Commission-licensed facilities and non-DOE Federal facilities, and underground uranium mines are final actions. Also, the decision not to establish radionuclide emission standards for coal-fired boilers; the phosphate industry, other extraction industries; uranium fuel cycle facilities, uranium mill tailings, and management of high-level radioactive waste; and low energy accelerators are final actions. Judicial review is available only by filing a petition for review in the United States Court of Appeals for the District of Columbia Circuit within 60 days of today's publication date.

III. Major Issues Raised in Public Comments

Many commenters expressed considerable dissatisfaction with the proposed standards. Operators of facilities for which standards were proposed objected vigorously to the stringency of the proposed standards; other groups objected on the grounds that the proposed actions were not sufficiently protective of public health. Both groups criticized the proposed standards for not meeting the intent of the Clean Air Act.

A number of comments were made which apply to all of the source categories considered and which address the bases of the standards-setting process. The following is a summary of the most significant comments and the Agency's responses:

Comment: Radionuclides should not be considered a hazardous air pollutant under section 112 of the Clean Air Act because ambient levels do not pose a significant risk to human health. One commenter petitioned for reconsideration of EPA's listing of radionuclides as a section 112 pollutant, on the basis that the Agency had not justified its conclusion that radionuclides are hazardous air pollutants within the meaning of section 112.

Responses: EPA has concluded that existing radionuclide emissions from some stationary sources can represent a significant risk of fatal and nonfatal cancers to exposed populations. There is no scientific doubt that radionuclides are carcinogens. This conclusion is based on extensive scientific evidence derived from studies of populations of humans and animals exposed to radiation at various levels ranging from very high doses to doses only slightly greater than environmental levels.

Both this conclusion and EPA's specific risk estimates are based on the

widely used assumption that there is no threshold below which exposure to radiation does not pose some risk to human health. Based on this premise, EPA concludes that exposure to radionuclides at low levels in the ambient air presents a risk of fatal and nonfatal cancers, as well as genetic damage.

In addition, section 112 requires not only a finding that the pollutant at issue is hazardous in the abstract, but also that it poses a public health risk in its form as an air pollutant. EPA has evaluated the air pollution risk of radionuclide emissions based on the magnitude of such emissions from stationary sources to the ambient air, on observed and estimated ambient concentrations of radionuclides, on the proximity of large populations to emitting sources, on estimates of health risks to exposed populations, and on considerations of uncertainties associated with risk estimates.

Based on this analysis, EPA has concluded that the present record does not support regulation of any of the source categories for which regulation was proposed. This conclusion, however, does not support delisting of radionuclides, because, in the case of uranium mines, the risks appear sufficient to warrant future regulatory action under section 112. It is only because regulation of the appropriate type is impossible at this time, due to the need for further work on the technical issues and the need to provide an opportunity for notice and comment on any proposed action, that no rules for uranium mines are being included in this decision.¹

Therefore, with respect to the petition for reconsideration of the listing of radionuclides as a hazardous air pollutant, EPA has considered this option and has rejected it, believing that the original decision to list under section 112 is still appropriate.

Comment: The EPA standards are unnecessary because current administrative or regulatory standards of 500 mrem/y to the whole body and 1500 mrem/y to any organ (Federal Radiation Council guidance and NRC regulatory values), coupled with directives to keep emissions as low as

¹ The Administrator believes, based on an analysis by EPA's Office of General Counsel, that today's actions are consistent with the statute and the court order governing today's decision. EPA acknowledges, however, that an argument exists that the only proper way to procedurally express the substantive conclusions set forth in today's rulemaking is by delisting the particular pollutant involved. Though EPA does not presently accept that position, it stands ready to amend this package promptly along these lines if the Court should so direct.

practicable, are adequately protective of the public health. Other commenters felt that the proposed standards were too lax and that the Agency should set an emission limit of zero, with exceptions allowed only after a case-by-case examination.

Response: EPA does not believe that current Federal Radiation Council guidance and NRC policy of limiting exposure to individuals to 500 mrem/y to the whole body and 1500 mrem/y to any organ protects public health with an ample margin of safety, as required by the Clean Air Act. EPA estimates that a person receiving 500 mrem/y to the whole body over a lifetime would have an added potential risk of developing a fatal cancer of about one in one hundred due to the radiation exposure. In addition, that same person would face an approximately equal level of risk of nonfatal cancer and of passing on nonfatal genetic effects to succeeding generations.

However, EPA recognizes that the "as low as reasonably achievable" (ALARA) emissions policy had led to generally low emissions of radionuclides from most facilities. The Agency expects that this current policy will continue in the future and does not anticipate an increase in the emission level or the associated risks. Therefore, the Agency believes that in cases in which a vigorous and well-implemented ALARA program has achieved low emissions, such practice can provide an ample margin of safety for public health protection.

The Agency does not agree with the approach of establishing an emission limit of zero. The implementation of such a standard for the source categories considered would be extremely burdensome, and would result in little improvement in public health. More important, however, is the Administrator's determination that public health is currently protected to a degree which satisfies the requirement of Section 112 of the Act.

Comment: EPA is required to promulgate standards under all of its applicable authorities in order to fulfill the intent of its Congressional mandates. For example, the Agency must regulate air emissions from uranium fuel cycle facilities under the Clean Air Act, as well as under the Atomic Energy Act.

Response: The Agency believes that its primary objective is to provide reasonable public health protection, but that it was not the intent of Congress that the Agency issue duplicative regulations to achieve this goal. In light of the limited resources in both the

public and private sector, it would be inefficient and unnecessarily complicated to require sources to comply with a standard they already meet, or alternatively, to meet several comparable standards set by one Agency under different statutory authorities.

Comment: Some commenters stated that the standards should be based on cost analyses, and if not cost-effective, they should not be promulgated. Others felt that costs should not be considered at all.

Response: The Agency believes that giving equal weight to costs and benefits is inappropriate in developing standards under Section 112 of the Clean Air Act. Congress clearly intended that public health protection considerations be primary and that cost be secondary.

