Interagency Steering Committee on **Radiation Standards**

1999 Annual Report

NUREG-1707, Vol. 2

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INTERAGENCY STEERING COMMITTEE ON
RADIATION STANDARDS

1999 ANNUAL REPORT

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FOREWORD

The Interagency Steering Committee on Radiation Standards (ISCORS) prepared this annual report for ISCORS member agencies, to document ISCORS' 1999 activities, and plans for the year 2000. The report identifies both past accomplishments, and goals for the future that will be a basis for assessing performance. We wish to thank the ISCORS members for their participation and contributions to the many topics discussed over the past year regarding radiation issues important to the public; Federal, State, and local agencies; and national and international communities. In addition, we extend compliments to all the subcommittee chairs and their members for significant support and accomplishments within the past year on numerous radiation issues, and for developing useful information, examples of which are attached in this report. The subcommittees have outlined an aggressive list of challenges for 2000 and the full committee looks forward to receiving subcommittee recommendations on the specific topics each has identified.

The full ISCORS met in March, June, September, and December 1999. The June 1999 meeting was open to the public for observation. At each full committee meeting, the subcommittees report on their yearly activities and progress. The full committee also reviews special topics, some of which included the GAO report, "Low-Level Radioactive Wastes: States Are Not Developing Disposal Facilities"; EPA's proposed rule regulating radon in drinking water; NRC's program for the regulation of uranium recovery facilities; DOT's regulations addressing exempt quantities; and DOE's program and draft agenda for fiscal years 1999 and 2000 Public Health Activities.

Over the past two years, the full ISCORS committee has established a strong intragovernmental working relationship that benefits each member agency and significantly aids in identifying topics of interest to each agency. The annual report makes the process visible to member representatives and the public. We appreciate any comments on the annual reports and expect that they will be used as a ready reference for an overview of committee activities. You may send comments on the report to Ms. Patricia A. Santiago, NRC, Mail Stop T-7J8, Washington, DC 20555; or Mr. Behram Shroff, EPA, Office of Radiation and Indoor Air (6608J), 1200 Pennsylvania Avenue, NW, Washington, DC 20460.

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HISTORICAL INFORMATION

INTERAGENCY STEERING COMMITTEE ON RADIATION STANDARDS

The Interagency Steering Committee on Radiation Standards (ISCORS) was formed in response to October 27, 1994, letters from Senator John Glenn to the U. S. Nuclear Regulatory Commission (NRC); the U.S. Environmental Protection Agency (EPA); and the Office of Science and Technology Policy (OSTP). In this letter, Senator Glenn charged the EPA and the NRC, in coordination with the Committee on Interagency Radiation Research and Policy Coordination (CIRRPC), to develop a plan for a "path forward" to address the inconsistencies, gaps, and overlaps in current radiation protection standards. ISCORS is one of the committees OSTP recommended for achieving the goals of the now defunct CIRRPC.

The objectives of the ISCORS include: (1) facilitating a consensus on acceptable levels of radiation risk to the public and workers; (2) promoting consistent risk assessment and risk management approaches in setting and implementing standards for occupational and public protection from ionizing radiation; (3) promoting completeness and coherence of Federal standards for radiation protection; and (4) identifying interagency issues and coordinating their resolution.

Since its inception, the NRC and the EPA have co-chaired the ISCORS. The current co-chairs are John T. Greeves, NRC, and Frank Marcinowski, EPA. In addition to the NRC and the EPA, ISCORS membership also includes senior managers from the U.S. Department of Defense; the U.S. Department of Energy (DOE); the U.S. Department of Labor's Occupational Safety and Health Administration (OSHA); the U.S. Department of Transportation; and the Department of Health and Human Services. Representatives of the Office of Management and Budget (OMB), OSTP, and the States are observers at meetings.

Committee meetings involve pre-decisional intragovernmental discussions and, as such, are not normally open for observation by members of the public or media. However, summary meeting notes are available in NRC's Public Document Room. The Committee does not act as a decision-making body. Instead, it provides recommendations and summaries of its activities on specific issues to both the heads of member agencies, and to OMB and OSTP, via an annual report. The Committee meets approximately once each calendar quarter. It held its first meeting on April 5, 1995.

The full ISCORS committee has established subcommittees, as needed, to conduct its technical work (e.g., to address specific issues of concern or significant interest to it). ISCORS has formed the following subcommittees: Clean-up; Mixed Waste; Recycle; Risk Harmonization; Sewage Sludge; Naturally Occurring Radioactive Materials (NORM); and Federal Guidance. The subcommittee activity section of this report summarizes each subcommittee's activities. No new subcommittees were formed in 1999.

LIST OF ISCORS PLANNED 1999 ACTIVITIES

Clean-up Subcommittee (C. Trottier)

1. Participate in the review of NRC's decommissioning regulatory guide.
2. Review clean-up codes in terms of assumptions and parameters.
3. Review and compile list of models.

Mixed Waste Subcommittee (A. Wallo)

4. Complete technical analyses of the DOE Radiological Control Criteria (RCC) supporting documentation.
5. Provide input to resolving any RCC issues.
6. Provide input to Conference of Radiation Control Program Directors (CRCPD) reviews and workshops on RCC concept.
7. Coordinate on EPA's "Generally Applicable standard on Resource Conservation and Recovery Act (RCRA) Mixed Waste Disposal."

Recycle Subcommittee (J. Karhnak)

8. Discuss the need for the NRC and the EPA to develop a consistent set of normalized dose tables for carbon steel.
9. Initiate discussions for normalized dose tables for aluminum and copper.
10. Review and participate in, as appropriate, NRC rulemaking for recycling of materials.
11. Monitor Department of State (DOS) initiative on source control.

Risk Harmonization Subcommittee (D. O'Connor)

12. Update Institutional Control Fact Sheets and provide a recommendation on whether to hold a workshop on institutional controls.
13. Provide recommendations for Phase II of evaluating uniform risk standards after reviewing the results of the Environmental Law Institute's (ELI) risk workshop of June 1998.

Sewage Sludge Subcommittee (R. Bastian/M. Thomas)

14. Complete final "Report on Survey Design and Test Sites" (including "Radiation Reference Document") for public release on the EPA home page website.
15. Complete Freedom of Information Act (FOIA) appeal response.
16. American Metropolitan Sewerage Association/ Water Environmental Foundation (AMSA/ WEF) letter and guidance sent to candidate Publicly-owned Treatment Works (POTWs) for survey effort.
17. Mail out full-survey questionnaire.
18. Issue updated "Joint NRC/EPA Guidance Document for POTWs."
19. Initiate full-survey sample collection/analyses.
20. Continue activities of Dose Modeling Workgroup.

NORM Subcommittee (L. Setlow)

21. Provide Input for development of EPA NORM Strategy.
22. Review American Standards Institute (ANSI) proposed standards for NORM.
23. Review CRCPD proposed standards for NORM.
24. Evaluate need to update existing regulations/standards affecting mining TENORM, in coordination with Federal Guidance Subcommittee.
25. Consider recommendation to OSHA to update its standard to adopt NRC 10 CFR 20.

Federal Guidance Subcommittee (J. Rosenberg)

26. Develop a ranked list of Federal Guidance projects to undertake (short- and long-term).
27. Maintain a process for communicating and coordinating on FG projects and activities.
28. Review comments on Federal Guidance Report 13 and provide summary to ISCORS.

LIST OF ISCORS PLANNED 2000 ACTIVITIES

Clean-up Subcommittee (C. Trottier)

1. Continue development of environmental modeling document.

Mixed Waste Subcommittee (G. Vazquez)

2. Hold discussions and exchanges on current mixed-waste initiatives and issues.
3. Provide input to resolving any RCC issues and complete any final review or analysis of the RCC as needed.
4. Provide input to CRCPD reviews and workshops on RCC concept.

Recycle Subcommittee (R. Meck)

5. Monitor the status of clearance and import controls among national agencies and international organizations.
6. Develop and finalize normalized dose tables for specific materials as needed.

Risk Harmonization Subcommittee (E. Regnier)

7. Narrative for institutional control tables.
8. Include Resources and Recovery Act (RCRA) on institutional control tables.
9. Optimization: develop a fact sheet examining statutory requirements.
10. Provide recommendations on the ELI/John Hopkins Phase II study as needed.

Sewage Sludge Subcommittee (R. Bastian/R. Hogan)

11. Issue updated "Joint NRC/EPA Guidance Document for POTWs," for review /comment.
12. Complete peer review input on dose modeling effort.
13. Complete dose modeling effort.
14. Complete POTW sample collection and analysis.
15. Complete public review of second-draft of guidance document.

NORM Subcommittee (L. Setlow)

16. Discuss EPA's report to Congress on response to the National Academy of Science's study of EPA's TENORM guidance.
17. Review and comment on EPA's technical report on uranium mining TENORM.
18. Coordinate activities with ISCORS Sewage Sludge Subcommittee.
19. Evaluate the need to update existing regulations/standards affecting TENORM in coordination with the ISCORS Federal Guidance Subcommittee.
20. Consider a recommendation to OSHA to update its standard to adopt NRC 10CFR 20.

Federal Guidance Subcommittee (J. Rosenberg)

21. Protective Action Guides (PAG): Produce final revised PAG manual.
22. White Paper on New Dosimetric Methods.
23. Produce Federal Guidance for the General Public. Establish and implement process for moving forward to developing an updated Federal Guidance for the General Public.
24. Develop a methodology for approximating the risk indicated by a dose assessment, in cases where a full risk assessment is not practicable.

1999 and 2000 SUBCOMMITTEE ACTIVITIES AND SUMMARY OF 1999 ACCOMPLISHMENTS

Clean-up Subcommittee Highlights

Subcommittee Chair: Cheryl Trottier, NRC (301-415-6232)

The Clean-up Subcommittee is evaluating radionuclide concentrations for screening decommissioning sites.

1999 Planned Activities and Accomplishments:

1. The Clean-up Subcommittee will participate in the review of NRC's decommissioning regulatory guide.

   The draft Regulatory Guide (DG-4006) was provided to the subcommittee members for their information.

2. The Clean-up Subcommittee will review clean-up codes in terms of assumptions and parameters.

   The subcommittee developed a draft document that will be useful to the model user and model developer. The draft document is described below under activity number 3.

3. The Clean-up Subcommittee will review and compile a list of models.

   During Calendar Year 1999, the Subcommittee developed a draft document that is intended to provide support and guidance to users who need information on how to select an environmental model. The document will eventually combine the information that has been developed by each Agency regarding both model selection criteria and information about specific models.

   The document will have two major sections, allowing it to be useful to both the model user and model developer. The first section will include a list of questions that users need to answer to select the appropriate model for their specific situation. The information will be presented as a series of questions, as well as a simple checklist. The second section will be oriented toward model developers and anyone who is interested in specific details for a particular model. Information for individual models will include responses to all of the questions in section 1. The information will be organized in a standard template to make it easier to compare different models and to ensure that the same information is supplied for every model. An attachment to this second section will be a series of completed templates, initially for models that were included in NUREG/CP-0163, "Proceedings of the Workshop on Review of Dose Modeling Methods for Demonstration of Compliance With the Radiological Criteria for License Termination," and the EPA model RAGS/HHEM. The Subcommittee intends to post an electronic version of the document on the ISCORS Internet web site.

The Subcommittee also developed a mission statement and strategic and tactical objectives:

Mission Statement
To provide a forum for exchanging information and promoting partnerships on the development and application of radiation clean-up standards and guidance.

Strategic Objective
To foster inter-agency cooperation and consistency when discussing and resolving issues encountered in the development and application of clean-up standards, guidance, and dose/risk modeling tools that support site cleanup assessments and decisions.

