
Suggested State Requirements and Criteria for a Low-Level Radioactive Waste Disposal Site Regulatory Program

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Conference of Radiation Control Program
Directors, Inc.

Prepared for
U.S. Nuclear Regulatory
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Documents such as theses, dissertations, foreign reports and translations, and non-NRC conference proceedings are available for purchase from the organization sponsoring the publication cited.

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Copies of industry codes and standards used in a substantive manner in the NRC regulatory process are maintained at the NRC Library, 7920 Norfolk Avenue, Bethesda, Maryland, and are available there for reference use by the public. Codes and standards are usually copyrighted and may be purchased from the originating organization or, if they are American National Standards, from the American National Standards Institute, 1430 Broadway, New York, NY 10018.

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Table of Contents

	Page
I. Statement of Task	1
II. Authority to regulate a LLW Site	1
III. 10 CFR Part 61 compatibility requirements	2
IV. State Program Staffing Requirements	3
V. State Environmental Monitoring Requirements	7
VI. State Program Equipment Requirements	8
VII. Lessons Learned from Current Regulatory Programs	9
Appendix A 46FR 7540-7546	A-1
Appendix B Training and Educational Requirements	B-1
Appendix C Pre-Operational Monitoring Program	C-1
Appendix D Operational Monitoring Program	D-1

I. Task Statement

Develop criteria and procedures for a state to follow in the development of a program to regulate a LLW disposal site. This would include identifying those portions of the NRC regulations that should be matters of compatibility, identifying the various expertise and disciplines that will be necessary to effectively regulate a disposal site, identifying the resources necessary for conducting a confirmatory monitoring program, and providing suggestions in other areas which, based on our experience, would result in a more effective regulatory program.

II. Authority to Regulate a Low-Level Radioactive Waste Site

To be able to regulate a low-level radioactive waste site, a state must first assume regulatory authority from the U. S. Nuclear Regulatory Commission in accordance with Section 274 of the Atomic Energy Act of 1954, as amended. The agreement may be a transfer of regulatory authority for all byproduct materials, source materials and special nuclear materials in quantities not sufficient to form a critical mass or be limited to authority to regulate low-level wastes in a permanent disposal site. This second category of transfer of regulatory authority is commonly called a "limited agreement," and is criterion 27.e in the NRC Statement of Policy entitled "Criteria for Guidance of States and NRC in Discontinuance of NRC Regulatory Authority and Assumption Thereof by States Through Agreement" (See 46FR 7540-7546, Appendix A).

In either case, an agreement may be effected between a state and the NRC: 1) upon certification by the governor that the state has a program for the control of radiation hazards adequate to protect the public health and safety with respect to the materials within the state covered by the proposed agreement and the state desires to assume regulatory responsibility for such materials; and 2) after a finding by the NRC that the state program is in accordance with the requirements of subsection O of Section 274. It is also necessary that the state have enabling legislation to enter into such an agreement.

The original criteria for an agreement (26FR 2537) were published on March 24, 1961, and were revised on January 23, 1984, to allow limited agreements (46FR 7540-7546). There are 36 criteria which are included in the NRC policy statement; the requirements of criteria 1-28 are generally applicable to LLW. These include requirements for state regulatory standards, license review and inspection procedures and personnel requirements.

A state's enabling legislation should make provisions for transfer of land used for disposal of low-level radioactive waste to the state prior to site operation. The operation would then be performed under a lease agreement and a radioactive material license. The enabling legislation should also provide for the collection of funds for post closure maintenance and monitoring.

A separate NRC license may be required if special nuclear material will be disposed of at the site in quantities greater than that allowed under state licensing authority.

Both Agreement and Nonagreement States that desire authority to regulate LLW site operations in their state should coordinate all activities with the NRC Office of State Programs to assure that all requirements are met.

III. 10 CFR Part 61 Compatibility Requirements

On March 29, 1983, the NRC Office of State Programs issued a statement to all agreement states concerning the "Compatibility Determination Regarding 10 CFR Part 61." This letter stated:

Based on our analysis of the regulation and discussions with the Agreement States, we have determined that the following sections and subparts of 10 CFR 61 are matters of compatibility for the Agreement States: Section 61.2, Definitions (applicable technical definitions); Subpart C, Performance Objectives; Subpart D, Technical Requirements for Land Disposal Facilities; those parts of Subpart B that are necessary to implement the provisions of Subparts C and D; these portions of Subpart D, financial Assurance, which deal with ensuring adequate funds for decontamination, closure and stabilization of a low-level radioactive waste disposal site; and Section 20.311 of 10 CFR Part 20; Transfer for Disposal and Manifest.

All Agreement States are expected to adopt equivalent provisions to 10 CFR 61.55, 61.56, 61.57 and 10 CFR 20.311 that pertain to persons generating and transferring waste which will be disposed of at land disposal facilities. Section 20.311 incorporates 10 CFR 61.55, 61.56 and 61.57 by reference and the provisions of these sections of Part 61 must be included in Agreement State regulations for completeness. Pursuant to our guidelines for review of Agreement State radiation control programs, these provisions should be adopted as soon as practicable but no later than 3 years. It should be noted that the waste transfer and manifest system becomes effective for NRC licensees on December 27, 1983. Interim arrangements are being made with the States having operating burial sites to implement the waste classification system and the waste transfer and manifest system through the burial site licensees so that Agreement States licensees will have to comply at the same time that NRC licensees do.

We would expect any Agreement State in which a new low-level radioactive waste burial ground is developed to adopt and apply those provisions of Part 61 which are a matter of compatibility.

With respect to Agreement States currently regulating operating burial sites, we have been and will continue to work with the States to implement Part 61 provisions on a case-by-case basis, to the extent practicable.

IV. State Program Staffing Requirements

The manpower necessary to properly regulate a permanent low-level waste disposal site is significant. The NRC estimates that three or more person-years total effort would be required just to perform the necessary pre-licensing review. This includes review by various specialties such as radiological health, geology, hydrology and related disciplines. In addition, a fairly extensive independent environmental monitoring program is required during all phases of site life, and resident inspectors must be employed to assure all wastes are properly packaged when they arrive at the site. Thus, there is also a significant effort to be applied in the operational phase.

The guidance provided in this document will separate the staffing requirements into the different operational phases of a low-level waste site. These are: A) Preoperational and Licensing, B) Operational and, C) Post Operational (long term care and maintenance phase). Where known, outside means of assistance will be identified such as the NRC. For each area of expertise, the basic training and education for the position will be identified as well as the job duties to be performed by the position.

A. Staffing Requirements for the Pre-operational and Licensing Stage

State regulatory activities for a low-level radioactive waste site begin long before a site receives its first drum of waste. The state will have interactions with the licensee/applicant even before a final site is located regarding siting requirements, pre-operational monitoring, data collection for the environmental impact statement and in a number of other areas. When the site is chosen, the state will have to initiate its independent environmental monitoring and site data collection program. At this time the state will have to interact with local residents who live near the site as well as local and county governments and the press. After the prelicensing data is collected and the licensee/applicant has submitted a formal license application and environmental impact statement, the state program will have to prepare its independent written environmental assessment and should conduct a public hearing before a license to begin construction of the site can be issued. The NRC has indicated their willingness to provide technical assistance to the state in the environmental impact and licensing review of a low-level waste site.

The state regulatory program should separate the licensing function from the compliance and inspection function if staffing allows. This allows staff members in each area to specialize in their job duties. However, it is also desirable to provide both groups cross training in each area.

The licensing staff should perform pre-license inspections and become familiar with inspection procedures, survey techniques and sampling procedures. The inspection staff should be given training in the licensing and the environmental assessment process and should review the license application and proposed license from the compliance perspective.

The state program staff requirements during the pre-operational and licensing stage include the following:

1. Program Administrators - These persons are in charge of the states regulatory program and would interface with the licensee/applicant, the general public and the press. They direct the day-to-day activities of the radiation control program staff. Individual program directors would supervise the licensing and compliance activities.
2. Health Physicists - Will be needed to review the license application from the stand point of radiological health protection and environmental monitoring. These persons would also write the state's safety analysis report which would be part of the environmental assessment. The requirements of education and training for these positions are included in Appendix B.
3. Civil/Mechanical Engineers - Will be used to review the site construction plans and trench designs. These persons would need expertise in both civil and mechanical engineering. These persons could be provided by outside consultants on a part-time basis or be employees of other state agencies that are used only during site licensing, or they could be persons provided by the NRC after the state requests technical assistance.
4. Environmental Quality Specialists - These persons will be necessary to review site ecology, meteorology and climatology and will have major input into the state program's environmental assessment. They will also examine the socioeconomic effects from site operation on surrounding communities. The training and education of these persons should include biology, chemistry, ecology, and other physical sciences. The expertise required for this area could also be provided by outside consultants on a part-time basis or be employees of other state agencies or NRC-provided personnel.
5. Hydrologists and/or Geologists - Will be needed to review site hydrology and geology, logs of wells in the area of the proposed site, and to perform earth resistivity measurements at the proposed site to confirm license application data. This expertise will also be needed during site operation and after closure to continually evaluate the performance of the site in conjunction with the environmental monitoring program. This will help assure that any leakage is detected and corrected as soon as possible.

6. Environmental Technicians - Responsible for collection of various environmental samples during the pre-license stage to verify the applicant's data. These persons should have basic science training as well as specific training in air, soil, and water sampling methodology.
7. Radiochemist - Responsible for analysis of environmental samples and preparation of data reports. This person should also have a basic science background with special training in radiochemistry and use of laboratory counting equipment.
8. Staff Assistants - Responsible for administrative and clerical functions associated with the regulatory program.
9. Public Information Specialists - May be necessary to issue press releases concerning the state's program activities as well as to review the Environmental Assessment for grammatical completeness. The training and education requirements include journalism and technical writing skills.
10. Lawyers - Legal assistance will be necessary if the state law requires an adjudicated public hearing before issuing the license, and also to review legal documents for transfer of the site land to the state.
11. Accountants - Accounting expertise will be necessary to establish and review financial security posted by the licensee for long-term care and maintenance funds.

