GUIDANCE ON IMPLEMENTING
the
RADIONUCLIDE NESHAPS

U.S. Environmental Protection Agency
Office of Radiation Programs
401 M Street, S.W.
Washington, DC 20460

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DISCLAIMER

This document summarizes the general NESHAP requirements of 40 CFR 61 Subpart A and the requirements of the radionuclides NESHAPs at 40 CFR 61 Subparts B, H, I, K, Q, R, T, and W. Every effort has been made to insure that this document faithfully summarizes these regulations. However, should there be any discrepancy between the regulations and this document, the correct interpretation shall be that of, and any compliance determination shall be based upon, the regulations themselves.

1. INTRODUCTION

1.1 BACKGROUND AND HISTORY OF THE STANDARDS

When Congress amended the Clean Air Act in 1977, it specifically addressed emissions of radioactive materials. Before that time, emissions of radionuclides either were regulated under the Atomic Energy Act or were not regulated at all. Section 122 of the Clean Air Act required the EPA Administrator to determine, after public notice and opportunity for public hearings (44 FR 21704, April 11, 1979), whether emissions of radionuclides cause or contribute to air pollution that may reasonably be expected to endanger public health. In December of 1979, the EPA published a notice in the Federal Register listing radionuclides as hazardous air pollutants under Section 112 of the Clean Air Act (44 FR 76738, December 27, 1979). This determination was supported by an analytic report ("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, August 1979).

In June Of 1981, the Sierra Club filed a suit alleging that the Clean Air Act required the EPA to propose standards for radionuclides within 180 days of listing them as hazardous pollutants under Section 112. The court agreed with the Sierra Club and in September of 1982 ordered the EPA to publish proposed emissions standards for radionuclides, with notice of public hearing within 180 days of that order.

In April of 1983, the EPA proposed radionuclides emission standards for four categories of sources: DOE facilities; NRC-licensed and non-DOE Federal facilities; underground uranium mines; and elemental phosphorus plants. The Agency also determined that emissions from several other source categories did not require regulations: coal-fired boilers; the phosphate industry; other mineral extraction industries; uranium fuel cycle facilities; uranium mill tailings; high-level radioactive waste facilities; and low energy accelerators (48 FR 15077, April 6, 1983). The draft "Background Information Document, Proposed Standards for Radionuclides" (EPA/520-1-83-001, Office of Radiation Programs, U.S. EPA, March 1983) supported these decisions.

After several extended comment periods and two public hearings, the Sierra Club again filed suit in February of 1984 to compel the EPA either to make the standards final or to determine that radionuclides are not hazardous air pollutants and "delist" them. In August of that year, the court ordered the Agency to take final action by October 23, 1984. In response to that order, the EPA then withdrew the proposed standards for elemental phosphorus plants, DOE facilities, and NRC licensees, finding that the control practices used by these source categories already protected public health with an ample margin of safety. The proposed standard for underground uranium mines was also withdrawn, but with the intent to set a different standard. The Agency also announced its intention to regulate radon-222 emissions from licensed uranium mills and reaffirmed its decision not to regulate emissions from coal-fired boilers, the phosphate industry, other extraction industries, uranium fuel cycle facilities, and high-level radioactive waste. Phosphogypsum stacks would be studied to determine whether a standard was needed.

In December 1984, the court again ordered the EPA either to issue final standards for the original four source categories or delist radionuclides. The Agency then promulgated NESHAPs for elemental phosphorus plants, DOE facilities, and NRC-licensed facilities (50 FR 7280, February 6,1985). Two other NESHAPs established work practice standards to control radon- 222 emissions from underground uranium mines (50 FR 15385, April 17, 1985) and licensed uranium mill tailings (51 FR 34056, September 24,1986). These standards were again challenged in court.

While these suits were being adjudicated, the U.S. Court of Appeals for the D.C. Circuit found that the EPA's NESHAP for vinyl chloride was defective because the Agency had considered costs and technological feasibility without first making a determination based only on health risk. The court also ordered the EPA to examine the effect of this decision on other standards. Concluding that costs had been considered in many of the radionuclide rulemakings, the Agency asked the court to let those NESHAPs remain in place while it reconsidered them and all other issues raised in the lawsuits. In early December 1987, the court accepted the EPA's proposal and established a time schedule requiring the Agency to propose decisions for all radionuclide source categories within 180 days and make final decisions within 360 days. This schedule was later modified to require proposed regulatory decisions by February 28, 1989, and final action by August 31, 1989.

On March 7, 1989, the EPA published proposed NESHAPs that described four possible policy approaches for regulating emissions of radionuclides. Public hearings were held in April. On July 14, 1989, the court extended the deadline for final action until October 31, 1989. The NESHAPs described later were made final on that date and, with two exceptions, became effective on December 15, 1989, when they were published in the Federal Register.

The NESHAP for NRC-licensed facilities (Subpart I) was stayed for 90 days pending reconsideration. This stay was extended for an additional 120 days on March 15, 1990, and extended for another 180 days on September 10, 1990. A partial reconsideration of the phosphogypsum NESHAP (Subpart R) was granted, and a limited class compliance waiver allowing agricultural use for the 1990 growing season was issued. Petitions for reconsideration of other NESHAPs have been received, but no actions have been taken.

1.2 IMPLEMENTING THESE STANDARDS

The EPA Regional Offices have the primary responsibility for implementing the radionuclides NESHAPs, with guidance from Agency Headquarters. This document, developed by the Office of Radiation Programs (ORP), provides part of that guidance. This guidance may be amended to reflect experience gained in working with the standards. The Stationary Source Compliance Division has developed additional guidance.

Implementing the radionuclides NESHAPs involves two main types of activities. One is inspection/enforcement: determining that the emissions or work practice standards are met and that other requirements of the standards, such as testing, monitoring and recordkeeping, are properly followed. The other is examining and responding to applications for compliance waivers,

construction or modification, and alternative monitoring plans or compliance demonstrations. Both types of activities are covered in this guidance.

1.3 FORMAT OF THIS GUIDANCE DOCUMENT

Section 2 of this guidance provides a summary of the general requirements of 40 CFR 61 Subpart A that apply to all the NESHAPs unless an individual standard supersedes them; a brief discussion of the specific exemptions from applying for approval for construction or modification contained in Subparts H and I; and individual summaries of the specific emission limits and other requirements that apply to each source category.

Section 3 discusses safety requirements that may apply to site inspections for some of the source categories. Section 4 contains lists of contacts for each source category except Subpart I (NRC-licensed and non-DOE Federal facilities). This category is omitted because there are more than 6,000 such facilities. ORP Headquarters has developed a list of these facilities and will work with the Regions to identify facilities that are not subject to Subpart I so that their names can be removed from that list.

Section 5 lists references that pertain to the rules. Section 6 covers questions that have been raised about specific issues and attempts to answer them. Finally, Section 7 provides sample letters that may be helpful in replying to facility correspondence.

2. SUMMARIES OF THE NESHAPS

This section contains a summary of the general requirements of 40 CFR 61 Subpart A, which include permitting requirements, and summaries of the rules that specifically apply to each radionuclides source category. Standards have been established for eight types of sources:

Subpart B: Underground Uranium Mines (emission standard)
Subpart H: DOE Facilities Other Than Radon Sites (emission standard)
Subpart I: NRC-Licensed and Non-DOE Federal Facilities (emission standard)
Subpart K: Elemental Phosphorus Plants (emission standard)
Subpart Q: DOE Radon Sites (emission standard)
Subpart R: Phosphogypsum Stacks (emission standard)
Subpart T: Uranium Mill Tailings Disposal (emission standard)
Subpart W: Operating Uranium Mill Tailings (emission and work practice standard)

One of the standards has been stayed: Subpart I (NRC licensees and non-DOE Federal facilities) was stayed for 120 days beginning March 15, 1990, and for another 180 days on September 10, 1990. In the case of the phosphogypsum NESHAP (Subpart R), a limited class compliance waiver allowing agricultural use for the 1990 growing season was issued, and a partial reconsideration was granted.

2.1 SUMMARY OF 40 CFR 61 SUBPART A REQUIREMENTS

The general provisions of Subpart A to 40 CFR (Sections 61.01 through 61.19) apply to all NESHAPs, unless superseded or amended by a specific subpart. These general provisions are provided here in a modified tabular form, with subjects indicated at the left so they can be more easily located. This format matches that of the individual NESHAPs summaries for easy comparison, except that definitions are given first, as they are in the Code of Federal Regulations.

A major purpose of 40 CFR 61 Subpart A is to require owners or operators to obtain permission from the EPA to construct a new source or modify an existing source, with the few exceptions discussed below. Applications for permission to construct or modify a source are a frequent reason for contacting the regional offices.

40 CFR 61 Subpart A - General Provisions

Definitions	Note :all definitions can be found in 40 CFR 61.02, unless otherwise noted.
o Act	The Clean Air Act (42 U.S.C. 7401 et seq.)
o Administrator	The Administrator of the EPA or his authorized representative.

o Alternative Method

Any method of sampling and analyzing for an air pollutant that is not a reference method (that is, is not described in 40 CFR 61 Appendix B) but that has been shown to produce results that allow the EPA to determine adequately whether a source is in compliance with a NESHAP.

o Capital Expenditure

An expenditure made for a physical or operational change to a source that is more than the product of the source's basis and the percentage allowed for annual repairs (with no reductions) by the IRS. For more information, see the current edition of IRS Publication 534 and Section 1012 of the Internal Revenue Code.

o Commenced

An owner or operator has undertaken a continuous program of construction or modification, or has signed contracts to undertake and complete such a continuous program within a reasonable time.

o Compliance Schedule

The date (or dates) when a source (or source category) must comply with a relevant NESHAP, plus the steps toward reaching compliance that are set out in a waiver of compliance under 40 CFR 61.11.

o Construction

Fabrication, erection, or installation of a facility affected by a NESHAP.

o Effective Date

The date that an applicable standard (or other regulation) under 40 CFR 61 is promulgated in the Federal Register. For all radionuclides NESHAPs except 40 CFR 61 Subpart I, the effective date is December 15, 1989.

o Modification

Any physical or operational change in a source that results in increased emissions of any hazardous air pollutant to which a standard applies, except:

- routine (as determined by the EPA) maintenance, repair, and replacements
- increased operating time
- change in ownership (report to the EPA within 30 days of the change)
- increased production rate, if that increase does not require a capital expenditure. (See above for the definition of "capital expenditure".) (40 CFR 61.15 (a, d))

NOTE: A modification to an existing source makes it a

	new source. (40 CFR 61.02, .15(b))
o Monitoring system	Any system required by the monitoring sections (if any) of the radionuclides NESHAPs, used to sample and condition (if applicable), to analyze, and to provide a record of emissions or process parameters.
o Owner or Operator	Any person who owns, leases, operates, controls, or supervises a source.
o Reference Method	A method of sampling and analyzing for an air pollutant described in 40 CFR 61, Appendix B.
o Run	The net period of time during which an emission sample is collected. A run may be either intermittent or continuous within the limits of good engineering practice unless a NESHAP specifies the type of run required.
o Source	A building, structure, facility, or installation that emits or may emit any air pollutant that the EPA has defined as hazardous.
- New Source	A source that commenced construction or modification after March 7, 1989 (the date the NESHAPs were proposed).
- Existing Source	Any source that is not a new source.
o Standard	A NESHAP, including a design, equipment, work practice, or operational standard to control a hazardous pollutant that is proposed or promulgated under 40 CFR 61.
o startup	Setting a source in operation for any purpose.
Units and Abbreviations	See 40 CFR 61.03. Amendments made at 54 Federal Register 51704 added "square meter." "curie," "millirem," and "picocurie."
Address	See 40 CFR 61.04.
Compliance Dates	
o New Sources	After December 15, 1989, all new sources must operate in compliance with the applicable NESHAP, including all reporting requirements. (40 CFR 61.05 (b, d)
o Existing Sources	An existing source must operate in compliance with the applicable NESHAP,including all reporting

requirements, within 90 days after December 15, 1989. (40 CFR 61.05 (c, d)

o Construction or Modification

After December 15, 1989, an owner or operator who wishes to construct a new source or modify an existing source subject to the radionuclides NESHAPs must obtain the EPA's approval to do so. Sources that began construction or modification after March 7, 1989, must also obtain permission. (40 CFR 61.05(a))

o Exemption/ Waiver

The President may exempt <u>any</u> source from these requirements for up to two years if control technology is not available <u>and</u> national security requires the source to operate. This exemption can be extended for additional periods of up to two years each. An <u>existing</u> source may also apply to the EPA for a compliance waiver (see below). (CAA § 112(c) (2), 40 CFR 61.05 (a-c))

Compliance Waiver (Existing sources)

If an existing source cannot comply with the relevant NESHAP within 90 days of December 15, 1989, the owner or operator can ask the EPA for up to 2 years (until December 15, 1991) to comply. A written request for a waiver must be submitted within the 90-day period and must include:

- a description of controls to be installed
- a compliance schedule, including <u>at least</u> the dates when: purchase orders or contracts for emission controls or process changes will be issued: onsite work on emission control or process equipment will start;that work is to be finished; and the source will be in compliance
- a description of what will be done to control emissions while changes are being made (40 CFR 61.10(b))

An approved waiver will identify in writing the specific source covered: when the waiver period ends; dates when steps toward compliance must be taken; and any other conditions needed to ensure controls are installed on time and public health is protected in the meantime. The EPA can end the waiver early if deadlines leading toward compliance are not met. If a waiver is granted, the EPA's authority is not reduced. (40 CFR 61.11(a-c), (f))

The EPA will notify the owner or operator if it intends to deny a waiver request, stating the reasons for the denial and offering an opportunity to present

additional information or arguments by a specific date. The EPA will make a final decision to deny or grant the waiver within 60 days after it receives more data or the time to present more information expires. (40 CFR 61.11(d, e))

Construction or Modification

An owner or operator must obtain EPA's approval to construct a new source or modify an existing source after March 7, 1989. (40 CFR 61.05(a))

o Determination

An owner or operator may ask the EPA to determine whether a proposed action will be considered "construction" or "modification," and the EPA will reply within 30 days after it receives enough information to evaluate the request. (40 CFR 61.06)

- Modification

To judge whether or not emissions will increase due to a modification, the EPA will use the best available emission factors if that approach will clearly show whether or not emissions will increase. Otherwise, the EPA will use material balances, monitoring data, or manual emissions tests, following procedures in 40 CFR 60, Appendix C, to determine whether emissions have increased. The EPA will specify emission test conditions, with at least three tests before and three tests after the change. If the EPA approves, the "before" tests may be the emission tests required within 90 days of December 15, 1989. (40 CFR 61.15(c); 61.13(a))

o Application

Before beginning to construct or modify a source, the owner or operator must apply to the EPA for approval. If construction or modification started after March 7, 1989, but operation had not begun before December 15, 1989, the application must be submitted within 30 days after December 15, 1989.A separate application must be submitted for each source at a facility.(40 CFR 61.07(a))

The application for construction approval must include:

- name and address of the applicant
- location of the source
- purpose, size, design, operating design capacity, operating method, and emission control equipment, with emission estimates calculated in enough detail to allow the EPA to judge their validity. (40 CFR 61.07(b))

The EPA must be notified within 30 days if any of this information changes. (40 CFR 61.10(c))

The application for approval to modify must include the above information, plus:

- a precise description of the proposed changes
- productive capacity of the source before and after the changes
- "before and after" emission estimates in enough detail to allow the EPA to judge their validity (40 CFR 61.07(c))

NOTE: An application for approval to modify is not considered a "change" that triggers the 30-day notice to the EPA under 40 CFR 61.10(c).

o Approval or Denial

Within 60 days after receiving enough information to evaluate an application, the EPA will notify the owner or operator whether it approves or intends to deny it. The EPA will approve the application if emissions from proper operation will comply with the standard. If the EPA intends to deny the application, it will give the reasons for the denial and offer an opportunity to present more information by a specific date. The EPA will make a final decision to deny or grant the waiver within 60 days after receiving more data or the time to present more information expires.(40 CFR 61.08 (a-d))

An owner or operator who submits an application must continue to comply with all other Federal, State, or local requirements that apply. If the EPA approves the application, its authority is not reduced. (40 CFR 61.08(e))

Emission Tests

o Requirements

If an applicable NESHAP requires emissions testing, an owner or operator must either obtain a waiver of those tests or (unless a NESHAP requires otherwise):

- test emissions within 90 days after December 15, 1989, if initial startup occurred before that date, or within 90 days after initial startup if startup occurs after that date. The EPA may require testing at other times if needed for a reasonable purpose, such as determining compliance or developing revisions to emission standards. The EPA must be notified at least 30 days before the test to allow an observer to attend. The owner or operator of a new source (and of an existing source, if the EPA requests) must provide adequate and safe sampling testing ports and supporting facilities. The EPA will specify test conditions

appropriate to the design and operational characteristics of the source. Unless the applicable NESHAP states otherwise, the samples must be analyzed and emissions determined within 30 days after each test has been completed, and the results reported to the EPA by registered letter mailed before close of business 31 days after the test was completed. (40 CFR 61.13(a-f))

o Alternate Methods

Emissions must be tested as specified in the standard, unless the EPA allows the specified method to be used with minor changes, approves en alternate method, or waives the test requirement because the owner or operator has used other means to prove the source complies with the standard. An owner or operator may ask the EPA to approve an alternate method at any time, with two exceptions:

- a source that first started up before December 15, 1989, must submit a request to use an alternate method for the first emission test within 30 days of December 15, 1989, or along with a request for a compliance waiver (within 90 days of December 15, 1989).
- a source that first starts up after December 15, 1989, must submit a request to use an alternate method for the first emission test along with the notice of anticipated startup (between 30 and 60 days before startup; see below). (40 CFR 61.13(h) (1), (3))

If an alternative method is used to test emissions and there is reason to question the results, the EPA may require a retest using a standard method. If the results of the alternate and standard methods do not agree, the results of the standard method prevail. (40 CFR 61.13(h) (2))

o Waiver

An owner or operator may request that emission tests be waived for three reasons:

- some other means can be used to demonstrate compliance to the EPA’s satisfaction
- the source is operating under a compliance waiver
- the EPA is still considering an application for a compliance waiver.