Tactical Objective
To develop an internet-accessible tool that will be of value to users who need help in selecting environmental dose or risk assessment models to support site clean-up activities. The tool will provide users with: (1) a list of questions that users should consider to select a model for a site clean-up assessment; and (2) information on specific dose or risk models, including model capabilities and intended applications, that provide answers to the list of user questions identified in number (1) above.

2000 Planned Activities:

1. Complete the environmental modeling document and post it on the subcommittee web site. A methodology will be developed for keeping the document up to date, and incorporating information about other environmental models.

Mixed Waste Subcommittee Highlights

Subcommittee Chair: Gus Vazquez, DOE (202-586-7629)

The Mixed Waste Subcommittee is a forum for exchanging information on mixed waste.

1999 Planned Activities and Accomplishments:

4. Complete technical analyses of DOE RCC supporting documentation.

   The Subcommittee received briefings regarding progress on DOE's RCC for hazardous waste. In 2000, the subcommittee will continue to receive briefings and complete any final review or analysis as needed.

5. Provide input to resolving any RCC issues.

   The subcommittee will continue to provide input to assist in resolving any RCC issues. No specific input was needed in 1999.

6. Provide input to CRCPD reviews and workshops on RCC concept.

   The Subcommittee was briefed with an overview of State CRCPD issues and comments on the potential waste disposal approach. In 2000, members will have the opportunity to participate in a liaison role in the on-going CRCPD review of the RCC approach.

7. Coordinate on EPA's "Generally Applicable standard on RCRA Mixed Waste Disposal."

   This activity is continued into 2000.

In addition, during the course of the year, Subcommittee members shared information on the status of their various agency initiatives. The subcommittee provided this information to ISCORS at its quarterly meetings. Major agency mixed waste initiatives that the subcommittee discussed included: (1) EPA's storage and disposal of commercial mixed waste rulemaking, and its extension of the policy of lower enforcement priority for storage of untreatable mixed waste; and (2) EPA's low activity mixed waste initiative—in addition to briefings on plans and status of the initiative, the members provided insights and technical suggestions to the EPA and shared related technical information.

2000 Planned Activities:

2. Hold discussions and exchanges on current mixed waste initiatives and issues.
3. Provide input to resolving any RCC issues and complete any final review or analysis of the RCC as needed.
4. Provide input to CRCPD reviews and workshops on RCC concept.

Recycle Subcommittee Highlights

1999 Subcommittee Chair: John Karhnak, EPA
2000 Subcommittee Chair: Robert A. Meck, NRC (301-415-6205)

The Recycle Subcommittee reviews issues on radiological control of materials.

1999 Planned Activities and Accomplishments:

8. Discuss the need for the NRC and the EPA to develop a consistent set of normalized dose tables for carbon steel.

   The subcommittee determined that there was a need for a carbon steel table and will continue to discuss and finalize development of the normalized dose tables in 2000.

9. Initiate discussions for normalized dose tables for aluminum and copper.

   In 1999, discussions were held on normalized dose tables for aluminum and copper and the work has been initiated.

10. Review and participate in, as appropriate, NRC rulemaking for recycling of materials.

    As a result of the continued efforts to harmonize dose assessments for clearance of materials, the normalized dose factors for the EPA and the NRC can be brought within a factor of 3 for all radionuclides. A factor of 3 is well within the resolution of the modeling assessments, and is thus virtual agreement. The Subcommittee has also coordinated U.S. input to the parallel development of clearance levels at the International Atomic Energy Agency (IAEA). This latter effort has also improved harmonization of the dose assessments. The DOE and the EPA participated in the NRC public meetings to scope the alternatives of a potential rulemaking on the control of solid materials.

11. Monitor DOS initiative on source control.

    The DOS and the EPA co-sponsored several meetings on the import of radioactively contaminated materials, with a focus on orphan sources.

In addition, the Subcommittee has broadened its scope to include issues relating to the release of materials and equipment from radiological control (clearance) and the interception of unlicensed imported goods that require radiological control. In 2000, the Subcommittee will actively recruit new members to ensure that the multiple aspects of clearance and interception issues are adequately represented.

2000 Planned Activities:

5. Actively monitor the status of clearance and import controls among Federal agencies and international organizations to promote broadly informed and coordinated actions.
6. Develop and finalize normalized dose tables for specific materials as needed.

Risk Harmonization Subcommittee Highlights

1999 Subcommittee Chair: Dennis O'Connor, EPA (202-564-9486)
2000 Subcommittee Chair: Edward Regnier, DOE

The Risk Harmonization Subcommittee was initiated to review similarities and differences between NRC and EPA risk assessment and risk management approaches.

1999 Planned Activities and Accomplishments:

12. Update institutional Control Fact Sheets and Summary Table and provide a recommendation on whether to hold a workshop on institutional controls.

    The Institutional Control Work Group of the Subcommittee prepared a summary of institutional control requirements in EPA, DOE, and NRC programs for radioactive waste disposal and site remediation. In addition to describing institutional controls, the tables also summarize the other risk management techniques that are used in each program, such as the use of engineered barriers and site characteristics, so that the contribution of institutional controls to risk reduction is put into context. The results of this work were presented in poster sessions at two major conferences—the IAEA "International Symposium on Restoration of Environments with Radioactive Residues" in Arlington, Virginia, November 29–December 3, 1999, and Waste Management 2000 in Tucson, Arizona, February 27–March 2, 2000.

    The Institutional Control Work members were Jacolyn Dziuban, EPA; Gary Roles, DOE; and James Kennedy, NRC. In the next year, the group will add RCRA disposal facilities to the summary, and provide a narrative description of the information in the tables. Appendix B contains the tables as presented at the conferences.

13. Provide recommendations for Phase II of evaluating uniform risk standards after reviewing the results of the Environmental Law Institute (ELI)/Johns Hopkins's chemical and radiation risk management workshop of June 1998.

    The Phase II was not complete in 1999 and the subcommittee will follow its progress in 2000 to determine any recommendations needed.

2000 Planned Activities

7. Make narrative for institutional control tables.
8. Include RCRA on institutional control tables.
9. Optimization: develop a fact sheet examining statutory requirements.
10. Provide recommendations on the ELI/John Hopkins Phase II study as needed.

Sewage Sludge Subcommittee Highlights

Subcommittee Co-chairs: Bob Bastian, EPA (202-260-7378) Rosemary Hogan, NRC (301-415-7484)

The Sewage Sludge Subcommittee is assisting in the development of an NRC/EPA sewage survey and a sewage guidance document.

1999 Planned Activities and Accomplishments:

14. Complete final "Report on Survey Design and Test Sites" (including "Radiation Reference Document") for public release on the EPA home page website.

    The subcommittee published the final *Joint NRC/EPA Sewage Sludge Radiological Survey: Survey Design and Test Site Results* Report (EPA 832-R-99-900; May 1999). The report was also made available on the internet, through EPA's TENORM web page (URL: http://www.epa.gov/rpdweb00/tenorm/pubs.htm).

15. Complete the FOIA appeal response.

    The original FOIA request asked for information on the nine test sites survey. At the time of the request, work on the test sites survey was still in progress. When the work on the test sites survey was complete, the joint NRC/EPA report (see above) was provided to the requester, to complete the response to the FOIA appeal.

16. Sent Association of Metropolitan Sewerage Agencies/Water Environment Foundation (AMSA/WEF) letter and guidance to candidate POTWs for survey effort.

    The AMSA/WEF guidance document was intended to assist pretreatment coordinators and biosolids managers in understanding and addressing various aspects of radioactivity within the wastewater industry. AMSA/WEF sent the guidance to publicly owned treatment works (POTWs) that were selected to participate in the NRC/EPA survey. Then, the package that the NRC and the EPA sent to the POTWs, asking for participation in the NRC/EPA survey, included an AMSA/WEF letter, which expressed support for participation in the survey.

17. Mail out full survey questionnaire.

    The EPA and the NRC jointly mailed out the survey questionnaires (July 1999). The subcommittee sent out 631 and received 377 completed survey questionnaires from

POTWs. We believe the good response of about 60 percent was because of the joint AMSA/WEF letter. The Subcommittee developed a database for tracking survey questionnaire information and sample analysis results, to be used to help automate selection of which POTWs are to be sampled.

18. Issue updated "Joint NRC/EPA Guidance Document for POTWs."

    The "Joint NRC/EPA Guidance Document for POTWs," responding to comments received on the May 1997 draft, was still undergoing revisions. The Subcommittee developed responses to comments received from States and others on the May 1997 draft. A revised draft document was received from EPA's contractor for Subcommittee review. The process of finalizing revisions to the revised draft document continued through 1999. This activity is now planned for completion in Summer 2000.

19. Initiate full-survey sample collection/analyses.

    The Subcommittee initiated the full-survey sample collection/analysis effort. The Subcommittee identified the first three groups of 25 POTWs to receive sampling kits. Sampling kits were mailed out in October, November, and December. Most of the samples were received and have had preliminary analyses completed. The Subcommittee also approved the Quality Assurance Project Plan for the survey effort.

20. Continue activities of Dose Modeling Workgroup.

    The Dose Modeling Workgroup of the Subcommittee continued its activities. The workgroup developed an initial draft of the dose modeling protocol document. This document is currently being reviewed by the full Subcommittee before presenting it to the full ISCORS Committee in Spring 2000.

In addition, the Subcommittee prepared and presented a paper on the status of the survey and guidance document at the CRCPD meeting in Louisville, KY. The subcommittee also responded to a request for participation on the Subcommittee by the radioactive materials users industry. The Subcommittee held a noticed, open public meeting to discuss Subcommittee activities.

2000 Planned Activities:

11. Issue updated "Joint NRC/EPA Guidance Document for POTWs" for review/ comment.
12. Complete peer review input on dose modeling effort.
13. Complete dose modeling effort.
14. Complete POTW sample collection and analysis.
15. Complete public review of second draft of the guidance document.

NORM Subcommittee Highlights

Subcommittee Chair: Loren Setlow, EPA (202-564-9445)

The NORM subcommittee's mission is to ensure effective communication and coordination among member agencies involved with regulatory, oversight, and disposal issues for NORM wastes, and products containing NORM.

1999 Planned Activities and Accomplishments:

21. Provide input to development of EPA's NORM Strategy.

    The Subcommittee provided member agencies with information on EPA's proposed approach to the technologically-enhanced naturally-occurring radioactive material (TENORM) policy and field study efforts.

22. Review of American National Standards Institute (ANSI) proposed standards for NORM.

    At its November 1999 meeting, the Subcommittee was briefed by the Chairman of the Health Physics Society committee which was preparing a draft ANSI Standard "Guide for Control and Release of Technologically-Enhanced Naturally Occurring Radioactive Materials." Members of the subcommittee could respond directly to that committee chairman with comments.

23. Review CRCPD proposed standards for NORM.

    The Subcommittee gave member agencies first-hand opportunities to be briefed by principals on the CRCPD model regulation "Part N–Regulation and Licensing of Technologically Enhanced Naturally Occurring Radioactive Materials (TENORM)."

24. Evaluate need to update existing regulations/standards affecting TENORM (in coordination with the Federal Guidance Subcommittee).

    The Subcommittee held discussions with the NRC on its proposed program and regulation changes for in-situ leaching, uranium mine licensing and operations oversight, byproduct classification, and use of mill site impoundments for waste disposal of materials other than 11e.(2) byproduct material. Agency member comments on the proposals were provided to the NRC by the Subcommittee on November 30. The Subcommittee also discussed the Department of Transportation's future plans to update transport regulations in consideration of revised international radiation standards.