The Agency did consider, in developing these rules, the availability and practicality of control equipment. While this was not a primary consideration, knowledge of the availability of control technology is necessary when making judgments on the need for and level of emission standards. EPA believes these considerations are within the Administrator's discretion in determining what level of protection is adequate. The Agency considered costs to a limited degree consistent with this overall perspective in reaching its decisions on coal-fired boilers and elemental phosphorus plants, but otherwise today's action does not rest on cost considerations.

Comment: Some commenters stated that the Clean Air Act requires standards for all source categories releasing significant amounts of radionuclides into the air. Determinations that standards are not needed are not allowed for any reason. Others supported EPA's determinations that standards for some categories are unnecessary.

Response: The comment that every stack emitting radionuclides to air must be subject to an emission limit established under the Clean Air Act must be considered in light of the fact that every stack in the United States discharges at least minute quantities of radionuclides. These radionuclides include certain kinds of carbon and potassium atoms and other naturally-occurring radionuclides. Because these emissions are so small, the risk to nearby individuals and the total population group is minimal. To regulate these sources would not significantly improve the public health.

Section 112 of the Act requires the Administrator to assure public health protection with an ample margin of

safety. A negative determination of the need for standards is permissible within the context of the Act, so long as this criterion is met. With respect to eight of the source categories considered in this rulemaking, the Agency has concluded that the public health is adequately protected under current practice, and therefore has met the requirements of the Act. For the uranium mines category, the Agency concludes that risks are significant; however, there is presently no feasible way to establish an emission standard. The Agency will consider such a standard, together with alternative design, equipment, work practice and operational standards, for future proposal.

Comment: There has not been sufficient review outside the Agency of EPA's methods and procedures for risk assessment. Specifically, EPA's Science Advisory Board should review the scientific basis of the proposed standards for radionuclides.

Response: The Agency agrees with this comment (see section V below).

Comment: The proposed standards should not be promulgated because they cannot be implemented with reasonable procedures. Compliance with indirect emission standards (dose or concentration limits at site boundary) must be determined by environmental measurements at the site boundary. Because the proposed standards are so restrictive, this is either very expensive or altogether impractical.

Response: Questions concerning the implementations of standards for airborne radionuclide emissions are moot in light of the Administrator's decision to withdraw the proposed rules.

Comment: Standards should be consistent with established international and national policies and regulations governing radiation protection, as well as among each source category.

Response: The Agency agrees with this comment and has based its decision to withdraw the proposed standards, in part, on the fact that current practices in radiation protection do provide adequate public health protection.

Comment: Standards should allow for greater operational flexibility in selecting control technology.

Response: Questions concerning the amount of operational flexibility necessary to comply with standards for airborne radionuclide emissions are moot in light of the Administrator's decision to withdraw the proposed rules.

V Technical Review by the Science Advisory Board

In response to criticism that the Agency did not have sufficient outside

review of its methods used to assess risk due to radionuclides, the Administrator formed a subcommittee of the Agency's Science Advisory Board to review the scientific basis of the proposed standards for radionuclides. The Subcommittee held three public meetings: the first on January 16, 1984, the second on February 21-22, 1984, and the third on March 22, 1984. At these meetings, the Subcommittee was briefed by Agency staff on the methods used in estimating risks caused by airborne radionuclides. The panel heard from members of the public on the Agency's risk assessments, as well. The Subcommittee also held executive sessions to consider the information presented by the Agency and the public.

Transcripts of the public meetings are available in the Docket. The Subcommittee's final report, entitled "Report on the Scientific Basis of EPA's Proposed National Emission Standards for Hazardous Air Pollutants for Radionuclides," was transmitted to the Administrator on August 17, 1984. A copy of this report and the Agency's response are available in the Docket.

In the Executive Summary of its report, the Subcommittee noted that its activities could be viewed as addressing two interrelated questions. First, did the Agency's staff collect the scientifically relevant data and use scientifically defensible approaches in modeling the transport of radionuclides through the environment from airborne releases, in calculating the doses received by persons inhaling or ingesting this radioactivity and in estimating the potential cancer and genetic risks of the calculated doses? Second, are the individual facts, calculational operations, scientific judgments, and estimates of uncertainty documented and integrated in a clear and logical manner to provide a risk assessment that can be used as a scientific basis for risk management purposes, i.e., standard-setting? With regard to the first question, the Subcommittee concluded that EPA had gathered the appropriate scientific information needed for a risk assessment in a technically proficient manner.

The Subcommittee made several technical suggestions on how EPA could improve its assumptions, models, and methods for estimating risks. Most of these technical suggestions have been incorporated into EPA's risk assessment procedures. The risk assessment for the final rule reflects these modifications. Some of these technical suggestions involve additional research to improve future risk assessment methods. Those

suggestions will be used as EPA conducts new studies.

The Subcommittee's greatest criticism in its report was related to the second question. They concluded that EPA had not assembled and integrated the available scientific data in the format of a risk assessment that provides an adequate basis for regulatory decisions. The panel suggested the need for an intermediate step between the collection of the relevant technical information and the selection of regulatory options. Specifically, they encouraged the Agency to assemble an integrated risk assessment document that would lead a decisionmaker step-by-step from the identification of emission sources, through the calculation of radiation doses and the associated degree of uncertainty, to a variety of regulatory options from which to choose. Only in this way did the Subcommittee feel that a policymaker could be presented with all the facts necessary to make a responsible regulatory decision. Further, this analysis would enable the scientific community and the public to understand the rationale and basis for the Agency's actions.

The Agency recognizes and is concerned about the adverse criticism of its processes by its own Science Advisory Board. EPA does believe that, on balance, its risk estimates for specific sources of radionuclide emissions are accurate within the limitations inherent in making such estimates. It acknowledges, however, that the criticism of the Board does cloud the rulemaking record, and that the Subcommittee's concerns, by their very nature, cannot be fully addressed within the time available for this decision. Nevertheless, the final Background Information Document has been greatly modified to encompass the format and suggestions of the Subcommittee to the extent possible. However, the Subcommittee has not reviewed this revised document.