Application for an emission test waiver should be filed with the notice of startup (within 15 days after startup) or within 90 days of December 15, 1989. If a waiver is granted, the EPA's authority is not reduced, and the EPA can later cancel the waiver after notifying the owner or operator. (40 CFR 61.13(i))

Monitoring

o Requirements

If an applicable NESHAP requires emissions monitoring, an owner or operator must:

- maintain and operate each monitoring system as the applicable NESHAP specifies and in accordance with good air pollution control practice. Breakdowns should be repaired promptly. The EPA will determine whether acceptable operating and maintenance procedures are being used based on review of procedures, manufacturer recommendations and specifications, and inspections.
- conduct a performance evaluation of the monitoring system when the EPA specifies, notifying the EPA at least 30 days before the evaluation starts and reporting the results within 60 days after the evaluation ends. (40 CFR 61.14(a-c))

o Monitoring System Arrangement

Effluents from multiple sources subject to the same emission standard can be monitored by a single monitoring system. Sources subject to different emission standards require separate monitoring systems unless the NESHAP states otherwise.If the NESHAP applies to mass emissions, each release point must be monitored unless the EPA approves fewer monitoring points. (40 CFR 61.14(d))

o Data Handling

The applicable NESHAP lists the procedures that must be used to reduce monitoring data. Data collected when the monitoring system is down or being repaired or calibrated should not be included in data averages. (40 CFR 61.14(e))

o Alternative Methods

The EPA may approve minor changes or alternatives to any monitoring requirements or methods. If an alternative monitoring method is used and there is reason to question the results, the EPA may require the use of standard methods. (40 CFR 61.14(g))

General Requirements

o Compliance

How to comply with numerical emission limits is usually set out in the applicable NESHAP. If a NESHAP does not provide a compliance procedure, compliance is determined by emissions tests established in 40 CFR 61.13. Compliance with design, equipment, work practice, or operational standards is described in the applicable NESHAP. (40 CFR 61.12(a,b))

- **Operations and Maintenance** — The owner or operator must maintain and operate the source and any pollution control equipment consistent with good practice for minimizing emissions. The owner or operator also must operate and maintain each monitoring system according to the requirements of the standard and using good practices to minimize emissions, making repairs and adjustments as soon as is practical. The EPA will use available information such as monitoring results, review of operating and maintenance procedures, and inspections to determine whether operating and maintenance procedures are acceptable. (40 CFR 61.12(c), .14(b))

- **Recordkeeping** — The recordkeeping requirements of 40 CFR 61 Subpart A (61.13(g) and 61.14(f)), which established a two-year retention period, have been superseded by the individual radionuclides NESHAPs, which require that records be kept for five years.

- **Concealment/ Circumvention** — An owner or operator must not do anything to conceal an emission that would violate the standard, including carrying out any action in a piecemeal fashion to avoid triggering coverage by the standard. (40 CFR 61.09)

- **Alternative Emission Controls** — If the EPA determines that another means of controlling emissions is at least as effective as the method specified for a source category, it will publish a notice in the Federal Register, after giving public notice and the opportunity for a hearing, that a source (or category of sources) may use that alternative means to comply with the standard under specific conditions. An owner or operator who wishes to use the alternative means must provide the EPA with a proposed test plan or test and monitoring results, the procedures used to test and monitor, and the conditions under which the testing and monitoring are conducted. (40 CFR 61.12(d)

- **Notice of Startup** — The owner or operator of any source which has an initial startup after December 15, 1989, must notify the EPA in writing of the proposed startup date between 30 and 60 days in advance, and of the actual startup date within 15 days after it occurs. A copy of a notice to a State or local agency that includes this information is satisfactory. (40 CFR 61.09)

- **Public Information** — Public access to information that the EPA obtains

under 40 CFR Part 61 is governed by Part 2 of 40 CFR Chapter I. That part describes the types of information that a facility may request be kept out of the public record and the requirements that such a request must meet. (40 CFR 61.16)

- o State Emission Limits: A State or any of its political subdivisions may adopt and enforce other emission limits, as long as they are at least as stringent es the Federal standard, and they may require owners or operators to obtain permission for construction, modification, or operation. (40 CFR 61.17)

- o Incorporation by Reference: Materials incorporated by reference in the standard are listed at 40 CFR 61.18. An amendment (54 Federal Register 51704) added ANSI N13.1. See Section 5 of this guidance document.

2.2 EXEMPTIONS FROM APPLYING FOR APPROVAL TO CONSTRUCT OR MODIFY

Facilities covered by Subpart H or Subpart I may be exempted from applying to the EPA for approval to construct or modify a facility, but only under very specific circumstances. This section summarizes those circumstances. See 40 CFR 61.96(b) for details on Subpart H and 40 CFR 61.106(b) for details on Subpart I.

2.2.1 Subpart H - Radionuclide Emissions Other Than Radon from DOE Facilities

For this source category, "construction" includes any fabrication erection, or installation of a new building or structure within a facility that emits radionuclides. A facility encompasses one contiguous site (see the Subpart H summary in the next subsection). (40 CFR 61.96)

If the most recent annual report shows that a facility is in compliance with the 10 mrem/y effective dose equivalent standard for this source category, the owner or operator does not have to apply for approval to construct or modify within an existing facility if the emissions from that construction or modification would result in an effective dose equivalent of less than 0.1 mrem/y (less than 1 percent of the standard). For this purpose only, the Source term for use with CAP-88, AIRDOS-PC, or COMPLY must be derived by following the procedures in Appendix D to 40 CFR 61:

- Determine the amount of radioactivity in curies used at the construction or modification, excluding sealed sources that remain intact.
- Depending on the physical state of the radionuclide, multiply the amount by 1 for gases, 1E-3 for liquids or particulate solids, or 1E-6 for solids. Any nuclide that boils at 100 C or lower, is heated to 100 C or higher, or is intentionally dispersed into the air is considered a gas.
- Depending on the emission controls installed, multiply the emissions

from the previous step by an adjustment factor given in Table 1 of 40 CFR 61 Appendix D.

If the EPA approves, the facility may use another method to estimate emissions to see whether the exemption applies. (40 CFR 61.96)

2.2.2 Subpart I - NRC Licensed and Non-DOE federal Facilities

For this source category, the definition of "construction" includes any fabrication, erection, or installation of a new building or structure within an existing facility. (40 CFR 61.106)

There are two potential ways to qualify for an exemption from applying to the EPA for construction or modification approval. The owner or operator does not have to apply if either:

- the emissions from the entire facility, including the construction or modification, would result in an effective dose equivalent of less than 1 mrem/y, of which less than 0.3 mrem comes from iodines (less than 10 percent of the standard), or
- the emissions from the construction or modification alone would result in an effective dose equivalent of less than 0.1 mrem/y, of which less than 0.03 mrem comes from iodines (less than 1 percent of the standard). This second exemption is available only if the facility's last annual report showed that it was in compliance. (40 CFR 61.106)

Source terms are estimated using the method described above, and doses are calculated using the COMPLY code.

2.3 NESHAPS SUMMARIES

The NESHAP for each of the eight source categories is summarized here, in the same modified tabular form as the Subpart A General Provisions. Each summary contains these major elements, and may contain others as needed:

Applicability - a description of the types of sources to which the standard applies, including any exceptions

Standard - a statement of the standard that each source in the category must meet

Compliance - a description of what each source must do to show that it meets the standard and what information it must report to the EPA

Recordkeeping - a description of the information each source must keep to verify compliance and how long it must keep the information

Emissions - a description of how the source is to estimate or monitor emissions, including alternate procedures or other methods that can be used in specific cases

Specific terms are defined where they are first used, rather than being defined in a separate section as they are in the rules themselves.

2.3.1 National Emission Standards for Radon Emissions From Underground Uranium Mines - 40 CFR 61 Subpart B

Applicability

This standard applies to owners or operators of active uranium mines that meet either of two conditions:

1. it has mined (or will, or is designed to mine) more than 100,000 tons of ore during the life of the mine; or
2. it has produced (or will produce) more than 10,000 tons of ore during a 12-month period, unless the owner or operator can prove that total lifetime ore production will be 100,000 tons or less.

An "active" mine is an underground mine that is being ventilated so people can enter it for any reason.

An "underground mine" is a man-made underground excavation made in order to remove ore primarily to recover uranium. (40 CFR 61.20, .21)

Standard

Emissions of radon-222 must not cause any member of the public to receive an effective dose equivalent of more than 10 mrem per year.

"Effective dose equivalent" is calculated by converting the radon concentration at the receptor to working levels, considering transit time to obtain an equilibrium fraction, and then converting working levels to dose in millirem.

"Member of the public" means a person at the nearest residence, or offsite school or office. (40 CFR 61.21, .22)

Compliance

- o Determine Dose

  Measure radon emissions according to 40 CFR 61 Appendix B, Method 115, Section 1, and use the EPA-approved computer code COMPLY-R to calculate effective dose equivalent. An equivalent computer model may be used if the EPA has approved it for use in this situation. For more information on COMPLY-R, see the User's Guide for the COMPLY-R Code, EPA 520/1-89-004, October 1989. (40 CFR 61.23)

- o Report to EPA

  - Annual Reports

    An owner or operator must calculate the effective dose equivalent annually and report the results to the EPA by March 31 of the next year. The first report will cover emissions for calendar year 1990. Reports must include:

- name and location of the mine
- who is responsible for operating the mine and who prepared the report (if different)
- emissions measurements and the effective dose equivalent calculated by COMPLY-R
- location, diameter, flow rate, effluent temperature, and height of all release points
- description of effluent controls on each release point and those used in the mine, and the estimated efficiency of each control device
- the distance from each release point to the nearest residence, school, business, or office and the nearest farm(s) that produces vegetables, milk, and meat
- the values of all other site-specific inputs (meteorological data, etc.) needed to run COMPLY-R and their source
- a statement certifying that the report is accurate and complete, followed by the signature of a corporate official in charge of the mine, and the date. (The certification statement is at 40 CFR 61.24(a) (8).)

-Monthly Reports

If a mine does not meet the standard for a calendar year, the owner or operator must start reporting to the EPA every month, with the first report due April 30 (covering emissions for March). Subsequent reports are due 30 days after the end of the month, until the EPA states they are no longer needed. These reports must cover the same information as the annual report, plus:

- a description of changes being made in order to meet the standard
- a description of performance under any enforcement decree.

Reporting under 40 CFR 61.10 is not required.

(40 CFR 61.24, .26)

Recordkeeping

An owner or operator must keep all the information used to develop inputs to COMPLY-R (emission measurements, calculations, analysis methods, data sources) and the compliance results at the mine for at least 5 years. This information must be complete enough to allow independent verification of compliance. The EPA has authority to inspect these records. (40 CFR 61.25)

Compliance Dates

See Section 2.1.

Compliance Waiver

See Section 2.1.

Construction or Modification	See Section 2.1
Emission Tests	The emission testing requirements of 40 CFR 61.13 are superseded by the requirements set out in 40 CFR 61.23, described in "Compliance," above.
Monitoring	This standard requires an owner or operator to monitor emissions, following the procedures specified in 40 CFR 61, Appendix B, Method 115, Section 1.
General Requirements	See Section 2.1.

2.3.2 National Emission Standards for Emissions of Radionuclides Other Than Radon from Department of Energy Facilities - 40 CFR 61 Subpart H

Applicability

This standard applies to operations at any facility owned or operated by the Department of Energy that emits any radionuclide other than radon-222 and radon-220 into the air, except disposal at uranium mill tailings sites or disposal at high level waste facilities.

"Radionuclide" means a type of atom that spontaneously undergoes radioactive decay.

"Facility" means all buildings, structures, and operations on one contiguous site.

"Owned or operated" means owned, operated, leased, controlled or supervised. (See the definition of "owner or operator" in Section 2.1.) (40 CFR 61.90, .91, .01)

Standard

Emissions of radionuclides to the air must not cause any member of the public to receive an effective dose equivalent of more than 10 mrem in any year.

"Effective dose equivalent" is calculated by multiplying absorbed dose by biological effectiveness factors (they account for the quality of the radiation and how it is distributed in the body of reference man) and summing those products. For more information, see ICRP Publication No. 26.

"Member of the public" means a person at the nearest offsite residence, school, or office.

"Residence" means any home, house, apartment building, or other dwelling that is occupied at any time during the year. (40 CFR 61.92, .91)

Compliance

- o Determine Dose

Measure radionuclide emissions as described below ("Measurement Methods"), and use the EPA-approved computer codes CAP-88 or AIRDOS-PC (or other procedures that the EPA has approved) to calculate effective dose equivalent to any member of the public. If the maximally exposed individual lives within 3 kilometers of all emission sources at a facility, that facility may use the EPA's COMPLY computer model and its procedures to calculate effective dose equivalent. For more information on COMPLY, see the User's Guide for the COMPLY CODE, EPA 520/1-89-003, October 1989. "Maximally exposed individual" means a person at the

offsite location with the highest radionuclide concentration where there is an office, school, or residence.(40 CFR 61.93(a), .94(a))

o Report to EPA

- Annual Reports

Each facility must report the monitoring data recorded in DOE's Effluent Information System and the calculated effective dose equivalent to any member of the public for a calendar year to both the EPA's headquarters and the proper EPA regional office by June 30 of the next year. The first report will cover emissions for calendar year 1990. Reports must include:

- name and location of the facility
- a list of the radioactive materials used at the facility
- a description of how those radioactive materials are handled and processed
- a list of stacks, vents, and other points where radioactive materials are released
- a description of effluent controls on each release point and the estimated efficiency of each control device
- the distance from each release point to the nearest residence, school, business, or office and the nearest farm(s) that produces vegetables, milk, and meat
- the values and source of all other site-specific inputs (meteorological data, etc.) needed to run the computer models
- monitoring results recorded in the DOE Effluent Information System and the effective dose equivalent calculated by CAP-ES, AIRDOS-PC, or COMPLY, as appropriate
- a brief description of modifications and construction completed during the calendar year for which EPA's approval was not needed because their emissions would provide an effective dose equivalent of less than 0.1 mrem per year (see below).Documentation to support this waiver must be included, and the EPA may ask for all information usually required in an application to construct or modify a facility, if needed.
- a statement certifying that the report is accurate and complete, followed by the signature of a corporate official in charge of the facility, and the date.(The certification Statement is at 40 CFR 61.94 (b) (9).)

-Monthly Reports If a facility does not meet the standard for a calendar year, the facility must start reporting to

	the EPA every month, with the first report due July 30 (covering emissions for June). Subsequent reports are due 30 days after the end of the month, until the EPA states they are no longer needed. These reports must cover the same information as the annual report, plus: -a description of changes being made in order to meet the standard -a description of performance under any enforcement decree
- Classified Information	If any of the required information is classified, the facility must submit it separately from the report. The EPA will handle and control it as required by law.
	Reporting under 40 CFR 61.10 is not required. (40 CFR 61.94, .97)
Recordkeeping	The facility must keep all the information used to develop inputs to the computer codes (emission measurements, calculations, analysis methods, data sources) and the compliance results at the site for at least 5 years. This information must be complete enough to allow independent verification of compliance. The EPA has authority to inspect these records (40 CFR 61.95) (40 CFR 61.94,.97)
Compliance Dates	See Section 2.1
Compliance Waiver	See Section 2.1
Emission Monitoring	
o Release Points	A facility must use the procedures listed below, or other procedures approved by the EPA, to measure radionuclide emission rates from stacks or vents that have the potential to emit enough radionuclides to cause an effective dose equivalent of more than 0.1 mrem per year. At each of those release points, the facility must measure all radionuclides that could contribute more than 0.01 mrem per year to the dose from that release point. Other potential release points must be measured periodically to assure that emissions are below these levels. "Potential" emission rates must be estimated by assuming normal operation with no pollution control equipment. (40 CFR 61.93 (b)(4))
o Measurement Methods	Effluent flow rates must be measured by:

- Reference Method 2,Part 60, Appendix A for velocity and volumetric flow rates in stacks and large vents.
- Reference Method 2A, Part 60, Appendix A for flow rates through pipes and small vents.
- frequent or continuous measurements must be made if the flow rates vary. If they are relatively constant, periodic measurements are adequate.

Radionuclides must be monitored directly or collected and measured by:

- Reference Method 1, Part 60, Appendix A for selecting monitoring or sampling sites.
- guidance in ANSI N13.1 1969 and its Appendix A for continuous direct monitoring or continuous sampling. Batch processes must be sampled continuously when they are operating. Grab sampling may be used only if the EPA approves in cases where continuous sampling is not practical and emission rates are relatively constant. Grab samples must be taken often enough to represent the emissions adequately.
- procedures based on principles of measurement described in Method 114, Part 61, Appendix B for collecting and measuring radionuclides, unless the EPA has approved methods based on different measurement principles.

The facility must also carry out a quality assurance program that meets the performance requirements of Appendix B, Method 114.(40 CFR 61.93(b) (1-2))

o Alternative Procedures

- Effluents

A facility may use alternative procedures to measure effluent flow rates or select sampling sites and take samples if it can show that:

- it is not practical to meet the requirements listed above for a particular effluent stream
- the alternative procedure will not significantly underestimate emissions
- the alternative procedure is fully documented
- it has received prior approval from the EPA (40 CFR 61.93(b)(3))

- Environmental Concentrations

Instead of air dispersion computer models, a facility may use environmental measurements of radionuclide concentrations in the air at critical receptor sites to show compliance if:

- radionuclides are continuously sampled at the monitoring site (or at the fencepost at the location of maximum concentration)
- the radionuclides that contribute the major portion of the effective dose equivalent from the facility are collected and measured as part of the environmental monitoring program
- radionuclide concentrations that would cause an effective dose equivalent of 1 mrem per year can be clearly detected and distinguished from background concentrations
- the facility carries out a quality assurance program that meets the performance requirements of Appendix B, Method 114
- the facility obtains the EPA's approval after submitting an application to use environmental measurements that describes in detail the sampling and analysis methods and shows how the first four criteria will be met

A facility using environmental measurements must use Table 2, Appendix E, Part 61 to determine whether it complies with the standard:

- if Only one radionuclide is released, the facility complies with the standard if the net measured concentration is less than or equal to the concentration level shown in Table 2
- if two or more radionuclides are released, the facility complies with the standard if the net measured concentration of each radionuclide is less than or equal to the level shown in Table 2, and the sum Of the fractions obtained by dividing each measured concentration by the Table 2 value is less than or equal to 1 (40 CFR 61.93(5))

Emission Tests

The emission testing requirements of 40 CFR 61.13 are superseded by the requirements set out in 40 CFR 61.93, described in "Emission Monitoring," above.