B. Staffing Requirements for the Operational Stage

When the low-level radioactive waste site is licensed and in operation, the state program will be responsible for monitoring all shipments to the site, performing inspections of the licensed operations as well as continuing the environmental monitoring and analysis programs. The state program staff requirements during the operational stage of the site should continue to include:

1. Program Administrators
2. Health Physicists - To review license amendments, procedures, on- and off-site dose assessment, and to direct the environmental monitoring program
3. Civil Engineers and Geologists - To review trench construction and operation as well as site integrity and groundwater monitoring
4. Environmental Technicians - To collect environmental samples
5. Radiochemists - To analyze samples and report results
6. Clerical Staff Assistants

Additional staffing requirements include:

1. Health Physicists/Compliance Inspectors - Responsible for conducting routine inspections at the disposal site. These persons require expertise in general health physics, low-level radioactive waste streams, nuclear reactor engineering, nuclear fuel cycle, radioactive waste disposal requirements (both technical and regulatory), hazardous materials transportation requirements, and inspection procedures.
2. On-Site Inspectors - Responsible for inspection of all shipments arriving at the site and broad review of all site operations. These persons require health physics training, knowledge of transportation and packaging regulations, waste form and manifest requirements as well as the waste site receipt and acceptance requirements.
3. Data Processing Technicians - Responsible for monitoring the state program's records of waste receipts and manifests. Skills include computer programming and data processing.
4. Health Physicists - Additional inspectors may be required if the state law and regulations require inspection of radioactive waste shipments at generator sites prior to transportation to the disposal site. These persons would require the basic health physics training as well as the site inspector training and education.

C. Staffing Requirements for the Long-term Care and Maintenance Stage

Once the low-level waste site has been decommissioned and the license is terminated, the state will assume responsibility for long-term care and maintenance. The state program will be responsible for environmental monitoring and sample analysis as well as assuring that the site is properly secured and maintained to prevent disturbance by intruders and to provide continued site stability. There may be two separate state programs at this stage. One, the landlord agency, and two, the regulatory agency. Both may have to do environmental monitoring. The state regulatory program staff requirements will include:

1. Program Administrators
2. Health Physicists - To evaluate environmental data and continue to perform dose assessments
3. Geologists and Engineers - To assure that the site is not damaged by erosion or slumping and to assure that the site does not release radioactive material through leachate migration
4. Environmental Technicians - To collect environmental samples
5. Radiochemists - To analyze samples and report results

The landowner agency staff would be required to maintain site fences, site vegetation, cover and perform remedial action if necessary. This work could be done through maintenance contracts.

All the additional state program staffing requirements for a LLW site depend on the staffing of the state program prior to the location of a site in the state. For example, states that have large uranium mining and milling programs will probably need less additional staff since most areas of expertise needed to regulate a LLW site are necessary for licensing uranium facilities. The waste volume to be received by the LLW site will also affect the additional staffing requirements of the state program. If the site is located in a state or compact that generates only a small volume of waste per year, the on-site inspection program may only require one person who may not be full-time. Where large volumes of waste are generated and shipped to the site, the on-site inspection program may require several full-time resident inspectors.

State laws and/or specific compact language may place requirements on the state program that result in the need for larger regulatory staffs.

Finally, the site location may affect the staffing requirements, especially in the environmental assessment and licensing stages due to site climate, topography, proximity to population centers, etc.

V. State Environmental Monitoring Requirements

An environmental surveillance program is essential to the regulation of a low-level radioactive waste disposal facility. The state program will be required to perform an independent environmental monitoring program to verify the site licensee's data. The monitoring program should include the following:

- A) Air samples - both particulate and charcoal filters at the site boundry and the nearest residence. These samples will be taken in all phases of site operation.
- B) Water samples from the following locations:
 - 1. Potable wells near the site
 - 2. Monitor wells
 - 3. Surface water impoundments near the site
 - 4. Stream or run-off water
 - 5. Disposal cells (water from open trenches)
- C) Vegetation, food, milk, fish, and wildlife samples from locations on site and near the site.
- D) Soil and sediment samples on and near the site.

- E) Direct gamma radiation levels from TLDs placed around the site as well as direct measurements taken during inspections.

A suggested pre-operational monitoring program is presented in Appendix C and an operational monitoring program is presented in Appendix D. In addition to these monitoring requirements, annual earth resistivity measurements could be performed at the site by the geologist to detect and map any leachate plumes resulting from site leaks or spills.

Also during the pre-operational and licensing stage, core samples from wells drilled outside the site boundaries should be obtained and analyzed as well as logs made in these wells to better define the regional geology and hydrology.

VI. State Program Equipment Requirements

The equipment needs for a state program regulating a low-level radioactive waste disposal site can be separated into several areas. These areas are: A) environmental monitoring equipment, B) laboratory sample analysis equipment, and C) site inspector monitoring and safety equipment.

A) Environmental monitoring equipment includes:

- 1) Air samplers - both high and low volume
- 2) Water sampling pumps
- 3) Sediment samplers
- 4) Soil and vegetation samplers (trowels, shearers, etc.)
- 5) TLD's permanent and quarterly exchange
- 6) Micro R meters and ion chambers for direct gamma readings
- 7) Earth resistivity meters

If plant and animal samples are collected during the environmental assessment stage, these samples should be mounted and permanently stored for future reference.

B) Laboratory sample analysis equipment includes:

- 1) GELI detectors interfaced with gamma spectrometer computer
- 2) Sodium iodide detectors and multichannel analyzers
- 3) Surface barrier alpha detector - alpha spectroscopy
- 4) Liquid scintillation system for tritium, carbon-14 samples and other beta analysis
- 5) Internal proportional counters for gross alpha analysis
- 6) TLD readers and calibration sources

C) Inspector monitoring and safety equipment includes:

- 1) GM survey meters - routine surveys
- 2) Ion chambers - perimeter surveys and package surveys
- 3) Teletector GM with telescoping probe - to measure underside of transport vehicle and high radiation levels
- 4) Alpha scintillation detectors - to measure package wipes and areas with alpha contamination
- 5) Fast/slow neutron detectors
- 6) Multichannel analyzer - to identify isotopes
- 7) Scalers - to measure wipes
- 8) Air samplers - high and low volume
- 9) Personnel monitoring badges
- 10) Respirators, safety shoes and hard hats for personnel protection
- 11) Office furniture and supplies for resident inspectors
- 12) Reference source sets

In addition to the equipment, it is recommended that the state perform routine bioassays on the site inspectors to assess internal exposures.

VII. Lessons Learned from Current Regulatory Programs

- A) Regulation of Generators/Shippers - Experience in the regulation of currently operating commercial low-level waste sites has shown that the more serious radiological problems were not a result of the disposal site operations, but in the packaging of the material by the generator prior to transport to the low-level radioactive waste burial site. A state regulatory program should have strict control over the waste generators and shippers to assure that all packaging requirements are met.

Each state with generators that ship radioactive waste to the low-level radioactive waste burial site must assume the responsibility of assuring that their generator licensees properly package all shipments to the site. Each state should conduct an inspection program to assure that each generator and shipper meet all of the burial site and Department of Transportation packaging and transport requirements. This will help to minimize problems with shipments that arrive at the burial site.

- B) Annual Program Costs - The cost of state regulatory programs at the currently operating commercial waste disposal sites ranges from \$75,000 to \$300,000. These costs are recovered from site operator license fees and license fees from waste generators using the site or by collection of surcharges on each cubic foot of waste buried.

- C) Political Interactions - All three commercial low-level waste sites have experienced political pressures. These occur because of the present public concern over the potential hazards from low-level radioactive waste disposal operations. The state regulatory program should develop information pamphlets on low-level radioactive waste and the regulatory program to educate the public and address their concerns.
- D) Interagency Cooperation - The state radiation control agency that regulates the low-level radioactive waste site faces interactions with other state and federal agencies. These include state water, air control and hazardous waste regulatory agencies as well as numerous local and county agencies. In addition, numerous federal agencies tend to get involved with waste site operations. Experience has shown that the best method of dealing with these groups is to provide each with accurate and timely information when it is available, and to establish from the beginning the role of each in regulatory activities at the site. This will allow coordination and cooperation among the agencies and establish that the radiation control program is the lead regulatory agency.

APPENDIX A

FR46 7540-7546

National Advisory Committee on Occupational Safety and Health; Full Committee Meeting and Subgroup Meeting

Notice is hereby given that the National Advisory Committee on Occupational Safety and Health (NACOSH) will meet on February 25-27, 1981 at the Frances Perkins Department of Labor Building, Room N4437, Third Street and Constitution Avenue, N.W., Washington, D.C. The meetings will begin at 9:00 a.m. the public is invited to attend.

The National Advisory Committee was established under Section 7(a) of the Occupational Safety and Health Act of 1970 (29 U.S.C. 656) to advise the Secretary of Labor and the Secretary of Health, Education and Welfare on matters relating to the administration of the Act.

Wednesday, February 25, 1981 will be devoted to Subgroup meetings. The Subgroups will discuss:

1. Reproductive Hazards.
2. Safety and Health Effects of New Energy Technologies.
3. Information Systems for NIOSH/OSHA Priority Setting.

The agenda for February 26 and 27 will include reports on OSHA and NIOSH activities, a discussion of repeat violations, and discussions of other safety and health matters relating to OSHA and NIOSH.

Written data or views concerning these agenda items may be submitted to the Division of Consumer Affairs. Such documents which are received before the scheduled meeting dates, preferably with 20 copies, will be presented to the Committee and included in the official record of the proceedings.

Anyone who wishes to make an oral presentation should notify the Division of Consumer Affairs before the meeting date. The request should include the amount of time desired, the capacity in which the person will appear and a brief outline of the content of the presentation. Oral presentations will be scheduled at the discretion of the chairman of the Committee to the extent which time permits.

For additional information contact: Clarence Page, Division of Consumer Affairs, Occupational Safety and Health Administration, 3rd Street and Constitution Avenue, N.W., Rm. N3635, Washington, D.C. 20210. Telephone 202/523-8024.

Official records of the meetings will be available for public inspection at the Division of Consumer Affairs.

Signed at Washington, D.C., this 16th day of January 1981.

Eula Bingham,

Assistant Secretary of Labor.

(FR Doc. 81-2535 Filed 1-22-81; 8:43 am)

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NUCLEAR REGULATORY COMMISSION

Criteria for Guidance of States and NRC in Discontinuance of NRC Regulatory Authority and Assumption Thereof by States Through Agreement

AGENCY: U.S. Nuclear Regulatory Commission.

ACTION: Statement of Policy.