The Science Advisory Board also made several procedural suggestions for improving the Agency's risk assessment methods. These recommendations will be incorporated into the Agency's procedures and processes. Detailed responses to the Science Advisory Board's recommendations can be found in Volume 2 of "NESHAPS-Radionuclides: Response to Comments for Fiscal Rule."

VI. Perspectives on Risk Assessment

Today's decision is based on a developing body of science and policy concerning the treatment of one particular class of hazardous substances, namely materials that

cause, or are thought to cause, cancer. In some cases, scientific evidence indicates that a given substance is hazardous at high levels or exposure, but has no effect below a certain level. For most carcinogenic substances, however, scientists are unable to identify such a threshold below which no effects occur; moreover, to the extent scientists understand the process of carcinogenesis, there is some reason to believe such thresholds may not exist. For these kinds of substances, EPA and other Federal agencies have taken the position that any level of exposure may pose some risks of adverse effects, with the risks increasing as the exposure increases.

EPA's approach to risk assessment for suspected carcinogens may be divided into several steps. The first is qualitative evaluation of the evidence to determine whether a substance should be considered a human carcinogen for regulatory purposes. This was done for radionuclides before they were listed as a hazardous air pollutant in 1979. The second step is quantitative: how large is the risk of cancer at various levels of exposure? The result of this examination is a dose-response function which gives the lifetime risk per unit of exposure (or "potency"). The third step is to estimate how many people are exposed to the sources of radiation, and at what levels. These exposure estimates then are combined with the dose-response function to obtain estimates of the risk caused by emissions of the pollutant, in this case radionuclides, into the environment.

Exposure levels for each specific source category are derived using emissions estimates, dispersion modeling, and population data. For any given level of emissions, dispersion models predict concentrations at different distances from the emission source. By combining those estimated concentrations with census data on population densities, the number of people exposed at different levels can be estimated. Several factors suggest that actual exposure levels 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 take into account indoor vs. outdoor air, for instance, or the fact that most people in their daily routines move in and out of the specific areas where the emission concentration are the highest.

The final risk estimates are the product of the exposure levels and the estimated unit-risk factor. Two summary

measures are of particular interest: "nearby individual risk" and "total population impact." The former refers to the estimated increased lifetime risk from a source that is faced by individuals who spent 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 a lifetime at the point of maximum exposure faces an estimated increased risk of cancer of one in one thousand. (For comparison, the average lifetime risk of dying of cancer in the United States is about 165 in 1,000, so eliminating a risk of one in one thousand reduces the overall lifetime risk of contracting cancer by less than 0.6 percent.) Estimates of nearby individual risk must be interpreted cautiously, however, since generally few people reside at the points of maximum concentrations and spend their whole lives at such locations.

The second measure, "total population impact," considers people exposed at all concentrations, low as well as high. 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 0.05 fatal cancer per year, for example, means that emissions of the specific pollutant from the source category are expected to cause one case of cancer every 20 years. Such figures should not be viewed as precise estimates of the likely effects. Together with the estimates of maximum individual risk, they are intended to give an indication of a reasonable upper-limit situation.

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 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 bear. Two sources of radionuclide or chemical emissions could have similar population impacts, but very different maximum individual risks, or vice versa. Any sensible "risk management" system cannot rely on either measure alone; both are important.

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 radionuclide emissions is likely to be more accurate than the same estimate for chemical releases. The situation for estimating risk from radionuclides is much less likely to reflect hypothetical maximum potential estimates than are estimates made for chemical emissions.

To provide general perspective regarding radiation exposure, everyone is exposed to background radiation due to cosmic radiation, and radioactivity in minerals, soils, and even our own bodies. Background radiation levels vary across the U.S., but average about 100 mrem/y for each person. There is very little that people can do to control exposure to background radiation. Over a lifetime this exposure is estimated to contribute to a fatal cancer risk of about one or two cases for every one thousand people.

VII. Withdrawal of Proposed Standards

A. Alternatives

In determining the appropriate course of action for the proposed standards, EPA considered the following alternatives.

1. Withdraw the Proposed Standards

This alternative is based on the finding that current and future emissions at the facilities under consideration are anticipated to be at levels that would protect the public with an ample margin of safety, as required by section 112 of the Act. This alternative is also appropriate if implementation of the proposed standards is infeasible.

2. Promulgate the Proposed Standards

This alternative is based on the conclusion that the findings made in the proposed rule were correct and that the proposed standards are necessary to adequately protect the public health.

3. Promulgate a Standard for Each Category at a Level That Would Limit Dose to 25 mrem/y to the Whole Body and 75 mrem/y to Any Organ

This alternative is based on the conclusion that the need for standards for each category for which the Agency proposed rules was correct, but that EPA could establish the standards at these recommended levels and still provide an ample margin of safety. Establishing the standards at these levels would also respond to several comments regarding consistency among the categories and with the recommendations of recognized national

and international radiation protection groups, and regarding the need for greater operator flexibility in selecting control technology and methods of demonstrating compliance.

B. Elemental Phosphorus Plants

One of the decisions presented by this rulemaking concerns emission for elemental phosphorus plants. Risks from these plants are higher than for any other source category in this rulemaking except uranium mines. Moreover, technology to reduce these risks is available. Nevertheless, after consideration of the proposed rule, the public comments, the Science Advisory Board report, the risk assessment, and other pertinent information, it is the Administrator's judgment that the present record does not support a conclusion that regulation of elemental phosphorus plants is necessary to protect the public health, within the meaning of the Clean Air Act. Therefore, the proposed rule is withdrawn. This decision presents difficult questions and the Agency is undertaking a number of nonregulatory actions, explained below, that may lead to reexamination of this decision at some future date.

EPA estimates the total risk to human populations posed by radionuclide emissions from elemental phosphorus plants to be 0.06 fatal cancer per year, or approximately one case every seventeen years. This risk is similar to other risks that EPA has considered insufficient to warrant Federal regulation in comparable Section 112 proceedings. About 80% of the total risk presented by the industry is accounted for by two plants, the FMC plant in Pocatello, Idaho, and the Monsanto plant in Soda Springs, Idaho.