Construction or Modification

See Section 2.1.However,a facility that qualifies for the exemption described below does not have to apply to the EPA for approval of construction or modification within an existing facility.

o Definition of "Construction"

"Construction" means fabrication, erection, or installation including fabrication, erection, or installation of a new building or structure within an existing facility. (40 CFR 61.02, .96(a))

o Exemption

If the most recent annual report shows that a facility

	is in compliance with the standard, it does not have to apply for approval of construction or modification within an existing facility if the emissions from that construction or modification would result in an effective dose equivalent of less than 0.1 mrem per year. To calculate the effective dose equivalent for this purpose only, the emissions (source term) for use with CAP-88, AIRDOS-PC, or COMPLY must be derived by following the procedures in Appendix D to Part 61: - determine the amount of radioactivity in curies used at the construction or modification, excluding sealed sources that remain intact. - depending on the physical state of the radionuclide, multiply the amount by 1 for gases, 10 E-3 for liquids or particulate solids, or 10 E-6 for solids. Any nuclide that boils at 100 C or lower, is heated to 100 or higher, or is intentionally dispersed into the air is considered a gas. - depending on the emission controls installed, multiply the emissions from the previous step by an adjustment factor given in Table 1, Appendix D, Part 61. If the EPA approves, the facility may use another method to estimate emissions to see whether this exemption applies.(40 CFR 61.96(b))
General Requirements	See Section 2.1 There is an exemption from filing a Notice of Startup as normally required under 40 CFR 61.09:
o Exemption from Notice of startup	This notice does not need to be filed for startup of new construction or modification within an existing facility that is exempt from applying to the EPA for approval because its emissions would result in an effective dose equivalent of less than 0.1 mrem per year. (40 CFR 61.96(b))

NOTE: The EPA and the DOE will enter into a Memorandum of Understanding (MOU) regarding the implementation of the NESHAP.

2.3.3 National Emission Standards for Radionuclide Emissions From Facilities Licensed by the Nuclear Regulatory Commission and Federal Facilities Not Covered By Subpart H - 40 CFR 61 Subpart I

Note: This subpart has been stayed several times. The current stay, until November 15, 1992, applies to all NRC-licensed facilities except power reactors. This subpart is also stayed pending completion of a proposed rulemaking to rescind the rule as it applies to power reactors. Non-DOE federal facilities are not covered by the current stay.

Applicability

This standard applies to NRC-licensed facilities to and facilities owned or operated by any federal agency other than the Department of Energy, except:

- disposal at high-level nuclear waste facilities
- uranium mill tailings piles after disposal under 40 CFR 192
- low energy accelerators
- facilities that possess and use only sealed radiation sources

"Owned or operated" means owned, operated, leased, controlled, or supervised. (See the definition of "owner or operator" in Section 2.1.)

"Facility" means all buildings, structures, and operations on one contiguous site.

"Federal facility" means a facility that is owned or operated by any department, commission, agency, office, bureau, or other unit of the US Government except DOE.

"NRC-licensed facility" means a facility to which the NRC or an Agreement State has granted a license to receive title to, receive, possess, use, transfer, or deliver any source, by-product, or special nuclear material.

"Agreement State" means a state that has entered an effective agreement with the AEC or the NRC under subsection 274(b) of the Atomic Energy Act of 1954, as amended.

"Sealed radiation sources" include sources that are sealed and not intended to be opened in their routine use, such as thickness gauges: sources that have not yet been opened for use; and special form sources (as defined by the NRC) in sealed form.(40 CFR 61.100, .101, .01)

Standard

Emissions of radionuclides, including iodine, to the air may not cause any member of the public to receive

an effective dose equivalent of more than 10 mrem in any year, of which no more than 3 mrem per year may come from iodine.

"Radionuclide" means a type of atom that spontaneously undergoes radioactive decay.

"Effective dose equivalent" is calculated by multiplying absorbed dose by biological effectiveness factors (they account for the quality of the radiation and how it is distributed in the body of reference man) and summing those products. For more information, see ICRP Publication No. 26.

"Member of the public" means a person at the nearest residence, or offsite school or office.

"Residence" means any home, house, apartment building, or other dwelling that is occupied at any time during the year. (40 CFR 61.101, .102)

Compliance

- Determine Compliance Status

There are two basic ways to determine if a facility meets the standard:

1. Determine radionuclide emissions as described below, and use the EPA-approved computer code COMPLY to calculate effective dose equivalent to any member of the public. An equivalent computer model may be used if the EPA has approved it for use in this situation, but a facility using an equivalent model must file an annual report (see below). For more information on COMPLY, see the User's Guide for the COMPLY Code, EPA 520/1-89-003, October 1989.

2. Use the tables in 40 CFR 61 Appendix E. Table 1 of Appendix E gives the maximum quantity of a radionuclide in curies, for gaseous, liquid, and solid forms, that a facility can possess during a year and still be sure of meeting the standard. A facility can use Table 1 to demonstrate compliance only if:

   - no person lives within 10 meters of any release point
   - no milk, meat, or vegetables are produced within 100 meters of any release point.

   Table 2 of Appendix E gives the maximum concentration of a radionuclide in curies per cubic

meter that the flow emissions from stacks or vents at the facility may contain and still meet the standard. A facility can use Table 2 to demonstrate compliance only if:

- all releases are from point sources such as stacks or vents
- EPA-approved methods have been used to measure concentrations
- the distance between each stack or vent and the nearest resident is more than 3 times the diameter of the stack or vent.

Directions on how to use these tables are given in A Guide for Determining Compliance with the Clear Air Act Standards for Radionuclides Emissions from NCR Licensed and Non-DOE Federal Facilities, EPA 520/1-89-_002, October 1989. (40 CFR 61.103; Appendix E

o Report to EPA

-Annual Reports Each facility must report to the EPA on its compliance status and its emissions for a calendar year by March 31 of the next year. The first report will cover 1990. Reports must include:

-name and location of the facility with a complete address, including suite and/or building number, street, city, county, state, and zip code
- mailing address, if different from location
- who is responsible for operating the facility and who prepared the report (if different)
- a list of the radioactive materials used at the facility
- a description of how those radioactive materials are handled and processed
- a list of stacks, vents, and other points where radioactive materials are released
- a description of effluent controls on each release point and the estimated efficiency of each control device
- the distance from each release point to the nearest residence, school, business, or office and the nearest farm(s) that produces vegetables, milk, and meat
- effective dose equivalent calculated using the compliance procedures in 40 CFR 61.103 (outlined above)
- the physical form and quantity of each radionuclide emitted from each release point and the methods used to determine these quantities
- the volumetric flow, diameter, effluent temperature, and release height for each release

point and the methods used to determine those data
- the height and width of each building from which radionuclides are emitted
- the values and source of all other site-specific inputs (meteorological data, etc.) needed to run the computer models
- a brief description of modifications and construction completed during the calendar year for which the EPA's approval was not needed because (1) their emissions would provide an effective dose equivalent of less than 0.1 mrem per year or (2) emissions from the whole facility including the modification or construction provide an effective dose equivalent of less than 1 mrem per year (see below). Documentation to support this waiver must be included, and the EPA may ask for all information usually required in an application to construct or modify a facility, if needed.
- a statement certifying that the report is accurate and complete, followed by the signature of a corporate official in charge of the facility, and the date. (The certification statement is at 40 CFR 61.104 (a) (1) (xvi).)

- Exemption

If the emissions from a facility during a year would result in an effective dose equivalent of less than 1 mrem per year, of which less than 0.3 mrem is from iodine, the facility does not have to submit a report for that year.

- Monthly Reports

If a facility does not meet the standard for calendar year, the facility must start reporting to the EPA every month, with the first report due April 30 (covering emissions for March).Subsequent reports are due 30 days after the end of the month, until the EPA states they are no longer needed. These reports must cover the same information as the annual report, plus:

- a description of changes being made in order to meet the standard
- a description of performance under any enforcement decree

Reporting under 40 CFR 61.10 is not required. (40 CFR 61.104)

Recordkeeping

The facility must keep all the information used to develop inputs to the computer codes (emission measurements, calculations, analysis methods, data, sources) and the compliance results at the site for at least 5 years. This information must be complete

	enough to allow independent verification of compliance and exemption from reporting, if claimed. The EPA has authority to inspect these records.(40 CFR 61.105)
Compliance Dates	See Section 2.1.
Compliance Waiver	See Section 2.1.
Construction of Modification	See Section 2.1 A facility that qualifies for the exemption described below does not have to apply to the EPA for approval of construction or modification within an existing facility.
o Definition of "Construction"	"Construction" means fabrication, erection, or installation, including fabrication, erection, or installation of a new building or structure within an existing facility. (40 CFR 61.02, .106(a))
o Application	If a facility must apply to the EPA for approval of construction or modification, the application for that approval must include the same information as the annual report to the EPA (see above). (40 CFR 61.07(b), 104(a)(1))
o Exemption	If the most recent annual report shows that a facility is in compliance with the standard, it does not have to apply for approval of construction or modification within an existing facility <u>if</u>: (1) the emissions from that construction or modification would result in an effective dose equivalent of less than 0.1 mrem per year, of which less than 0.03 mrem comes from iodine, <u>or</u> (2) the emissions from the entire facility including the construction or modification would result in an effective dose equivalent of less than 1 mrem per year, of which less than 0.3 mrem comes from iodine. (40 CFR 61.106)
Emissions	
o Estimating	Instead of monitoring, a facility may estimate radionuclide emissions using 40 CFR Appendix D: - Determine the amount of radioactivity in curies used at the construction or modification, excluding sealed sources that remain intact. - depending on the physical state of the radionuclide, multiply the amount by 1 for gases, 10 E-3 for liquids or particulate solids, or 10 E-6 for solids. Any nuclide that boils at 100 C or lower, is heated to 100 C or higher, or

is intentionally dispersed into the air is considered a gas.
- depending on the emission controls installed, multiply the emissions from the previous step by an adjustment factor given in Table 1, Appendix D, Part 61.

If the EPA approves, the facility may use another method to estimate emissions. (40 CFR 61.107(a); Appendix D)

o Monitoring

- Release points: A facility must use the procedures listed below, or other procedures approved by the EPA, to measure radionuclide emission rates from stacks or vents that have the potential to emit enough radionuclides to cause an effective dose equivalent of more than 0.1 mrem per year. At each of those release points, the facility must measure all radionuclides that could contribute more than 0.01 mrem per year to the dose from that release point. Other potential release points must be measured periodically to assure that emissions are below these levels. "Potential" emission rates must be estimated by assuming normal operation with no pollution control equipment. (40 CFR 61.107(b) (4))

- Measurement Methods: Effluent flow rates must be measured by:

  - Reference Method 2, Part 60, Appendix A for velocity and volumetric flow rates in stacks. and large vents
  - Reference Method 2A, Part 60, Appendix A for flow rates through pipes and small vents
  - frequent or continuous measurements must be made if the flow rates vary. If they are relatively constant, periodic measurements are adequate.

Radionuclides must be monitored directly or collected and measured by:

- Reference Method 1, Part 60, Appendix A for selecting monitoring or sampling sites
- guidance in ANSI N13.1-1969 and its Appendix A for continuous direct monitoring or continuous sampling. Batch processes must be sampled continuously when they are operating. Grab sampling may be used only if the EPA approves in cases where continuous sampling is not practical and emission rates are relatively constant. Grab samples must be taken often enough to represent

the emissions adequately.
- procedures based on principles of measurement described in Method 114, Part 61, Appendix B for collecting and measuring radionuclides, unless the EPA has approved methods based on different measurement principles.

The facility must also carry out a quality assurance program that meets the performance requirements of Appendix B, Method 114. (40 CFR 61.107(b) (1-2))

- Alternative Procedures

-- Effluents

A facility may use alternative procedures to measure effluent flow rates or select sampling sites and take samples for a particular effluent stream if it can show that:

- it is not practical to meet the requirements listed above for the particular effluent stream
- the alternative procedure will not significantly underestimate emissions
- the alternative procedure is fully documented
- it has received prior approval from the EPA (40 CFR 61.107(b) (3))

--Environmental Concentra-tions

Instead of Sir dispersion computer models, a facility may use environmental measurements of radionuclide concentrations in the Sir St critical receptor sites to show compliance if:

- radionuclides are continuously sampled St the site
- the radionuclides that contribute the major portion of the effective dose equivalent from the facility are collected and measured as part of the environmental monitoring program
- radionuclide concentrations that would cause an effective dose equivalent of 1 mrem per year (0.3 mrem for iodine) can be clearly detected and distinguished from background concentrations
- the facility carries out a quality assurance program that meets the performance requirements of Appendix B, Method 114
- the facility obtains the EPA's approval after submitting an application to use environmental measurements that describes in detail the sampling and analysis methods and shows how the first four criteria will be met

A facility using environmental measurements must use Table 2, Appendix E, Part 61 to determine whether it

complies with the standard:

- if only one radionuclide is released, the facility complies with the standard if the net measured concentration is less than or equal to the concentration level shown in Table 2.
- if two or more radionuclides are released, the facility complies with the standard if the net measured concentration of each radionuclide is less than or equal to the level shown in Table 2, and the sum of the fractions obtained by dividing each measured concentration by the Table 2 value is less than or equal to 1. (40 CFR 61.107(b) (5))

- Methods for Certain Facilities

Some types of facilities may follow the monitoring methods and quality assurance programs described above or use these methods to determine their emissions:

- nuclear power reactors - effluent Technical Specifications in the NRC operating license, and a quality assurance program as described in NRC Regulatory Guide 4.15, February 1979
- fuel processing and fabrication plants, and uranium hexafluoride plants - NRC Regulatory Guide 4.16, December 1985, and a quality assurance program as described in NRC Regulatory Guide 4.15, February 1979
- uranium mills - NRC Regulatory Guide 4.14, April 1980, and a quality assurance program as described in NRC Regulatory Guide 4.15, February 1979 (40 CFR 61.107(c))

Emission Tests

The emission testing requirements of 40 CFR 61.13 are superseded by the requirements set out in 40 CFR 61.107, described in "Emissions," above.

General Requirements See Section 2.1.

NOTE: OMB has not yet approved the reporting requirements. In addition, the Clean Air Act Amendments of 1990 state that requirements that apply to medical licensees will not become effective for at least two years.

2.3.4 National Emission Standards for Radionuclide Emissions From Elemental Phosphorus Plants - 40 CFR 61 Subpart K

Applicability

This standard applies to owners or operators of calciners and nodulizing kilns at elemental phosphorus plants.

"Owner or operator" means persons who own, lease, operate, control, or supervise a calciner or nodulizing kiln at an elemental phosphorus plant.

"Calciner" or "nodulizing kiln" means a unit in which phosphate rock is heated to high temperatures to remove organic material and/or to convert the rock to a nodular form. The EPA considers these two types of units to be similar for the purposes of this standard.

"Elemental phosphorus plant" ("plant") means a facility that produces elemental phosphorus from phosphate rock, and includes all buildings, structures, operations, calciners, and nodulizing kilns on one contiguous site.(40 CFR 61.120, .121)

Standard

Emissions of polonium -210 to the air from all calciners and nodulizing kilns at a plant must not exceed a total of 2 curies per year. (40 CFR 61.122)

Compliance

o Determine Emissions

Measure the annual emission rate (see below) for each operating calciner and nodulizing kiln and sum them.

o Report to EPA

An owner or operator must test polonium-210 emissions from the plant within 90 days after December 15, 1989, and once a year after that, and report results to the EPA within 60 days. The EPA may waive the annual testing requirement either permanently or temporarily, or require that tests be made more often. The EPA must be notified 30 days before the test so the Agency may observe. (40 CFR 61.123(a,b))

Reports must include:

- name and location of the plant
- who is responsible for operating the plant and who prepared the report (if different)
- a description of effluent controls on each release point and those used in the mine, and the estimated efficiency of each control device
- test results, including the results of each completed sampling run
- values used to calculate emissions and the source

of these values
- a statement certifying that the report is accurate and complete, followed by the signature of a corporate official in charge of the facility, and the date. (The certification statement is at 40 CFR 61.123 (f) (6).)

Reporting under 40 CFR 61.10 is not required. (40 CFR 61.123(f), .127)

Recordkeeping

An owner or operator must keep all the information used to develop inputs to the annual reports (emission measurements, procedures used in emission testing, calculations, analysis methods, data sources), the compliance results, and monitoring data at the plant for at least 5 years. This information must be complete enough to allow independent verification of compliance. The EPA has authority to inspect these records. (40 CFR 61.124)

Compliance Dates

See Section 2.1.

Compliance Waiver

See Section 2.1.

Emission Testing

These test methods, specified in Appendix A to 40 CFR 60 unless otherwise noted, must be used unless the EPA has approved an equivalent or alternate method:

- Test Method 1 for sample and velocity traverses
- Test Method 2 for velocity end volumetric flow rate
- Test Method 3 for gas analysis
- Test Method 5 for collecting particulate matter containing polonium-210
- Test Method 111, Appendix B, 40 CFR 61 for determining polonium-210 emissions (40 CFR 61.125)

Each operational calciner and nodulizing kiln must be tested. If the units have multiple stacks, test each stack and add each emission rate to obtain the total emission rate for the unit. (40 CFR 61.123 (c))

Each emission test consists of three sampling runs. For each sampling run:

1. Record the phosphate rock processing rate.
2. Measure the emissions in curies using the approved procedures.
3. Determine the emission rate by dividing emissions (curies) by amount of rock processed (metric tons).

	Then, average the emission rates for the three runs to determine the polonium-210 emission rate for the test. Determine the annual polonium-210 emission rate for each calciner or nodulizing kiln by multiplying the measured polonium-210 emission rate (curies per metric ton of phosphate rock processed) by the amount of rock processed (metric tons) by the unit in a year. Use the highest reasonable operating capacity and the greatest reasonable number of operating hours to determine the amount of rock expected to be processed during the year. Add the emission rates for all operating units to obtain the total annual emission rate for the plant. (40 CFR 61.123(d)) If polonium-210 emissions could increase due to operating changes (such as processing a different type of rock, processing more rock, or changing kiln or calciner temperature), a new emission test must be conducted within 45 days under the new conditions. (40 CFR 61.123(e))
o Alternative Methods/Waiver	See Section 2.1 for a discussion of alternative testing methods and testing waivers.
Monitoring	Owners or operators must install, calibrate, maintain and operate equipment to monitor certain operations and keep records of that monitoring at the plant for 5 years: - Equipment to measure rock feed to each calciner or kiln must be accurate to within ± 5 percent of the mass rate over its operating range. - Equipment to measure continuously the pressure loss of a gas stream through a wet scrubber must be certified by the manufacturer to be accurate within ± 250 pascals (± 1 inch of water). - Equipment to measure continuously the primary and secondary current and the voltage in each electric field in an electrostatic precipitator must be properly operated. (40 CFR 61.126)
Construction or Modification	See Section 2.1.
General Requirements	See Section 2.1.