SUMMARY: The Nuclear Regulatory Commission has revised its statement of policy regarding criteria for guidance of States and NRC in discontinuance of NRC regulatory authority and assumption of regulatory authority by States through agreement. This action is necessary to make editorial changes to update the policy statement, to allow States to enter into agreements for low-level waste only, and to incorporate the provisions and requirements of the Uranium Mill Tailings Radiation Control Act of 1978. Adoption of this policy will allow interested States to enter into agreements with the NRC and regulate low-level waste sites only. Additionally, those States that meet the criteria for the regulation of uranium mills and tailings may exercise regulatory authority over these sources as provided by the Uranium Mill Tailings Radiation Control Act of 1978, as amended.

The revised statement of policy reflects the following principal changes:

1. Modification of Criterion 27 to allow a State to seek an agreement for the regulation of low-level waste as a separate category.
2. Inclusion of additional criteria for States wishing to continue regulating uranium and thorium processors and mill tailings after November 8, 1981.
3. Editorial and clarifying changes to make the statement current.

DATES: This policy statement is effective January 23, 1981.

FOR FURTHER INFORMATION CONTACT: John F. Kendig, Office of State Programs, U.S. Nuclear Regulatory Commission, Washington, D.C. 20555, telephone: 301-492-7787.

SUPPLEMENTARY INFORMATION:

1. These criteria were developed to implement a program, authorized by Pub. L. 86-373 which was enacted in the form of a new section to the Atomic Energy Act (Section 274) and approved by the President on September 23, 1959

and amended by Pub. L. 95-804 approved November 8, 1978. These criteria are intended to indicate factors which the Commission intends to consider in approving new or amended agreements. They are not intended to limit Commission discretion in viewing individual agreements or amendments. In accordance with these statutory provisions, when an agreement between a State and the NRC is effected, the Commission will discontinue its regulatory authority within that State over one or more of the following materials: byproduct material as defined in Section 11e(1) of the Act (radioisotopes), byproduct material as defined in Section 11e(2) of the Act (mill tailings or wastes), source material (uranium and thorium), special nuclear material (uranium 233, uranium 235 and plutonium) in quantities not sufficient to form a critical mass and permanent disposal of low-level waste containing one or more of the materials stated above but not including mill tailings.

2. An agreement may be effected between a State and NRC: (1) upon certification by the Governor that the State has a program for the control of radiation hazards adequate to protect the public health and safety with respect to the materials within the State covered by the proposed agreement and the State desires to assume regulatory responsibility for such materials; and (2) after a finding by the Commission that the State program is in accordance with the requirements of subsection c of section 274 and in all other respects compatible with the Commission's program for the regulation of such materials, and is adequate to protect the public health and safety with respect to the materials covered by the proposed agreement. It is also necessary that the State have enabling legislation authorizing its Governor to enter into such an agreement.

3. The original criteria were published on March 24, 1961 (26 FR 2537) after discussions with various State officials and other State representatives, to provide guidance and assistance to the States and the AEC (now NRC) in developing a regulatory program which would be compatible with that of the NRC. The criteria were circulated among States, Federal agencies, labor and industry, and other interested groups for comment.

4. The criteria require that the State authority consider the total accumulated occupational radiation exposure of individuals. To facilitate such an approach, it is the view of the NRC that an overall radiation protection program is desirable. The maximum scope of

each State's radiation protection program is not, however, a necessary or appropriate subject for coverage in the criteria. Consequently, the criteria are silent on the question of whether a State should have a total regulatory program covering all sources of radiation, including those not subject to control by the NRC under the Atomic Energy Act, such as x-rays, radium, accelerators, etc.

5. These revised criteria provide for entering into an agreement for a separate category of materials, namely, low-level waste material in permanent disposal facilities. They also provide new criteria for States wishing to continue regulating uranium and thorium processing and the wastes resulting therefrom under the provisions of the Uranium Mill Tailings Radiation Control Act of 1978 (Pub. L. 95-604) after November 8, 1981. The revised criteria also contain a number of editorial changes such as changing AEC to NRC where appropriate to conform to present practice and law.

6. Inquiries about details of the criteria or other aspects of the NRC Federal-State Relations Program should be addressed to the Office of State Programs, U.S. Nuclear Regulatory Commission, Washington, D.C. 20555.

Criteria¹

Objectives

1. *Protection.* A State regulatory program shall be designed to protect the health and safety of the people against radiation hazards.

Radiation Protection Standards²

2. *Standards.* The State regulatory program shall adopt a set of standards for protection against radiation, which shall apply to byproduct, source and special nuclear materials in quantities not sufficient to form a critical mass.

3. *Uniformity in Radiation Standards.* It is important to strive for uniformity in technical definitions and terminology, particularly as related to such things as units of measurement and radiation dose. There shall be uniformity on maximum permissible doses and levels of radiation and concentrations of radioactivity, as fixed by Part 20 of the NRC regulations based on officially approved radiation protection guides.

4. *Total Occupational Radiation Exposure.* The regulatory authority shall consider the total occupational radiation

exposure of individuals, including that from sources which are not regulated by it.

5. *Surveys, Monitoring.* Appropriate surveys and personnel monitoring under the close supervision of technically competent people are essential in achieving radiological protection and shall be made in determining compliance with safety regulations.

6. *Labels, Signs, Symbols.* It is desirable to achieve uniformity in labels, signs and symbols, and the posting thereof. However, it is essential that there be uniformity in labels, signs, and symbols affixed to radioactive products which are transferred from person to person.

7. *Instruction.* Persons working in or frequenting restricted areas³ shall be instructed with respect to the health risks associated with exposure to radioactive materials and in precautions to minimize exposure. Workers shall have the right to request regulatory authority inspections as per 10 CFR 19, section 19.19 and to be represented during inspections as specified in section 19.14 of 10 CFR 19.

8. *Storage.* Licensed radioactive material in storage shall be secured against unauthorized removal.

9. *Waste Disposal.* The standards for the disposal of radioactive materials into the air, water, and sewers, and burial in the soil shall be in accordance with Part 20. Holders of radioactive material desiring to release or dispose of quantities in excess of the prescribed limits shall be required to obtain special permission from the appropriate regulatory authority.

10. *Regulations Governing Shipment of Radioactive Materials.* The State shall to the extent of its jurisdiction promulgate regulations applicable to the shipment of radioactive materials, such regulations to be compatible with those established by the U.S. Department of Transportation and other agencies of the United States whose jurisdiction over interstate shipment of such materials necessarily continues. State regulations regarding transportation of radioactive materials must be compatible with 10 CFR Part 71.

11. *Records and Reports.* The State regulatory program shall require that holders and users of radioactive materials (a) maintain records covering personnel radiation exposures, radiation

surveys, and disposals of materials; (b) keep records of the receipt and transfer of the materials; (c) report significant incidents involving the materials, as prescribed by the regulatory authority; (d) make available upon request of a former employee a report of the employee's exposure to radiation; (e) at request of an employee advise the employee of his or her annual radiation exposure; and (f) inform each employee in writing when the employee has received radiation exposure in excess of the prescribed limits.

12. *Additional Requirements and Exemptions.* Consistent with the overall criteria here enumerated and to accommodate special cases or circumstances, the State regulatory authority shall be authorized in individual cases to impose additional requirements to protect health and safety, or to grant necessary exemptions which will not jeopardize health and safety.

Prior Evaluation of Uses of Radioactive Materials

13. *Prior Evaluation of Hazards and Uses, Exceptions.* In the present state of knowledge, it is necessary in regulating the possession and use of byproduct, source and special nuclear materials that the State regulatory authority require the submission of information on, and evaluation of, the potential hazards and the capability of the user or possessor prior to his receipt of the materials. This criterion is subject to certain exceptions and to continuing reappraisal as knowledge and experience in the atomic energy field increase. Frequently there are, and increasingly in the future there may be, categories of materials and uses as to which there is sufficient knowledge to permit possession and use without prior evaluation of the hazards and the capability of the possessor and user. These categories fall into two groups—those materials and uses which may be completely exempt from regulatory controls, and those materials and uses in which sanctions for misuse are maintained without pre-evaluation of the individual possession or use. In authorizing research and development or other activities involving multiple uses of radioactive materials, where an institution has people with extensive training and experience, the State regulatory authority may wish to provide a means for authorizing broad use of materials without evaluating each specific use.

14. *Evaluation Criteria.* In evaluating a proposal to use radioactive materials, the regulatory authority shall determine the adequacy of the applicant's facilities

¹ The criteria were first adopted in February 1961 (28 FR 2337, March 24, 1961, and amended in November 1963 (30 FR 15044, December 4, 1963). Minor editorial changes were made in June 1968 to reflect the authority of the U.S. Department of Transportation and Organization change in NCRP.

² Suggested State regulations and State legislation will give content to all criteria enumerated.

³ "Restricted area" means any area access to which is controlled by the licensee for the purpose of radiation protection of individuals from exposure to radiation and radioactive materials. "Restricted area" shall not include any area used as residential quarters, although a separate room or rooms in a residential building may be set apart as a restricted area.

and safety equipment, his training and experience in the use of the materials for the purpose requested, and his proposed administrative controls. States should develop guidance documents for use by license applicants; this guidance should be consistent with NRC licensing and regulatory guides for various categories of licensed activities.

15. Human Use. The use of radioactive materials and radiation on or in humans shall not be permitted except by properly qualified persons (normally licensed physicians) possessing prescribed minimum experience in the use of radioisotopes or radiation.

Inspection

16. Purpose, Frequency. The possession and use of radioactive materials shall be subject to inspection by the regulatory authority and shall be subject to the performance of tests, as required by the regulatory authority. Inspection and testing is conducted to determine, and to assist in obtaining, compliance with regulatory requirements.

Frequency of inspection shall be related directly to the amount and kind of material and type of operation licensed, and it shall be adequate to insure compliance.

17. Inspections Compulsory. Licensees shall be under obligation by law to provide access to inspectors.

18. Notification of Results of Inspection. Licensees are entitled to be advised of the results of inspections and to notice as to whether or not they are in compliance.

Enforcement

19. Enforcement. Possession and use of radioactive materials should be amenable to enforcement through legal sanctions, and the regulatory authority shall be equipped or assisted by law with the necessary powers for prompt enforcement. This may include, as appropriate, administrative remedies looking toward issuance of orders requiring affirmative action or suspension or revocation of the right to possess and use materials, and the impounding of materials, the obtaining of injunctive relief, and the imposing of civil or criminal penalties.