    This activity will be continued in 2000.

25. Consider recommendation to OSHA to update its standard to adopt NRC Part 20.

    The Subcommittee is still considering this issue.

In addition, the Subcommittee held three meetings during 1999, with members from seven Federal and one State agency. This provided a forum for exchanging information on current agency activities, proposed regulations and new reports, as well as planned international meetings at which NORM issues were to be discussed. A representative of the DOE's Energy Information Administration briefed the Subcommittee on a project by the international Nuclear

Energy Agency (NEA) to develop a compendium of world-wide reclamation costs for closed uranium mines and uranium recovery facilities.

2000 Planned Activities:

16. Discuss EPA's report to Congress on response to the National Academy of Science's study of EPA's TENORM guidances.
17. Review and comment on EPA's technical report on uranium mining TENORM.
18. Coordinate activities with ISCORS Sewage Sludge Subcommittee.
19. Evaluate the need to update existing regulations/standards affecting TENORM in coordination with the ISCORS Federal Guidance Subcommittee.
20. Consider a recommendation to OSHA to update its standard to adopt NRC 10 CFR 20.

Federal Guidance Subcommittee Highlights

Subcommittee Chair: Julie Rosenberg, EPA (202-564-9154)

This Subcommittee works with the EPA to produce Federal Guidance -- including Presidential Guidance and Technical Reports -- that supports the development of consistent national radiation protection standards and implementing guidance.

The Subcommittee serves as the forum for coordination among Federal and State Government agencies interested in any or all aspects of Federal Guidance, to ensure that all agencies have opportunities for input before and during development of Federal Guidance.

1999 Planned Activities and Accomplishments:

26. Develop a ranked list of Federal Guidance projects to undertake — both short- and long-term.

    The Subcommittee made this task the focus of its work in 1999. The Subcommittee reviewed an initial list of potential Federal Guidance projects, and developed a shortened list of potential projects to be ranked. The Subcommittee used three ranking criteria: (1) the project fills a regulatory gap involving several Federal and State agencies; (2) the project provides increased or more cost- effective health or environmental protection; and (3) the project promotes consistency with new and existing laws, executive orders, and other guidance, while addressing the needs of the constituencies. The Subcommittee then ranked the potential projects, and decided to focus on the top three projects during the next 2 to 5 years: (1) Federal Guidance for the general public; (2) Protective Action Guides (PAGs); and (3) a White Paper on new dosimetric methods. A second tier of potential projects, which could be worked on if the subcommittee has time available, includes development of NORM guidance; an update to Federal Guidance for occupational exposure; updates to Federal Guidance (technical) Reports 11 and 12; guidance for ecological risk assessment; and standardization of exposure parameters and models for fate and transport assessments.

27. Maintain a process for communicating and coordinating on Federal Guidance projects and activities.

    The Subcommittee continued to address outreach and communication issues. The Subcommittee met quarterly to: (1) update members on the status of ongoing activities; and (2) establish the method for evaluating and selecting the list of Federal Guidance projects it would undertake. An internet link between the DOE and the EPA Federal Guidance Home Page was established, and work on additional internet cross-links continued. The Subcommittee distributed information related to Federal Guidance activities, including a joint EPA and DOE meeting on ecological risk assessment.

28. Review public comments on Federal Guidance Report 13, and provide a summary to ISCORS.

    The Subcommittee exchanged information about and was kept up to date on EPA's progress on issuing Federal Guidance Report No. 13. The final report was published in September 1999. After EPA Science Advisory Board review and after receiving public comments (including those from Federal and State agencies), the EPA made several changes to the interim version. Risk coefficients for additional radionuclides were added to the report. An uncertainty annex, which discusses the sources of uncertainty in the risk coefficients, and a table giving examples of uncertainty analysis results, were major additions to the document. Over 1,000 copies had been distributed by the end of 1999, not including downloads from the EPA's internet site. Copies of the final document and the "Response to Comments" document were mailed to all ISCORS representatives.

2000 Planned Activities:

21. PAG: distribute draft revised PAG manual for review.
22. "White Paper on New Dosimetric Methods": complete within the year.
23. "Federal Guidance for General Public": 1) review issues from 1960 and 1994 (proposal) versions, to identify areas of agreement and disagreement; and 2) draft a report, available for discussion at the September ISCORS meeting, that will include: a) potential areas of common agreement that could serve as the "Federal Guidance for the General Public" policy statement, and b) issues that the Subcommittee agrees need to be elevated to be resolved through another path.
24. Develop a methodology for approximating the risk indicated by a dose assessment, in cases where a full risk assessment is not practicable.

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* Middlesex County Utilities Authority
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APPENDIX A
ISCORS Charter

Charter for Interagency Steering Committee on Radiation Standards

Purpose of Committee

The purpose of this committee is to foster early resolution and coordination of regulatory issues associated with radiation standards.

MEMBERSHIP

1. Agencies represented on the committee include the U.S. Environmental Protection Agency, U.S. Nuclear Regulatory Commission, U.S. Department of Energy, U.S. Department of Defense, U.S. Department of Transportation, the Occupational Safety and Health Administration of the U.S. Department of Labor, the U.S. Department of Health an Human Services, and any successor agencies.
2. The Office of Science and Technology Policy and the Office of Management and Budget will be invited as observers at meetings because of their responsibilities for coordination of science policy and regulation policy, respectively.
3. The committee will be co-chaired by the EPA and NRC representatives for the first two years, after which the committee will determine whether the chairmanship should be rotated among additional agencies, or whether the chairmanship should be held by a single agency.
4. Other departments and agencies will be invited to participate in forming consensus for specific issues as voting members when their interests and responsibilities are involved.

OBJECTIVES

The objectives of the committee include the following:

1. Facilitate a consensus on allowable levels of radiation risk to the public and workers.
2. Promote consistent and scientifically sound risk assessment and risk management approaches in setting and implementing standards for occupational and public protection from ionizing radiation.
3. Promote completeness and coherence of Federal standards for radiation protection.
4. Identify interagency radiation protection issues and coordinate their resolution.

IMPLEMENTATION

The committee will conduct its activities in accordance with the attached understandings and procedures.

Understandings and Procedures for the Interagency Steering Committee on Radiation Standards

PARTICIPATION

1. Various offices and agencies within each agency may participate in the committee meetings. Each agency will develop a unified position and present that position at committee meetings. Each agency representative is responsible for developing their coordinated agency position in preparation for reaching committee consensus.
2. Agencies will be represented at the meetings by senior level, career government employees, who are engaged in policy matters for the agency.
3. Official agency representatives will be identified in writing to the co-chairpersons by the Assistant Administrator, Secretary, or Commissioner, as appropriate.
4. Committee meetings involve pre-decisional intragovernmental discussions and, as such, are not open for observation by members of the public or media.
5. The committee may, from time to time, revise the charter based on the consensus views of the committee, including such items as membership, responsibility for chairing the committee, and objectives.

DECISIONS

1. The committee has not been delegated any authorities established by law, regulation, Executive Order, or other administrative mechanism to act in lieu of formal agency action. The objectives of the committee are described in the committee charter.
2. The committee will make every effort to base decisions on consensus. Consensus reflects acceptance among the voting agencies.
3. Each agency will have a single vote in reaching consensus on specific issues. If a consensus cannot be reached, committee recommendations will reflect the lack thereof and include the opportunity for agencies to attach minority views to any documentation of the recommendations.
4. Recommendations on specific issues will be provided to the heads of member agencies, OMB, and OSTP.

MEETINGS

1. Responsibility for hosting the meetings will rotate among the agencies. The host agency is responsible for developing a mutually agreeable meeting date and time, informing the agencies at least two weeks in advance of the meeting date, distributing a draft agenda for the meeting, arranging for a meeting facility, and documenting and distributing summary meeting notes.
2. Summary meeting notes will be provided by the host agency to designated representatives of each of the member agencies, OMB, OSTP, and, as appropriate, Congressional contacts and other groups. The host agency will distribute draft notes within one week of the committee meeting and final meeting notes at least two weeks before the next committee. NRC will also place a copy of the summary meeting notes in the Public Document Room.

3. The committee will establish a plan for approximately a six-month period. Specific agendas will be developed for each meeting based on the general plan.

4. The committee will meet approximately once each calendar quarter, with more frequent meetings, as needed to address specific issues.

SUBCOMMITTEES

1. The committee may create subcommittees to focus on specific issues or activities (e.g., recycling criteria, risk harmonization, cleanup standards). Subcommittees will follow the same understandings and procedures as the full committee.

2. Subcommittees will meet at a frequency and location as determined necessary by the subcommittee.

For the U.S. Nuclear Regulatory Commission

Hugh L. Thompson, Jr. — 12-18-95

Hugh L. Thompson, Jr.
Deputy Executive Director for
Nuclear Materials Safety, Safeguards and Operations Support

Date

For the U.S. Environmental Protection Agency

Mary Nichols — 1-16-96

Mary Nichols
Assistant Administrator
Office of Air and Radiation

Date

For the U.S. Department of Energy

Tara O'Toole — 2-4-96

Tara O'Toole, M.D., M.P.H.
Assistant Secretary for
Environment, Safety and Health

Date

For the U.S. Department of Defense

Paul Kaminski

7-12-96

Paul G. Kaminski
Under Secretary of Defense
(Acquisition & Technology)

Date

For the U.S. Department of Transportation

D. K. Sharma

10-24-96

Dr. Dharmendra K. Sharma
Administrator
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Greg Watchman
Acting Assistant Secretary for
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Date

For the U.S. Department of Health and Human Resources

5-16-97

Jo Ivey Bouford, M.D.
Acting Assistant Secretary for Health

Date

APPENDIX B
Institutional Controls Tables

Federal Institutional Control Requirements for Radioactive Waste and Restricted Release of Property Containing Radioactive Material

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The Interagency Steering Committee on Radiation Standards (ISCORS) was established in 1994 to facilitate U.S. Federal agency coordination in the development of a consistent approach for setting national radiation protection standards. Membership includes participants from all Federal agencies with radiation protection responsibilities. The Risk Harmonization Subcommittee of the ISCORS was tasked with evaluating the similarities and differences in risk assessment and risk management approaches developed by the different Federal agencies. One of the specific tasks of this subcommittee is to evaluate the use of institutional controls in standards, regulations, and licensing criteria developed by the Environmental Protection Agency (EPA), Department of Energy (DOE), and Nuclear Regulatory Commission (NRC). The attached four tables describe the regulatory requirements for disposal of radioactive waste and restricted release of sites containing radioactive material, set forth by these U.S. Federal organizations, with an emphasis on institutional controls.

The four tables address:

- High-level and transuranic radioactive wastes and spent nuclear fuel;
- Low-level radioactive waste;
- Uranium and thorium mill tailings; and
- Property released under restricted use conditions.

Comparison Table

Disposal of High-Level and TRU Wastes and Spent Nuclear Fuel

Disposal requirements for spent nuclear fuel (SNF), high-level waste (HLW) and transuranic waste (TRU). SNF is fuel withdrawn from a nuclear reactor. HLW is highly radioactive material from the processing of spent fuel. TRU contains high levels of alpha-emitting transuranic radionuclides and usually has been generated from defense activities.