2.3.5 National Emission Standards for Radon Emissions from Department ofEnergy Facilities - 40 CFR 61 Subpart Q

Applicability	This standard applies to the design and operation of all storage and disposal facilities for materials that contain radium (byproduct material as defined under § ll.e(2) of the Atomic Energy Act of 1954, as amended) owned or operated by DOE and that emit radon-222 to the air. Five facilities are specifically listed. This standard does not apply to facilities listed in or designated by the Secretary of Energy under Title I of the Uranium Mill Tailings Control Act of 1978.
	"Facility" means all buildings, structures, and operations on one contiguous site. (40 CFR 61.190, .191(a))
Standard	Each source at a DOE facility must not emit to the air more than 20 pCi/sq m-s of radon-222 as an average for the entire source.
	"Source" means any building, structure, pile, impoundment, or area used to dispose of or temporarily store waste material (or that is itself waste material) that contains enough radium to emit more than 20 pCi/s. m before remedial action has been taken. (40 CFR 61.192,.191(b))
Compliance	This requirement will be part of any Federal Facilities Agreement between the EPA and DOE. (40 CFR 61.192)
Reporting Exemption	Reporting under 40 CFR 61.10 is not required. (40 CFR 61.193)

NOTE: The EPA and the DOE will enter into a Memorandum of Understanding (MOU) regarding implementation of the NESHAP. In addition, all known sites subject to Subpart Q have entered (or will enter) into Federal Facilities Agreements with the EPA. Those agreements must include (by amendment, if necessary) attainment of the 20 pCi/sq m-s average radon flux standard. After final disposal, a one-time determination of the radon flux, following the approach of 40 CFR 61 Appendix B, Method 115, Section 2, constitutes acceptable demonstration of compliance with the standard. Prior to final disposal, 40 CFR 61 Appendix B, Method 115, Section 2, or other testing methods approved by the EPA, may be used to demonstrate compliance.

2.3.6 National Emission Standards for Radon Emissions from Phosphogypsum Stacks - 40 CFR 61 Subpart R

Note: This standard requires that all phosphogypsum be disposed of in stacks, allowing no other use of the byproduct. A compliance waiver allows agricultural use of phosphogypsum for the 1991 growing season. A partial reconsideration of the standard should be complete by October 1, 1991.

Applicability	This standard applies to owners and operators of phosphogypsum produced as a result of phosphorus fertilizer production, and phosphogypsum contained in existing phosphogypsum stacks. "Phosphogypsum stacks" are waste piles containing phosphogypsum produced when making phosphorus fertilizer, including phosphate mines used to dispose of phosphogypsum. (40 CFR 61.200, .201)
Standard	Phosphogypsum must be disposed of in stacks or phosphate mines that must not emit more than 20 pCi/sq m-3 of radon-222 to the air. (40 CFR 61.202)
Compliance	
o Determine Emissions	Measure radon flux and calculate the mean radon flux for the entire phosphogypsum stack according to Appendix 8, Method 115, Section 3.Emissions tests must be conducted within 60 days after a stack becomes inactive, or 90 days after December 15, 1989, if a stack is already inactive. The owner or operator must notify the EPA 30 days in advance of the test so the EPA may observe. If the test must be postponed because of weather, the EPA must be notified and the test conducted as soon as weather conditions allow. "Inactive stack" means a stack to which gypsum is no longer being routinely added and that is no longer used to manage water associated with phosphogypsum production. A stack that has not been used for either of these purposes for two years is considered inactive. (40 CFR 61.203(a), .201(a))
o Report to EPA	Each owner or operator must test emissions according to the above schedule and report the results to the EPA within 90 days. The report must include: - name and location of the facility - who is responsible for operating the facility and who prepared the report (if different) - a list of the stacks at the facility, with their dimensions and size - a description of control measures used to reduce

	radon flux and actions taken to ensure those measures are effective over the long term - test results, including the results of each measurement - a statement certifying that the report is accurate and complete, followed by the signature of a corporate official in charge of the facility, and the date. (The certification statement is at 40 CFR 61.202(b) (61.) If an owner or operator makes year-long measurements, the report must include the results of the first measurement period and provide a schedule for the other measurement periods. The owner or operator must submit another report that contains all the above information within 90 days after the final measurements are completed. (40 CFR 61.203(c)) Reporting under 40 CFR 61.10 is not required. (40 CFR 61.205)
Notification of Activity	If an owner or operator again uses a stack for phosphogypsum disposal or water management, the stack is no longer inactive and the EPA must be notified in writing within 45 days. When the stack becomes inactive again, it must be retested and the results reported to the EPA as above. (40 CFR 61.203(d))
Recordkeeping	An owner or operator must keep all the information used to develop inputs to the annual reports (emission measurements, procedures used in emission testing, calculations, analysis methods, data sources), the compliance results, and monitoring measurements at the plant for at least 5 years. This information must be complete enough to allow independent verification of compliance. The EPA has authority to inspect these records. (40 CFR 61.204)
Compliance Dates	See Section 2.1.
Compliance Waiver	See Section 2.1.
Construction or Modification	See Section 2.1.
Emission Tests	The emission testing requirements of 40 CFR 61.13 are superseded by the requirements set out in 40 CFR 61.203, described in "Compliance," above.
General Requirements	See Section 2.1.

2.3.7 National Emission Standards for Radon Emissions From the Disposal of Uranium Mill Tailings - 40 CFR 61 Subpart T

Applicability

This standard applies to owners and operators of sites that:

1. are used for disposal of tailings from processing uranium ore and
2. that managed residual radioactive material or uranium byproduct materials during and after processing uranium ore (uranium mills and associated tailings), that are listed in or designated by the Secretary of Energy under Title I of the Uranium Mill Tailings Control Act of 1978, or that are regulated under Title II of that Act.

"Uranium byproduct material" or "tailings" means the waste produced by extraction or concentrating uranium from any ore processed primarily to obtain uranium. This definition does not include ore bodies depleted by uranium solution extraction that remain underground.(40 CFR 61.220, .221)

Standard

This standard has two parts:

1. Radon-222 emissions to the air from uranium mill
   tailings piles that are no longer operational must not exceed 20 pCi/s m-s.
2. A uranium mill tailings pile or impoundment that ceases to be operational must be disposed of and brought into compliance with the above emission limit by December 15, 1991 or within two years of the day it ceases to be operational, whichever is later. If an owner or operator cannot physically complete disposal within two years, the EPA will consult with the owner or operator to establish a compliance schedule for timely disposal.

“Operational” means a uranium mill tailings pile that is licensed to accept additional tailings and those tailings can be added without violating 40 CFR 61 Subpart W (‘Radon Emissions from Operating Mill Tailings") or any other Federal, State, or local rule or law. A tailings pile that is filled to capacity or that accepts tailings from a mill that has been dismantled or decormissioned is not operational. (40 CFR 61.222, .221)

Compliance

o Determine Emissions

Measure radon flux and calculate the mean radon flux for each tailings pile at the facility according to Appendix B, Method 115, Section 2. Other procedures may be used if the EPA has given prior approval. If long term stabilization of the pile has not begun, the owner or operator must test emissions 60 days after the pile has been covered to limit radon emissions but prior to long-term stabilization. If long term stabilization began before December 15, 1989, the test can be conducted any time up to 60 days after long term stabilization is complete. The owner or operator must notify the EPA 30 days in advance of the test so the EPA may observe. If the test must be postponed because of weather, the EPA must be notified and the test conducted as soon as weather conditions allow.

If long-term stabilization is complete and the tests or other EPA-approved procedures demonstrate that radon-222 emissions from the pile are no more than 20 pCi/sq m-s,the EPA considers the pile disposed of for purposes of this standard. (40 CFR 61.223(e))

"Long term stabilization" means placing material on a uranium mill tailings pile to meet the requirements of 40 CFR 192.02(a) or 192.32(b)(i). Long term stabilization is complete when the NRC determines that those requirements have been met. (40 CFR 61.221(a))

o Report to EPA

Each owner or operator must test emissions and report the results to the EPA within 90 days. The report must include:

- name and location of the facility
- a list of the piles at the facility
- a description of control measures used to reduce radon flux and actions taken to ensure those measures are effective over the long term
- test results, including the results of each measurement
- a statement certifying that the report is accurate and complete, followed by the signature of a corporate official in charge, and the date. (The certification statement is at 40 CFR 61.223(b) (5))

If an owner or operator makes year-long measurements, the report must include the results of the first measurement period and provide a schedule for the other measurement periods. The owner or operator must submit another report that contains all the above

	information within 90 days after the final measurements are completed. (40 CFR 61.223(c)) Reporting under 40 CFR 61.10 is not required. (40 CFR 61.225)
Recordkeeping	An owner or operator must keep all the information used to develop inputs to the report (emission measurements, procedures used in emission testing, calculations, analysis methods, data sources), the compliance results,and monitoring measurements for at least 5 years. This information must be complete enough to allow independent verification of compliance. The EPA has authority to inspect these records and the owner or operator must keep the EPA informed of their location. (40 CFR 61.224)
Emission Tests	The emission testing requirements of 40 CFR 61.13 are superseded by the requirements set out in 40 CFR 61.223, described in "Compliance," above.
Compliance Dates	See Section 2.1.
Compliance Waiver	See Section 2.1.
Construction or Modification	The requirements set out in 40 CFR 61 Subpart A do not apply in this case.
General Requirements	See Section 2.1.

2.3.8 National Emission Standards for Radon Emissions from Operating Mill Tailings - 40 CFR 61 Subpart W

Applicability

This standard applies to owners or operators of facilities licensed to manage uranium byproduct materials during and after processing uranium ore (uranium mills and associated tailings). It does not apply to tailings disposal.

"Uranium byproduct material" or "tailings" means the waste produced by extraction or concentrating uranium from any ore processed primarily to obtain uranium. This definition does not include ore bodies depleted by uranium solution extraction that remain underground. (40 CFR 61.250, .251)

Standard

This standard has three parts:

1. Radon-222 emissions to the air from an existing uranium mill tailings pile must not exceed 20 pCi/sq m-s.
2. No new tailings impoundment can be built after December 15, 1989 unless it is designed, constructed, and operated to meet one of these two work practices:

   - phase disposal in lined tailings impoundments that have an area of no more than 40 acres that meet the requirements of 40 CFR 192.32(a) as determined by the NRC. An owner or operator cannot have more than two impoundments (including existing impoundments) in operation at any time.
   - continuous disposal of tailings that are dewatered and immediately disposed of with no more than 10 acres uncovered at any time and operated according to 40 CFR 192.32(a) as determined by the NRC or an Agreement State.

3. All mill owners and operators must comply with 40 CFR 192.32(a) in the operation of tailings piles, the exemption for existing piles in that section notwithstanding.

"Area" means the vertical projection of the pile on the earth's surface.

"Continuous disposal" means a method of tailings management and disposal in which tailings are mechanically dewatered immediately after they are generated. The dried tailings are then placed in trenches or other disposal areas and immediately

covered to limit emissions to meet all Federal standards that apply.

"Dewatered" means using mechanical methods or evaporation to remove water from fresh tailings so that the water content of the tailings is not more than 30 percent by weight.

"Existing impoundment" means any uranium mill tailings impoundment licensed to accept additional tailings and in existence on December 15, 1989.

"Operation" means tailings are being placed in an impoundment or the impoundment is in standby status for placement. An impoundment is in operation from the day that tailings are first placed there until the day final closure begins.

"Phased disposal" means a method of tailings management and disposal using lined impoundments that are filled and then immediately dried and covered to meet all applicable Federal standards. (40 CFR 61.251, .252)

Compliance

- o Determine Emissions — Measure radon flux and calculate the mean radon flux for each tailings pile for the year according to Appendix B, Method 115, Section 2. If the owner or operator elects to make measurements over a year, the EPA must be given a schedule of the tests either before or after the first measurement period. The owner or operator must notify the EPA 30 days in advance of any test so the EPA may observe.

o Report to EPA

- Annual Reports — Each owner or operator must determine emissions for the calendar year and report the results to the EPA by March 31 of the following year. The first report will cover 1990. The report must include:

  - name and location of the mill
  - who is responsible for operating the mill and who prepared the report (if different)
  - input parameters used in emissions calculations
  - test results, including the results of each measurement
  - a statement certifying that the report is accurate and complete, followed by the signature of a corporate official in charge of the mill, and the

	date. (The certification statement is at 40 CFR 61.254(a)(4).)
- Monthly Reports	If a facility does not meet the standard for a calendar year, the owner or operator must start reporting to the EPA every month, with the first report due April 30 (covering emissions for March). Subsequent reports are due 30 days after the end of the month, until the EPA states they are no longer needed. These reports must cover the same information as the annual report, plus: - a description of changes being made in order to meet the standard - a description of performance under any enforcement decree. Reporting under 40 CFR 61.10 is not required. (40 CFR 61.254, .256)
Recordkeeping	An owner or operator must keep all the information used to develop inputs to the report (emission measurements, procedures used in emission testing, calculations, analysis methods, data sources), the compliance results, and monitoring measurements at the mill for at least 5 years. This information must be complete enough to allow independent verification of compliance. The EPA has authority to inspect these records. (40 CFR 61.255)
Compliance Dates	See Section 2.1.
Compliance Waiver	See Section 2.1.
Construction or Modification	See Section 2.1.
General Requirements	See Section 2.1.

3. RADIATION HEALTH AND SAFETY ASPECTS OF INSPECTIONS

This section provides an overview of radiation safety issues that may arise during facility inspections. It is not a comprehensive health and safety plan. A comprehensive plan is being developed, which will cover appropriate dosimetry and other instruments available to inspectors, periodic examinations for internal exposure, and generic and site-specific training. The information that follows offers preliminary guidance until that plan is available.

The sections below describe potential radiation safety concerns at seven generic types of facilities, rather than by the applicable NESHAP.

3.1 NUCLEAR POWER REACTORS - 40 CFR 61 Subpart I

Radiation areas are usually confined to the reactor building and the waste handling areas. There will also be radiation in the turbine-generator building at a boiling water reactor (BWR), but only when the plant is operating. If radiation levels exceed 2 mrem/hr, the area is posted as a "radiation area." Above 100 mrem/h=, the posting indicates a "high radiation area. " If airborne radioactivity is present, the area will be closed off and posted as an "airborne, radioactivity area."

All of these areas require special access, and a site visitor should avoid them. If it is necessary to enter them, several approvals will be required, which will be obtained by the plant staff. Normally, approval will not be granted unless there is a clear need for access and training has been completed at the plant. Occasionally, protective clothing will be required.

Site visitors are usually required to attend a briefing session before entering the plant. However, if the visitor is going only to the office areas, or will be escorted while at the plant, a briefing may not be needed. A visitor will be issued a dosimeter if he or she will be going to, or near, any radiation areas.

Airborne releases of radioactivity occur at the off-gas stack and the reactor building vent at a BWR. At a pressurized water reactor (PWR), releases occur only through the vent at the top of the containment building. Cooling towers do not release radioactivity.

3.2 OTHER NRC LICENSEES - 40 CRF 61 Subpart I

Radiation safety concerns at other NRC and Agreement State licensees vary according to the way in which radionuclides are used. Hospitals that use radionuclides in nuclear medicine comprise the largest group of these licensees. Some hospitals have research laboratories where radionuclides are used as tracers. Hospitals also use radionuclides for radiation therapy, but these are sealed sources that do not cause emissions to the air.

At hospitals, research laboratories, nuclear pharmacies, and some industrial facilities, radionuclides are most commonly released to the air through fume hoods. These are enclosed workspaces that have three fixed sides and a closable window on the user's side. Hoods have their own ventilation

system, which draws room air into the enclosed space and sends it out the top, where it passes through a filtration or absorption system, if one is present. This exhaust air is then released to the atmosphere. Volatile radionuclides are usually stored in fume hoods. Exposure can also occur at accelerators, x-ray machines, and cobalt-60 units. However, access to these devices is protected by postings, interlocked doors, and/or shielding. Care must be exercised in such areas.

The radiation area posting rules described above for reactors apply to other NRC licensees as well. Most of these facilities will have few, if any, such areas, but if they do, these areas should be avoided. At all NRC-licensed facilities, one person - the Radiation Safety Officer (RSO) - is responsible for radiation safety.

3.3 DOE FACILITIES - 40 CFR 61 Subpart H

The DOE operates 27 research laboratories, nuclear fuel cycle facilities, and weapons production plants. Their equipment includes nuclear reactors and particle accelerators; activities cover laboratory research, nuclear fuel preparation, nuclear weapons production, and waste management. DOE facilities usually provide radiation dosimeters for visitors who will be going to, or near, areas where radiation may be present.

Radiological concerns at nuclear reactors are discussed in Section 3.1. In addition to these concerns, some DOE reactors are air cooled, which produces more airborne radioactivity than do commercial nuclear power reactors. This additional radioactivity is primarily argon-41.

General laboratory research issues are covered in Section 3.2. However, DOE research and weapons production tends to involve unusual or unique materials (for example, plutonium) with special hazards. This work is generally performed in "hot cells," which are not accessible to a site visitor. The posting and access requirements that apply to NRC licensees are generally also in effect at DOE facilities.

The DOE laboratories house a number of large particle. accelerators used for nuclear physics research. Radiation safety concerns involve ambient radiation and radioactive gases. Ambient radiation is present when the accelerator is running - so-called "prompt" radiation. Lower levels of radiation are present at all times, coming from induced radioactivity in the accelerator components and in the concrete walls of the accelerator room. This radiation is generally not very hazardous, though a visitor to the facility should be aware that it exists. Radioactive gases are produced when the accelerator beam passes through air. These gases have short half-lives, the longest being 1.8 hours for argon-41. These gases are exhausted to the air before they can become an internal safety hazard.

At DOE's nuclear fuel preparation plants, uranium is handled in a variety of forms. Exposures to gaseous uranium and uranium dust are potential hazards. Areas where this gas and dust are present are posted and marked and should be avoided. Chemical hazards, such as beryllium and fluorine, may also be present at DOE facilities. Potential chemical hazards should be noted and appropriate care taken if such areas must be entered.

Finally, all DOE activities have a waste management component. This is less of a concern at accelerators and more of a concern at research laboratories and weapons plants. Generally, there is little short-term hazard associated with waste handling. For example, radiation levels around waste storage tanks may be elevated. Airborne radioactivity may be present where active waste processing operations are taking place. Again, radiation areas will be appropriately posted.

Some EPA Regional Offices have developed and are implementing specific radiation health and safety plans for certain DOE facilities. These plans contain more detailed information than presented here.