Personnel

20. Qualifications of Regulatory and Inspection Personnel. The regulatory agency shall be staffed with sufficient trained personnel. Prior evaluation of applications for licenses or authorizations and inspection of licensees must be conducted by persons possessing the training and experience relevant to the type and level of

radioactivity in the proposed use to be evaluated and inspected. This requires competency to evaluate various potential radiological hazards associated with the many uses of radioactive material and includes concentrations of radioactive materials in air and water, conditions of shielding, the making of radiation measurements, knowledge of radiation instruments—their selection, use and calibration—laboratory design, contamination control, other general principles and practices of radiation protection, and use of management controls in assuring adherence to safety procedures. In order to evaluate some complex cases, the State regulatory staff may need to be supplemented by consultants or other State agencies with expertise in geology, hydrology, water quality, radiobiology and engineering disciplines.

To perform the functions involved in evaluation and inspection, it is desirable that there be personnel educated and trained in the physical and/or life sciences, including biology, chemistry, physics and engineering, and that the personnel have had training and experience in radiation protection. For example, the person who will be responsible for the actual performance of evaluation and inspection of all of the various uses of byproduct, source and special nuclear material which might come to the regulatory body should have substantial training and extensive experience in the field of radiation protection. It is desirable that such a person have a bachelor's degree or equivalent in the physical or life sciences, and specific training-radiation protection.

It is recognized that there will also be persons in the program performing a more limited function in evaluation and inspection. These persons will perform the day-to-day work of the regulatory program and deal with both routine situations as well as some which will be out of the ordinary. These persons should have a bachelor's degree or equivalent in the physical or life sciences, training in health physics, and approximately two years of actual work experience in the field of radiation protection.

The foregoing are considered desirable qualifications for the staff who will be responsible for the actual performance of evaluation and inspection. In addition, there will probably be trainees associated with the regulatory program who will have an academic background in the physical or life sciences as well as varying amounts of specific training in radiation protection but little or no actual work

experience in this field. The background and specific training of these persons will indicate to some extent their potential role in the regulatory program. These trainees, of course, could be used initially to evaluate and inspect those applications of radioactive materials which are considered routine or more standardized from the radiation safety standpoint, for example, inspection of industrial gauges, small research programs, and diagnostic medical programs. As they gain experience and competence in the field, trainees could be used progressively to deal with the more complex or difficult types of radioactive material applications. It is desirable that such trainees have a bachelor's degree or equivalent in the physical or life sciences and specific training in radiation protection. In determining the requirement for academic training of individuals in all of the foregoing categories proper consideration should be given to equivalent competency which has been gained by appropriate technical and radiation protection experience.

It is recognized that radioactive materials and their uses are so varied that the evaluation and inspection functions will require skills and experience in the different disciplines which will not always reside in one person. The regulatory authority should have the composite of such skills either in its employ or at its command, not only for routine functions, but also for emergency cases.

Special Nuclear Material, Source Material and Tritium

21. Conditions Applicable to Special Nuclear Material, Source Material and Tritium. Nothing in the State's regulatory program shall interfere with the duties imposed on the holder of the materials by the NRC, for example, the duty to report to the NRC, on NRC prescribed forms (1) transfers of special nuclear material, source material and tritium, and (2) periodic inventory data.

22. Special Nuclear Material Defined. Special nuclear material, in quantities not sufficient to form a critical mass, for present purposes means uranium enriched in the isotope U-235 in quantities not exceeding 350 grams of contained U-235; uranium 233 in quantities not exceeding 200 grams; plutonium in quantities not exceeding 200 grams; or any combination of them in accordance with the following formula: For each kind of special nuclear material, determine the ratio between the quantity of that special nuclear material and the quantity specified above for the same kind of special nuclear material. The sum of

such ratios for all of the kinds of special nuclear material in combination should not exceed "1" (i.e., unity). For example,

$$\frac{175 \text{ (grams contained U-235)}}{350} + \frac{50 \text{ (grams U-233)}}{200} + \frac{50 \text{ (grams Pu)}}{200} = 1$$

(This definition is subject to change by future Commission rule or regulation.)

Administration

23. State practices for assuring the fair and impartial administration of regulatory law, including provision for public participation where appropriate, should be incorporated in procedures for:

- a. Formulation of rules of general applicability;
- b. Approving or denying applications for licenses or authorization to possess and use radioactive materials, and
- c. Taking disciplinary actions against licensees.

Arrangements For Discontinuing NRC Jurisdiction

24. *State Agency Designation.* The State should indicate which agency or agencies will have authority for carrying on the program and should provide the NRC with a summary of that legal authority. There should be assurances against duplicate regulation and licensing by State and local authorities, and it may be desirable that there be a single or central regulatory authority.

25. *Existing NRC Licenses and Pending Applications.* In effecting the discontinuance of jurisdiction, appropriate arrangements will be made by NRC and the State to ensure that there will be no interference with or interruption of licensed activities or the processing of license applications, by reason of the transfer. For example, one approach might be that the State, in assuming jurisdiction, could recognize and continue in effect, for an appropriate period of time under State law, existing NRC licenses, including licenses for which timely applications for renewal have been filed, except where good cause warrants the earlier reexamination or termination of the license.

26. *Relations With Federal Government and Other States.* There should be an interchange of Federal and State information and assistance in connection with the issuance of regulations and licenses or authorizations, inspection of licensees, reporting of incidents and violations, and training and education problems.

27. *Coverage, Amendments, Reciprocity.* An agreement providing for

the following quantities in combination would not exceed the limitation and are within the formula, as follows:

discontinuance of NRC regulatory authority and the assumption of regulatory authority by the State may relate to any one or more of the following categories of materials within the State, as contemplated by Public Law 86-373 and Public Law 95-604:

- a. Byproduct materials as defined in section 11e(1) of the Act.
- b. Byproduct materials as defined in section 11e(2) of the Act.
- c. Source materials.
- d. Special nuclear materials in quantities not sufficient to form a critical mass.
- e. Low-level wastes in permanent disposal facilities, as defined by statute or Commission rules or regulations containing one or more of the materials stated in a, c, and d above but not including byproduct material as defined in Section 11e(2) of the Act; but must relate to the whole of such category or categories and not to a part of any category. If less than the five categories are included in any discontinuance of jurisdiction, discontinuance of NRC regulatory authority and the assumption of regulatory authority by the State of the others may be accomplished subsequently by an amendment or by a later agreement.

The agreement may incorporate by reference provisions of other documents, including these criteria, and the agreement shall be deemed to incorporate without specific reference the provisions of Pub. L. 86-373 and Pub. L. 95-604 and the related provisions of the Atomic Energy Act.

Arrangements should be made for the reciprocal recognition of State licenses and Federal licenses in connection with out-of-the-jurisdiction operations by a State or Federal licensee.

28. *NRC and Department of Energy Contractors.* The State should provide exemptions for NRC and DOE

contractors which are substantially equivalent to the following exemptions:

- a. Prime contractors performing work

*A State which does not wish to continue regulation of uranium and thorium processors and byproduct material, as defined in Section 11e(2) of the Atomic Energy Act as amended, after November 8, 1981 pursuant to Pub. L. 95-604 may obtain authority over all source material licenses within the State except for uranium or thorium processors.

for the DOE at U.S. Government-owned or controlled sites:

- b. Prime contractors performing research in, or development, manufacture, storage, testing, or transportation of, atomic weapons or components thereof;

c. Prime contractors using or operating nuclear reactors or other nuclear devices in a U.S. Government-owned vehicle or vessel; and

d. Any other prime contractor or subcontractor of DOE or NRC when the State and the NRC jointly determine (i) that, under the terms of the contract or subcontract, there is adequate assurance that the work thereunder can be accomplished without undue risk to the public health and safety and (ii) that the exemption of such contractor or subcontractor is authorized by law.

Additional Criteria for States Regulating Uranium or Thorium Processors and Wastes Resulting Therefrom After November 8, 1981

Statutes

29. State statutes or duly promulgated regulations should be enacted, if not already in place, to make clear State authority to carry out the requirements or Public Law 95-604, Uranium Mill Tailings Radiation Control Act (UMTRCA) as follows:

- a. Authority to regulate the tailings or wastes produced by the extraction or concentration of uranium or thorium from any ore processed primarily for its source material content.

b. That an adequate surety (under terms established by regulation) will be provided by the licensee to assure the completion of all requirements established by the (cite appropriate State agency) for the decontamination, decommissioning, and reclamation of sites, structures, and equipment used in conjunction with the generation or disposal of such byproduct material.

c. If in the States' licensing and regulation of byproduct material or of any activity which produces byproduct material, the State collects funds from the licensee or its surety for long-term surveillance and maintenance of such material, the total amount of the funds collected by the State shall be transferred to the U.S. if custody of the byproduct material and its disposal site is transferred to the Federal Government upon termination of the State license. (See 10 CFR 150.32.) If no default has occurred and the reclamation or other bonded activity has been performed, funds for the purpose

are not to be transferred to the Federal Government. The funds collected by the State shall be sufficient to ensure compliance with the regulations the Commission establishes pursuant to Section 161X of the Atomic Energy Act.

d. In the issuances of licenses, an opportunity for written comments, public hearing (with transcript) and cross examination is required.

e. In the issuances of licenses, a written determination of the action to be taken based upon evidence presented during the public comment period and which is subject to judicial review is required.

f. A ban on major construction prior to completion of the aforementioned stipulations.

g. An opportunity shall be provided for public participation through written comments, public hearings, and judicial review of rules.

30. In the enactment of any supporting legislation, the State should take into account the reservations of authority to the U.S. in UMTRCA as stated in 10 CFR 150.15a and summarized by the following:

a. The establishment of minimum standards governing reclamation, long-term surveillance or maintenance, and ownership of the byproduct material.

b. The determination that prior to the termination of a license, the licensee has complied with decontamination, decommissioning and reclamation standards, and ownership requirements for sites at which byproduct material is present.

c. The requirement that prior to termination of any license for byproduct material, as defined in Section 11e(2), of the Atomic Energy Act or for any activity that results in the production of such material, title to such byproduct material and the disposal site be transferred to the Federal Government or State at the option of the State, provided such option is exercised prior to termination of the license.

d. The authority to require such monitoring, maintenance, and emergency measures after the license is terminated as necessary to protect the public health and safety for those materials and property for which the State has assumed custody pursuant to Pub. L. 95-604.

e. The authority to permit use of the surface or subsurface estate, or both of the land transferred to the United States or State pursuant under provision of the Uranium Mill Radiation Tailings Control Act.

f. The authority to exempt land ownership transfer requirements of Section 83(b)(1)(A).