In the case of one of the plants, EPA estimates the dose rate to individuals at the location of highest air concentrations to be about 600 mrem/y to the lung. The chance of getting cancer from a lifetime of exposure at this location is calculated to be about one in one thousand. If risk to the "most exposed individuals" were the only criterion for judgment, this relatively high risk might well have led to a decision to regulate.

However, this risk must be weighed against both the low aggregate risk described earlier and against other factors. Our studies indicate that present emission controls on these plants are not efficient in removing radionuclides and could be improved. However, adding such additional controls will be expensive measured against the limited public health benefits provided.

Finally, the SAB Subcommittee's report harshly criticized EPA's analysis in support of its proposed standards. That alone would not justify a decision not to regulate, but in the context of the limited aggregate risk and other factors described earlier it contributes to such a decision, particularly given the Science Advisory Board's statutory role as the Agency's science advisor.

Over the next several years, EPA will work with the Science Advisory Board to satisfy its concerns regarding the scientific basis of regulations such as this. Undertaking this effort will also allow the development of answers to the following two questions that may have a bearing on any future EPA action.

1. EPA is currently reconsidering its ambient air quality standard for particulates, and may shift its emphasis toward regulating the smaller-sized particles. Since the two elemental phosphorus plants being considered here emit large amounts of these smaller particles, they may require additional controls based on these new standards. Limiting emissions of these smaller particulates would also control some of the radionuclide emissions from the plants.

2. The area surrounding these two plants is characterized by high total levels of radiation from a variety of sources. The storage and widespread use of slag and possibly other waste products from these plants have significantly increased the natural background radiation levels in parts of the communities. In particular, phosphate slag from these plants has been widely used as aggregate in road and house construction in these areas. EPA and the State of Idaho intend to perform a total assessment of the various sources and will investigate ways to reduce or prevent risks from growing. This assessment may find more effective ways to control the overall risks than by controlling the emissions at issue here.

C. Department of Energy (DOE) Facilities

It is also the Administrator's judgment that the present record does not support a conclusion that regulation of DOE facilities for radio-nuclide emissions to air is necessary to protect the public health with an ample margin of safety, within the meaning of the Clean Air Act. Therefore, the proposed rule is withdrawn and the rulemaking is terminated.

EPA estimates the total risk to exposed human populations by all DOE facilities for which regulation was proposed as 0.08 potential fatal cancer

per year, or one case every 13 years. This risk is comparable to risks that EPA has considered insufficient to warrant regulation in similar Section 112 proceedings.

Dose rates from the four DOE facilities with the greatest radionuclide emissions range from 50 mrem/y to 88 mrem/y to the lung; one of these facilities delivers a dose rate of 34 mrem/y to the whole body. EPA estimates the chances of fatal cancer from a lifetime of exposure to these plants' most concentrated emissions are about one to eight in ten thousand, somewhat lower than the maximum risks elemental phosphorus plants. Once again, this risk to nearby individuals must be weighed both against the low aggregate risks and the Science Advisory Board report described earlier.

The DOE currently has a program to keep exposure to the public to levels that are as low as reasonably achievable. This program is operated by the Department in keeping with the longstanding recommendations of the National Council on Radiation Protection and Measurements, the International Commission on Radiological Protection, and the Federal Radiation Council to avoid radiation exposure where practical. While the Agency recognizes that DOE facilities maintain very large quantities of radionuclides in their inventories at many of their facilities, there has been a general trend at most facilities for radionuclide emissions to be reduced over the years. Emissions should not significantly increase in the future. EPA intends to continue its oversight of emissions from DOE facilities and should this change, the Agency will reexamine its decision not to regulate.

As previously noted, EPA currently has a Memorandum of Understanding (MOU) with DOE regarding the development and implementation of standards under section 112. EPA intends to coordinate with DOE to seek to modify the Memorandum of Understanding as appropriate.

D. Nuclear Regulatory Commission (NRC)-Licensed Facilities and Non-DOE Federal Facilities

It is also the Administrator's judgment that the present record does not support a conclusion that regulation of NRC-licensed facilities and Federal facilities other than DOE facilities is necessary to protect the public health with an ample margin of safety, within the meaning of section 112. Therefore, the proposed rule is withdrawn and the rulemaking is terminated.

EPA estimates the total risk to human populations posed by NRC-licensed

facilities and non-DOE Federal facilities for which regulations were proposed to be no more than 0.02 fatal cancer per year, or less than one case every fifty years. This risk is comparable to other risks that EPA has considered insufficient to warrant regulation in similar Section 112 proceedings.

EPA calculates the changes of developing fatal cancer from a lifetime of exposure to the most concentrated emissions from the NCR facility with the greatest dose rate at no more than two in ten thousands. EPA believes that the Nuclear Regulatory Commission and other Federal facilities will continue to implement programs to keep exposure of the public to levels that are as low as reasonably achievable, and adequate to protect the public against significant adverse effects from radiation. Emissions should not significantly increase in the future. EPA will continue its oversight of emissions from these facilities, and should this change, the Agency will reexamine its decision not to regulate.

As previously noted EPA currently has a Memorandum of Understanding (MOU) with NRC regarding the development and implementation of standards under section 112. EPA intends to coordinate with NRC to seek to modify the Memorandum of Understanding as appropriate.

E. Underground Uranium Mines

The Agency proposed a standard for underground uranium mines that would limit the annual average radon-222 concentration in air due to emissions from an underground mine to 0.2 pCi/l above background in any unrestricted area. The standard was expected to be met by one of the following procedures: (1) Reducing the percentage of time the mine operates, (2) increasing the effective height of the release, and (3) controlling additional land. EPA expected that mine operators would most likely try to control land within about 2 kilometers of the mine vents in order to comply with the standard. EPA did not issue a direct emission standard for radon from underground uranium mines because, as the proposal explained, available information suggested that radon could not be collected by available pollution control equipment before being released from the vents, reductions afforded by better bulkheading or sealants were highly uncertain, and reducing the volume of air flow was not feasible due to the effect on occupational exposure. Comments on the proposed rule indicated that controlling a sufficient amount of land might not be feasible because private owners of land

surrounding the mine might be unwilling to make their land available to the mine owners.