3.4 ELEMENTAL PHOSPHORUS PLANTS - 40 CFR 61 Subpart K

Generally, there is no radiological hazard inside these plants. Any radioactivity contained in the feed ore is released only in the process kilns, where the contaminated off-gases are collected, treated, and released to the atmosphere through a stack or vent. Radiation levels in the plant should not be significantly elevated, nor should there be any airborne radioactivity.

3.5 UNDERGROUND URANIUM MINES - 40 CFR 61 Subpart B

Underground uranium mines release radon gas to the atmosphere when the mine is being ventilated by fans located in vertical shafts. The fans pull fresh air into "downcast" shafts and up through "upcast" shafts, carrying radon out with the air. A mine may have as few as one or as many as 15 upcast shafts. Typically, the ventilation fan is located at the top of the shafts, on the surface. If effluent monitoring is performed at the fan, there is no need to enter the mine, but care should be taken to spend as little time as possible at the vent. There are no other radiological hazards at the surface above the mine.

Radiological hazards in the mine are exposure to radon, radon daughters, and uranium dust. Mine operators must monitor radiation in occupied areas of the mine. Areas that exceed a specified working level concentration of radon cannot be occupied.

3.6 URANIUM MILLS - 40 CFR 61 Subpart I

Mills, located near uranium mines, process ore to separate uranium from the rock matrix. The product, uranium oxide, is called "yellowcake." Milling is largely a wet process, and the uranium-bearing liquids are generally well - contained to prevent physical contact.

However, the final step in the process is the drying of the wet yellowcake. This can and does produce uranium dust, and breathing and ingesting this dust is the primary concern at the mills. Where dust is excessive, workers wear face masks to filter their breathing air, and these areas should be avoided. A visitor should also be aware of uranium dust on surfaces, which can be ingested if hands come in contact with the mouth. Smoking and eating should also be avoided inside the mills.

3.7 RADON SOURCES - 40 CFR 61 Subparts B, Q, R, T, and W

The radiological hazard at all radon sources is the same, no matter what the source. As described above, radon is ventilated from underground uranium mines. It also emanates from uranium mill tailings piles, phosphogypsum stacks, and other solid wastes that are rich in radium.

Normally, radon is not a hazard outside buildings. It mixes quickly with the ambient air to small concentration levels. Nevertheless, point sources of radon, such as mine vents, should be treated with care. In closed structures built on or near radon sources, concentrations can be very high. These buildings should be avoided, unless measurements show that radon concentrations are within acceptable limits.

4. CONTACTS

This Section contains mailing lists, including contact persons and addresses, for the facilities in each of the eight source categories (except Subpart I, NRC Licensees and Non-DOE Federal Facilities).The lists are also grouped by EPA Region. Subpart I facilities are too numerous to list conveniently, and no complete listing has ever been made. The appropriate NRC Regional Office should be able to supply the names and addresses of the major sources for that Subpart.

4.1 CONTACTS AT UNDERGROUND URANIUM MINES - 40 CFR 61 Subpart B

Region 6

Mr. Edward E. Kennedy
Homestake Mining Company P.O. Box 98
Grants, NM 87020
Site: Section 23

Region 8

Eric Newman
Minerals Recovery Corporation
2801 Youngfield, Suite 331
Golden, CO 8040
Site:

John L. (Jack) Larsen, President
U.S. Energy/Crested Corporation
877 North 8th West
Riverton, WY 82501
Site:

Earl Shortridge, Manager
Umetco Minerals Corporation
P.O. Box 1029
Grand Junction, CO 81502
Site:

Jerry Powers, Director of Personnel, Health, and Safety
Cotter Corporation
12596 West Bayout Avenue, Ste 350
Lakewood, CO 80228
Site:

4.2 CONTACTS AT DEPARTMENT OF ENERGY FACILITIES - 40 CFR 61 Subpart H

Region 1

Environmental Affairs Contact
Massachusetts Institute of Technology
Manning Road,P.O. Box 95
Middleton, MA 01949
Site: Bates Linear Accelerator

Environmental Affairs Contact
General Electric Company
P.O. Box 545
Windsor, CT 06095
Site: Knolls At. Pwr Lab. - Windsor

Region 2

Environmental Affairs Contact
Associated Universities, Inc.
50 Bell Avenue, Bldg 464
Upton, NY 11973
Site: Brookhaven National Laboratory

Environmental Affairs Contact
Princeton Plasma Physics Laboratory
Forrestal Campus, P.O. Box 451
Princeton, NJ 08543
Site: Princeton Plasma Physics Lab.

Environmental Affairs Contact
West Valley Nuclear Services Co.
Rock Springs Road, P.O. Box 191 West
Valley, NY 14171-0191
Site: West Valley Demo. Project

Environmental Affairs Contact
General Electric Company
P.O Box 1072
Schenectady, NY 12301
Site: Knolls Atomic Power Laboratory
- Kesselring and Knolls sites

Environmental Affairs Contact
U.S. Department of Energy
Naval Reactors (Schenectady)

Region 3

Environmental Affairs Contact
Westinghouse Electric Corporation
Bettis Atomic Power Laboratory
Pittsburgh Naval Reactors Office
P.O. Box 109
West Mifflin, PA 15122-0109
Site : Bettis Atomic Power Laboratory

Environmental Affairs Contact
U.S Department of Energy
Pittsburgh Naval Reactors Office

Region 4

Environmental Affairs Contact
General Electric Company
P.O. BOX 2908
Largo, FL 34294
Site: Pinellas Plant

Environmental Affairs Contact
Martin Marietta Energy Systems, Inc.
P.O. Box 2003
Oak Ridge, TN 37831-7402
Site: Oak Ridge Gaseous Diffusion Plant

Environmental Affairs Contact
U.S. Department of Energy
Oak Ridge Operations Office

Environmental Affairs Contact
Martin Marietta Energy Systems, Inc.
P.O. Box 2008
Oak Ridge, TN 37831
Site: Oak Ridge National Laboratory

Environmental Affairs Contact
Martin Marietta Energy Systems, Inc.
P.O. Box 2009
Oak Ridge, TN 37831
Site: Oak Ridge Y-12 Plant

Environmental Affairs Contact
Martin Marietta Energy Systems, Inc.
P.O. Box 1410
Paducah, KY 42001
Site: Paducah Gaseous Diffusion Plant

Environmental Affairs Contact
E.I. Du Pont De Nemours & Co.
Savannah River Plant
Aiken, SC 29808-0001
Site: Savannah River Plant

Region 5

Environmental Affairs
Contact
Monsanto-Mound
P.O. Box 32
Miamisburg, OH 45342
Site: Mound Facility

Environmental Affairs Contact
Universities Research Association
P.O. Box 500
Batavia, IL 60510
Site : Fermi Nat'1 Accel. Laboratory

Environmental Affairs Contact
U.S. Department of Energy
Chicago Operations Office

Environmental Affairs Contact
U.S. Department of Energy
Portsmouth Gaseous Diffusion Plant
P.O. BOX 628
Piketon, OH 45661
Site : Portsmouth Gaseous Diff'n Plt

Environmental Affairs Contact
Argonne National Laboratory
9800 South Cass Avenue
Argonne, IL 60439
Site: Argonne Nat'l Lab.- East

Environmental Affairs Contact
Battelle Columbus Division
505 King Avenue
Columbus, OH 43201
Site: West Jefferson Nuclear Site

Environmental Affairs Contact
Westinghouse Materials Co. of Ohio
P.O. Box 398704
Cincinnati, OH 45239-8704
Site: Feed Mat'ls Production Center

Environmental Affairs Contact
RMI Company Extrusion Plant
P.O. Box 579, East 21st Street
Ashtabula, OH 44004
Site: RMI Company Extrusion Plant

Region 6

Nestor R. Ortiz
Director, ES&H
Sandia National Labs. Org. 3200
P.O. Box 5800
Albuquerque NM 87185
Site: Inhalation Toxicology Res. Inst.

P. M. Ramey
U.S. Department of Energy
P.O. Box 30030
Amarillo, TX 79120
Site: pantex Plant

R. W. Hunnicut, Director
Facility Operations
Organization 7800
Sandia National Laboratory
P.O. Box 5800
Albuquerque, NM 87185
Site: Sandia Nat'l Labs (Albq.)

David Hutchins
U.S. Department of Energy
Los Alamos National Laboratories
LOS Alamos, NM 87545
Site: Los Alamos National Laboratory

Bruce Twining, Manager
Albuquerque Area Operations Office
U.S. Department of Energy
P.O. Box 5400
Albuquerque, NM 87115
Site: Waste Isolation Pilot Plant

B. L. Gage
Chief, ESH&EP Management Branch
U.S. Department of Energy/Amarillo
P.O. Box 30030
Amarillo, TX 79120
Site: Pantex Plt/Amarillo Office

Region 8

Environmental Affairs Contact
Midwest Research Institute
1617 Cole Blvd.
Golden, CO 80401
Site : Solar Energy Research Inst.

Environmental Affairs Contact
Rockwell International
P.O. Box 464
Golden, CO 80402
Site: Rocky Flats Plant

Region 9

Environmental Affairs Contact
Sandia Corporation, Albuquerque
East Avenue
Livermore, CA 94550
Site: Sandia National Laboratories
(Livermore)

Environmental Affairs Contact
Sandia Nat'l Laboratories,
Tonopah Test Range
P.O. Box 871
Tonopah, NV 89049
Site: Tonopah Test Range

Environmental Affairs Contact
Reynolds Electrical & Eng. Co,. Inc.
U.S. Department of Energy
Nevada Operation Office
P.O. Box 98518
Las Vegas, NV 89193-8518
Site: Nevada Test Site

Environmental Affairs Contact
U.S. Department of Energy
Nevada Operations Office
P.O. Box 98518
Las Vegas, NV 89193-8518

Environmental Affairs Contact
U.S. Department of Energy
San Francisco Operations Office

Environmental Affairs Contact
University of California
1 Cyclotron Road
Berkeley, CA 94720
Site: Lawrence Berkeley Laboratory

Environmental Affairs Contact
Rocketdyne Div. of Rockwell Int'l
6633 Canoga Ave.
Canoga Park, CA 91303
Site: Santa Susanna Field Laboratory

Environmental Affairs Contact
University of California
7000 East Ave. Livemore, CA 94550
Site: Lawrence Livermore Nat'l Lab.

Environmental Affairs Contact
Stanford University
Stanford, CA 94309
Site: Stanford Linear Accelerator Center

Region 10

Environmental Affairs Contact
Site Operators
785 DOE Place
Idaho Falls, ID 83402
Site: Idaho Nat'l Engineering Lab.

Environmental Affairs Contact
U.S. Department of Energy
Idaho Operations Office

Environmental Affairs Contact
U.S. Department of Energy
Richland Operations Office

Environmental Affairs Contact
Westinghouse Hanford Company
Richland, WA 99352
Site: Hanford Site

4.3 CONTACTS AT NRC-LICENSED AND NON-DOE FEDERAL FACILITIES - 40 CFR 61 Subpart I

Site contacts are not listed for this source category, as they are extremely numerous and diverse. Major sources will be familiar to the EPA Regional Offices. In addition, some of the sources listed for Subparts T and W may also hold NRC licenses.

4.4 CONTACTS AT ELEMENTAL PHOSPHORUS PLANTS - 40 CFR 61 Subpart K

Region 4

Bill Purdue, Plant Manager
Monsanto Company
Highway 50W
Columbia, TN 48401

Tom Vasko, Plant Manager
Occidental Chemical
P.O. Box 591
Columbia, TN 38402

4.5 CONTACTS AT DOE RADON SITES - 40 CFR 61 Subpart Q

Region 2

Environmental Affairs Contact
Bechtel National, Inc.
Niagara Falls Storage Site
Lewiston, NY
Site: Niagara Falls Storage Site

Environmental Affairs Contact
Site Operator
Middlesex Sampling Plant
Middlesex, NJ
Site: Middlesex Sampling Plant

Region 5

Environmental Affairs Contact
Westinghouse Materials Company
Feed Materials Production Center
Fernald, OH
Site: Feed Materials Production Ctr

Region 7

Environmental Affairs Contact
M-K Ferguson Company
Weldon Spring Site
Weldon Spring, MO
Site: Weldon Spring Site

Region 8

Environmental Affairs Contact
U.S. Department of Energy
Monticello Uranium Mill Tailings Pile
Monticello, UT
Site: Monticello U. Mill Tlgs Pile

4.6 CONTACTS AT PHOSPHOGYPSUM FACILITIES - 40 CFR 61 Subpart R

* indicates persons who can be contacted to identify on-site personnel

Region 4

Selwyn Presnell
Environmental Affairs Contact
Agrico Chemical Co.
P.O. Box 1110
Mulberry, FL 33860
Site: Bartow, FL

Ivan Nance
Environmental Affairs Contact
Royster Phosphate, Inc.
P.O. Box 1329
Palmetto, FL 34220
Site: Palmetto, FL

Environmental Affairs Contact
Brewster Phosphates
Bradley, FL
Site: Bradley, FL

Tom Edwards
Environmental Affairs Contact
CF Industries, Inc.
P.O. Drawer "L"
Plant City, FL 33566
Site: Plant City, FL

James Sampson
Environmental Affairs Contact
CF Industries, Inc.
Bonnie Mine Road
Bartow, FL 33830
Site: Bartow, FL

Kenneth O. West
Environmental Affairs Contact
Conserv, Inc.
P.O. Box 314
Nichols, FL 33863
Site: Nichols, FL

J. R. Perrin
Environmental Affairs Contact
Estech, Inc.
P.O. Box 208
Bartow, FL 33830
Site: Bartow, FL

C. Gene Meier
Environmental Affairs Contact
Farmland Industries, Inc.
P.O. Box 960
Bartow, FL 33830
Site: Bartow, FL

Ozzie Morris
Manager of Environment
Gardinier, Inc.
8813 Hwy 41 South
Riverview, FL 33569
Site: Tampa, FL

Kenneth V. Ford
Manager, Environmental Affairs
Seminole Fertilizer Corp.
Box 471
Bartow, FL 33830
Site: Bartow, FL

Joseph M. Baretincic
Director, Environmental Services
IMC Core, New Wales Operations
P.O. Box 1035
Mulberry, FL 33860
Site: Mulberry, FL

R. E. McNeill
Environmental Affairs Contact
Occidental Chemical Co.
P.O. Box 300
White Springs, FL 32096
Site: White Springs, FL

T. R. Schmalz
Environmental Affairs Contact
Royster Phosphate, Inc.
P.O. Drawer 797
Mulberry, FL 33860
Site: Mulberry, FL

James H. Carroll
Environmental Affairs Contact
USS Agri-Chemicals, Inc.
3225 State Road, 630 West
Ft. Meade, FL 33841
Sites: Bartow & Ft. Meade, FL

Jimmie F. Smith
Sr. Process Engineer
Nu-South Industries,
Inc. P.O. Box 848
Pascagoula, MS 39567
Site: Pascagoula, MS

William A. Schimming
Environmental Affairs Contact
Texasgulf Chemicals Co.
P.O. Box 48
Aurora, NC 27806
Site: Aurora, NC

Region 5

Steven K. Shogren
Supervisor, Environmental Services
General Chemical Corporation
Route 3, Box 30
Harrisburg, IL 62946
Site : E. St. Louis, IL

Dain Kelly
F & W Flying Service
168 East Bluff Street
Marseilles, IL 61341
Site: Marseilles, IL

Frank B. Eisenhardt
Environmental Manager
Mobil Mining & Minerals
P.O. Box 311
Nichols, FL 33863-0311
Site: DePue, IL

Jerry Starkey
Environmental Group Leader
Quantum Chemical Corp., USI Division
8805 North Tabler Road
Morris, IL 60450-9988
Site: Morris, IL

Vickie J. Ray
Environmental Specialist
Olin Chemicals
P.O. Box 248
Lower River Road
Charleston, TN 37310
Site: Joliet, IL

G. M. Miller
Technical Manager
Quantum Chemical Corp., USI Division
P.O. Box 218
Tuscola, IL 61953
Site: Tuscola, IL

Environmental Affairs Contact
SECO, Inc.
Streator, IL
Site: Streator, IL
(Illinois Superfund Site)

Region 6

Jacob Ross, Jr.
Environmental Engineer
Five Rivers Nitrogen Corp.
P.O. Box 825
Helena, AR 72342
Site: Donaldsonville, LA

D. J. Miller
Vice President, Environmental Affairs
Freeport McMoRan, Inc.
1615 Poydras Street
New Orleans, LA 70112
Site: Fanstina Plant

H. J. Baker
Plant Manager
Arcadian Corporation
P.O. Box 307
Geismar, LA 70734
Site: Geismar, LA

D. J. Miller
Vice President, Environmental Affairs
Freeport McMoRan, Inc.
1615 Poydras Street
New Orleans, LA 70112
Site: Uncle Sam Plant, LA

Keith B. Kline
Environmental Specialist
Kerley Enterprises, Inc.
2480 W. Twin Buttes Road
Sahuarita, AZ 85629
Site: Kerley Agricultural Chemicals

W.C. Stoltz
Phillips 66 Company
P.O. Box 792
Pasadena, TX 77501-0792
Site: Pasadena (Phillips)

Ronald A. Johnson
Environmental Affairs Contact
Agrico Chemical Company
7760 River Road
Hahnville, LA 70057
Site: Hahnville, LA

Charles V. Rice
Environmental Affairs Contact
Amoco Oil Co.
P.O. Box 401
Texas City, TX 77590
Site: Texas City, TX

John L. Murray, Jr.
Environmental Affairs Manager
Mobil Mining & Minerals Division
P.O. Box 3447
Pasadena, TX 77501
Site : Pasadena (Mobil)

D. J. Miller
Vice President, Environmental Affairs
Freeport McMoRan, Inc.
1615 Poydras Street
New Orleans, LA 70112
Site: Taft Plant

Region 7

George Chambers*
Agrico Chemical Company
P.O. Box 60031
New Orleans, LA 70160
Site: Ft. Madison, IA

Environmental Affairs Contact
W.R. Grace and Company
Joplin, MO
Site: Joplin, MO

Region 8

H. K. Sepehri-Nik
Environmental Affairs Contact
Chevron Chemical Co. c/o FCI
P.O. Box 100
Magna, UT 84044
Site: Magna, UT

Rick Vincent
Environmental Affairs Contact
Chevron Chemical Company
P.O. Box 1928
Rock Springs, WY 82902
Site: Rock Springs, WY