31. It is preferable that State statutes contain the provisions of Section 8 of the Model Act. But the following may be accomplished by adoption of either procedures by regulation or technical criteria. In any case, authority for their implementation should be adequately supported by statute, regulation or case law as determined by the State Attorney General.

In the licensing and regulation of ores processed primarily for their source material content and for the disposal of byproduct material, procedures shall be established which provide a written analysis of the impact on the environment of the licensing activity. This analysis shall be available to the public before commencement of hearings and shall include:³

a. An assessment of the radiological and nonradiological public health impacts;

b. An assessment of any impact on any body of water or groundwater;

c. Consideration of alternatives to the licensed activities; and

d. Consideration of long-term impacts of licensed activities (see Item 36b.(1)).

Regulations

32. State regulations should be reviewed for regulatory requirements, and where necessary incorporate regulatory language which is equivalent to the extent practicable or more stringent than regulations and standards adopted and enforced by the Commission, as required by Section 274c (see 10 CFR 40 and 10 CFR 150.31(b)).

Organizational Relationships Within the States

33. Organizational relationships should be established which will provide for an effective regulatory program for uranium mills and mill tailings.

a. Charts should be developed which show the management organization and lines of authority. This chart should define the specific lines of supervision from program management within the radiation control group and any other department within the State responsible for contributing to the regulation of uranium processing and disposal of tailings. When other State agencies or regional offices are utilized, the lines of communication and administrative control between the agencies and/or regions and the Program Director should be clearly drawn.

b. Those States that will utilize personnel from other State Departments

³It is strongly recommended that a 30-day period be provided for public review.

or Federal agencies in preparing the environmental assessment should designate a lead agency for supervising and coordinating preparation of this environmental assessment. It is normally expected that the radiation control agency in Agreement States will be the lead agency. The basic premise is that the lead agency is required to prepare the environmental assessment. Utilization of an applicant's environmental report in lieu of a lead agency assessment of the proposed project is not adequate or appropriate. However, the lead agency may prepare an environmental assessment based upon an applicant's environmental report. Other credible information may be utilized by the State as long as such information is verified and documented by the State.

c. When a lead agency is designated, that agency should coordinate preparation of the statement. The other agencies involved should provide assistance with respect to their areas of jurisdiction and expertise. Factors relevant in obtaining assistance from other agencies include the applicable statutory authority, the time sequence in which the agencies become involved, the magnitude of their involvement, and relative expertise with respect to the project's environmental effects.

In order to bring an environmental assessment to a satisfactory conclusion, it is highly recommended that an initial scoping document be developed which clearly delineates the area and scope of work to be performed by each agency within a given time constraint.

d. For those areas in the environmental assessment where the State cannot identify a State agency having sufficient expertise to adequately evaluate the proposal or prepare an assessment, the State should have provisions for obtaining outside consulting services. In those instances where non-governmental consultants are utilized, procedures should be established to avoid conflict of interest consistent with State law and administrative procedures.

Medical consultants recognized for their expertise in emergency medical matters, such as the Oak Ridge and Hanford National Laboratories, relating to the intake of uranium and its diagnosis thereof associated with uranium mining and milling should be identified and available to the State for advice and direct assistance.

During the budget preparation, the State should allow for funding costs incurred by the use of consultants. In addition, consultants should be available for any emergencies which

may occur and for which their expertise would be needed immediately.

Personnel

34. Personnel needed in the processing of the license application can be identified or grouped according to the following skills: Technical; Administrative; and Support.

a. Administrative personnel are those persons who will provide internal guides, policy memoranda, reviews and managerial services necessary to assure completion of the licensing action. Support personnel are those persons who provide secretarial, clerical support, legal, and laboratory services. Technical personnel are those individuals who have the training and experience in radiation protection necessary to evaluate the engineering and radiological safety aspects of a uranium concentrator. Current indications are that 2 to 2.75 total professional person years' effort is needed to process a new conventional mill license, in situ license, or major renewal, to meet the requirements of UMTRCA. This number includes the effort for the environmental assessment and the in-plant safety review. It also includes the use of consultants. Heap leach applications may take less time and is expected to take 1.0 to 1.5 professional staff years' effort, depending on the circumstances encountered. Current indications are that the person years effort for support and legal services should be one secretary for approximately 2 conventional mills and 1/2 staff years for legal services for each noncontested mill case. The impact on environmental monitoring laboratory support services is difficult to estimate but should be added into the personnel requirements.

In addition, consideration should be given to various miscellaneous post-licensing ongoing activities including the issuance of minor amendments, inspections, and environmental surveillance. It is estimated that these activities may require about 0.5 to 1 person years effort per licensed facility per year, the latter being the case for a major facility. These figures do not include manpower for Title I activities of UMTRCA.

b. In evaluating license applications the State shall have access to necessary specialties, e.g., radiological safety, hydrology, geology and dam construction and operation.

In addition to the personnel qualifications listed in the "Guide for Evaluation of State Radiation Control Programs," Revision 3, February 1, 1980, the regulatory staff involved in the regulatory process (Radiation) should

have additional training in Uranium Mill Health Physics and Environmental Assessments.

c. Personnel in agencies other than the lead agency are included in these total person year numbers. If other agencies are counted in these numbers then it shall be demonstrated that these personnel will be available on a routine and continuing basis to a degree claimed as necessary to successfully comply with the requirements of UMTRCA and these criteria. The arrangements for making such resources available shall be documented, such as an interagency memorandum of understanding and confirmed by budgetary cost centers.

Functions To Be Covered

35. The States should develop procedures for licensing, inspection, and preparation of environmental assessments.

a. Licensing

(1) Licensing evaluations or assessments should include in-plant radiological safety aspects in occupational or restricted areas and environmental impacts to populations in unrestricted areas from the plant.

(2) It is expected that the State will review, evaluate and provide documentation of these evaluations. Items which should be evaluated are:

- (a) Proposed activities;
- (b) Scope of proposed action;
- (c) Specific activities to be conducted;
- (d) Administrative procedures;
- (e) Facility organization and radiological safety responsibilities, authorities, and personnel qualifications;
- (f) Licensee audits and inspections;
- (g) Radiation safety training programs for workers;
- (h) Radiation safety program, control and monitoring;
- (i) Restricted area markings and access control;
- (j) At existing mills, review of monitoring data, exposure records, licensee audit and inspection records, and other records applicable to existing mills;

- (k) Environmental monitoring;
- (l) Emergency procedures, radiological;
- (m) Product transportation; and
- (n) Site and physical decommissioning procedures, other than tailings.

(o) Employee exposure data and bioassay programs.

b. Environmental Assessment

(1) The environmental evaluation should consist of a detailed and documented evaluation of the following items:

- (a) Topography;

(b) Geology;

(c) Hydrology and water quality;

(d) Meteorology;

(e) Background radiation;

(f) Tailings retention system;

(g) Interim stabilization, reclamation, and Site Decommissioning Program;

(h) Radiological Dose Assessment;

(1) Source terms

(2) Exposure pathway

(3) Dose commitment to individuals

(4) Dose commitment to populations

(5) Evaluation of radiological impacts to the public to include a determination of compliance with State and Federal regulations and comparisons with background values

(6) Occupational dose

(7) Radiological impact to biota other than man

(8) Radiological monitoring programs, pre-occupational and operational

(i) Impacts to surface and groundwater, both quality and quantity;

(j) Environmental effects of accidents; and

(k) Evaluation of tailings management alternatives in terms of regulations.

(2) The States are encouraged to examine the need to expand the scope of the assessment into other areas such as:

(a) Ecology;

(b) Environmental effects of site preparation and facility construction on environment and biota;

(c) Environmental effects of use and discharge of chemicals and fuels; and

(d) Economic and social effects.

c. Inspections

(1) As a minimum, items which should be inspected or included during the inspection of a uranium mill should adhere to the items evaluated in the in-plant safety review. The principal items recommended for inspection are:

(a) Administration;

(b) Mill circuit, including any additions, deletions, or circuit changes;

(c) Accidents/incidents;

(d) Part 19 or equivalent requirements of the State;

(e) Action taken on previous findings;

(f) A mill tour to determine compliance with regulations, and license conditions;

(g) Tailings waste management in accordance with regulations and license conditions (see NRC Reg. Guide 3.11.1);

(h) Records;

(i) Respiratory protection in accordance with license conditions or 10 CFR Part 20.

(j) Effluent and environmental monitoring;

(k) Training programs;

(l) Transportation and shipping;

(m) Internal review and audit by management;

(n) Exit interview; and
(o) Final written report documenting the results of the inspection and findings on each item.

(2) In addition, the inspector should perform the following:

(a) Independent surveys and sampling.

(3) Additional guidance is contained in appropriate NRC regulatory and inspection guides. A complete inspection should be performed at least once per year.

d. Operational Data Review

(1) In addition to the reporting requirements required by the regulations or license conditions, the licensee will submit in writing to the regulatory agency within 60 days after January 1 and July 1 of each year, reports specifying the quantity of each of the principal radionuclides released to unrestricted areas in liquid and in gaseous effluents during the previous six months of operation. This data shall be reported in a manner that will permit the regulatory agency to confirm the potential annual radiation doses to the public.

(2) All data from the radiological and non-radiological environmental monitoring program will also be submitted for the same time periods and frequency. The data will be reported in a manner that will allow the regulatory agency to confirm the dose to receptors.

Instrumentation

36. The State should have available both field and laboratory instrumentation sufficient to ensure the licensee's control of materials and to validate the licensee's measurements.

a. The State will submit its list of instrumentation to the NRC for review. Arrangements should be made for calibrating such equipment.

b. Laboratory-type instrumentation should be available in a State agency or through a commercial service which has the capability for quantitative and qualitative analysis of radionuclides associated with natural uranium and its decay chain, primarily; U-238, Ra-226, Th-230, Pb-210, and Rn-222, in a variety of sample media such as will be encountered from an environmental sampling program.