Several comments were received starting that EPA had overestimated the risks from radon-222 emissions from underground uranium mines. It was suggested that the Agency had used overly conservative assumptions in the dispersion and risk calculations and that it used greater risk coefficients than recommended by other recognized radiation experts. EPA has considered these comments in establishing its parameters for emission rates, plume rise, and equilibrium ratios in the revised risk assessment. The most recent estimates of the lifetime risks to individuals living near these mine range from one in one thousand to one in one hundred. The potential exists for even higher risks in some situations, e.g., a person living very close to several horizontal mines vents or in areas influenced by multiple mine emissions. Lifetime risks in these situations could be as high as one in ten. EPA estimates the fatal cancer risk to the total population to be about five fatal cancers per year. The Agency considers these risks to be significant and believes action is needed to protect populations and individuals living near underground uranium mines.

Analysis of the likely reduction in health risks afforded by the proposed standards showed that while risks to nearby individuals were reduced by a factor of about ten, the risks to the total population were only negligibly reduced. The lack of population risk reduction is due to the fact that radon releases would not be reduced by the proposed rule, they would only be more widely dispersed.

EPA has concluded that its proposed standard was legally flawed in two ways. First, because it would not have limited radionuclide emissions on a continuous basis, but was primarily based on the use of dispersion technology to reduce risks to nearby people, it did not qualify an "emission standard" within the meaning of section 112 (See Clean Air Act, section 302(k)). EPA also believes such dispersion techniques cannot qualify in this context as a "design, equipment, work practice or operational standard" within the meaning of section 112(e). EPA believes that for such standards to be valid, they must also have an emission limiting effect. (See Clean Air Act, sections 112(e)(3) and (e)(4).) Second, because this standard would not reduce the aggregate population risk appreciably, when such risk was high, if failed to

meet the public health protection purposes of the Act.

Because radon-222 is a noble gas and the volume of air discharged through mine vents is very large, there is no practical method to remove radon-222 from the mine exhaust air. Adsorption onto activated charcoal is the most widely used method for removing noble gases from a low volume air stream. However, application of this method to the removal of radon-222 from mine ventilation air at the volumes of air which must be treated would require large, complex, unproven systems which would be extremely costly (i.e., at least \$18-44/lb of U₃O₈ produced).

Since proposal, EPA has received additional technical information in a report prepared for the U.S. Bureau of Mines, indicating that work practices, such as bulkheading abandoned sections of mines to trap the radon before it is vented, may be more feasible and cost-effective than previously thought. This information, which is of a preliminary nature, suggests that bulkheading, even without the use of charcoal filters, could reduce emissions of radon-222 by 10-60% from typical mines at a cost ranging from \$4-\$60 per curie reduced or about \$0.01-0.05/lb of U₃O₈ produced.

Uranium mines are widely diverse in their characteristics. They differ in configuration; for example, some mines have very few side tunnels and cross cuts whereas others may have many side areas. Consequently, they have a wide variety of surface areas where radon can be generated. In addition, mines differ in the geologic strata, mining techniques, and uranium and radium concentrations. All of these factors tend to decrease the number of common characteristics among mines that can be used to make general predictions of the effectiveness of specific control measures. Therefore, considerable additional work is needed to establish whether these results can be realized consistently for an appreciable segment of the industry, and to determine methods of bulkheading that might potentially produce any such consistently acceptable results. Only after these facts have been established would EPA be able to propose a standard based on these techniques. In any event, no such rule can be promulgated on the present record because the original proposal considered the use of this form of control and explicitly dismissed it as a basis for the standard.

Because the Agency is convinced that the health risks posed by underground uranium mines are significant, EPA has decided to begin developing an

emission, design, equipment, work practice, or operational standard to control radon releases from underground uranium mines. An Advance Notice of Proposed Rulemaking announcing this decision is being published simultaneously with this notice.

VIII. Final Determination for Sources EPA Proposed Not To Regulate

EPA previously identified several source categories that emit radionuclides to air but proposed not to regulate them. Final decisions on the need for emission standards for these categories, and the reasons for these decisions, are discussed in the following paragraphs.

A. Coal-Fired Boilers

Large coal-fired boilers are used by utilities and industry to generate electricity and to make process steam and hot water for space heaters and industrial processes. When operating, these boilers emit trace amounts of uranium, radium, thorium, and their decay products found in the feed coal. These radionuclides become incorporated into fly ash and are carried into the air along with the particulate matter these boilers emit. Technology that removes particulates will also limit radionuclide emissions.

Particulate emissions from new utility and new large industrial boilers are controlled by new source performance standards issued under Section 111 of the Clean Air Act reflecting best demonstrated technology. EPA has also proposed new source performance standards for smaller industrial boilers. Existing utility and industrial boilers are regulated for particulate emissions by State implementation plans as required by the Clean Air Act.

EPA proposed not to regulate coal-fired boilers because these existing particulate emission standards also limit radionuclide releases, and result in relatively insignificant risks to nearby individuals and to populations due to radionuclides. The highest dose resulting from this source category is 1 mrem/y to the lung. This is equivalent to an individual lifetime risk of fatal cancer of one in one million. Population risk is estimated to be about two fatal cancers per year, spread over the entire U.S. population. The cost to further reduce radionuclide emissions is greater in comparison to the additional public health protection achieved. In addition, radionuclide emissions will decrease as old plants are replaced with new ones having improved particulate emission controls as required by the Clean Air Act.

Many commenters, mostly industrial groups, strongly supported the determination not to propose regulations for this source category. Several commenters stated that the risks from coal-fired boilers were so low that this fact alone indicated that standards are not needed. The Agency's decision not to regulate is based on both a consideration of the level of risk and on a consideration of total cost and practicality of additional control equipment. Some commenters stated costs should not be considered under section 112 of the Clean Air Act. EPA believes it is not reasonable to avoid considering cost and practicality of control technology; however, the protection of public health was the primary consideration in reaching this decision.

Some commenters raised the question of whether there are some boilers that might burn coal with high uranium content, leading to emission levels far greater than those considered in making this determination. EPA asked for comment on this point and contracted with Los Alamos National Laboratory to investigate the existence of such boilers. The Agency was unable to find boilers with radionuclide emission rates significantly greater than the model facility we studied in detail. In fact, the majority of boilers can be demonstrated to have emissions much lower.