Region 10

Monty Johnson
Environmental Affairs Contact
Nu-West Industries, Inc.
3010 Conda Road
Soda Springs, ID 83276
Site: Conda, ID

John F. Cochrane
Environmental Affairs Contact
J.R. Simplot Company
P.O. Box 912
Pocatello, ID 83204
Site: Pocatello, ID

Environmental Affairs Contact
Bunder Hill Company
Kellogg, ID
Site: Kellogg, ID

4.7 CONTACTS AT URANIUM MILL TAILINGS DISPOSAL SITES - 40 CFR 61 Subpart T

Region 3

Canonsburg Site
Pennsylvania

Region 6

Bruce Twining, Manager
Albuquerque Operations Office
U.S. Department of Energy
P.O. Box 5400
Albuquerque, NM 87115
Sites: Ambrosia Lake, NM
Shiprock, NM
Falls City, TX

R. S. Ziegler, Project Manager
Bluewater Mill
P.O. Box 638
Grants, NM 87020
Site: Bluewater Mill

Gerald Schurtz, Director
Environmental Affairs
Kennecott Corporation
P.O. Box 11248
Salt Lake City, UT 84147
Site: L-Bar Mill

Juan R. Velasquez, President
United Nuclear Corporation
1700 Louisiana, NE, Suite 230
Albuquerque, NM 87110
Site : Churchrock Mill

Bill Ferdinand, Manager
Radiation Safety, Licensing and
Regulatory Compliance
Rio Algom Mining Corporation
6305 Waterford Blvd,
Suite 325 Oklahoma City, OK 73118
Site: Ambrosia Lake, NM

J. D. Patton, Manager
Operations Support Division
Exxon Coal and Minerals co.
P.O. Box 1314
Houston, TX 77251-1314
Site : Ray Point Mill

Claude Olenick
Project Manager
CONOCO Inc. - Conquista Project
P.O. Box 309
Falls City, TX 78113
Site : Conquista Mill

Region 8

Durango Site
Durango, Co

Gunnison Site
Gunnison, CO

Naturita Site
Colorado

Old Rifle Site
Rifle, CO

Slick Rock (Union Carbide) Site
Colorado

Bowman Site
North Dakota

Mexican Hat Site
Mexican Hat, UT

Converse County Site
Wyoming

Environmental Affairs Contact
Umetco Minerals
Colorado
Site : Uravan Mill

Environmental Affairs Contact
Tennessee Valley Authority
South Dakota
Site: Edgemont Mill

Environmental Affairs Contact
Western Nuclear
Wyoming
Site : Split Rock Mill

Environmental Affairs Contact
Rocky Mountain Energy
Wyoming
Site: Bear Creek Mill

Environmental Affairs Contact
American Nuclear Corporation
Wyoming
Site: FAP Mill

Grand Junction Site
Grand Junction, Co

Maybell Site
Colorado

New Rifle Site
Rifle, CO

Slick Rock (North Continent) Site
Colorado

Belfield Site
North Dakota

Green River Site
Green River, UT

Salt Lake City Site
Salt Lake City, UT

Riverton Site
Wyoming

Environmental Affairs Contact
Atlas
Utah
Site: Moab Mill

Environmental Affairs Contact
Petrotomics
Wyoming
Site: Petrotomics Mill

Environmental Affairs Contact
Umetco Minerals
Wyoming
Site: Umetco Mill

Environmental Affairs Contact
Exxon
Wyoming
Site: Highland Mill

Region 9

Monument Valley Site
Arizona

Tuba City Site
Tuba City, AZ

Region 10

Lowman Site
Idaho Oregon

Lakeview Site

Environmental Affairs
Contact
Dawn Mining
Washington
Site: Dawn Mill

Environmental Affairs Contact
Western Nuclear
Washington
Site: Sherwood Mill

4.8 CONTACTS AT OPERATING URANIUM MILL TAILINGS SITES - 40 CFR 61 Subpart W

Region 6

John E. Hardaway
Technical Manager, Envir. Affairs
Homestake Mining Co.
1726 Cole Blvd.
Golden, CO 80401
Site: Homestake Mill, NM

Kevin L. Raabe, Coordinator
Env. & Safety Div., Chevron Res. Co.
Panna Maria Uranium Operations
P.O. Box 1000
Hobson, TX 78117
Site: Panna Maria Mill

Environmental Affairs Contact
Kerr-McGee
New Mexico
Site: Ambrosia Lake Mill

Region 8

Environmental Affairs Contact
Cotter Corp.
Colorado
Site: Canon City Mill

Environmental Affairs Contact
Umetco Minerals
Utah
Site: White Mesa Mill

Environmental Affairs Contact
Rio Algom
Utah
Site: Rio Algom Mill

Environmental Affairs Contact
Pathfinder
Wyoming
Site: Shirley Basin Mill

Environmental Affairs Contact
Plateau Resources
Utah
Site: Shootaring Mill

Environmental Affairs Contact
Pathfinder
Wyoming
Site: Lucky MC Mill

Environmental Affairs Contact
Minerals Exploration, Wyoming
Site: Sweetwater Mill

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6. QUESTIONS AND ANSWERS ABOUT THE NESHAPS

This section includes questions raised by commenters and other persons who have studied the NESHAPS, together with suggested responses. Obviously, not all possible questions have been asked; experience with implementing the standards will certainly produce more. Please share new questions or comments with EPA Headquarters so they can be added to the guidance.

1. **Compliance reports sent to the EPA under subparts B, W, H, and I are to cover emissions for the previous calendar year. What if a source has operated for only part of a year?**

Answer: A source that began operating or ceased operating during a year will have only a partial year of monitoring or operational data. However, when a source is not operating, no emissions occur. (For this purpose, "operating period" includes all times when radionuclides are present at the site.) Therefore, the EPA considers that the emissions during a partial year of operation are those for the entire calendar year covered by the annual report.

2. **The standards for Subparts B, H, I, and W require a facility to demonstrate compliance on a calendar year or annual basis. However, those standards refer to emissions in "a year" or "in any year." Does a facility have to ascertain compliance on a "rolling" basis, for example, by running appropriate air dispersion models every month?**

Answer: The standards are intended to apply to any 12-month period, but the EPA will not require a facility to provide proof of compliance more than once a year unless the facility is not meeting the standards. In that case, a facility that is not in compliance must submit a report each month that covers emissions and the resulting dose for the previous month. When the EPA is satisfied that the facility is in compliance it will inform the facility that monthly reports are no longer needed. A facility does have to monitor its emissions as specified in the applicable standard, and the results of that monitoring should be sufficient to alert the operator if there is a problem. The EPA expects that even those facilities that use approved methods to estimate emissions will do so periodically. In addition, a facility that can demonstrate compliance but is very close to the limit should examine its operations and monitoring results to see whether it is exceeding the standard for part of a calendar year and operating well beneath it at other times. Such a pattern may be due to the nature of the firm's operation, or it may indicate that sound practices should be more rigorously enforced. The records required to be kept at the facility for five years will reflect the situation.

3. **If a facility is not in compliance with the standard and must file monthly reports, when is the first monthly report due to the EPA?**

Answer: The first monthly report is due 30 days after the annual report - April 30 for Subparts I, B, and W, covering emissions during March; and July 30 for Subpart H, covering emissions for June. If the Administrator requires tests more often than annually under Subpart K, reports are due within 60 days of the test unless the Administrator specifies otherwise.

4. **When is the first annual report due under Subpart H?**

Answer: The first annual report under Subpart H is due June 30, 1991 and should cover emissions for calendar year 1990. The report must be filed with both the appropriate EPA regional office and with EPA headquarters, as stated in 40 CFR 61.94(a). Emissions for calendar year 1989 should have been reported under the former NESHAP.

5. **How are accidental releases handled in determining compliance?**

Answer: Accidental releases are included in the standards and can result in a violation of the standard. The wording of the standards, "(E)missions...shall not exceed..." does not exclude any emissions, whether due to normal operations or not.

6. **What criteria will the EPA use in reviewing applications to construct or modify? What authority does the EPA have to disapprove those applications if the standard will be met?**

Answer: The owner or operator must submit enough information (plans, timetables, emissions estimates with backup information, etc.) to allow the EPA to assess independently whether the source will meet NESHAPs requirements. General information requirements are listed at 40 CFR 61.07, and the sample letter in Section 7.2 describes these items more completely. Applications will be approved if the source, as constructed or as modified, can operate in compliance with the relevant standard.

7. **When applying for approval to modify a source, what are the limitations or requirements on the time period for the meteorological data, emissions averaging period, release assumptions, and other inputs to COMPLY?**

Answer: Since the standard applies to a year period, the dose from a modification should be estimated for a year. "A Guide for Determining Compliance with the Clean Air Act Standards for Radionuclides Emissions from NRC-Licensed and Non-DOE Federal Facilities" (EPA 520/1-89-002, January 1989) and "User's Guide for the COMPLY Code" (EPA 520/1-89-003, October 1989) describe the needed assumptions and limitations on input data.

8. **Will EPA consider accidental releases when deciding to approve or deny an application to construct a new facility or modify an existing one?**

Answer: No. By definition, accidental releases cannot be expected to occur and therefore are not considered. However, experience has shown that some releases that do not result from normal operation, such as occasional improper handling of or physical damage to sources, or failure of filters or exhaust hoods, are more predictable, and the EPA will require and consider information on this type of release when considering applications.

9. **Would changes in building dimensions require EPA approval as a modification, if emissions did not increase?**

Answer: A modification is defined in § 40 CFR 61.15(a) as a physical or operational change that results in an "increase in the rate of emission... ." The standard for Subpart I states that "emissions...shall not exceed those amounts that would cause any member of the public to receive in any year an effective dose equivalent of 10 mrem/yr." Thus, while it is possible that substantially altering the shape or size of a building could change the dose received, it does not change emissions, and no approval is needed. However, the facility must continue to comply with the standard.

10. **For facilities subject to subpart H, how frequently should "periodic" measurements be made at release points that have been determined not to require continuous monitoring?**

Answer: The owner or operator should determine the frequency of these periodic measurements on a case-by-case basis using the best professional judgment of the potential for emissions from that release point to increase significantly.

11. **What is the DOE Effluent Information System?**

Answer: DOE's Effluent Information System is a database that includes annual emissions data by release point.

12. **What criteria will the EPA use to evaluate an application by sources subject to Subparts H and I to use environmental measurements to demonstrate compliance?**

Answer: Detailed guidance for evaluating environmental monitoring programs is presented in Appendix A.

13. **Can accidental releases or plant upsets be considered when deciding to approve or deny environmental monitoring in lieu of stack monitoring at DOE facilities?**

Answer: Approval of environmental measurements for demonstrating compliance at DOE facilities is not in lieu of stack monitoring: environmental measurements take the place of air dispersion modeling. Therefore, stack measurements will be available to capture accidental release information in a timely fashion.

14. **Where mixed wastes are involved, do the RCRA regulations or the CAA NESHAP standards take precedence?**

Answer: For most facilities, the issue of mixed wastes is moot. At facilities that do have mixed wastes, primarily DOE facilities and NRC-licensed facilities, the RCRA and NESHAP requirements do not, for the most part, come in conflict since the mixed wastes are not in a form that will lead to airborne releases. Facilities where incineration is used to dispose of mixed wastes are an important exception to this general statement. For these facilities, both the RCRA requirements for mixed wastes and the NESHAP limits

for radionuclide emissions must be met. Neither set of regulations takes precedence over the other.

15. **The need to obtain EPA approval to modify a facility is likely to result in delay in implementing NRC-required modifications. This could have significant safety implications for workers or the public, depending on the nature of the modification. Is there any "emergency" modification approval process? Or could NRC procedures for reviewing modification/construction plans accommodate EPA's needs?**

Answer: Only modifications that would result in an increase in emissions require EPA approval. Modifications must be assessed for their potential to cause an increase. For modifications that are not estimated to cause an increase in emissions that would result in a dose greater than 1 percent of the standard (or, when combined with existing emissions, result in a dose greater than 10 percent of the standard), no application is required. Further, at least some NRC-required modifications cannot (or need not) be implemented in the time frame for EPA approval or denial (a maximum of 120 days), so there should not be a problem for some modifications or new construction. This issue is being considered as a topic for an NRC-EPA Memorandum of Understanding.

16. **Will NRC licensees be required to obtain a license amendment to incorporate the new EPA dose standard?**

Answer: This will be discussed as part of the NRC-EPA MOU.

17. **The NRC authorizes the use of radioactive materials at temporary and outdoor job sites. What constitutes the facility?**

Answer: Section 61.101 defines facility as 'all buildings, structures and operations on one contiguous site." The standard applies to all activities under the control of an NRC licensee, whether indoor or outdoor, permanent or temporary. The EPA can provide mote specific guidance on a case-by-case basis.

18. **Radionuclides may be intentionally dispersed into the environment as part of a tracer study. Where is the point of release if radionuclides are released into a well to determine hydrogeologic characteristics?**

Answer: Generally, radionuclides released to the atmosphere should be assumed to enter the air at the point of release. If radionuclides are released to another medium, a site-specific technical analysis may be performed to estimate the point of release. If the resulting dose exceeds the exemption level, these estimates must be submitted to the Agency for review before the tracer studies are performed. Actual releases and the resulting dose are then subject to the NESHAPs reporting requirements.

19. **At low level radioactive waste disposal sites, how is the source term from buried materials to be calculated? How are releases from area sources to be handled?**

Answer: To calculate a source term, radionuclides that boil at temperatures less than 100° C must be assumed to be released from waste disposal sites. Also, volatile daughters that form as a result of decay of parent nuclides buried at the site must be considered to be released. In either case, the release rate can be assumed to be associated with the durability of the waste packaging (Class A, B, or C). In handling area sources, if the receptor is far from the site - more than twice the distance across the site, measured in the direction to the receptor - it can be assumed that the total release takes place at ground level from the center of the disposal site. If the receptor is closer to the site, a computer program called AREA can be used to calculate a multiplier that accounts for the additional exposure due to close proximity.

20. **What is a low energy accelerator for purposes of subpart I?**

Answer: The EPA's provisional definition of a low-energy accelerator is one that has a beam energy of 100 MeV or less. The Agency is continuing to refine this definition.

21. **Potential emissions from an accelerator include both activation products and releases from the target materials. How is the source term for these facilities to be determined?**

Answer: The source term should be determined by making two separate estimates: 1) releases from the accelerator tunnel itself, and 2) releases from handling and processing the targets once they are removed from the accelerator. For accelerators with a beam energy of 100 MeV or less (low energy accelerators, as currently defined), emissions from the accelerator tunnel are exempt from the rule. For accelerators with a beam energy greater than 100 MeV, the tunnel may be considered a "sealed" source until venting occurs. The source term may be reduced due to radioactive decay, based on the time between shutting off the beam current and venting the tunnel. The targets may also be considered "sealed" unless they are damaged. If damaged, then the appropriate release fraction based on the physical form of the target must be applied to the quantity of radioactive material in the target. At all facilities, once the target is removed from the tunnel, it should be included in the facility's annual inventory. When it undergoes processing to recover the product, the appropriate release fraction is applied to estimate the source term.

22. **Do the dose standards apply to an actual member of the public or a hypothetical individual?**

Answer: The standards apply to actual members of the public.

23. **Does the COMPLY code calculate the dose to a real or to a hypothetical individual?**

Answer: Like all dose assessment codes, the COMPLY code only approximates reality. As explained in the Background Information Document (EPA 520/1-89-

002), the tiered approach used in COMPLY allows more site-specific values to be substituted for certain parameters at higher levels. Other parameter values and calculational techniques are implicit in the methodology and cannot be changed. The COMPLY methodology was developed to assure that the calculated doses do not significantly underestimate the actual dose received by any member of the public. The user may, of course, calculate dose to a hypothetical individual at the fencepost in the predominant wind direction.

24. **Can methods other than COMPLY, such as those approved by the NRC, be used to calculate dose? Why is a facility that uses another method required to file an annual report even if it is in compliance?**

Answer: Alternate methods can be used with prior EPA approval on a case-by case basis. The Agency anticipates that relatively few facilities will need to use an alternate method, and that those that wish to do so will be large, complex, or unusual in some respect. These facilities are more likely to have the potential to cause larger doses, and the EPA wishes to track that potential and the adequacy of the alternate methods over time.

25. **What criteria will the EPA use to approve alternate computer codes for use in place of COMPLY?**

Answer: Approval of alternative computer codes will be based on an evaluation of the meteorological and dosimetric models used in the code end on the exposure pathways that are included. The meteorological dispersion portion of the code must be appropriate for the situation that is being evaluated. For example, a code for treating area sources is not appropriate for releases from a stack or vent. The dosimetric models should closely approximate those in ICRP 26 and 30, and any differences should be explained and justified by the applicant. With respect to pathways, the code must consider air immersion, inhalation, ingestion, and ground-surface contamination. In addition, any request for approval of an alternative procedure that proposes modifying parameters that affect dose should be reviewed by EPA Headquarters prior to approval.

26. **Is the nearest office, business, or school located off the site, or could it be a part of the facility?**

Answer: For all subparts except Subpart I, compliance is to be demonstrated at the offsite residence, school, or office that is determined to have the highest potential exposure. For Subpart I, which includes facilities such as universities where there may be a residence on the site, compliance is determined at the residence (including an onsite residence, if any) or the offsite school or office that is determined to have the highest potential exposure.

27. **How is "receptor" defined?**
Answer: The receptor is either the point occupied by the individual whose exposure is being assessed, or the location where food that the individual consumes is being grown. (Note : the EPA compliance procedures for Subpart I

allow three separate locations for farms producing vegetables, milk, and meat.)

28. **Can facilities subject to Subparts B, H, or I assume that the receptor is at the site boundary in order to avoid continually determining the location of the maximally exposed individual?**

Answer: For facilities subject to Subparts B and H, demonstrating compliance at the site boundary requires prior EPA approval. This approval is appropriate when the release point/fence post relationship is such that the plume touches the ground within the site boundary. For facilities subject to Subpart I that do not have a residence on the site, prior approval is not required because the compliance procedures assure that the fence post exposure does not underestimate exposure at other locations.

29. **Some facilities that use measured emissions data for input into air dispersion models to demonstrate compliance may not yet meet all the specific monitoring requirements set out in the standards but can show that they meet the dose standards. What should those facilities do while amending their monitoring programs or changing monitoring equipment to meet the EPA requirements?**

Answer: Where monitoring is required by a specific subpart, the facility also has the option to ask the EPA to approve alternative procedures. The possibility of obtaining approval for the use of alternative procedures is mentioned both in the specific subpart (e.g., 40 CFR 61.93) and in Subpart A, at 61.14(g) (1).