Comparison Table--High-Level and TRU Wastes and Spent Nuclear Fuel[1]

PROGRAM		AEA (Reorg. Plan No. 3), NWPA EPA/Disposal of Spent Nuclear Fuel, HLW, and TRU Waste 40 CFR 191	WIPP LWA EPA/Waste Isolation Pilot Plant 40 CFR 194	AEA, NWPA NRC/Geologic Disposal of HLW and Spent Nuclear Fuel 10 CFR 60
ATTRIBUTE	**DESCRIPTION**			
Applicability	The type of waste that is disposed of and the facility that is regulated.	Disposal of spent nuclear fuel, high-level waste, or transuranic waste, except at Yucca Mountain or directly into the ocean or ocean sediments.	Disposal of transuranic waste in the Waste Isolation Pilot Plant (WIPP). Implements 40 CFR 191.	Disposal of spent nuclear fuel and high-level waste in a geologic repository.[2]
Scope of Standard[3]	Regulations may define "generally applicable environmental standards" for all agencies to follow, define methods for implementing those standards, or define siting, design, and closure requirements for a facility.	Generally applicable standard for implementing agencies to follow: applies to releases of radioactive material into the accessible environment beyond the controlled area (defined as an area that encompasses ≤ 100 km^2, and extends < 5 km from the original location of waste in the disposal system).	Facility specific regulation setting forth requirements for EPA certification of DOE compliance with 40 CFR 191, for the WIPP.	Regulation for licensing DOE for siting, design, construction, and closure of a geologic repository sited under the NWPA. Addresses releases of radioactive material to the accessible environment beyond the controlled area.
Performance Criteria	Protective standards that define acceptable performance of a disposal facility or decommissioned property.	The disposal system must be designed to provide a reasonable expectation that cumulative releases to the accessible environment from all significant processes and events shall: • have a likelihood of less than one chance in 10 of exceeding limits specified in Table 1 of Appendix A of 40 CFR 191, and less than one chance in 1000 of exceeding 10 times these specified limits; • undisturbed performance of the disposal system shall not cause the dose from all potential pathways to any member of the public to exceed 15 mrem/yr; and • undisturbed performance of the disposal system shall not cause the levels of radioactivity in any underground source of drinking water to exceed the maximum contaminant levels (MCLs), developed under the authority of the Safe Drinking Water Act, specified at 40 CFR 141, as they existed on January 19, 1994. • Any event or process with less than 1 chance in 10,000 of occurring over 10,000 years need not be considered.	Same as 40 CFR 191.	Rule requires compliance with applicable EPA general environmental standards plus additional NRC requirements, including those listed below in "Engineered Barrier Criteria."
Timeframe	Length of time that future performance is projected.	10,000 years.	10,000 years.	10,000 years.

[1]This table is intended for informational purposes only and is not intended to substitute for the requirements found in the relevant statutes or regulations.

[2]EPA and NRC are developing standards for the proposed Yucca Mountain geologic repository in 10 CFR 63 and 40 CFR 197, respectively. 10 CFR 60 will not apply to Yucca Mountain.

[3]This discussion focuses on those portions of existing Federal programs that apply directly to the use of institutional controls to protect the public and the environment. The listed Federal standards, regulations, and directives include many additional requirements that although important, are not directly germane to the discussion. Examples include those requirements pertaining to releases of radionuclides and public and worker protection during the operation of a high-level or low-level waste disposal facility, unrestricted release of property by DOE or an NRC licensee.

PROGRAM		AEA (Reorg. Plan No. 3), NWPA EPA/Disposal of Spent Nuclear Fuel, HLW, and TRU Waste 40 CFR 191	WIPP LWA EPA/Waste Isolation Pilot Plant 40 CFR 194	AEA, NWPA NRC/Geologic Disposal of HLW and Spent Nuclear Fuel 10 CFR 60
Engineered Barrier Criteria	Standards of performance for an engineered barrier or physical characteristics of the barrier.	Engineered barriers are required to isolate waste from the accessible environment; design criteria for the barriers are not specified.	Engineered barriers are required to prevent or substantially delay movement of water or radionuclides toward the accessible environment. Before selecting engineering barriers, alternatives shall be evaluated that consider: worker exposure, compliance assessment, public comment, the effects of mitigating the consequences of human intrusion, and others. Alternatives to be evaluated include cementation, vitrification, incineration, etc.	Waste packages shall provide for substantially complete containment for the time period specified below. After 1000 years, the maximum release rate is 10^{-5} per year of the total inventory in the repository.
Timeframe	The time period that engineered barriers are designed to perform, as specified in the regulation.	Not specified; however, the entire disposal system must be designed to meet the performance criteria over a 10,000 year period.	Same as 40 CFR 191.	300-1000 years for waste packages.
Method for Determining Compliance with Performance or Engineered Barrier Criteria	Overall approach for determining compliance with principal requirements -- e.g., a requirement for modeling facility performance into the distant future (typically 1000 - 10,000 years), performing engineering assessments of structures or barriers, demonstrating that a specified design (e.g., materials of construction) has been implemented, or a mix of these.	The standard requires modeling and analysis of the long-term performance of the disposal system to provide reasonable expectation of compliance with the performance criteria.	Same as 40 CFR 191. Includes additional site-specific assumptions for containment, individual, and groundwater protection standards.	The regulation requires modeling and analysis of the long-term performance of the repository to demonstrate compliance with the performance and engineered barrier criteria.
Siting Criteria	Features of a site upon which a facility is built that are designed to contribute to waste isolation. Often includes requirements related to flooding, seismic activity, proximity to groundwater, etc.	Avoid places where mining for resources has been or can reasonably be expected to occur, unless favorable characteristics compensate for their greater likelihood of being disturbed in the future.	Compliance with 40 CFR 191. Siting considerations included: minimal ground water, minimum number of existing boreholes, low population density, annual precipitation, geochemical conditions, and maximum use of Federal lands	Detailed requirements are specified, including remoteness from population centers, groundwater travel time, annual precipitation, geochemical conditions, etc.
Intruder Requirements	An intruder is a person who inadvertently becomes exposed to waste in a disposal facility, through home construction, well drilling, etc.			
Protection of Intruder	Requirements that provide for protection of the health and safety of a postulated intruder.	The likelihood of intrusion is reduced by repository design, site selection, and passive institutional controls.	Same as 40 CFR Part 191.	Same as 40 CFR Part 191.
Consideration of intruder on facility performance	Requirements that provide for analysis of continued performance of a facility after a person intrudes.	The impact of inadvertent intrusion on facility performance must be considered as part of the analysis for the containment requirement. As long as passive institutional controls endure and are understood, they may reduce the likelihood of inadvertent, intermittent human intrusion. Nonetheless, an implementing agency should not assume that passive controls entirely eliminate human intrusion.	Intrusion scenarios are specified. Scenarios primarily consider mining and drilling, and are more extensive than the general Part 191 guidance.	Inadvertent intrusion must be addressed, subject to certain specified assumptions in the rule. Actual intrusion scenarios are not specified. Only intruder impacts on projected facility performance are considered.

PROGRAM		AEA (Reorg. Plan No. 3), NWPA EPA/Disposal of Spent Nuclear Fuel, HLW, and TRU Waste 40 CFR 191	WIPP LWA EPA/Waste Isolation Pilot Plant 40 CFR 194	AEA, NWPA NRC/Geologic Disposal of HLW and Spent Nuclear Fuel 10 CFR 60
Active Institutional Controls	Actions taken at a site to ensure that performance criteria continue to be met, engineered structures perform as expected, and to prevent human intrusion.	Control access. Monitor/assess disposal system. Monitor groundwater. Perform corrective actions.	Consistent with 40 CFR Part 191. However, assumptions pertaining to active institutional controls shall be supported by a description, including location and period of time the controls are proposed to remain active. 40 CFR 194 also requires a plan for pre-closure and post-closure monitoring.	Specific controls are not defined in the rule.
Timeframe	The length of time in the regulation for which risk assessments take credit for the operation of the active controls.	As long as practicable. Assume no more than 100 years for purposes of regulatory compliance.	As long as practicable. Assume 100 years for purposes of regulatory compliance.	As long as practicable. Assume 100 years for analysis.
Passive Institutional Controls	Controls that are self-implementing and preserve knowledge about the location, design, and contents of a disposal system.	Must use the most permanent markers, records, and other passive institutional controls practicable to indicate the dangers of the wastes and their location.	Same as 40 CFR Part 191.	Monuments, markers, records.
Land Ownership	Organization that takes title to the land after closure and during the institutional control period.	Federal land ownership.	Federal land ownership.	Federal land ownership.
Documentation	Knowledge is preserved in documents for future generations' use.	Documented in public records and archives, and other methods of preserving knowledge.	Documented in public records that must be placed in the archives and land record systems of local, state, and Federal governments, and international archives that would be likely to be consulted by individuals in search of unexploited resources. There are extensive requirements for information contained in the records, including the location of the repository and the boundaries of the controlled area, and the nature and hazard of the waste. DOE must provide a recertification document on a five-year basis.	Documented in public records that must be placed in the archives and land record systems of local, state, and Federal governments, and international archives, that would be likely to be consulted by potential inadvertent intruders. Records must identify the location of the repository and the boundaries of the controlled area, and the nature and hazard of the waste.
Timeframe	The length of time in the regulation for which risk assessments take credit for the functioning of the passive controls	Required permanently, but limited effectiveness must be assumed for regulatory compliance.	Required permanently, but limited effectiveness must be assumed for regulatory compliance	Required permanently. Monuments assumed to be sufficiently permanent to serve intended function; records assumed accessible for several hundred years. Limited effectiveness of other controls must be assumed for analysis.
Funding Assurances	Money is set aside at closure, and often sooner, in a protected account, such as a trust fund, for implementing the institutional control program.	Funding is provided by the Federal government.	Funding is provided by the Federal government.	Funding is provided by the Federal government.

PROGRAM		AEA (Reorg. Plan No. 3), NWPA EPA/Disposal of Spent Nuclear Fuel, HLW, and TRU Waste 40 CFR 191	WIPP LWA EPA/Waste Isolation Pilot Plant 40 CFR 194	AEA, NWPA NRC/Geologic Disposal of HLW and Spent Nuclear Fuel 10 CFR 60
Public Participation	Procedures used to engage the public in the regulatory process	The rule was published for public comment and public hearings were held prior to promulgation. EPA consulted with affected State and Tribal governments. Otherwise, EPA encourages public participation in the implementation of this generally applicable standard (e.g., see the discussion for 40 CFR 194 (WIPP)) including consultation with affected State and Tribal governments.	EPA established a process of public participation that exceeded the basic requirements of the Administrative Procedures Act, and provided the public with an opportunity to participate in the regulatory process. EPA considered environmental justice issues with regard to impact of this action on environmental and health conditions in low income, minority, and native American communities. EPA provided for enhanced rulemaking procedures, including extended comment periods, advance notice of proposed rulemaking, notice of proposed rulemaking, stakeholders meeting, public hearings in New Mexico, a full response to comments, and the maintenance of informational dockets in New Mexico.	In addition to the requirements of 10 CFR 2, "Rules of Practice for Domestic Licensing Proceedings and Issuance of Orders," Commission rules require consultation with affected State and Tribal governments and consideration of State and Tribal proposals for participation in the license review.
Other	Additional relevant information that is not included in the above attributes.	Waste shall be disposed in a form and manner that allows location of the waste and removal for a reasonable period of time after disposal. Disposal systems shall use different types of barriers to isolate the wastes from the accessible environment. Both engineered and natural barriers shall be included. The rule includes non-quantitative assurance requirements, including that to monitor disposal systems after disposal to detect substantial and detrimental deviations from expected performance. This shall be done with techniques that do not jeopardize the isolation of the wastes, until there are no significant concerns to be addressed by further monitoring.	From 1965, the U.S. Geological Survey conducted studies to identify a site for the disposal of TRU. In 1975, at the invitation of local officials, a salt formation east of Carlsbad, New Mexico was explored. By 1979, DOE completed the initial environmental studies of the site. The Department of Energy National Security and Military Applications of Nuclear Energy Authorization Act, of 1979 provided the authorization for the development of the WIPP at that site.	A performance monitoring program is required that begins during site characterization and continues until permanent facility closure.