Some commenters stated that the requirements of the Clean Air Act dictate that EPA must propose an emission standard specifically for radionuclides, regardless of other Clean Air Act regulations limiting particulate emissions. EPA believes that to issue a standard that duplicates current regulations is unreasonable. As a practical matter, Clean Air Act regulations limiting particulate emissions from these boilers also limit radionuclide emissions. Hence, these existing regulations protect the public health with an ample margin of safety as far as radionuclide emissions are concerned.

After carefully considering all comments, EPA has decided not to regulate radionuclide emissions from coal-fired boilers at this time. This decision will be periodically reviewed as additional information on the total impact of all hazardous air pollutants from coal-fired boilers becomes available.

B. Phosphate Industry

The phosphate industry processes phosphate rock to produce fertilizers, detergents, animal feeds, and other products. The production of fertilizer

uses approximately 80 percent of the phosphate rock mined in the United States. Phosphate deposits contain elevated quantities of natural radioactivity, principally uranium-238 and members of its decay series. Uranium concentrations in phosphate deposits range from ten to one hundred times the concentration of uranium in other natural rocks and soils.

Phosphate Rock Processing Plants

The processing of phosphate rock in dryers, grinders, and fertilizer plants results in the release of radionuclides into the air in the form of dust particles. Control techniques that remove particulates will also control radionuclide emissions.

Particulate emissions from new or modified phosphate rock drying, grinding, and fertilizer plants are controlled by new source performance standards issued under Section 111 of the Clean Air Act. In the case of fertilizer plants, the new source performance standard for fluoride also provides for effective control of particulates. Existing drying, grinding, and fertilizer plants are regulated for particulate emissions by State implementation plans as required by the Clean Air Act. EPA proposed not to regulate phosphate rock processing facilities because the existing particulate and fluoride emission standards also limit radionuclide releases. The risks to nearby individuals and the total population risks due to radionuclide emissions from these three types of facilities are insignificant. The highest doses resulting from emissions from these facilities are 15 mrem/y to the bone and 7 mrem/y to the lung. This is equivalent to a lifetime individual risk of fatal cancer of one in one hundred thousand. Population risk is from all of these facilities about to 0.02 fatal cancer per year. In addition, there is no potential for emissions to increase; rather, they should decrease as older plants are replaced with new ones subject to new source performance standards.

Comments from the phosphate industry strongly supported EPA's proposal not to regulate phosphate rock processing facilities and further stated that EPA had overestimated the radionuclide emissions from these facilities. EPA agrees that its estimates of radionuclide emissions from these facilities were based on some conservative assumptions and has concluded that this serves to reinforce its decision not to regulate these facilities.

Several commenters stated that standards were needed for phosphate

rock processing facilities and that cost should not be considered in reaching a decision on the need for these standards. Even without considering costs, EPA does not agree that standards are needed for these facilities for the reasons just stated.

EPA did not previously make any determination regarding radionuclide standards for phosphate rock calciners at wet process fertilizer plants because information on emissions from these facilities was not available. EPA requested comments on these emissions and asked whether standards were needed. In addition, the Agency conducted emission tests at two of these facilities. EPA has not yet completed its analysis of these emission tests or carried out a risk assessment for these calciners. Therefore, no determination of the need for standards for phosphate rock calciners at wet process fertilizer plants is made at this time.

After considering all comments, EPA has decided to affirm and make final its decision not to regulate radionuclide emissions from phosphate rock processing plants, other than phosphate rock calciners at wet process fertilizer plants. A decision regarding the need for standards for this latter source will be made after completion of the Agency's analyses of emissions and risks from these facilities.

Phosphogypsum Piles

Several comments were received requesting EPA to issue standards under the Clean Air Act for radionuclide emissions from phosphogypsum piles (fertilizer plant waste material). EPA did not propose radionuclide standards for this source because it believed that such wastes would be more appropriately regulated under the Resource Conservation and Recovery Act (Pub. L. 94-580).

After considering all comments, EPA is reevaluating the need for radionuclide standards for this source. Preliminary risk estimates indicate that individual lifetime risks from exposure to air emissions from these piles may be as high as eight in ten thousand. Population risks may be on the order of one fatal cancer per year. The Agency will continue its examination of the need for a standard for this source category.

C. Other Extraction Industries

Almost all industrial operations involving removal and processing of soils and rocks to recover mineral resources release some radionuclides into the air. EPA has conducted studies of airborne radioactive emissions from the mining, milling, and smelting of iron, copper, zinc, clay, limestone, fluorspar,

and bauxite. These are relatively large industries and are considered to have the greatest potential for air emissions of radionuclides.

EPA proposed not to regulate these extraction industries because the available data showed that the risks to individuals and populations from radionuclide emissions from these facilities are insignificant. Individual lifetime risks range from one in one hundred million to one in ten thousand. Population risks range from 0.000001 to 0.01 fatal cancer per year.

Most of the comments received were from industry representatives who concurred with EPA's proposal not to regulate these facilities. In their opinion, emissions, doses, and risks were so small that a regulation was unnecessary. No new information was provided to the Agency during the public comment period which indicated a need for standards. Additional Agency studies have confirmed that radionuclide emissions from these sources are low.

After considering all comments, EPA has decided to affirm and make final its decision not to regulate radionuclide emissions from extraction industry facilities.

D. Uranium Fuel Cycle Facilities, Uranium Mill Tailings, and Management of High-Level Radioactive Waste

The uranium fuel cycle consists of operations associated with production of commercial electric power by light water reactors using uranium fuel. It includes nuclear power plants and facilities that mill uranium ore, process uranium, and fabricate and reprocess uranium fuel. EPA has promulgated emission standards for normal operations of the uranium fuel cycle under the Atomic Energy Act (40 CFR Part 190). These standards limit the annual dose equivalent from radionuclide emissions to 25 mrem/y to the whole body and to any organ, with the exception of the thyroid, which may receive 75 mrem/y. EPA standards and their implementation by the NRC require the use of available technology which results in low doses to individuals and populations.