30. **An elemental phosphorus plant is required under Subpart K to test its emissions initially within 90 days of December 15, 1989, and every year after that. The previous Subpart K NESHAP also required a plant to conduct an initial emission test or obtain a waiver of that test. Will tests conducted under the old NESHAP have to be repeated?**

Answer: Unless a waiver of emissions testing is obtained under 40 CFR 61.13, tests must have been conducted by March 15, 1990, and annually thereafter. Considerations for granting a testing waiver should include: the operational status of the plant (three facilities are on indefinite shutdown and no testing should be required unless they resume operations, if ever): whether the facility has changed its operations; and the previous level of polonium 210 emissions. If the testing methods met the requirements of the previous NESHAP and the test results showed emissions of less than 0.5 Ci/yr, an emissions testing waiver may be granted. This emissions level allows for testing error, provides an ample margin of safety, and would require only three plants to test emissions under the new NESHAP standard. As well as waiving the testing requirement, the EPA may also increase the frequency of testing.

31. **If operating conditions do not change, does an elemental phosphorus plant have to test emissions every year?**

Answer: Under the new Subpart K, annual tests are required unless the Administrator waives them. The Administrator may grant either a temporary or permanent waiver. Also note that the Administrator may require more frequent testing under 40 CFR 61.123(a) and 40 CFR 61.13(b).

32. **When demonstrating compliance for an elemental phosphorus plant under Subpart K, would it be appropriate to measure the feedstock for polonium-210 concentration using, for example, the EERF Radiochemistry Method (R. Blanchard) instead of determining the emission rate each year?**

Answer: Measuring the polonium-210 concentration in the feedstock would require the Administrator's approval as an alternative method under 40 CFR 61.13 (h) (1) (ii). Approval is appropriate if the annual throughput of polonium-210 is less than 2 Ci/yr. If the annual throughput of polonium-210 is greater than 2 Ci/yr, approval could still be appropriate if the owner or operator can prove that the efficiency of the effluent control system would limit emissions of polonium-210 to less than 2 Ci/yr.

33. **What is meant by the "size and dimensions" of a phosphogypsum stack (Subpart R, §61.203(b) (2))?**

Answer: Since radon monitoring of phosphogypsum stacks is to be conducted by type of region (beaches, loose and dry top surface areas, hard-packed roadways, end sides), enough information should be included so that the area of each of these regions, and the total area of the stack, including water-covered regions, can be determined.

34. **Subpart R, the NESHAP limiting radon emissions from inactive phosphogypsum stacks, states that an owner or operator must notify the EPA within 45 days if he begins to use an inactive stack for further phosphogypsum disposal or for water management. Is this reuse a modification for which EPA approval is required, or is the notification of activity sufficient?**

Answer: The concept of modification as defined in 40 CFR 61.15 does not apply in the case of phosphogypsum stacks. Providing the EPA with notice of activity is sufficient.

35. **Are phosphogypsum supplies held by farmers and farm supply facilities subject to the NESHAP?**

Answer: The Subpart R prohibition on using phosphogypsum for agricultural purposes has been waived for the 1991 growing season. Under the partial reconsideration granted for Subpart R, this and other issues relating to alternative uses of phosphogypsum are being addressed and should be resolved by October 1, 1991.

36. **One phosphogypsum stack in Region V was created as a result of detergent production rather than fertilizer production. Is this stack subject to Subpart R?**

Answer: The partial reconsideration of Subpart R (55 FR 13480, September 10, 1990) is addressing this discrepancy in the applicability of Subpart R to certain phosphogypsum stacks.

37. **What criteria will EPA use when evaluating compliance waiver requests for uranium mills subject to Subpart W?**

Answer: Compliance waivers for operating mills should be granted only when there is substantial evidence that the waiver is needed to allow the construction of a new impoundment, and if the source meets all requirements of Section 112 of the Clean Air Act and 40 CFR 61.10(b). Waivers should be issued with the explicit condition that withdrawal of the licensing request for the replacement impoundment terminates the waiver.

38. **How should facilities that have completed reclamation of a tailings pile comply with the monitoring requirements?**

Answer: Subpart T allows owners or operators to request that the EPA approve an alternative monitoring procedure. Since it is not the EPA's intention to have facilities with reclaimed tailings piles disturb the erosion control system, one alternative is for the facility to submit its cover design calculations for review. If that review indicates that the flux standard will be met, the pile should be judged in compliance and no on-pile monitoring should be required.

39. **Where can a facility subject to Subparts Q, R, T, or W obtain the large area radon collectors required by Method 115?**

Answer: Large area canisters are commercially available from Scientific Analysis Inc., P.O. Box 3112, Montgomery, AL 36109. In addition, they can be constructed by the facility, following the description in EPA 520/5-85-029. EPA Headquarters is evaluating the possibility of approving alternative radon flux measurement devices.

7. SUGGESTED LETTER FORMATS

This section contains sample letters that can be adapted to notify facilities about NESHAP activities that may affect them, respond to their inquiries, and transmit approvals or denials in response to applications. They are based on letters produced by several different EPA Regional Offices. They are quite general in nature and should be adapted to suit the particular topic discussed and the type of licensee to which they are addressed. Origination and other codes should follow the standard format for each region.

7.1 APPLICATION FOR MODIFICATION NOT REQUIRED

(Address Block)

Subject: NESHAP Applicability to Changes in (system) at the (facility name)

Dear -------:

As requested in your letter of (date), we have reviewed the information describing the proposed change in order to determine whether or not it constitutes a modification as defined in 40 CFR 61.15. Based upon our review, we do not consider this change (brief description) to be a modification. The basis for our determination is that this change is a (pollution control system modification, etc.) that should reduce radionuclide air emissions rather than increase them. Therefore, if emissions will not increase as a result of this change, the change will not be a modification under the NESHAP.

If you have any questions about the applicability information provided in this letter, please contact (name) of my staff at (telephone).

Sincerely yours,

(Signature Block)

cc:

7.2 CONTENT OF AN APPLICATION FOR APPROVAL OF CONSTRUCTION OR MODIFICATION

(Address Block)

Subject: Application for Approval of Construction or Modification

Dear -------:

Thank you for your (letter, phone call) to the United States Environmental Protection Agency (U.S. EPA) regarding (construction, modification) of the (source) at (facility). As you may know, (facility) is subject to the Radionuclides NESHAP published at 40 CFR 61 Subpart (--).

The general NESHAP provisions of 40 CFR 61.07 require an owner or operator to submit an application for approval of the construction of any new source or

modification of an existing source to the EPA. This application must be submitted before the construction or modification is planned to commence. "Construction" means "fabrication, erection or installation of an affected facility" (40 CFR 61.02). "Modification" means "any physical or operational change to a stationary source which results in en increase in the rate of emission to the atmosphere of radionuclides" (40 CFR 61.15). **(Note: For Subparts H and I, the definition of "construction" covers a new structure at an existing facility. For these subparts, a "facility" is defined as a "all buildings, structures, and operations on one contiguous site.")**

In your (letter, phone call), you asked what information should be included in an application to construct or modify your facility. General requirements are listed at 40 CFR 61.07, and the enclosure to this letter describes these items more completely. **(Note: Facilities subject to Subpart H do not have to apply for approval if the emissions from the new construction or modification would result in an effective dose equivalent of less than 1 percent of the standard, if their last annual report shows that the facility is in compliance; facilities subject to Subpart I do not have to apply for approval if the emissions from the new construction or modification would result in an effective dose equivalent of less than 1 percent of the standard, or emissions from the entire modification) facility (including the construction or modification) would result in an effective dose equivalent of less than 10 percent of the standard, if their last annual report shows that the facility is in compliance.)** The U.S. EPA may request additional information if, during its review of the application, it determines that such information is necessary to complete its evaluation.
An application for approval to construct or modify should be sent to : (name, address).

If you have any questions about this letter, contact (name) at (telephone).

Sincerely yours,

(Signature Block)

Enclosure: Content of an Application for Approval of Construction or Modification

cc:

Content of an Application for Approval of Construction or Modification

I Name and Address of the Owner or Operator
Provide the address of the facility where the radionuclides may be released as well as the address of the owner or operator, if they are not the same.

II Location of the Source

Provide: (1) plant layout on a topographic map showing boundaries; (2) location of the proposed construction or modification: (3) location of other existing sources (including those not constructed or modified that have received approval to construct or modify, and those that were exempt from obtaining approval); (4) topographic characteristics of the area; (5) location of National Weather Service or on-site/local points for meteorological observations; (6) latitude and longitude (within 1 minute) of center of site; and (7) location of the nearest unrestricted area where an individual resides or abides.

III Identification of Radionuclides

Identify the type of radionuclides emitted by the new construction or modification and the annual quantity projected to be released in curies per year (Ci/y) under normal operating conditions. Evaluate the potential for release under abnormal circumstances that can be reasonably foreseen. Also, provide information such as: (1) the number and location of emission points; (2) the identity and activity of radionuclides released from each point; (3) the monitoring program for measuring these emissions; (4) stack heights and diameters; and (5) stack exit velocities and temperatures. Provide any other relevant information that may be used to determine dose to the nearest receptor from radionuclides released by the proposed construction or modification.

IV Process Characterization

Provide a brief description of the nature, size, design, and method of operation of the new construction or modification, including the design operating capacity. Provide a process flow diagram with operating rates, operating schedule, and projected releases during normal operations. Estimate releases from abnormal operations under reasonably foreseeable circumstances. If the feed material can vary in radionuclide content, describe the measures that will be taken to verify the composition of the feed materials.

V Estimate Dose

Estimate the annual effective dose equivalent to any member of the public at the offsite point of maximum annual air concentration where there is a residence, school, or office. The effective dose equivalent should be calculated using the computer models (AIRDOS-EPA, RADRISK [CAP-88 version], COMPLY, COMPLY-R). A copy of the computer output showing all input parameters used end the annual effective dose equivalent (in all 16 compass directions, at (--) distances [output shown depends upon computer model used]) should be included. Include dose estimates by exposure pathway, if the computer printout shows them. If the dose is caused by a mixture of radionuclides, provide estimates of the dose contributed by each individual nuclide.

Estimate the dose from the proposed construction or modification alone

as well as the dose from the entire facility including the construction or modification.

VI Abnormal Circumstances Analysis

List the possible abnormal circumstances that can be reasonably foreseen to occur as a result of operation of the equipment involved in the new construction or modification (e.g., [insert appropriate example]), the relative likelihood of each such circumstance, and an estimate of the effective dose equivalent (based on the most appropriate method for the circumstance) associated with the circumstance that results in the maximum estimated dose, and an explanation of the methodology used to conduct the analysis.

VII Control Equipment

Describe the existing control equipment for each emission point. Describe both primary and secondary control device(s) for radionuclide emissions. Estimate control efficiency (percent) for each control device and provide a basis for these estimates.

7.3 INITIAL RESPONSE TO REQUEST FOR [VARIOUS SUBJECTS]

Note: This type of letter might be used for requests that require review by the EPA. Some examples are an extension of time to provide information; determine whether a response is needed; waiver of compliance; waiver of emission testing; approval of alternative methods or models; end use of an alternative emission standard. Extension of time is used as an example here.

(Address Block)

Subject: Extension of Time

Dear -------:

The U.S. Environmental Protection Agency has received your request for an extension of time for (period of time) beyond (agency action that triggered request for extension). We have begun our review of the material you submitted.

You will be contacted if we have any questions about your submission or when our review is complete.

Sincerely,

(Signature Block)

cc:

7.4 NOTICE TO ANOTHER FEDERAL AGENCY OF NESHAP APPLICABILITY; REVIEW AND COMMENT

(Address Block)

Subject: Applicability of Radionuclides NESHAPS to Proposed Action

Dear -------:

The (date) Federal Register that the (agency) is considering authorizing the (action). As described, this facility would be subject to the regulations of Title 40 of the Code of Federal Regulations, Part 61, Subpart (--) (Radionuclides NESHAPs). The operator of that facility may submit to the appropriate EPA Regional Office an application for a determination as to whether the (action) is considered a (construction, modification) of a source. Such (construction, modification) would require application to and approval by the EPA before commencing (construction, modification). A copy of the current NESHAP is enclosed.

Any Environmental Assessment (EA) performed by the (agency) should address the NESHAP' regulations and perform the analyses described in those regulations before reaching a "Finding of No Significant Impact" (FONSI). Until the EPA has had the opportunity to review such EAs, we would be unable to determine whether the issuance of a FONSI is warranted.

EPA Region (--) would appreciate the opportunity to review such EAs and, as appropriate, to provide comments to (agency). Please provide the EPA's Office of (--) with the EA for this project and all such future projects. Any comments that the EPA provides on the adequacy of the EA would be submitted pursuant to Section 309 of the Clean Air Act, the National Environmental Policy Act (NEPA), and the Council on Environmental Quality's Regulations for implementing NEPA (40 CFR 1500-1508).

If you have any questions, please contact (name) of our staff at (telephone) about NESHAP requirements or (name) at (telephone) regarding EPA's role in the NEPA process.

Sincerely,

(Signature Block)

Enclosure

cc:

7.5 NOTICE OF NESHAPS APPLICABILITY

CERTIFIED MAIL - RETURN RECEIPT REQUESTED

(Address Block)

Subject: Applicability of Radionuclides NESHAPs

Dear -------:

The United States Environmental Protection Agency (EPA) promulgated radionuclide air emission standards under Section 112 of the Clean Air Act on (date). Subpart (--) of 40 CFR Part 61 applies to (source category). This letter is to notify you that your facility may be subject to this standard. Please fill out and return the enclosed response form so that the EPA will have a record that your facility was notified.

A copy of the regulation and a summary are enclosed for your information, along with a copy of Subpart A, which contains the general provisions of 40 CFR Part 61. If your facility is subject to the standard, it must comply with both the general provisions that have not been superseded by the Subpart and the specific provisions of Subpart (--).

Please be aware that these provisions are effective (date), including, according to the relevant Subpart, emissions monitoring requirements or emissions testing requirements, unless a compliance waiver has been obtained under 40 CFR 61.11 or 61.13, or alternative procedures have been approved by the EPA under the relevant subpart and 40 CFR 61.13 and 61.14. **(Note: select the comments appropriate to the Subpart being discussed:** Facilities subject to Subpart (B, H, W) are required to monitor their emissions to determine an effective dose equivalent. Facilities subject to Subpart I may either monitor or estimate their emissions to determine an effective dose equivalent. Owners or operators of facilities subject to Subpart (K, R, T) are required to conduct an initial emissions test. New sources that started up prior to (effective date), and existing sources, must conduct the initial emissions test by (90 days after effective date). New sources that started up after (effective date) must conduct the initial emissions test within 90 days of startup. Sources subject to Subpart (K must report the test results to the EPA within 60 days of the test; R, T must report the test results to the EPA within 90 days of the test. For facilities subject to Subpart Q, requirements for testing or monitoring to demonstrate compliance with the standard will be part of a Federal Facilities Agreement negotiated between the EPA and DOE.)

If you do not own or operate any of the affected facilities described in the regulations, please notify our office in writing. If you have any questions about procedures or the regulations, please contact (name) at (telephone). Please address all letters, initial reports, waiver requests, and like correspondence to this office to the attention of (name).

Sincerely,

(Signature Block)

Enclosures (2)

cc:

7.6 APPROVAL OF CONSTRUCTION/MODIFICATION

[First Page Reads as Follows]

(Source Designation Number and Name)
Approval to Construct/Modify

In compliance with provisions of the Clean Air Act, ,as amended (42 U.S.C. § 7401 et seq.), the (facility name) is granted approval to construct/modify source (designation, name), located at (facility name and location). This approval is granted in accordance with the plans and materials submitted with the applications and with Federal regulations governing the National Emission Standards for Hazardous Air Pollutants, 40 CFR Part 61, Subpart (--). Any conditions attached to this document are considered part of this approval.

Failure to comply with any conditions or terms set forth in this approval may result in sanctions available under the authority of Section 1-604 of Executive Order 12088, as well as enforcement procedures established by the Clean Air Act.

This approval to construct/modify grants no relief from the responsibility for compliance with other applicable provisions of Federal regulations. This approval shall be effective immediately upon receipt by the applicant.

Dated _____ _____
Regional Administrator

[Attached Sheets Include Terms and Conditions. These may cover:

- o Emergency notification
- o Approval expiration, transferability, amendment
- o Adherence to construction/modification application information
- o Provision of testing facilities
- o Emissions testing
- o Monitoring requirements
- o Notification of startup
- o Facility operation/maintenance conditions
- o Severability
- o Other applicable regulations
- o Agency correspondence]

APPENDIX A

GUIDANCE ON APPROVAL OF ENVIRONMENTAL MONITORING PROGRAMS TO DEMONSTRATE COMPLIANCE WITH THE DOE NESHAP

Paragraph (b) (5) of 40 CFR 61.93 states that the use of environmental measurements at critical receptor locations to demonstrate compliance with the standard is subject to prior approval of the EPA (EPA89.a). Applications for approval must:

1) include a detailed description of the sampling and analytical methodology, and

2) show how the following criteria will be met:

   i) Measurements shall be made at the location of the critical receptor.

   ii) The air at the point of measurement shall be continuously sampled for collection of radionuclides.

   iii) The radionuclides released from the facility that are the major contributors to the effective dose equivalent must be collected and measured.

   iv) Radionuclide concentrations that would cause an effective dose equivalent greater than or equal to 10 percent of the standard shall be readily detectable and distinguishable from background.

   v) A quality assurance program shall be conducted that meets the requirements described in Appendix B, Method 114.

1. SAMPLING AND ANALYTICAL METHODOLOGY

The stack monitoring and sample collection methods described in Method 114, Section 2, Section 3, and the radionuclide analysis methods listed in Method 114, can, in general, be applied to environmental measurement of airborne radionuclides. If the method provided in the application does not conform to Method 114, the method should be submitted to Headquarters, Office of Radiation Programs, for further review and a decision on its applicability.

Table 1 lists the half-lives and modes of decay of the principal radionuclides released at DOE facilities and identifies the physical state of each. Consideration of these physical parameters is necessary to establish whether environmental monitoring for determining compliance will be feasible.