Analysis and data reduction from laboratory analytical facilities should be available to the licensing and inspection authorities in a timely manner. Normally, the data should be available within 30 days of submittal. State acceptability of quality assurance (QA) programs should also be established for the analytical laboratories.

c. Arrangements should also be completed so that a large number of

samples in a variety of sample media resulting from a major accident can be analyzed in a time frame that will allow timely decisions to be made regarding public health and safety.

d. Arrangements should be made to participate in the Environmental Protection Agency quality assurance program for laboratory performance.

Dated at Washington, D.C. this 16th day of January, 1981.

For the Nuclear Regulatory Commission,

John C. Hoyle,

Assistant Secretary of the Commission.

(FR Doc. 81-2428 Filed 1-23-81; 8:43 am)

BILLING CODE 7590-01-01

Advisory Committee on Reactor Safeguards; Proposed Meetings

In order to provide advance information regarding proposed meetings of the ACRS Subcommittees and Working Groups, and of the full Committee, the following preliminary schedule reflects the current situation, taking into account additional meetings which have been scheduled and meetings which have been postponed or cancelled since the last list of proposed meetings published Dec. 22, 1980 (45 FR 84182). Those meetings which are definitely scheduled have had, or will have, an individual notice published in the Federal Register approximately 15 days (or more) prior to the meeting. Those Subcommittee and Working Group meetings for which it is anticipated that there will be a portion or all of the meeting open to the public are indicated by an asterisk (*). It is expected that the sessions of the full Committee meeting designated by an asterisk (*) will be open in whole or in part to the public. ACRS full Committee meetings begin at 8:30 a.m. and Subcommittee and Working Group meetings usually begin at 8:30 a.m. The time when items listed on the agenda will be discussed during full Committee meetings and when Subcommittee and Working Group meetings will start will be published prior to each meeting. Information as to whether a meeting has been firmly scheduled, cancelled, or rescheduled, or whether changes have been made in the agenda for the February 1981 ACRS full Committee meeting can be obtained by a prepaid telephone call to the Office of the Executive Director of the Committee (telephone 202/634-3287, ATTN: Mary E. Vanderholt) between 8:15 a.m. and 5:00 p.m., Eastern Time.

ACRS Subcommittee Meetings

*Fort St. Vrain, January 27, 1981, at site, near Longmont, CO. The

Subcommittee will review operating experience, degree of success in eliminating the core power fluctuations, core performance (fuel and structural), plans for testing and operation at levels above 70% of rated power and plans for future operations, modifications, refueling, and shift manning requirements. Notice of this meeting was published Jan. 12.

*Safety Philosophy, Technology and Criteria, January 28, 1981, Los Angeles, CA. The Subcommittee will discuss requirements for new (beyond Near-Term Construction Permit) reactor plants. Notice of this meeting was published Jan. 14.

*Extreme External Phenomena, January 29-30, 1981, Los Angeles, CA. The Subcommittee will discuss the status of the Seismic Safety Margins Program. Notice of this meeting was published Jan. 14.

*San Onofre 2 and 3, January 31, 1981, Los Angeles, CA. The Subcommittee will meet to review the seismology and geology related items for San Onofre Units 2 and 3 for an Operating License. Notice of this meeting was published Jan. 15.

*Regulatory Activities, February 3, 1981, Washington, DC. The Subcommittee will discuss proposed Regulatory Guides and Regulations. Notice of this meeting was published Jan. 19.

*Plant Features Important to Safety, February 3, 1981, Washington, DC. The Subcommittee will discuss the NRC definitions of the terms "safety grade", "safety related" and "important to safety" as developed for testimony related to the Three Mile Island Unit 1 restart, as well as review the generic implications of the use of these definitions in the licensing process. Notice of this meeting was published Jan. 19.

*NRC Safety Research Program, February 4, 1981, Washington, DC. The Subcommittee will discuss NRC's long-range safety research plan and ACRS comments on the Office of Nuclear Regulatory Research response to ACRS recommendations in NUREG-0609. Notice of this meeting was published Jan. 21.

*Safety Philosophy, Technology and Criteria, February 4, 1981, Washington, DC. The Subcommittee will discuss the proposed Near-Term Construction Permit. Notice of this meeting was published Jan. 21.

*Reactor Radiological Effects, February 5, 1981, (1:00 p.m.), Washington, DC. The Subcommittee is to review and comment on the NRC Staff's paper to the NRC Commissioners on the current status of thinking and

APPENDIX B

Training and Education Requirements*

1. Health Physicist
2. Environmental Quality Specialist
3. Engineers
4. Hydrologists/Geologists
5. Engineer/Environmental Technician

*Entry Level and Senior Level

ENTRY LEVEL
HEALTH PHYSICIST

GENERAL DESCRIPTION

Performs technical work relating to radiation control, health physics, and radiological environmental surveillance and health functions in state or regional health departments. Work involves planning and conducting inspections and collecting samples or data related to radiation safety, health physics, and radiological environmental surveillance and health. Works independently under general supervision. Frequent travel may be required.

EXAMPLES OF WORK PERFORMED

Conducts licensing inspections of facilities using or wishing to use radioactive materials.
Maintains and operates radiation detection or measuring equipment and environmental monitoring equipment.
Collects, compiles, and analyzes data, including calculating radiation exposures received by individuals.
Writes letters and reports documenting licensing or compliance inspections.
Communicates with hospital administrators, doctors, supervisors, and others regarding radiation safety.
Organizes own workload, including planning, scheduling, setting priorities, etc.

MINIMUM QUALIFICATIONS

Education and Experience

Bachelor's degree from an accredited college or university with at least twenty-four (24) semester hours in the natural or physical sciences or advanced mathematics.

OR

Sixty (60) semester hours at an accredited college or university that included twelve (12) semester hours in the natural or physical sciences or advanced mathematics. Two (2) years of paid experience directly related to health physics or radiological control functions.

Knowledge, Skills, and Abilities

Knowledge of basic health physics.
Knowledge of basic mathematics, including algebra.
Knowledge of the English language sufficient to write letters and reports.
Ability to operate radiation detection equipment.
Ability to make accurate and objective observations.

SENIOR
HEALTH PHYSICIST

GENERAL DESCRIPTION

Performs supervisory and administrative work in programs concerning radiation control, health physics, and radiological environmental surveillance. Work is performed independently and occasional travel may be required.

EXAMPLES OF WORK PERFORMED

Provides technical assistance in the fields of radiation control, health physics, and environmental surveillance.
Reviews literature, federal and state regulations relating to radiation control, health physics, and environmental surveillance.
Supervises staff, including evaluating employee performance, and assigning and monitoring tasks.
Develops recommendations to management concerning budget, grants, or contracts, manpower needs, policies or procedures, etc.
Provides information to the general public, news media, etc.
Communicates with hospital administrators, doctors, Agency personnel, and others regarding radiation safety.
Attends meetings, training classes, and seminars concerning the fields of radiation control, health physics, and environmental surveillance.
Writes letters and reports concerning inspections, investigations, or program activities.
Organizes workload, including planning, scheduling, setting priorities, etc.
May testify in court or legal proceedings as expert witness.
Analyzes data concerning radiation control.

MINIMUM QUALIFICATIONS

Education and Experience

Master's degree from an accredited college or university in a physical or natural science, mathematics, health physics, or radiological science. Five (5) years of paid experience directly related to health physics or radiological control functions, two (2) years of such experience shall have been in an administrative or supervisory capacity.

Bachelor's degree from an accredited college or university with at least twenty-four (24) semester hours in the natural or physical sciences, or advanced mathematics. Seven (7) years of paid experience directly related to health physics or radiological control functions, two (2) years of such experience shall have been in an administrative or supervisory capacity.

Knowledge, Skills, and Abilities

Knowledge of radiation control, health physics, or related environmental areas.

Knowledge of federal and state regulations concerning radiation control and safety.

Knowledge of sources of information regarding radiation control, health physics, and radiological environmental surveillance.

Knowledge of administrative/supervisory techniques appropriate to the operation of a unit or office.

Knowledge of the English language sufficient to write letters or reports.

Knowledge of radiation control program operations.

Ability to communicate technical information at an appropriate level.

Ability to organize and express thoughts clearly and concisely.

Ability to interpret and use data.

Ability to establish priorities in workload.

Ability to maintain documentation of program goals and workflow.

ENTRY LEVEL
ENVIRONMENTAL QUALITY SPECIALIST

GENERAL DESCRIPTION

Performs technical and complex health work in the fields of air pollution and radiological health under the general supervision of the Chief Engineer, or higher grade Environmental Health Specialist. Responsible for carrying out specific areas of the environmental health program such as air pollution and radiological health. Responsible for the investigational and inspectional phases of the environmental health program. Work involves the detection, analysis and elimination or control of radiological, biological, chemical, and physical health hazards. Conducts inspections, surveys, and studies; prepares reports.

EXAMPLES OF WORK PERFORMED

Conducts technical and complex inspections and surveys in the fields of air pollution and radiological health; evaluates the results of such inspections and surveys in regard to their environmental health aspects and prepares technical reports and recommendations regarding findings. Collects and analyzes toxic and radioactive contaminants encountered in the environment; examines exhaust and ventilation systems; collects samples of dust, dirt, fumes and other harmful agents. Conducts investigations regarding noise, temperature, humidity, radiation and other hazardous conditions. Operates and maintains technical equipment and various detection instruments such as velometers, radiation detectors, air samples, carbon monoxide indicators, direct reading air analyzers, etc. Analyzes samples obtained during inspections for hazardous properties. Conducts follow-up inspections and performs other duties as required or assigned. Assists in the review of license applications and procedures for radioactive waste and processor licenses, and assists in the preparation of environmental assessments.

MINIMUM QUALIFICATIONS

Education and Experience

Graduation from a recognized college or university with a master's degree in one of the basic sciences.

OR

Graduation from a recognized college or university with a bachelor's degree, and one (1) year of experience in the field of environmental health.

Knowledge, Skills, and Abilities

Working knowledge of local, state, and federal ordinances and laws pertaining to environmental health. Working knowledge of environmental health engineering, chemical engineering practices and radiological safety techniques. Working knowledge of the principles and techniques of radiological, chemical and biological analysis. Thorough knowledge of the operation, use and care of detection equipment used in industrial hygiene, air pollution and radiological health.

SENIOR
ENVIRONMENTAL QUALITY SPECIALIST

GENERAL DESCRIPTION

Performs and supervises complex environmental health work at the advanced technical level. Is responsible for the execution of the established environmental health program. Reviews environmental impact statements and independently confirms environmental data.