Many commenters, both government and industry, supported EPA's decision not to issue emission standards for this source category. Other commenters felt that the Clean Air Act requires EPA to set emission standards for uranium fuel cycle facilities, regardless of any other standards in force.

The Agency believes that current EPA standards for the uranium fuel cycle provide a level of protection which

satisfies the requirements of the Clean Air Act. An emission standard promulgated under the Clean Air Act would be duplicative with the uranium fuel cycle standard and would not offer any additional public health protection. During the Agency's upcoming review of 40 CFR Part 190, this issue will be reexamined.

Uranium mill tailings remain after uranium is removed from the ore. Many thousands of acres of these tailings exist at both inactive and active uranium mill sites, located mostly in the West. The high concentration of radium-226 in the tailings can result in significant emission or radon-222, a radioactive gas. Under current EPA disposal standards which require long term stabilization of the tailings piles, 95% or more of the random emissions will be controlled. These standards, issued under the authority of the Uranium Mill Tailings Radiation Control Act of 1978 (Pub. L. 95-604), provide a level of public health protection comparable to an air emission standard.

However, commenters noted that random emissions from the tailings piles at licensed uranium mills are exempted from the requirements of 40 CFR Part 190. They are controlled, instead, by NRC regulations which allow a concentration of 3pCi/1 of radon-222 in unrestricted areas. This value represents a level of risk that may be significant. EPA is publishing, simultaneously with this notice, and Advance Notice of Proposed Rulemaking to consider the need for an emission standard for radon emission from licensed uranium mills.

Highly radioactive liquid or solid wastes from reprocessing spent nuclear fuel, or the spent fuel elements themselves if they are disposed of without reprocessing, are considered high-level radioactive waste. EPA has proposed standards under the Atomic Energy Act to limit public exposure to the radionuclides in this waste prior to disposal and has proposed that operations be conducted to reduce exposures below the standard to the extent reasonably achievable. The Agency expects its standards for the management of high-level radioactive waste to be promulgated in the near future. These standards will control emissions during the operational phase of the disposal site to a level which results in a dose equivalent no greater than 25 mrem/y to the whole body or to any organ, except the thyroid, which may receive a dose as high as 75 mrem/y. These standards will provide a level of public health protection comparable to an emission standard issued under the Clean Air Act.

After consideration of all comments, EPA affirms and makes final its decision not to issue separate standards under the Clean Air Act for radionuclide emissions from the uranium fuel cycle, uranium mill tailings, and management of high-level radioactive waste.

E. Low Energy Accelerators

Accelerators impart energy to charged particles, such as electrons, alpha particles, protons, and neutrons. They are used for a wide variety of applications, including radiography, activation analysis, food sterilization and preservation, and radiation therapy and research. Accelerators, other than those owned by the DOE, operate at comparatively low energy levels and therefore emit very small quantities of radionuclides. The doses and health risks associated with these emissions are extremely low. Lifetime individual risks range from one in ten trillion to one in one billion. Further, there is no potential for the emissions from these facilities to increase significantly.

The Agency proposed not to regulate this category. No comments were received on this proposal, and the Agency is not aware of any new information indicating a need for a standard. Therefore, the Agency affirms and makes final its decision not to regulate radionuclide emissions from low energy accelerators.

IX. Miscellaneous

Docket

The docket is an organized and complete file of all information considered by EPA in this rulemaking. It is a dynamic file, since material is added throughout the rulemaking process. The docket allows interested persons to identify and locate documents so they can effectively participate in the rulemaking process, and it also serves as the record for judicial review.

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

Dated: October 23, 1984.

William D. Ruckelshaus,
Administrator.

[FR Doc. 84-28453 Filed 10-30-84; 2:12 PM]
BILLING CODE 6560-50-M

40 CFR Part 61

[AD-FRL 2694-2a]

National Emission Standards for Hazardous Air Pollutants; Standards for Radon-222 Emissions From Underground Uranium Mines

AGENCY: Environmental Protection Agency (EPA).

ACTION: Advance notice of proposed rulemaking.

SUMMARY: This notice announces the Agency's intent, under Section 112 of the Clean Air Act, as amended, to start a program to consider a standard based on bulkheading or related techniques to control radon emissions from underground uranium mines. This standard could be an emission standard, or a design, equipment, work practice, or operational standard, or a combination thereof. The Agency requests interested parties to submit information and comments relative to controlling these emissions.

DATES: Information received by April 30, 1985 will be of maximum value.

ADDRESS: Comments must be submitted (in duplicate, if possible) to: Central Docket Section (LE-139) Attention: Docket No. A-79-11, Environmental Protection Agency, 401 M Street, SW., Washington, D.C. 20460.

FOR FURTHER INFORMATION CONTACT: James M. Hardin, (703) 557-8977, Environmental Standards Branch, Criteria and Standards Division (ANR-460), Office of Radiation Programs, Environmental Protection Agency, Washington, D.C. 20460.

SUPPLEMENTARY INFORMATION: This Advance Notice of Proposed Rulemaking (ANPR) serves to inform interested parties that the Agency is considering a rulemaking related to the design and type of equipment, work practices, operational procedures, or to emission standards based on these techniques, to control the radon-222 emissions from underground uranium mines. As of January 1933, there were 139 of these mines located in Arizona, Colorado, New Mexico, Utah, and Wyoming. These mines have a production rate of 6,200 tons of U_3O_8 and account for about 46% of the total production of U_3O_8 in the United States.

The Agency proposed a standard under section 112 of the Clean Air Act in April of 1933 for underground uranium mines that would limit the annual radon-222 concentration in air due to emissions from an underground mine to 0.2 pCi/1 above background in any unrestricted area. The principal method

to meet this standard was considered to be control of land around the mine, since at the time, the Agency believed that no emission reduction measures were practical.