Comparison Table

Disposal of Low-Level Radioactive Waste

Disposal requirements for radioactive waste other than
high-level waste, transuranic waste, spent nuclear fuel, or uranium mill tailings.

Comparison Table–Low-Level Radioactive Waste[1]

PROGRAM		AEA NRC/Low-Level Radioactive Waste Disposal 10 CFR 61	AEA DOE/Low-Level Radioactive Waste Disposal Orders 435.1 and 5400.5
ATTRIBUTE	**DESCRIPTION**		
Applicability	The type of waste that is disposed of and the facility that is regulated.	Land disposal facilities for low-level radioactive waste.	Land disposal facilities for low-level radioactive waste.
Scope of Standard[2]	Regulations may define "generally applicable environmental standards" for all agencies to follow, define methods for implementing those standards, or define siting, design, and closure requirements for a facility.	NRC regulations for licensing the siting, construction, closure, and long-term control of a low-level radioactive waste disposal facility.	DOE requirements for authorizing siting, construction, closure, and long-term control of low-level radioactive waste disposal facilities within DOE sites.

[1]This table is intended for informational purposes only and is not intended to substitute for the requirements found in the relevant statutes or regulations.

[2]This discussion focuses on those portions of existing Federal programs that apply directly to the use of institutional controls to protect the public and the environment. The listed Federal standards, regulations, and directives include many additional requirements that although important, are not directly germane to the discussion. Examples include those requirements pertaining to releases of radionuclides and public and worker protection during the operation of a high-level or low-level waste disposal facility, unrestricted release of property by DOE or an NRC licensee, or remediation and unrestricted release of land contaminated with uranium mill tailings.

PROGRAM		AEA NRC/Low-Level Radioactive Waste Disposal 10 CFR 61	AEA DOE/Low-Level Radioactive Waste Disposal Orders 435.1 and 5400.5
Performance Criteria	Protective standards that define acceptable performance of a disposal facility or decommissioned property.	Three of Part 61's four performance objectives apply to the long-term performance of a disposal facility: 1. Protection of the general population from releases of radioactivity : • Releases of radioactive material to the general environment must not result in an annual dose to a member of the public exceeding 75 mrem to the thyroid or 25 mrem to the whole body or any other organ; and • Maintain releases as low as reasonably achievable (ALARA). 2. Protection of individuals from inadvertent intrusion; and 3. Stability of the disposal site after closure.	The following performance objectives are applicable to LLW disposed after 9/26/88, as determined (except for Rn flux) at a point of compliance 100 meters from the edge of the waste (DOE M 435.1): 1. Dose to representative members of the public shall not exceed 25mrem (ede) in a year from all exposure pathways, except for Rn in air; 2. Dose to representative members of the public via the air pathway shall not exceed 10 mrem (ede) in a year, excluding Rn; and 3. Release of Rn from the disposal facility surface shall either not exceed a surface flux of 20 pc/m^2-sec, or a concentration of 0.5 pc/l of air at the 100-meter point of compliance. In addition, for the LLW disposal facility plus all other interacting sources (e.g.. inactive disposal facilities), projected doses to members of the public at the projected future site boundary may not exceed 100 mrem in a year considering the ALARA process. Annual doses calculated at areas where members of the public use (e.g., residences, workplace, recreational areas) may not exceed 100 mrem from all sources and must be controlled to low levels considering the ALARA process (DOE 5400.5).
Timeframe	Length of time that future performance is projected.	Typical practice is to carry out site-specific analyses pertaining to protection of the general population from releases of radioactivity over 10,000 years.	Typical practice has been to conduct site-specific analysis demonstrating compliance with the performance objectives over 10,000 years. However, M 435.1 calls for a 1000-year time of compliance as well as a sensitivity/ uncertainty analysis. Guidance for the sensitivity/uncertainty analysis calls for extending the analysis to peak dose (G 435.1).
Method for Determining Compliance with Performance Criteria	Overall approach for determining compliance with performance criteria -- e.g., a requirement for modeling facility performance into the distant future (typically 1000-10,000 years), performing engineering assessments of structures or barriers, demonstrating that a specified design (e.g., materials of construction) has been implemented, or a mix of these.	Compliance with the general population performance objective is based on modeling and analysis of the long-term performance of a specific disposal facility, where the point of compliance is anywhere in the general environment beyond the site boundary. Compliance with the intrusion performance objective is based on adherence to the Part 61 waste classification system (which was determined generically based on modeling inadvertent intrusion at a hypothetical site over a 500-year period). Compliance with the site stability performance objective is based on adherence to the Part 61 waste classification system and on engineering assessment.	Compliance with the 100-mrem in a year dose limit in DOE 5400.5 is determined annually by means of monitoring, surveillance, and analysis. Compliance with the performance objectives for waste disposed after 9/26/88 is determined using long-term performance models (termed performance assessments) that also consider separate analyses of impacts to water resources and to potential inadvertent intruders, as well as ALARA assessments. Compliance with the "all other interactive sources" requirement is also determined using long-term modeling assessments (termed composite analyses) conducted over a 1000-year period.

PROGRAM		AEA NRC/Low-Level Radioactive Waste Disposal 10 CFR 61	AEA DOE/Low-Level Radioactive Waste Disposal Orders 435.1 and 5400.5
Engineered Barrier Criteria	Standards of performance for an engineered barrier or physical characteristics of the barrier.	Class B and C wastes must be structurally stable to ensure gross physical properties, and disposed segregated from structurally unstable waste. Class C waste must be disposed at a 5-meter minimum depth or have a barrier against intrusion designed to last at least 500 years.	None specified. Barrier requirements are determined on a site-specific basis using the assessments described above.
Timeframe	The time period that engineered barriers are designed to perform, as specified in the regulation.	Per guidance, Class B and C wastes are designed to remain stable for at least 300 years. Per rule, a Class C barrier is designed to last at least 500 years.	Longevity requirements, if any, are determined on a site-specific basis.
Siting Criteria	Features of a site upon which a facility is built that are designed to contribute to waste isolation. Often includes requirements related to flooding, seismic activity, proximity to groundwater, etc.	Use of isolated, stand-alone sites is assumed. Requirements are specified, and include avoiding areas with natural resources, projected population growth, faulting, seismic activity, flooding, and others. The site must also be capable of being characterized, modeled, analyzed, and monitored.	Use of existing DOE sites is assumed. Siting assessments must address, inter alia, environmental and geotechnical characteristics, human activities, flooding, tectonics, and predictability, with the goal of achieving long-term site stability (minimize active maintenance after closure).
Intruder Requirements	An intruder is a person who inadvertently becomes exposed to waste in a disposal facility, through home construction, well drilling, etc.		
Protection of Intruder	Requirements that provide for protection of the health and safety of a postulated intruder.	An annual radiation dose limit of 500 mrem (whole body) to inadvertent intruders was used to establish the concentration limits for the radionuclides considered in the Part 61 waste classification system. Various scenarios for temporarily exposing intruders to radiation were analyzed, including home construction and resident farmer. Site-specific intrusion analyses are not required.	Radiation doses to intruders are limited to 100 mrem/yr for chronic exposures (a few years) or 500 mrem/yr for acute exposures. Temporary intrusion is considered on a site-specific basis to determine the acceptability of waste for near-surface disposal. The analysis strongly affects waste acceptance criteria (e.g., concentration limits).
Consideration of intruder on facility performance	Requirements that provide for analysis of continued performance of a facility after a person intrudes	Impacts on the facility performance are not considered.	Impacts on facility performance are not considered, since temporary intrusion damage can be repaired (permanent institutional controls).
Active Institutional Controls	Actions taken at a site to ensure that performance criteria continue to be met, engineered structures perform as expected, and to prevent human intrusion.	Control access. Perform corrective actions, such as minor repair of disposal unit covers. Monitor/assess disposal system. Monitor groundwater.	Control access. Perform corrective actions. Monitor & assess system performance. Monitor environment (air, water, biota). Determine, document, and report annual compliance with the 100-mrem overall dose limit.
Timeframe	The length of time in the regulation for which risk assessments take credit for the operation of the active controls.	100 years after closure.	Permanently required (scope may change over time). 100 years is usually assumed for purpose of analysis.

PROGRAM		AEA NRC/Low-Level Radioactive Waste Disposal 10 CFR 61	AEA DOE/Low-Level Radioactive Waste Disposal Orders 435.1 and 5400.5
Passive Institutional Controls	Controls that are self-implementing and preserve knowledge about the location, design, and contents of a disposal system.	Permanent markers. Surveys of disposal units. Records of location and quantity of waste disposed of.	Permanent markers. Records of waste disposed of, including physical, chemical, and radiological characteristics.
Land Ownership	Organization that takes title to the land after closure and during the institutional control period.	Federal/State ownership of land.	Federal ownership of land.
Documentation	Knowledge is preserved in documents for future generations' use.	Documented in public records widely distributed.	Documented in records and archives.
Timeframe	The length of time in the regulation for which risk assessments take credit for the functioning of the passive controls.	After 100 years of post-closure care, passive controls replace active controls, and continue thereafter. To establish the waste classification system, an intruder analysis was performed assuming that these passive controls temporarily fail.	Permanently required, although temporary failures of institutional controls are assumed to occur after 100 years following disposal facility closure.
Funding Assurances	Money is set aside at closure, and often sooner, in a protected account, such as a trust fund, for implementing the institutional control program.	Financial assurances are provided by the licensee.	Funding is provided by the Federal government.
Public Participation	Procedures used to engage the public in the regulatory process.	In addition to the requirements of 10 CFR 2, "Rules of Practice for Domestic Licensing Proceedings and Issuance of Orders," the Commission will consult with affected States and Tribal governments and consider State and Tribal proposals for participation in the license review.	Performance assessments, composite analyses, and related documents are shared with citizen advisory boards and state and Federal regulators. Otherwise, public participation is conducted in accordance with DOE policy P 1210.1.
Other	Additional relevant information that is not included in the above attributes.	Pursuant to an agreement with a State under Section 274 of the AEA, NRC may relinquish authority to this "Agreement State" for regulating source, byproduct, and special nuclear material in quantities not sufficient to form a critical mass. Hence, under NRC's Agreement State program, Agreement States may license LLW disposal facilities in accordance with State regulations that are compatible with those of NRC's.	DOE 435.1, consisting of an order (O 435.1), a mandatory manual (M 435.1), and an implementation guide (G 435.1), replaced DOE 5820.2A (as it was interpreted through 11/1/96 DOE guidance) on 7/14/99. DOE 5400.5 will be replaced by 10 CFR 834. Performance assessments, composite analyses, and related documents are used as bases for disposal facility authorization. The DOE authorization document is similar to an NRC license. Assessment documents must be maintained and updated through closure of the disposal facility to incorporate new information as needed.

Comparison Table

Stabilization and Disposal of Uranium and Thorium Mill Tailings

Disposal requirements for waste generated
as a byproduct of the extraction of uranium or thorium from ore.