EXAMPLES OF WORK PERFORMED

Plans and supervises the activities of an environmental health staff in the field of radiological health.
Reviews reports from Environmental Health Specialists for technical correctness and competence.
Advises and consults with representatives of the public, management, labor, and professional groups on organization and operation of environmental health plans.
Analyzes and evaluates special conditions and situations involving environmental health.
Prepares environmental assessments.

MINIMUM QUALIFICATIONS

Education and Experience

Graduation from a recognized college or university with a master's degree in one of the basic sciences and two (2) years experience in environmental health.

OR

Graduation from a recognized college or university with a bachelor's degree and four (4) years experience in environmental health.

Knowledge, Skills, and Abilities

An intimate knowledge of local, state and federal laws on environmental health, and organization and structure of public health organizations.

ENTRY LEVEL
ENGINEER

GENERAL DESCRIPTION

Performs minor supervisory and/or engineering work. Work involves problems of air pollution control, wastewater facilities, occupational health and radiation control, and other environmental problems. Work is performed under the general supervision of a registered professional engineer.

EXAMPLES OF WORK PERFORMED

Recommends improvements for obtaining compliance with recognized public health standards of sanitation; performs preliminary or basic reviews of plans and specifications for construction or improvements of new or existing facilities.

Inspects air pollution abatement facilities and new or modified facilities emitting air pollutants, and inspects and conducts surveys of low-level waste collection and disposal facilities.

Appraises results of surveys and makes recommendations as to corrections to be made, subject to review and approval of his or her supervisor.

Prepares reports on inspections and surveys.

Conducts surveys, collects data and prepares reports on sources of air pollution, radiological health problems, and industrial and rural occupational health hazards.

Assists in the selection of air monitoring sites, air quality surveys, and set up and calibration of radiological monitoring equipment.

MINIMUM QUALIFICATIONS

Education and Experience

Graduation with a degree in engineering from an accredited college or university and one (1) year of acceptable engineering experience.

One (1) year of graduate study in engineering may be substituted for the required year of paid experience.

A master's degree in public health, environmental science or health, sanitary science, or radiological science or health, or community and regional planning from an accredited college or university may be substituted for the one year of required paid experience.

Knowledge, Skills, and Abilities

Considerable knowledge of principles and practices of environmental and radiological engineering; general knowledge of state and federal laws pertaining to occupational health and radiation protection, public health, and urban planning; structure and function of public health and environmental agencies.

SENIOR
ENGINEER

GENERAL DESCRIPTION

Performs administrative and highly responsible and supervisory professional engineering work. Work involves initiating, planning, developing, and supervising major programs including evaluation of low-level radioactive waste disposal site construction details.

EXAMPLES OF WORK PERFORMED

Work includes programs of air pollution control, ionizing radiation, industrial hygiene; field investigations concerning water pollution control, industrial waste treatment and control, environmental development program including urban planning.

Supervises the preparation of reports and public health engineering standards.

Provides technical information on various programs involved.

Reviews plans and specifications for facilities using radioactive materials and recommends appropriate action regarding issuance of licenses to construct and operate.

Reviews and approves plans and specifications for low level radioactive waste disposal sites.

Advises responsible officials as to recommendations to correct deficiencies.

Consults with responsible officials, local health departments, and technical groups concerning specific methods of complying with rules and regulations.

Supervises programs for training and certification of facility operators and urban planning.

Evaluates construction and operating permits, variance and exemption requests, and alternate methods of controlling sources of radiation.

Plans and supervises source sampling.

Provides technical support to legal staff at public hearings.

Initiates and supervises special air pollution investigations and studies.

Investigates emergency episodes (explosions, catastrophic leaks, etc.).

Investigates complaints of environmental degradation.

MINIMUM QUALIFICATIONS

Education and Experience

A bachelor's degree in engineering from an accredited college or university and a master's degree in engineering, public health, environmental science or health, or radiological science or health from an accredited college or university, plus six (6) years of paid engineering experience which shall have included three (3) years of supervisory or administrative engineering experience.

A Professional Engineer's license is required.

Knowledge, Skills, and Abilities

Thorough knowledge of principles and practices of public health, safety or environmental control engineering; state and federal laws pertaining to radiation control, environmental engineering, occupational health, and environmental control organizations.

ENTRY LEVEL
GEOLOGIST

GENERAL DESCRIPTION

Performs beginning geological work. Work involves the evaluation of geological data pertaining to low-level radioactive waste disposal sites and determination of their suitability for waste disposal. Advises on geological data requirements, evaluates soils and geological reports, advises on suitability of soils to achieve required specifications. Work is performed under general supervision of a senior geologist.

EXAMPLES OF WORK PERFORMED

Provides technical assistance or guidance to permit applicants, consulting engineers, or geologist, and soils testing laboratories in developing geological reports for low-level waste facility permit applications.

Evaluates geological and soils reports submitted in support of permit applications for low-level waste disposal sites, recommends as part of the Department's evaluation of a permit application, appropriate protective measures when necessary to safeguard groundwaters in vicinity of disposal sites.

Performs research and analysis of published geological and soils data to correlate reported site data with overall area geology, and determines the potential impact of the site on area groundwater.

Performs field investigations as necessary to resolve conflicting reports of site geology and soils conditions.

Performs related duties as assigned.

MINIMUM QUALIFICATIONS

Education and Experience

A bachelor's degree in geology from an accredited college or university, plus two (2) years of geological experience.

OR

A master's degree in geology from an accredited college or university may be substituted for the two (2) years of geological experience required above.

Qualifying experience includes: Any geological teaching, administrative or field experience covering water pollution control, disposal of solid wastes or liquids, water resources and supply, air pollution, laboratory analysis and instrumentation; or any geological service with any governmental agency.

Knowledge, Skills, and Abilities

Practicing knowledge of geological techniques and theories.

Skill in the application of geological concepts.

Ability to establish and maintain effective working relationships, deal tactfully with the public, work professionally and resourcefully with public health and environmental problems, express ideas clearly and concisely, and address groups effectively.

SENIOR
GEOLOGIST

GENERAL DESCRIPTION

Functions as chief geologist with responsibility for organizing, supervising, coordinating, and administering geotechnical and engineering geological programs. Work primarily involves the evaluation of geological data pertaining to radioactive waste disposal sites and determination of their suitability for waste disposal. Advises on geological data requirements, evaluates soils and geological reports, advises on suitability of soils to achieve required specifications.

EXAMPLES OF WORK PERFORMED

Organizes, supervises, coordinates, and administers geotechnical and engineering geological programs in support of permitting and surveillance of radioactive waste disposal sites.

Develops geotechnical requirements for radioactive waste management rules and regulations.

Assists hearing examiners in the interpretation of geotechnical data in permit applications, legal briefs, and lawsuits.

Participates in conferences with consulting geologists, research institutions, other state and federal agencies, and municipal and industrial officials regarding problems of a public health engineering nature.

Consults with municipal officials and other state agencies regarding current geotechnical requirements for radioactive waste disposal sites. Plans and assigns work projects, coordinates planned activities to insure adequate support of other staff elements.

Directs and supervises the work of personnel performing geological and technical tasks in conjunction with assigned projects.

Provides technical assistance or guidance to permit applicants, consulting engineers or geologists, and soils testing laboratories in developing geological reports for radioactive waste facility license applications.

Evaluates geological and soils reports submitted in support of license applications for radioactive waste disposal sites, recommends as part of the Department's evaluation of a permit application, appropriate protective measures when necessary to safeguard groundwaters in vicinity of disposal sites.

Performs research and analysis of published geological and soils data to correlate reported site data with overall area geology and determines the potential impact of the site on area groundwater.

Participates in public hearings and court hearings as an expert witness on geological aspects of radioactive waste disposal sites.

Performs field investigations as necessary to resolve conflicting reports of site geology and soils conditions.

MINIMUM QUALIFICATIONS

Education and Experience

A bachelor's degree in geology from an accredited college or university, plus eight (8) years of geological experience which shall include three (3) years of supervisory or administrative responsibility.

OR

A master's degree in geology from an accredited college or university may be substituted for two (2) years of the nonspecified experience required above.

Qualifying experience includes: Any geological teaching, administrative or field experience covering water pollution control, disposal of solid wastes or liquids, water resources and supply, air pollution, laboratory analysis and instrumentation; or any geological service with any governmental agency.

Knowledge, Skills, and Abilities

Practicing knowledge of geological techniques and theories.
Skill in the application of geological concepts.
Ability to direct and supervise technical work. Ability to establish and maintain effective working relationships, deal tactfully with the public, work professionally and resourcefully with public health and environmental problems, express ideas clearly and concisely, and address groups effectively.

Physical

Good health and physical condition sufficient to permit the full performance of the duties of the position.

ENTRY LEVEL
ENVIRONMENTAL TECHNICIAN

GENERAL DESCRIPTION

Performs beginning level routine technical work relating to environmental health functions. Work involves the conduct of surveys, inspections or investigations, collection of samples or data related to air pollution, and radiological control. Works under close supervision.

EXAMPLES OF WORK PERFORMED

May function as a member of a team or work may be closely supervised when making surveys, inspections, investigations for compliance with state and local laws or ordinances pertaining to environmental health. May be required to collect and measure samples of radioactive material or other agents or objects that are believed harmful to humans. May install and operate equipment and/or instruments used to collect air or water samples or measure radiation emissions. Assembles data used in gaining needed improvements in a specific environmental health program. Maintains, processes and prepares reports as required by the program. Performs related work as assigned.

MINIMUM QUALIFICATIONS

Education and Experience

Graduation from an accredited senior high school.

Knowledge, Skills and Abilities

Some knowledge of the principles and practices of environmental health functions; structure of public health organizations and community relationships; knowledge of mathematics.

Ability to learn the use of the tools and instruments required to use in the position employed.

Ability to deal tactfully and effectively with the public; to work well with other employees and to express ideas clearly and concisely.

SENIOR
ENVIRONMENTAL TECHNICIAN

GENERAL DESCRIPTION

Performs work relating to radiation control, health physics, and radiologic environmental surveillance and health functions in state or regional health departments. Work involves assisting in conduction of inspections and collection of samples or data related to radiation safety, health physics, and radiological environmental. Work is performed under close supervision. Frequent travel may be required.