In EPA's most recent evaluation of the risks due to radon-222 emissions from underground uranium mines, the estimated lifetime risk of fatal cancer to nearby individuals ranges from one in one thousand to one in one hundred. The potential exists for an even higher risk in some situations (up to one in ten) for individuals living very close to several horizontal vents or in areas influenced by multiple mine emissions. The fatal cancer risk to the total population from radon-222 emissions from all underground uranium mines is five fatal cancers per year. The Agency considers these risks to be significant and believes action is needed to protect individuals living near underground mines and other populations.

However, analysis of the likely reduction in health risks afforded by the proposed standard showed that, while risks to nearby individuals were reduced by a factor of about ten, the risks to the total population were only negligibly reduced. The lack of population risk reduction was due to the fact that radon releases would not be reduced, they would only be more widely dispersed.

The Agency decided to withdraw its proposed standard for underground uranium mines based on its conclusion that the proposed standard was not authorized by the Clean Air Act and that the limited reduction in population risk would not meet the full intent of section 112 to provide adequate public health protection.

Because radon-222 is a noble gas and the volume of air discharged through mine vents is very large, there is no practical method to remove radon-222 from the mine exhaust air. Adsorption onto activated charcoal is the most widely used method for removing noble gases from a low volume air stream. However, application of this method to the removal of radon-222 from mine ventilation air at the volumes of air that must be treated would require large, complex, unproven systems which would be extremely costly.

Since proposal, EPA has received additional information indicating that work practices, such as bulkheading, are more feasible and cost-effective than originally thought. The Agency has decided to begin development of standards based on bulkheading or similar techniques to control radon releases from underground uranium mines. Interested parties are requested

to submit information and comments on the following issues:

- (1) Measured or estimated radon-222 releases from underground mines;
- (2) Applicable standards for reducing radon emissions, including such practices as bulkheading, sealants, mine pressurization, and backfilling;
- (3) Methods of procedures to predict releases of radon-222 without controls and with controls, such as bulkheading, sealants, mine pressurization, and backfilling;
- (4) Effectiveness, feasibility and costs of controls;
- (5) Methods of determining compliance with design, equipment, work practice, or operational type standards;
- (6) Estimates of impacts on nearby individuals and populations due to radon-222 emissions before and after control;
- (7) Extent of radon-222 controls now practiced by the industry, including such methods as bulkheading, sealants, mine pressurization, and backfilling; and
- (8) Effect on the industry if controls are required.

Dated: October 23, 1984.
William D. Ruckelshaus,
Administrator.
[FR Doc. 84-28439 Filed 10-26-84; 2:13 pm]
BILLING CODE 6560-50-M

40 CFR Part 61

[AD FRL 2694-2b]

National Emission Standards for Hazardous Air Pollutants; Standards for Radon-222 Emissions from Licensed Uranium Mills

AGENCY: Environmental Protection Agency (EPA).

ACTION: Advance notice of proposed rule making.

SUMMARY: This notice announces the Agency's intent, under section 112 of the Clean Air Act, as amended, to consider development of standards to control radon-222 emissions from licensed uranium mills. The Agency requests interested parties to submit information and comments relative to controlling these emissions.

DATES: Information received by April 30, 1985 will be of maximum value.

ADDRESS: Comments must be submitted (in duplicate, if possible) to: Central Docket Section (LE-130) Attention: Docket No. A-79-11, Environmental Protection Agency, 401 M Street, SW., Washington, D.C. 20460.

FOR FURTHER INFORMATION CONTACT: James M. Hardin, (703) 557-8977,

Environmental Standards Branch, Criteria and Standards Division (ANR-460), Office of Radiation Programs, Environmental Protection Agency, Washington, D.C. 20460.

SUPPLEMENTARY INFORMATION: This Advance Notice of Proposed Rulemaking (ANPR) serves to inform interested parties that the Agency is considering emission standards under the Clean Air Act for licensed uranium ore processing facilities. As of January 1983, there were 27 licensed uranium mills located in Colorado, New Mexico, South Dakota, Texas, Utah, Washington, and Wyoming. These mills have produced a total of over 150 million metric tons of tailings which contain radioactive elements from the uranium decay chain, including radium-226 which decays to radon-222. The latter is a radioactive gas which is emitted from the piles to the ambient air.

EPA issued standards under the Uranium Mill Tailings Radiation Control Act (UMTRCA) (40 CFR Part 192 Subparts D and E) for the management of tailings at locations that are licensed by the Nuclear Regulatory Commission (NRC) or the States under Title II of the UMTRCA. These standards do not specifically limit radon-222 emissions until after closure of the facility. When the UMTRCA standards were promulgated, the Agency stated that it would issue an ANPR for consideration of control of radon emissions from uranium tailings piles during the operational period of a uranium mill. This notice fulfills that commitment.

The Agency issued Environmental Radiation Protection Standards for Nuclear Power Operations (42 FR 2858, January 13, 1977). These standards (40 CFR Part 190) limit the total individual radiation dose caused by emissions from facilities that comprise the uranium fuel cycle, including licensed uranium mills. At the time 40 CFR Part 190 was promulgated, there existed considerable uncertainty about the public health impact of existing levels of radon-222 in the atmosphere, as well as uncertainty about the best method for management of new man-made sources of the gas. The Agency exempted radon-222 from control under 40 CFR Part 190 since at that time the problems associated with radon emissions were considered sufficiently different from those of other radioactive materials associated with the fuel cycle to warrant separate consideration.

Subsequently, standards were proposed under the Clean Air Act (48 FR 15076, April 6, 1983) for NRC licensees, but uranium fuel cycle facilities, which included operating uranium mills, were

excluded because these sources are subject to EPA's 40 CFR Part 190 standard that provided protection equivalent to that of the Clean Air Act. It was noted during the comment period for the Clean Air Act standards that radon-222 emitted from operating uranium mills and their actively used tailings piles are not subject to any current or proposed EPA standards, and that there may be significant risks associated with resulting radon-222 emission.

The Agency is particularly interested in receiving information on the following issues:

- (1) Radon-222 emissions from these facilities;
- (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 from active uranium mills;

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

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

Dated: October 23, 1984.

William D. Ruckelshaus,
Administrator.

[FR Doc. 84-22410 Filed 10-23-84; 2:14 am]

BILLING CODE 6500-50-M