Comparison Table–Uranium and Thorium Mill Tailings Sites[1]

PROGRAM		UMTRCA, AEA EPA/Health and Environmental Standards for Uranium and Thorium Mill Tailings 40 CFR 192 Subparts A,B,C Title I Sites	UMTRCA, AEA EPA/Health and Environmental Standards for Uranium and Thorium Mill Tailings 40 CFR 192 Subpart D,E Title II Sites	UMTRCA, AEA DOE/Uranium Mill Tailings Programs UMTRA Site Management Manual, LTSP Guidance Document, etc. Title I and II Sites	UMTRCA, AEA NRC/Disposal of Uranium or Thorium Mill Tailings 10 CFR Part 40, including Appendix A Title I and II Sites
ATTRIBUTE	**DESCRIPTION**				
Applicability	The type of waste that is disposed of and the facility that is regulated.	Remediation, stabilization, and disposal of uranium mill tailings and waste from inactive uranium processing sites and vicinity properties. (See "Other" below, for definition of Title I and Title II sites.)	Stabilization and disposal of mill tailings from active uranium and thorium processing sites.	Remediation, stabilization, and disposal of uranium mill tailings and waste from inactive uranium processing sites and vicinity properties, and disposal of mill tailings from active uranium and thorium processing sites.	Remediation, stabilization, and disposal of uranium mill tailings and waste from inactive uranium processing sites and vicinity properties, and disposal of mill tailings from active uranium and thorium processing sites.
Scope of Standard[2]	Regulations may define "generally applicable environmental standards" for all agencies to follow, define methods for implementing those standards, or define siting, design, and closure requirements for a facility.	Generally applicable environmental standard for implementing agencies to follow.	Generally applicable environmental standard for implementing agencies to follow.	DOE guidance applicable to remediation, stabilization , and disposal of tailings and waste under Title I of UMTRCA and long-term care of disposal sites under Title I and Title II of UMTRCA.	NRC regulation for licensing uranium and thorium disposal sites under Title II of UMTRCA, and long-term care of sites under Title I and Title II of UMTRCA.

[1]This table is intended for informational purposes only and is not intended to substitute for the requirements found in the relevant statutes or regulations.

[2]The discussion focuses on those portions of existing Federal programs that apply directly to the use of institutional controls to protect the public and the environment. The listed Federal standards, regulations, and directives include many additional requirements that although important, are not directly germane to the discussion. Examples include those requirements pertaining to releases of radionuclides and public and worker protection during the operation of a high-level or low-level waste disposal facility, unrestricted release of property by DOE or an NRC licensee, or remediation.

PROGRAM		UMTRCA, AEA EPA/Health and Environmental Standards for Uranium and Thorium Mill Tailings 40 CFR 192 Subparts A,B,C Title I Sites	UMTRCA, AEA EPA/Health and Environmental Standards for Uranium and Thorium Mill Tailings 40 CFR 192 Subpart D,E Title II Sites	UMTRCA, AEA DOE/Uranium Mill Tailings Programs UMTRA Site Management Manual, LTSP Guidance Document, etc. Title I and II Sites	UMTRCA, AEA NRC/Disposal of Uranium or Thorium Mill Tailings 10 CFR Part 40, including Appendix A Title I and II Sites
Performance Criteria	Protective standards that define acceptable performance of a disposal facility, decommissioned site, or remedial action.	***Remedial Action*** Remedial action shall provide reasonable assurance that • Residual radium-226 concentration in soil, averaged over any area of 100 m^2, does not exceed the background level by more than 5 pCi/g in first 15 cm of soil below surface; and 15 pCi/g over 15 cm thick layers of soil more than 15 cm below the surface • In any occupied or habitable building the goal is to limit the radon decay product to an annual average of 0.02 WL, but shall not exceed 0.03 WL; and gamma shall not exceed background by more than 20 microroentgens/hr, • Groundwater should be restored to specified limits. ***Stabilization and Disposal*** Radon releases are limited to: • 20 pCi/m^2-sec. from the surface of the disposal site; or • 0.5 pCi/l in air at or above any location outside the disposal site Groundwater protection limits are specified for radiation and chemical contaminants.	***Disposal*** Radon releases to the atmosphere must not exceed 20 pCi/m^2-sec from the surface of the disposal site. The disposal requirements apply to any portion of a site which contains a concentration of radium-226 in land, averaged over 100 m^2, that exceeds the background level by more than 5 pCi/g average over the first 15 cm of soil below surface; and 15 pCi/g averaged over 15 cm thick layers of soil more than 15 cm below the surface ***Corrective Action*** If groundwater standards are exceeded, a corrective action shall be put into operation as specified.	Implements EPA (40 CFR 192) and NRC (10 CFR 40) requirements.	Implements 40 CFR 192 and NRC's AEA authority and disposal sites. For Title I sites, DOE's task of remediation and disposal/stabilization can occur in two steps. Step one is to decontaminate property (soil and buildings) and to stabilize or dispose of waste and tailings. Step two is to complete the groundwater restoration program.
Timeframe	Length of time that future performance is projected.	1000 years to extent reasonably achievable; in any case for at least 200 years.	1000 years to extent reasonably achievable: in any case for at least 200 years.	1000 years to extent reasonably achievable; in any case for at least 200 years.	1000 years to extent reasonably achievable; in any case for at least 200 years.

PROGRAM		UMTRCA, AEA EPA/Health and Environmental Standards for Uranium and Thorium Mill Tailings 40 CFR 192 Subparts A,B,C Title I Sites	UMTRCA, AEA EPA/Health and Environmental Standards for Uranium and Thorium Mill Tailings 40 CFR 192 Subpart D,E Title II Sites	UMTRCA, AEA DOE/Uranium Mill Tailings Programs UMTRA Site Management Manual, LTSP Guidance Document, etc. Title I and II Sites	UMTRCA, AEA NRC/Disposal of Uranium or Thorium Mill Tailings 10 CFR Part 40, including Appendix A Title I and II Sites
Engineered Barrier Criteria	Standards of performance for an engineered barrier or physical characteristics of the barrier.	The disposal system must be designed to insure that protective air and groundwater standards are met. A liner or equivalent is recommended Each disposal site shall be designed and stabilized in a manner that minimizes the need for future maintenance.	The disposal system must be designed as follows: • Emplacement of a permanent radon barrier constructed to achieve the protective air standard is required. • New impoundments require a liner, are limited to a 40-acre surface area, and are limited to two operational impoundments at any time. • The facility must be designed, constructed, and managed according to the RCRA standard at 40 CFR 264.221 as of January 1, 1983. • The radon barrier should be constructed as expeditiously as practicable considering technological feasibility, after the impoundment ceases to be operational.	Implements EPA (40 CFR 192) and NRC (10 CFR 40) requirements.	Implements 40 CFR 192 plus additional NRC requirements (e.g., preferred use of below-grade disposal units).
Timeframe	The time period that engineered barriers are designed to perform, as specified in the regulation.	1000 years to extent reasonably achievable; in any case for at least 200 years.	1000 years to extent reasonably achievable; in any case for at least 200 years.	1000 years to extent reasonably achievable; in any case for at least 200 years.	1000 years to extent reasonably achievable; in any case for at least 200 years.

PROGRAM		UMTRCA, AEA EPA/Health and Environmental Standards for Uranium and Thorium Mill Tailings 40 CFR 192 Subparts A,B,C Title I Sites	UMTRCA, AEA EPA/Health and Environmental Standards for Uranium and Thorium Mill Tailings 40 CFR 192 Subpart D,E Title II Sites	UMTRCA, AEA DOE/Uranium Mill Tailings Programs UMTRA Site Management Manual, LTSP Guidance Document, etc. Title I and II Sites	UMTRCA, AEA NRC/Disposal of Uranium or Thorium Mill Tailings 10 CFR Part 40, including Appendix A Title I and II Sites
Method for Determining Compliance with Performance or Engineered Barrier Criteria	Overall approach for determining compliance with principal requirements -- e.g., a requirement for modeling facility performance into the distant future (typically 1000 - 10,000 years), performing engineering assessments of structures or barriers, demonstrating that a specified design (e.g., materials of construction) has been implemented, or a mix of these.	***Remedial Action*** Requires measurements in accordance with reasonable survey and sampling procedures to provide reasonable assurance that remediation performance criteria are met. A plan for remedial action, addressing decontamination of soil and structures, stabilization and disposal of waste, groundwater characterization and remediation, etc. is also required. ***Disposal*** Requires the use of long-term analytic models and site-specific analyses to provide reasonable assurance that performance criteria for disposal are met.	***Disposal*** Requires a written tailings closure plan (radon). The plan shall include key closure milestones, detailing activities to accomplish timely emplacement of a permanent radon barrier.	Compliance is demonstrated through DOE preparation, and NRC review and concurrence, of Remedial Action Plans (RAPs) and Construction Completion Reports (CCRs) that include NRC- and EPA-required information (i.e., the 40 CFR 192 requirement for "plans of remedial action"). (See below ("Other") for additional regulatory information.)	Compliance is determined based on a combination of engineering assessments and long-term modeling. Engineering assessments include field tests and analyses pertaining to siesmicity, slope stability, flooding and erosion protection, radon attenuation, hydrological characteristics, etc. Some forward-looking analyses (e.g., probable maximum flood, seismic analyses), are conducted, generally over a 1000-year period. (See below ("Other') for additional regulatory information.
Siting Criteria	Features of a site upon which a facility is built that are designed to contribute to waste isolation. Often includes requirements related to flooding, seismic activity, proximity to groundwater, etc.	An analysis of the physical properties of the site and the control system and projection of the effects of natural systems over time should be performed. Events and processes that could significantly affect the average radon release rate from the entire disposal site should be considered. Emphasis is given to waste isolation.	An analysis of the physical properties of the site and the control system and projection of the effects of natural systems over time should be performed. Events and processes that could significantly affect the average radon release rate from the entire disposal site should be considered. Emphasis is given to waste isolation	Under its Uranium Mill Tailings Remedial Action (UMTRA) program, DOE relocated tailings and wastes from numerous sites and vicinity properties to alternative disposal sites. Criteria for relocation of tailings emphasized groundwater protection and protection against flooding, among other natural site conditions and population concerns. Other tailings sites were stabilized in place.	The goal is permanent isolation of tailings without ongoing active maintenance. Contributing site features, considered when selecting among alternative disposal sites or judging the adequacy of existing tailings sites, include: remoteness from populated areas; hydrologic and other natural conditions; and the potential for minimizing erosion, disturbance, and dispersion by natural forces. Emphasis is given to waste isolation rather than short-term convenience or benefits.

PROGRAM		UMTRCA, AEA EPA/Health and Environmental Standards for Uranium and Thorium Mill Tailings 40 CFR 192 Subparts A,B,C Title I Sites	UMTRCA, AEA EPA/Health and Environmental Standards for Uranium and Thorium Mill Tailings 40 CFR 192 Subpart D,E Title II Sites	UMTRCA, AEA DOE/Uranium Mill Tailings Programs UMTRA Site Management Manual, LTSP Guidance Document, etc. Title I and II Sites	UMTRCA, AEA NRC/Disposal of Uranium or Thorium Mill Tailings 10 CFR Part 40, including Appendix A Title I and II Sites
Intruder Requirements	An intruder is a person who inadvertently becomes exposed to waste in a disposal facility, through home construction, well drilling, etc.				
Protection of Intruder	Requirements that provide for protection of the health and safety of a postulated intruder.	Reliance on facility design and institutional controls to protect an intruder (isolated location, engineering design, use of thick and difficult-to-penetrate cover).	Reliance on facility design and institutional controls to protect an intruder (isolated location, engineering design, use of thick and difficult-to-penetrate cover).	Reliance on facility design and institutional controls to protect an intruder (isolated location, engineering design, use of thick and difficult-to-penetrate cover).	Reliance on facility design and institutional controls to protect an intruder (isolated location, engineering design, use of thick and difficult-to-penetrate cover).
Consideration of intruder on facility performance	Requirements that provide for analysis of continued performance of a facility after a person intrudes.	No specific requirements.	No specific requirements.	The effects of intrusion on facility performance are not assessed.	The effects of intrusion on facility performance are not assessed.