EXAMPLES OF WORK PERFORMED

Assists in conducting licensing inspections of facilities using or wishing to use radioactive materials.
Inspects x-ray equipment, including operating radiation measuring devices.
Operates radiation detection or measuring equipment and environmental monitoring equipment.
Collects, compiles, and analyzes data, including calculating radiation exposures received by individuals.
Writes letters and reports documenting licensing and compliance inspections.
Communicates with hospital administrators, doctors, supervisors, and others regarding radiation safety.

MINIMUM QUALIFICATIONS

Education and Experience

Sixty (60) semester hours at an accredited college or university that includes twelve (12) semester hours of courses in the natural or physical sciences or advanced mathematics.

Knowledge, Skills, and Abilities

Knowledge of basic mathematics, including algebra.
Knowledge of the English language sufficient to write letters and reports.
Ability to operate radiation detection equipment.
Ability to make accurate and objective observations.
Ability to establish and maintain effective interpersonal relationships.
Ability to read, understand, and apply literature and technical material relating to health physics, radiation control, and environmental surveillance.
Ability to communicate technical information at an appropriate level.

APPENDIX C

Pre-Operational Monitoring Program

Preoperational Monitoring for a LLW Site Sample Collection

Type of Sample	Number	Location	Method	Frequency	Frequency	Sample Analysis Type of Analysis
AIR Particulates	3	At or near the site boundaries	Continuous	Weekly filter change	Quarterly composite, gamma-scan weekly	gamma-scan, gross alpha, gross beta
	2	At or near the nearest residence and the downwind nearest residence	Continuous	Weekly filter change	Quarterly composite, gamma-scan weekly	gamma-scan, gross alpha, gross beta
	1	At a control or background location remote from the site	Continuous	Weekly filter change	Quarterly composite, gamma-scan weekly	gamma-scan, gross alpha, gross beta
WATER Groundwater	6 or more	Wells located around future disposal area. At least three wells hydrologically down gradient from disposal area. At least three located on other sides of disposal area.	Grab	Quarterly	Quarterly	gamma-scan, gross alpha, gross beta, tritium, carbon-14
	One from each well	Wells within 2 km of disposal area that are or could be used for potable water supplies, watering of livestock, or crop irrigation.	Grab	Quarterly	Quarterly	gamma-scan, gross alpha, gross beta, tritium, carbon-14
	One	Well located hydrologically up gradient from disposal area to serve as control or background location.	Grab	Quarterly	Quarterly	gamma-scan, gross alpha, gross beta, tritium, carbon-14

Type of Sample	Number	Location	Method	Frequency	Sample Analysis	
					Frequency	Type of Analysis
Surface Water	One from each body of water	Large permanent onsite water impoundments or offsite impoundments that may be subject to direct surface drainage from potentially contaminated areas.	Grab	Quarterly	Quarterly	gamma-scan, gross alpha, gross beta, tritium, carbon-14
	One from each body of water	Surface waters passing through the site or offsite surface waters that may be subject to drainage from potentially contaminated areas.	Grab	Quarterly	Quarterly	gamma-scan, gross alpha, gross beta, tritium, carbon-14
	One	Upstream control sample	Grab	Quarterly	Quarterly	gamma-scan, gross alpha, gross beta, tritium, carbon-14
VEGETATION, FOOD, AND FISH						
Vegetation	6	1 composite at air particulate sampling location	Grab	Spring and Fall	Each Sample	gamma-scan, gross alpha, gross beta, tritium, carbon-14, species composition by biomass
Food	2 samples	Primary herbivore and wildlife with dependent license area	Grab	Spring and Fall	Each Sample	gamma-scan, gross alpha, gross beta, tritium, carbon-14; composite of edible portions
	1	Crop within 3 km, downwind of site	Grab	Time of harvest	Each Sample	gamma-scan, gross alpha, gross beta, tritium, carbon-14
Fish	Each body of water	Collection of fish (if any) from lakes, rivers, and streams in the site environs that may be subject to seepage or direct surface runoff from potentially contaminated areas.	Grab	Semiannually	Twice	gamma-scan, gross alpha, gross beta, tritium, carbon-14, composite of edible portions
Milk	1	Nearest dairy	Grab	Quarterly	Quarterly	gamma-scan, gross alpha and gross beta

Type of Sample	Number	Location	Method	Frequency	Sample Analysis	
					Frequency	Type of Analysis
SOIL AND SEDIMENT						
Surface Soil	40	1 per acre within immediate disposal area	Grab	Once	Each Sample	gamma-scan, gross alpha, gross beta
	36	1 per 10 acres within licensed area	Grab	Once	Each Sample	gamma-scan, gross alpha, gross beta
	6	At air particulate sampling stations	Grab	Once	Each Sample	gamma-scan, gross alpha, gross beta
Sediment	Two from each stream	Up and downstream of surface waters passing through site or from offsite surface waters that may be subject to direct runoff from potentially contaminated areas.	Grab	Once	Each Sample	gamma-scan, gross alpha, gross beta
	One from each water impoundment	Onsite water impoundments (lakes, ponds, etc), or offsite impoundments that may be subject to direct surface runoff from potentially contaminated areas.	Grab	Once	Each Sample	gamma-scan, gross alpha, gross beta
Direct Gamma Radiation	Up to eighty	150-meter intervals to a distance of 1500 meters in each of 8 directions from center.	—	Once	Once	Gamma exposure rate, using passive integrating device such as TLD, pressurized ionization chamber, or properly calibrated portable survey instrument.
	6	At air particulate sampling locations	—	Quarterly	Quarterly	Gamma exposure rate using passive integrating device (such as TLD)

APPENDIX D

Operational Monitoring Program

Appendix D

Operational Monitoring Program for a LLW Site

Type of Sample	Number	Location	Method	Frequency	Sample Analysis	
					Frequency	Type of Analysis
AIR						
Particulates	3	At or near the site boundaries	Continuous	Weekly filter change	Quarterly composite..gamma-scan Weekly.....gross alpha, gross beta	
	2	At or near the nearest residence and the downwind nearest residence	Continuous	Weekly filter change	Quarterly composite..gamma-scan Weekly.....gross alpha, gross beta	
	1	At a control or background location remote from the site	Continuous	Weekly filter change	Quarterly composite..gamma-scan Weekly.....gross alpha, gross beta	
WATER						
Groundwater	6 or more	Wells located around future disposal area. At least three wells hydrologically down gradient from disposal area. At least three located on other sides of disposal area.	Grab	Quarterly	Quarterly	gamma-scan, gross alpha, gross beta, tritium, carbon-14
	One from each well	Wells within 2 km of disposal area that are or could be used for potable water supplies, watering of livestock, or crop irrigation.	Grab	Quarterly	Quarterly	gamma-scan, gross alpha, gross beta, tritium, carbon-14
	One	Well located hydrologically up gradient from disposal area to serve as control or background location.	Grab	Quarterly	Quarterly	gamma-scan, gross alpha, gross beta, tritium, carbon-14

Type of Sample	Number	Location	Method	Frequency	Sample Analysis	
					Frequency	Type of Analysis
Surface Water	One from each body of water	Large permanent onsite water impoundments or offsite impoundments that may be subject to direct surface drainage from potentially contaminated areas.	Grab	Quarterly	Quarterly	gamma-scan, gross alpha, gross beta, tritium, carbon-14
	One from each body of water	Surface waters passing through the site or offsite surface waters that may be subject to drainage from potentially contaminated areas.	Grab	Quarterly	Quarterly	gamma-scan, gross alpha, gross beta, tritium, carbon-14
	One	Upstream control	Grab	Quarterly	Quarterly	gamma-scan, gross alpha, gross beta, tritium, carbon-14
VEGETATION, FOOD, AND FISH						
Vegetation	6	1 composite at air particulate sampling locations.	Grab	Spring and Fall	Each Sample	gamma-scan, gross alpha, gross beta, tritium, carbon-14; species composition by biomass
Food	2 samples	Primary herbivore and wildlife within dependent license areas.	Grab	Spring and Fall	Each Sample	gamma-scan; gross alpha, gross beta, tritium, carbon-14; composite of edible portions
	1	Crop within 3 km, downwind of site.	Grab	Time of harvest	Each Sample	gamma-scan, gross alpha, gross beta, tritium, carbon-14
Fish	Each body of water	Collection of fish (if any) from lakes, rivers, and streams in the site environs that may be subject to seepage or direct surface runoff from potentially contaminated areas.	Grab	Semiannually	Twice	gamma-scan, gross alpha, gross beta, tritium, carbon-14, composite of edible portions
Milk	1	From nearest dairy	Grab	Quarterly	Quarterly	gamma-scan, gross alpha, and gross beta

Type of Sample	Number	Location	Method	Frequency	Sample Analysis	
					Frequency	Type of Analysis
SOIL AND SEDIMENT						
Soil	6	At air particulate sampling locations	Grab	Quarterly	Each Sample	gamma-scan, gross alpha, gross beta
Sediment	Two from each stream	Up and downstream of surface waters passing through site or from offsite surface waters that may be subject to direct runoff from potentially contaminated areas.	Grab	Annually	Each Sample	gamma-scan, gross alpha, gross beta
	One from each water impoundment	Onsite water impoundments (lakes, ponds, etc), or offsite impoundments that may be subject to direct surface runoff from potentially contaminated areas.	Grab	Annually	Each Sample	gamma-scan, gross alpha, gross beta
Direct gamma radiation	6	At air particulate sampling locations	—	Quarterly	Quarterly	Gamma exposure rate using passive integrating device (such as TLD)

NRC FORM 335 <small>(11-81)</small>		U.S. NUCLEAR REGULATORY COMMISSION BIBLIOGRAPHIC DATA SHEET		1. REPORT NUMBER (Assigned by DDC) NUREG/CR-4352	
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				3. RECIPIENT'S ACCESSION NO.	
7. AUTHOR(S) R.A. Ratliff, B. Dornsife, V. Autry, L. Gronemyer, J. Vaden, T. Cashman				5. DATE REPORT COMPLETED MONTH May YEAR 1984	
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16. ABSTRACT (200 words or less) <p>Description of criteria and procedure for a state to follow in the development of a program to regulate a LLW disposal site. This would include identifying those portions of the NRC regulations that should be matters of compatibility, identifying the various expertise and disciplines that will be necessary to effectively regulate a disposal site, identifying the resources necessary for conducting a confirmatory monitoring program, and providing suggestions in other areas which, based on experiences, would result in a more effective regulatory program.</p>					
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DISPOSAL SITE REGULATORY PROGRAM