1.1 RADIONUCLIDES AS PARTICULATES

The radionuclides of greatest concern at many DOE facilities, often uranium-234 and/or uranium-238, are in particulate form (see Table 2). To sample for particulates, air is pulled through a high-efficiency particulate filter using a calibrated high-volume air sampler. The sampling rates (volume

Radionuclide	Half-Life	Decay Mode
	Particulates	
U-234	2.4 E+5 yr	Alpha
U-235	7.1 E+8 yr	Alpha
U-238	4.5 E+9 yr	Alpha
Pu-238	8.8 E+1 yr	Alpha
Pu-239	2.4 E+4 yr	Alpha
Am-241	4.3 E+2 yr	Alpha
K-40	1.3 E+9 yr	Beta, Gamma
Co-60	5.3 E+0 yr	Beta, Gamma
Sr-90	2.9 e+1 yr	Beta
Sb-125	2.7 E+0 yr	Beta, Gamma
Pb-212	1.1 E+1 hr	Beta, Gamma
	Gases	
H-3 (H_2)	1.2 E+1 yr	Beta
C-11	2.0 E+1 min	Positron
N-13	1.0 e+1 min	Positron
C14 (CO_2)	5.7 E+3 yr	Beta
O-15	1.2 E+2 sec	Positron
Ar-41	1.8 E+0 hr	Beta, Gamma
Kr-88	2.8 E+0 hr	Beta, Gamma
Xe-133	5.3 E+0 day	Beta, Gamma
	Liquids	
H-3 (H_20)	1.2 E+1 yr	Beta

Table 2. The Primary Radionuclides at the 27 DOE Facilities[a]

Facility	Radionuclides	Percent Contribution[b]	Maximum Organ Dose, mrem/yr
Reactive Metals, Inc., OH	U-234 U-238	52 46	Lungs 2.5 E+1
Los Alamos Natl. Lab., NM	0-15 C-11 N-13	57 29 7	Gonads 9.5 E+0
Hanford Reservation, WA	Ar-41 Pu-238	61 33	Endosteum 6.3 E+0
Oak Ridge Reservation, TN	U-234 U-238 H-3	40 13 35	Lungs 2.2 E+1
Savannah River Plant, SC	H-3 Ar-41	77 18	Lungs 2.7 E+0
Feed Materials Production Center, OH	U-234 U-238	53 48	Lungs 1.9 E+1
Brookhaven Natl. Lab., NY	Ar-41	94	Gonads 8.0 E-1
Mound Facility, OH	H-3	98	Lungs 3.8 E-2
Idaho Natl. Eng. Lab., ID	Ar-41 Sb-125 Kr-88	51 32 8	Gonads 2.9 E-2
Lawrence Berkeley Lab., CA	H-3	90	Red Marrow 2.5 E-2
Paducah Gaseous Diffusion Plant, KY	U-234 U-238	} 99 }	Lungs 2.5 E-1
Lawrence Livermore/Sandia Lab., CA	H-3	98	Multiple[c] 1.1 E-2
Portsmouth Gaseous Diff. Plant, OH	U-234 U-238	} 96 }	Endosteum 3.4 E-1
Argonne Natl. Lab., IL	C-11 H-3	NR[d] NR	Lungs 3.1 E-2
Pinellas Plant, FL	H-3	100	Multiple 4.4 E-3
Nevada Test Site, NV	Xe-133 H-3	81 10	Thyroid 1.9 E-2

Table 2. (Continued)

Facility	Radionuclides	Percent Contribution[b]	Maximum Organ Dose, mrem/yr
Knolls Atomic Power Lab., NY	Ar-41 Co-60 C-14	69 12 7	Red Marrow 6.9 E-3
Battelle Memorial Inst., OH	K-40 U-235 Pu-239	61 24 10	Lungs 3.1 E-3
Fermi Natl. Lab., IL	C-11	100	Gonads 9.2 E-4
Sandia Natl. Lab., NM	Ar-41 Pb-212	74 26	Lungs 1.2 E-3
Bettis Atomic Power Lab., PA	U-234 U-238 Sb-125	} 69 10	Lungs 4.3 E-3
Knolls Lab., Windsor, CT	Ar-41	93	Gonads 3.8 E-4
Rocky Flats Plant, CO	U-238	35	Endosteum 1.6 E-2
Pantex Plant, TX	U-238	94	Lungs 2.2 E-3
Knolls Lab., Knolls, CT	U-234	79	Lungs 1.7 E-3
Ames Lab., IA	H-3	100	Multiple 1.3 E-5
Rocketdyne Rockwell, CA	Sr-90	100	Red Marrow 7.0 E-6

(a) From Environmental Impact Statement - NESHAPs for Radionuclides (EPA 89b).
(b) Percent contribution to total exposure.
(c) Multiple organs with same estimated dose rate.
(d) NR - Not Reported.

of air per unit of time) should be recorded daily, and the total volume of air sampled based on the average of the recorded flow rates. The decrease in flow rate during a sampling period, up to one week, should not exceed 40 percent.

For radionuclide analyses, at least halves,the air filter should be equally split into at least halves, and each analyzed separately: 1) as a duplicate analysis; 2) as a cross-check analysis for the QA program; or 3) to be retained in case a re-analysis or additional analyses are required later. The volume of air sampled can be assumed to be proportional to the mass of the filter fraction. Also, combining filters for analysis, each representing a specific sampling period (e.g., weekly), into a monthly composite sample can be an acceptable approach to measuring long-lived radionuclides.

1.2 RADIONUCLIDES AS GASES

Tritium, as water vapor, can be collected in the environment by the methods described in Section 2.2.1 of Method 114. TO measure total tritium in the environmental air sample (tritiated water vapor plus elemental tritium, H_2), the sampling system requires an oxidizing bed to convert any elemental tritium into water followed by a zeolite bed, for example, to absorb the tritiated water that was initially present in the air and that formed from the oxidation of H_2 in the sampling system. Because elemental tritium may remain as H_2 for extended periods of time in the atmosphere, the applicant should:

1) measure both chemical forms of tritium in the environment; or

2) increase the measured environmental tritiated water vapor concentration by the activity ratio (total tritium/tritiated water vapor), measured at the point of release; or

3) show that concentrations of elemental tritium are insignificant at the environmental sampling location relative to the tritium present as water vapor.

The carbon-14 in environmental airborne samples can be considered to be in the form of carbon dioxide (CO_2) and sampled as carbon dioxide as described in Method 114, Section 2.2.4.

Applying cryogenic techniques to sample radioactive noble gases will be impractical at most locations in the environment and away from the plant. Therefore, a sampler that collects a controlled volume of air at specific time intervals will be acceptable and considered a continuous sample for the purpose of the standard. Cryogenic techniques, with liquid scintillation counting, can be used in the laboratory to separate and measure the radioactive noble gases collected in the field, as described in Method 114.

It will not be practical, nor possible at most facilities, to collect and measure the short-lived gaseous radionuclides in the environment. These radionuclides are primarily oxygen-15, carbon-11, and nitrogen-13 (see Table 1). Although the half-lives of the noble gases argon-41 and krypton-88 are much longer (2-3 hours), their measurement in the environment on a continuous basis will also be impractical. As the sample collects, the

radionuclide rapidly decays, and in a short time an equilibrium is established when the collection is equal to the decay rate. Thus, there is a limit to the quantity of radioactivity collected, and also considering the decay that will occur during dispersion from the source to the receptor, obtaining adequate sensitivity will be extremely difficult. For this reason, demonstrating compliance by measuring the following short-lived radionuclides in the environment should not be an option:

Radionuclide	Half-life
oxygen-15	120 seconds
nitrogen-13	10 minutes
carbon-11	20 minutes
argon-41	1.8 hours
krypton-88	2.8 hours

Except possibly for the Los Alamos facility, the radiation exposures to the maximum exposed individuals contributed by these short-lived gaseous radionuclides are not significant compared to the 10 mrem/yr limit.

2. CRITERIA FOR ENVIRONMENTAL MONITORING PROGRAMS

2.1 MEASUREMENTS SHALL BE MADE AT CRITICAL RECEPTOR LOCATIONS - HOW SHOULD THESE LOCATIONS BE DETERMINED?

For facilities with continuous emissions, the critical receptor locations may be either:

(a) the location of the highest chi/Q on the facility perimeter fence line; or

(b) the location of the highest off-site chi/Q where a residence exists.

In case b), the sampling location may be placed at any site between the highest off-site chi/Q and the fence line if this would make sampling easier, more convenient, and less restrictive.

Any acceptable dispersion model (AIRDOS, COMPLY, etc.) may be used to determine the highest chi/Q location(s). If the highest chi/Q location is represented by several sites with similar values, measurements should be required at all such sites until the location with maximum chi/Q can be definitely identified (one year minimum sampling). Sampling will then be required at only the maximum chi/Q site. The same procedure should be followed when fence-line measurements are used (case (a) above) and the highest concentrations are computed to be similar within 2 or more of the 16 sectors.

For facilities with intermittent or variable emissions, many locations around the facility (at least one within each of the 16 sectors) should be monitored.

2.2 THE AIR AT THE POINT OF MEASUREMENT SHALL BE CONTINUOUSLY SAMPLED FOR COLLECTION OF RADIONUCLIDES - WHAT REPRESENTS CONTINUOUS SAMPLING?

The requirements for continuous sampling will be considered satisfied when an 80 percent QA completeness requirement is met. That is, the time the sampler is not in satisfactory operation due to malfunctions, filter or sample changes, maintenance, calibration, etc., cannot exceed 20 percent of the sampling period. If a facility fails periodically to satisfy this requirement, a backup sampler must be in place at all times and operated on a schedule that ensures that a sample is collected during at least 80 percent of the sampling period. The collection of radioactive noble gases is an exception to this requirement (see Section 1.2).

2.3 THE RADIONUCLIDES RELEASED FROM THE FACILITY THAT ARE THE MAJOR CONTRIBUTORS TO THE EFFECTIVE DOSE EQUIVALENT MUST BE COLLECTED AND MEASURED - WHAT RADIONUCLIDES DOES THIS INCLUDE?

The radionuclides that contribute significantly to the effective dose equivalent at DOE facilities are listed in Table 2. There are only 11 particulate and 7 gaseous radionuclides and tritium, which can exist as both a gas (H_2) and a liquid (H_2O). All of the listed particulate radionuclides and tritium, both as a gas and as a liquid, can be collected and measured in the environment. Of all the other gases listed, only xenon-133 has a half-life sufficiently long to permit it to be collected in the environment and measured (see Section 1.2).

2.4 RADIONUCLIDE CONCENTRATIONS THAT WOULD CAUSE AN EFFECTIVE DOSE EQUIVALENT OF 1 MREM/YR SHALL BE READILY DETECTABLE AND DISTINGUISHABLE FROM BACKGROUND

2.4.1 Radionuclide Concentrations That Would Cause an Effective Dose Equivalent of 1 mrem/yr Shall Be Readily Detectable - How Should This Be Determined?

Environmental monitoring programs shall be judged to meet this criterion if the "lower limit of detection" (LLD) of the sampling and analysis methods is 10 percent or less of the Concentration Levels for Environmental Compliance listed in Table 2, Appendix E of 40 CFR part 61. The LLD is the smallest concentration of a radionuclide that has a 95 percent probability of being detected (i.e., the true activity value is greater than zero). The LLD is calculated as follows:

$$LLD(Ci/m^3) = \frac{4.66S_b}{2.2x10^{12}E.V.Y.e^{-\lambda\Delta t}}$$

where

S_b = standard deviation of the background or blank count rate (cpm);

E = counting efficiency (cpm/dpm);

V = sample volume (m^3);

Y = radiochemical yield, if applicable (unitless);

= radioactive decay constant($time^{-1}$);

t = time elapsed between midpoint of sample collection and time of counting (time); and

2.2×10^{12} = dpm/curie

The value of S_b should be the standard deviation of a series of blank measurements made on the sample collection media (e.g., an air-particulate filter) carried through the complete analysis procedure.

If the application for approval does not list an LLD for the sampling and analysis methods, nor a description of the computation used for its determination, the applicant should be requested to provide this information. In some cases, the applicant may not supply the detection limits for the proposed monitoring program using the above calculational method but may provide the information necessary to perform the computation. If this occurs, the reviewer may calculate the LLD using the information provided.

Some applicants may express their detection limits as a "minimum detectable activity" (MDA). Calculating an MDA requires determination of the standard deviation of the background count rate (S_b). This value can be used in the above equation for the LLD to compute the MDA.

Table 3 lists the required sensitivities and examples of actual procedural sensitivities for the principal radionuclides released to the atmosphere at DOE facilities. The required sensitivities are one-tenth the concentrations listed in 40 CFR 61, Appendix E, Table 2. The procedural sensitivities are based primarily on the airborne radionuclide measurement program conducted at the EPA's National Air and Radiation Environmental Laboratory (NAREL), formerly the Eastern Environmental Radiation Facility (EERF) (Br83). Information in Table 3 indicates that the sensitivities for measuring all particulate radionuclides, tritium, and carbon-14 are quite adequate to satisfy the requirements of the rule. On the other hand, the sensitivities associated with argon-41 and, very likely, krypton-88, are not low enough to satisfy the sensitivities required by the rule, particularly when the short half-lives of these radionuclides are considered (see Section 1.2).

2.4.2 Radionuclide Concentrations That Would Cause an Effective Dose Equivalent of 1 mrem/yr Shall Be Readily Distinguishable From Background - How Should This Be Determined?

The background concentrations of radionuclides in air are sufficiently low that nearly all radionuclides of interest at DOE facilities can be readily distinguished from background levels at concentrations that would cause an effective dose equivalent of 1 mrem/yr (see Table 3). However, there are two notable exceptions - radon-222 and external gamma-ray dose rates:

Table 3. Examples of Backgrounds and Sensitivities of Some Principal Airborne Radionuclides Released from DOE Facilities

Radionuclide	Required Sensitivity[1]	Representative Background	Example Sensitivity
	Concentration (aCi/m^3)		
U-234	770	25[2]	13[3]
U-238	830	25[2]	13[3]
Pu-238	210	4[2]	13[3]
Pu-239	200	4[2]	13[3]
Am-241	190	4	13[3]
	Concentration (pCi/m^3)		
Ar-41	170	0	600[4]
Kr-85	100,000	40[5]	ND[6]
Kr-88	50	0	ND
C-14	NL[7]	1.3[8]	1.1
H-3	150	1.1[9]	1.1

(1) These sensitivities are 1/10 the concentrations listed in 40 CFR 61, Appendix E, Table 2.
(2) Average of January - December 1986 airborne measurements in 63 U.S. cities (EERF87a. b).
(3) Based on a weekly sample, average collection rate of 26 cfm, analysis of 1/2 filter, and a measurement sensitivity of 0.05 pCi/sample.
(4) Estimated from an EPA report on airborne radionuclides at the Savannah River Plant (B184).
(5) Average concentration measured in air at 12 U.S. cities in 1983, Environmental Radiation Data (ERD) files, Eastern Environmental Radiation Facility, EPA.
(6) ND - Not Determined.
(7) NL - Not Listed.
(8) Concentration taken from pp. 61-62 of NCRP85 and ORP73. This concentration relates to 7.5 pCi/g carbon.
(9) This estimate assumes 30 percent humidity at 20 C and a background <200 pCi/L of water vapor.

1) radon-222 concentrations in air that cause an effective dose equivalent to the lung of 1 mrem/yr cannot be distinguished from a background concentration of 0.2 pCi/l: and

2) submersion dose rates of 1 mrem/yr caused by radionuclide concentrations in air cannot be distinguished from background gammaray dose rates.

Therefore, applications for approval of environmental monitoring programs involving measurements of radon-222 or gamma-ray dose rates should be rejected.

Background levels are defined as general ambient radionuclide concentrations that are not related to an emission source. In some cases, sources other than the facility of interest may contribute to the radionuclide concentrations at the critical receptor location. Uranium mining and milling regions, where numerous sources of emissions exist in the same area, are an example of multiple sources contributing to the measured environmental concentration at a receptor location. However, this situation can exist wherever several different facilities releasing similar contaminants are in the same area. In these cases, it is extremely difficult, if not impossible, to distinguish the contributions of the various sources to the radionuclide concentrations at the receptor locations. Similarly, when the radionuclide being monitored also occurs in nature (e.g., potassium-40 at Battelle Memorial Institute in Ohio), the contribution to airborne concentrations from natural sources during high-wind conditions could not be distinguished from the amount of the radionuclide released from the facility. Therefore, because of these uncertainties, no correction (subtraction) of concentrations resulting from other sources to the concentration measured at the receptor location should be allowed (i.e., the total measured radionuclide concentration shall be used to determine compliance). Monitoring programs that include subtraction of concentrations from other emission sources should not be approved; rather, the total airborne radionuclide concentration measured should be compared to the concentration levels for environmental compliance in Table 2, Appendix E of 40 CFR 61, to determine compliance.

2.5 A QUALITY ASSURANCE PROGRAM SHALL BE CONDUCTED THAT MEETS THE PERFORMANCE REQUIREMENTS DESCRIBED IN APPENDIX B, METHOD 114, 40 CFR 61 - HOW IS THE VALIDITY OF A QA PROGRAM EVALUATED?

The application should include a statement that the applicant is conducting or is in the process of developing a quality assurance (QA) program in general conformance with the requirements of Method 114. Specifically, the applicant should provide the information required by Sections 4.4 and 4.5 of Method 114, including the following:

1) the requirements for precision, accuracy, and completeness of the environmental measurements; and

2) the number of replicates, spiked samples, split samples, and blank samples to be analyzed.

Applications that do not indicate or state that the applicant is conducting a QA program that generally conforms to the requirements of Method 114 should not be approved. Considerable flexibility should be allowed in judging whether a QA program is in conformance with Method 114. Quality assurance programs that meet the general intent of Method 114 should be judged to be in conformance.

If information required by Sections 4.4 and 4.5 of Method 114 is not submitted with the application, the applicant should be informed that this information must be provided. In reviewing these requirements, the following guidelines should be used:

1) the accuracy and precision of the measurements should be within 20 percent at the concentrations levels listed in Table 2 of Appendix E;

2) completeness should be at least 80 percent, that is, 80 percent of the samples collected should provide valid data; and

3) 20 percent of the samples analyzed should be replicates, blank, split, or spiked samples. Usually 10 percent are duplicate or split samples, 5 percent are blank samples, and 5 percent are spiked samples.

3. REFERENCES

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EERF87a Eastern Environmental Radiation Facility, "Environmental Radiation Data: Report 47," U.S. Environmental Protection Agency Report, EPA 520/5-87-006, June 1987.

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NCRP85 National Council on Radiation Protection and Measurements, "Carbon-14 in the Environment," NCRP Report No. 81, May 15,1985

ORP73 Office of Radiation Programs, U.S. Environmental Protection Agency, "Carbon-14 in Total Diet and Milk, 1972-1973," Radiation Health Data Reports 14, 679, November 1973.