PROGRAM		UMTRCA, AEA EPA/Health and Environmental Standards for Uranium and Thorium Mill Tailings 40 CFR 192 Subparts A,B,C Title I Sites	UMTRCA, AEA EPA/Health and Environmental Standards for Uranium and Thorium Mill Tailings 40 CFR 192 Subpart D,E Title II Sites	UMTRCA, AEA DOE/Uranium Mill Tailings Programs UMTRA Site Management Manual, LTSP Guidance Document, etc. Title I and II Sites	UMTRCA, AEA NRC/Disposal of Uranium or Thorium Mill Tailings 10 CFR Part 40, including Appendix A Title I and II Sites
Active Institutional Controls	Actions taken at a site to ensure that performance criteria continue to be met, engineered structures perform as expected, and to prevent human intrusion.	***Remedial Action*** Ground-water restoration can be accomplished using natural flushing if specified conditions are met, including the establishment of institutional controls having a high degree of permanence and extending for no more than 100 years. ***Disposal*** Implement a groundwater monitoring plan of adequate duration to demonstrate future compliance of the disposal system with the groundwater protection standard. If the standard is exceeded, a corrective action program must be implemented to restore the performance of the disposal system. Monitor radon emissions to the atmosphere for 1 year after closure, to insure compliance with the standard.	Upon placement of the radon barrier, the licensee shall monitor to demonstrate the effectiveness of the barrier design in meeting the performance criteria. If groundwater standards are exceeded, a corrective action program must be put into operation	DOE documents active institutional control plans in long-term surveillance plans, including use of fences; monitoring, inspection, and maintenance (e.g., repair) programs; remediation programs, etc.	Long-term surveillance plans (LTSPs) are required for Title I and II sites, and must include a legal description of the disposal site, the final disposal site conditions, the long-term surveillance program, the criteria for follow-up inspections in response to observations from routine inspections or unusual natural events, and the criteria for instituting maintenance or emergency measures. NRC accepts LTSPs as a condition for licensing long-term care of disposal sites, generally by DOE.
Timeframe	The length of time in the regulation for which risk assessments take credit for the operation of the active controls.	Not specified. A government agency is assumed to maintain the sites in perpetuity, and repair or remediate as needed.	Not specified. A government agency is assumed to maintain the sites in perpetuity, and repair or remediate as needed.	Not specified. There can be no termination of the long-term care license. Hence, there is no end to active institutional controls, although the scope of the program can change over time.	Not specified. There can be no termination of the long-term care license. Hence, there is no end to active institutional controls, although the scope of the program can change over time.

PROGRAM		UMTRCA, AEA EPA/Health and Environmental Standards for Uranium and Thorium Mill Tailings 40 CFR 192 Subparts A,B,C Title I Sites	UMTRCA, AEA EPA/Health and Environmental Standards for Uranium and Thorium Mill Tailings 40 CFR 192 Subpart D,E Title II Sites	UMTRCA, AEA DOE/Uranium Mill Tailings Programs UMTRA Site Management Manual, LTSP Guidance Document, etc. Title I and II Sites	UMTRCA, AEA NRC/Disposal of Uranium or Thorium Mill Tailings 10 CFR Part 40, including Appendix A Title I and II Sites
Passive Institutional Controls	Controls that are self-implementing and preserve knowledge about the location, design, and contents of a disposal system.	None specified except as described below.	None specified except as described below.	Passive institutional controls implemented for title I and II sites include markers, disposal unit surveys, archived records, deed restrictions, and government or Tribal ownership.	Passive (and active) institutional controls are addressed in required LTSPs for Title I and II sites.
Land Ownership	Organization that takes title to the land after closure and during the institutional control period.	Federal ownership or Tribal ownership with Federal access of Title I disposal sites; Federal or State ownership for Title II disposal sites.	Federal ownership or Tribal ownership with Federal access of Title I disposal sites; Federal or State ownership for Title II disposal sites.	Federal ownership or Tribal ownership with Federal access of Title I disposal sites; Federal or State ownership for Title II disposal sites.	Federal ownership or Tribal ownership with Federal access of Title I disposal sites; Federal or State ownership for Title II disposal sites.
Documentation	Knowledge is preserved in documents for future generations' use.	Written plan for remedial action	Written tailings closure plan to be incorporated into the NRC or Agreement State license	Documentation includes a site RAP, LTSP, photographs, monitoring results, etc. Documents will be archived in accordance with NARA standards.	Documentation includes site RAPs, CCRs, LTSPs, and other information as provided for under 10 CFR 2 and 40.
Timeframe	Period of time that institutional controls are considered to be effective.	Not specified, although perpetual Federal control was assumed for the rulemaking.	Not specified, although perpetual Federal control was assumed for the rulemaking.	Not specified. DOE maintains Title I sites under permanent NRC license.	Not specified. DOE or State maintains Title II sites under permanent NRC license.
Funding Assurances	Money is set aside at closure, and often sooner, in a protected account, such as a trust fund, to provide funding for implementing the institutional control program.	Not addressed.	Not addressed.	Not addressed. However, per UMTRCA, DOE and States fund remediation of Title I sites; and the Federal government funds long-term care of Title I and II sites.	Licensees of Title II sites provide (1) financial surety for site closure and D&D, and (2) pay a one-time long-term care fee to the Federal government. Otherwise, long-term care and maintenance costs for Title I and Title II sites are funded by the Federal government.
Public Participation	Procedures used to engage the public in the regulatory process.	All standards and regulations were proposed in the Federal Register for public comment, and public hearings were held in local locations, prior to finalization.	All standards and regulations were proposed in the Federal Register for public comment, and public hearings were held in local locations, prior to finalization.	Remedial action plans (RAPs) and LTSPs are coordinated with the public, States and Tribes. DOE conducts public information programs and includes State and Tribal representatives in site inspection programs.	NRC concurs with RAPs and CCRs (Title I), and grants long-term care licenses (Title I and II), in accordance with NRC public notice and comment procedures (10 CFR 2). Otherwise, NRC rules of practice (10 CFR 2) apply to licensing actions for Title II mill sites.

PROGRAM		UMTRCA, AEA EPA/Health and Environmental Standards for Uranium and Thorium Mill Tailings 40 CFR 192 Subparts A,B,C Title I Sites	UMTRCA, AEA EPA/Health and Environmental Standards for Uranium and Thorium Mill Tailings 40 CFR 192 Subpart D,E Title II Sites	UMTRCA, AEA DOE/Uranium Mill Tailings Programs UMTRA Site Management Manual, LTSP Guidance Document, etc. Title I and II Sites	UMTRCA, AEA NRC/Disposal of Uranium or Thorium Mill Tailings 10 CFR Part 40, including Appendix A Title I and II Sites
Other	Additional relevant information that is not included in the above attributes.	UMTRCA established two programs for the protection of public health and the environment from uranium mill tailings: one for designated inactive sites and vicinity properties, that are not licensed and where all milling has stopped (Title I sites), and another for operating sites licensed by the NRC or an Agreement State (Title II sites). For Title I sites, UMTRCA requires EPA to set health and environmental standards to govern the stabilization, control, and cleanup of uranium mill tailings by DOE. These standards were to provide protection that is consistent to the maximum extent practicable with the Solid Waste Disposal Act (SWDA), as amended. DOE is required to conduct remedial actions in compliance with EPA standards, and with the concurrence of NRC and in cooperation with States and Tribes.	For Title II sites, UMTRCA directed EPA to promulgate general environmental standards for the processing, possession, transfer, and disposal of uranium mill tailings at licensed operating uranium processing sites. The standards were to be consistent with Subtitle C of the SWDA, as amended, and implemented by NRC or the Agreement States, at these sites. No EPA permit is required under UMTRCA or the SWDA, as amended, for the processing, possession, transfer, or disposal of mill tailings.	For Title I sites, DOE prepares RAPs, CCRs, and LTSPs that are approved by NRC. For both Title I and Title II sites, DOE prepares LTSPs that are approved by NRC. Upon NRC confirmation that remediation is complete and in compliance with EPA and NRC standards, and NRC approval of LTSPs, NRC issues a general license specifically to DOE (or optionally a state agency for Title II sites). DOE then carries out long-term care and maintenance of the stabilized and disposed tailings.	For Title I sites, NRC approves RAPs, CCRs and LTSPs, inspects remediated sites and stabilized and disposed tailings for compliance with EPA standards, and issues a general license to DOE for long-term site control and maintenance. For Title II sites, license applications must address compliance with NRC and EPA standards, including processing site reclamation (structure decommissioning, final tailings disposition including impoundment closure, soil and structure decontamination, and groundwater remediation as needed). After site reclamation and closeout are completed according to NRC-approved plans, title to the site and radioactive materials is transferred to DOE (or a State). NRC issues a general license to DOE (or a State) for long-term site control and maintenance.

Comparison Table
Restricted Release of Property

Requirements for sites containing residual radioactive material released under restricted conditions.

Comparison Table–DOE and NRC Sites Released Under Restricted Use Conditions[1]

PROGRAM		AEA DOE/ Property Released Under Restricted Use Conditions Order 5400.5 and Guidance	AEA NRC/ Sites Released With Restricted Use 10 CFR 20, Subpart E
ATTRIBUTE	DESCRIPTION		
Applicability	The type of waste that is disposed of and the facility that is regulated.	DOE property containing residual radioactive material that is released under restricted conditions.	Sites of NRC licensees that are released with residual radioactivity above unrestricted release levels.
Scope of Standard[2]	Regulations may define "generally applicable environmental standards" for all agencies to follow, define methods for implementing these standards, or define specific requirements for siting, design, and closure of a facility.	DOE requirements and guidance applicable to restricted release of property.	NRC regulation and guidance for restricted release of decommissioned facilities after termination of the NRC license.
Performance Criteria	Protective standards that define acceptable performance of a disposal facility or decommissioned property.	Authorized limits for release of property must be derived under the ALARA process and be projected to result in doses that are <25 mrem/yr under actual or likely use scenarios (reduced to a few mrem/yr or less). Projected doses under worst plausible use scenarios, without restrictions on property use, should not exceed 100 mrem/yr. (An authorized limit is a limit on the concentrations of residual radioactive material on the surfaces or within property, that has been derived consistent with the ALARA process, given the anticipated use of the property, and has been authorized by DOE to permit the release of the property from DOE control.)	With the implementation of legally enforceable institutional controls following license termination, projected doses to an average member of a critical group (including those from groundwater sources) must be ALARA and not exceed 25 mrem/yr. Assuming these institutional controls are removed, projected doses must not exceed 100 mrem/yr. In unusual site-specific cases, doses up to 500 mrem/yr may be allowable, assuming removal of institutional controls. In these cases additional controls must be imposed, including durable institutional controls and site rechecks at five-year intervals or less. Legally enforceable institutional controls may be based on property rights (e.g., the right to restrict the use of, or access to, property) or on a government's sovereign or police powers, and may include physical controls such as fences, markers, earthen covers, monitoring, etc. Although legally enforceable institutional controls may include control by a private individual or organization, or a government agency, durable institutional controls should be either government ownership of the land or property or government enforcement of the property restrictions.
Timeframe	Length of time that future performance is projected.	1000 years.	1000 years.

[1]This table is intended for informational purposes only and is not intended to substitute for the requirements found in the relevant statutes or regulations.

[2]This discussion focuses on those portions of existing Federal programs that apply directly to the use of institutional controls to protect the public and the environment. The listed Federal standards, regulations, and directives include many additional requirements that although important, are not directly germane to the discussion. Examples include those requirements pertaining to releases of radionuclides and public and worker protection during the operation of a high-level or low-level waste disposal facility, unrestricted release of property by DOE or an NRC licensee, or remediation and unrestricted release of land contaminated with uranium mill tailings.

PROGRAM		AEA DOE/ Property Released Under Restricted Use Conditions Order 5400.5 and Guidance	AEA NRC/ Sites Released With Restricted Use 10 CFR 20, Subpart E
Engineered Barrier Criteria	Standards of performance for an engineered barrier or physical characteristics of the barrier.	None specified, although the effectiveness of barriers or other physical controls, if any, may be considered in the analysis.	None specified in rule, although the effectiveness of barriers or other physical controls (e.g., fences), if any, may be considered in the analysis provided that they are used in combination with legally enforceable or durable institutional controls.
Timeframe	The time period that engineered barriers are designed to perform, as specified in the regulation.	Not specified.	Not specified.
Method for Determining Compliance with Performance or Engineered Barrier Criteria	Overall approach for determining compliance with principal requirements -- e.g., a requirement for modeling facility performance into the distant future (typically 1000 - 10,000 years), performing engineering assessments of structures or barriers, demonstrating that a specified design (e.g., materials of construction) has been implemented, or a mix of these.	To demonstrate compliance with dose limits, hypothetical exposure scenarios are hypothesized, and radiation doses are projected for up to 1000 years into the future.	To demonstrate compliance with dose limits, hypothetical exposure scenarios, such as resident farming, are hypothesized, and radiation doses are projected for up to 1000-year periods.
Siting Criteria	Features of a site upon which a facility is built that are designed to contribute to waste isolation. Often includes requirements related to flooding, seismic activity, proximity to groundwater, etc.	Not applicable.	Not applicable.
Intruder Requirements	An intruder is a person who inadvertently becomes exposed to waste in a disposal facility, through home construction, well drilling, etc.		
Protection of Intruder	Requirements that provide for protection of the health and safety of a postulated intruder.	Projected dose under the worst plausible use scenario, which for many situations is similar to a LLW intrusion scenario, should not exceed 100 mrem/yr. If the worst plausible use scenario is deemed likely, it must conform to the 25-mrem/yr dose constraint.	The institutional controls must be assumed to fail, and projected intruder doses limited to 100 mrem/yr. The rule also provides for allowable intruder doses after institutional controls fail of up to 500 mrem/yr, although potential doses larger than 100 mrem/yr are expected to be approved only in unusual site-specific circumstances. In these cases, additional, durable institutional controls must be imposed including periodic third-party rechecks of the site at least every five years.
Consideration of intruder on facility performance	Requirements that provide for analysis of continued performance of a facility after a person intrudes.	Not directly applicable.	Not directly applicable.

PROGRAM		AEA DOE/ Property Released Under Restricted Use Conditions Order 5400.5 and Guidance	AEA NRC/ Sites Released With Restricted Use 10 CFR 20, Subpart E
Active Institutional Controls	Actions taken at a site to ensure that performance criteria continue to be met, engineered structures perform as expected, and to prevent human intrusion.	Restrictions on use are imposed according to a graded approach, depending on the projected dose under the worst plausible use scenario, and may include monitoring, inspections, and appropriate radiological safety measures during maintenance, demolition or other activities. DOE review of restrictions should occur frequently (not less infrequent than every 5 years) to ensure restrictions are being maintained.	Site-specific application of legally enforceable and durable institutional controls may include active measures such as site monitoring and inspections, and maintenance of controls such as fences and signs, as may be determined to be appropriate and needed.
Timeframe	The length of time in the regulation for which risk assessments take credit for the operation of the active controls.	Not directly applicable. However, actual and likely use scenarios include those that are plausible, unlikely to substantially underestimate dose, and have a reasonable chance of occurring within at least the first 50 years. Scenarios that are not expected to occur for at least 100 years after property release need not be considered as likely use. A worst plausible use scenario is one that is credible over the long term.	Not directly addressed in rule. However, although institutional controls must be designed to last for as long as required, consideration of their failure and the resulting dose to members of the public is also required.
Passive Institutional Controls	Controls that are self-implementing and preserve knowledge about the location, design, and contents of a disposal system.	Mainly land use controls -- deed restrictions, zoning, etc.	Mainly land use controls–deed restrictions, zoning, etc.
Land Ownership	Organization that takes title to the land after closure and during the institutional control period.	Private or government land ownership or control (e.g., leasing) is permitted.	Private or governmental land ownership is permitted. Governmental land ownership is generally expected if durable institutional controls are required.
Documentation	Knowledge is preserved in documents for future generations' use.	Documentation of restrictions on land use must be clear to persons receiving control, through notification, land records, or other suitable methods.	Documentation of restrictions on land use should be clear to current and future owners, either through notification, placement in land records, or other standard publicly available records archives.
Timeframe	The length of time in the regulation for which risk assessments take credit for the functioning of the passive controls.	Not directly applicable. However, active and passive controls should be designed to last as long as necessary, although consideration of their failure is required.	Not directly applicable. However, active and passive controls should be designed to last as long as necessary, although consideration of their failure is required.
Funding Assurances	Money is set aside at closure, and often sooner, in a protected account, such as a trust fund, for implementing the institutional control program.	Funding for DOE review of restrictions, etc., is provided by the Federal government.	Financial assurances are provided by the licensee

PROGRAM		AEA DOE/ Property Released Under Restricted Use Conditions Order 5400.5 and Guidance	AEA NRC/ Sites Released With Restricted Use 10 CFR 20, Subpart E
Public Participation	Procedures used to engage the public in the regulatory process.	Release of property should be coordinated with NRC or Agreements States to ensure that licensable radioactive material is not transferred to unauthorized persons. Documentation on release of property is publicly available. Otherwise, public participation is conducted in accordance with DOE policy P 1210.1.	In addition to 10 CFR 2, "Rules of Practice for Domestic Licensing Proceedings and Issuance of Orders," Commission rules require public notification of licensee plans and that licensees seek advice from affected parties on the adequacy of institutional controls and financial assurances. NRC also conducts meetings in the local community, and implements the NEPA public participation requirements for an EIS, including public meetings for scoping and documenting the resolution of comments on the draft EIS.
Other	Additional relevant information that is not included in the above attributes.	Although the same criteria (dose limits, the ALARA process) apply to release of real and non-real property, the DOE approval process is more rigorous for release of non-real property because of the greater possibility of multiple exposures to humans.	Pursuant to a agreement with a State under Section 274 of the AEA, NRC may relinquish authority to this "Agreement State" for regulating source, byproduct, and special nuclear material in quantities not sufficient to form a critical mass. Hence, under NRC's Agreement State program, Agreement States may implement Subpart E in accordance with State regulations that are compatible with those of NRC's.

APPENDIX C
Glossary

Glossary

Acronym List

AMSA/WEF	American Metropolitan Sewage Association/ Water Environmental Federation
ANSI	American National Standards Institute
CIRRPC	Committee for Interagency Radiation Research and Policy Coordination
CRCPD	Conference of Radiation Control Program Directors
DOE	Department of Energy
DOS	Department of State
ELI	Environmental Law Institute
EPA	Environmental Protection Agency
FOIA	Freedom of Information Act
IAEA	International Atomic Energy Agency
ISCORS	Interagency Steering Committee on Radiation Standards
NORM	Naturally Occurring Radioactive Material
NRC	Nuclear Regulatory Commission
OMB	Office of Management and Budget
OSTP	Office of Science and Technology Policy
PAG	Protective Action Guides
POTW	Publicly-Owned Treatment Works
RCC	Radiological Control Criteria
RCRA	Resources Conservation and Recovery Act
TENORM	Technologically Enhanced Naturally Occurring Radioactive Material

NRC FORM 335
(2-89)
NRCM 1102,
3201, 3202

U.S. NUCLEAR REGULATORY COMMISSION

BIBLIOGRAPHIC DATA SHEET

(See instructions on the reverse)

1. REPORT NUMBER
(Assigned by NRC, Add Vol., Supp., Rev., and Addendum Numbers, if any.)

NUREG-1707
Vol. 2

2. TITLE AND SUBTITLE

Interagency Steering Committee on Radiation Standards
1999 Annual Report

3. DATE REPORT PUBLISHED

MONTH	YEAR
September	2000

4. FIN OR GRANT NUMBER

5. AUTHOR(S)

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6. TYPE OF REPORT

Final

7. PERIOD COVERED *(Inclusive Dates)*

January through December 1999

8. PERFORMING ORGANIZATION - NAME AND ADDRESS *(If NRC, provide Division, Office or Region, U.S. Nuclear Regulatory Commission, and mailing address; if contractor, provide name and mailing address.)*

Division of Waste Management
Office of Nuclear Material Safety and Safeguards
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

9. SPONSORING ORGANIZATION - NAME AND ADDRESS *(If NRC, type "Same as above"; if contractor, provide NRC Division, Office or Region, U.S. Nuclear Regulatory Commission, and mailing address.)*

Same as 8. above

10. SUPPLEMENTARY NOTES

11. ABSTRACT *(200 words or less)*

The Interagency Steering Committee on Radiation Standards (ISCORS) 1999 Annual Report was prepared to report to ISCORS members agencies on ISCORS' activities and plans. The report identifies both the past accomplishments and goals for the future that will be a basis for assessing performance in 2000. The report provides the contacts for each agency and describes the subcommittee activities. The subcommittees include Clean-up, Mixed Waste, Recycle, Risk Harmonization, Sewage Sludge, NORM and Federal Guidance. ISCORS was formed to foster early resolution and coordination of regulatory issues associated with radiation standards. Agencies represented on ISCORS include the U.S. Nuclear Regulatory Commission, U.S. Environmental Protection Agency, U.S. Department of Energy, U.S. Department of Defense, U.S. Department of Labor's Occupational Health and Safety Administration, U.S. Department of Transportation, U.S. Department of Health and Human Services. Representatives from the Office of Science and Technology Policy, Office of Management and Budget, and States are observer members on ISCORS.

12. KEY WORDS/DESCRIPTORS *(List words or phrases that will assist researchers in locating the report.)*

Interagency Steering Committee on Radiation Standards
ISCORS
Radiation Standards

13. AVAILABILITY STATEMENT

unlimited

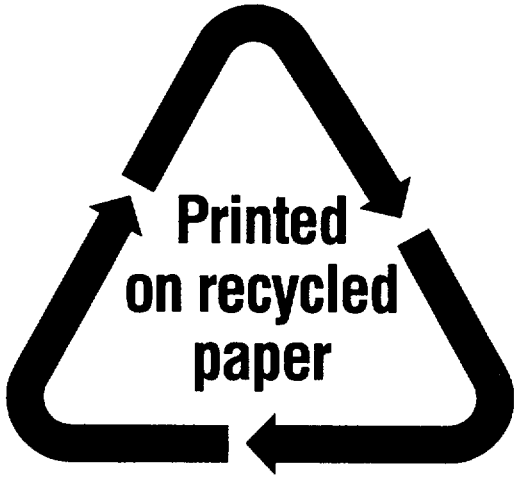
14. SECURITY CLASSIFICATION

(This Page)
unclassified

(This Report)
unclassified

15. NUMBER OF PAGES

16. PRICE



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WASHINGTON, D.C. 20555-0001

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