UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

JAN 27 1994

Dear Participants and Interested Parties:

SUBJECT: DEVELOPING RADIOLOGICAL CRITERIA FOR DECOMMISSIONING

Your participation in the Nuclear Regulatory Commission's enhanced participatory process for developing radiological criteria for decommissioning is greatly appreciated. This process included a series of 7 workshops held from January through May 1993. While these workshops were not designed to seek "consensus" in the sense that there is agreement on how each issue should be resolved, the workshops were conducted at a very early stage of rulemaking to enhance participation of interested parties and the public with the following objectives: a) to ensure that the relevant issues have been identified; b) to exchange information on these issues; and c) to identify underlying concerns and areas of disagreement, and, where possible, approaches for resolution.

The NRC staff has now developed and is circulating the enclosed "staff draft" of the criteria to the Agreement States, participants in the workshops, and other interested parties. In developing these criteria the staff has carefully considered the range of viewpoints expressed during the workshops. This has been a difficult task. As was acknowledged by many participants during the workshops, it is not possible to accommodate all of the specific viewpoints presented, given the large range of views and opinions offered. However, the NRC staff believes that the draft criteria respond to the key themes that emerged from these workshops. We also believe it is important for participants to see how the NRC staff has responded to their views in advance of formal Commission review of the proposed rule.

Any comments you might have on this draft will be most useful if they are received prior to March 11, 1994 so they may be included in the development of the proposed rule for Commission review and consideration. On behalf of Chip Cameron, Mike Weber, and myself, thank you again for your continued participation in this unique rulemaking process.

Sincerely,

Donald A. Cool

Donald A. Cool, Chief
Radiation and Health Effects Branch
Division of Regulatory Applications
Office of Nuclear Regulatory Research

Enclosure:
Staff Draft Radiological
Criteria for Decommissioning

FOREWORD

The staff of the Nuclear Regulatory Commission has been engaged in an enhanced participatory process for developing radiological criteria for decommissioning. This process included a series of 7 workshops held from January through May 1993 in Chicago, IL; San Francisco, CA; Boston, MA; Dallas, TX; Philadelphia, PA; Atlanta, GA; and Washington, D.C. The workshops elicited informed views of participants on options and approaches for establishing the decommissioning criteria. Participants included representatives of the Environmental Protection Agency, other federal agencies, State and Local governments, Indian Tribes, citizen and environmental groups, decommissioning contractors, professional societies including the Health Physics Society and American Nuclear Society, and industry representatives including nuclear power, fuel cycle, material, and medical facilities. While these workshops were not designed to seek "consensus" in the sense that there is agreement on how each issue should be resolved, the workshops were conducted at a very early stage of rulemaking to enhance participation of interested parties and the public with the following objectives: a) to ensure that the relevant issues have been identified; b) to exchange information on these issues; and c) to identify underlying concerns and areas of disagreement, and, where possible, approaches for resolution. In July 1993, the NRC staff conducted 8 meetings in four cities (Washington, D.C.; San Francisco, CA; Oklahoma City, OK; and Cleveland, OH) on the proposed scope of the Generic Environmental Impact Statement (GEIS) supporting the rulemaking.

The NRC staff has developed and is circulating a "staff draft" of the criteria to the Agreement States, participants in the workshops, and other interested parties for comment. The intent of this informal comment period in advance of a proposed rule is to provide an opportunity for interested parties to comment on the adequacy of the draft criteria and the extent to which the criteria have considered the range of viewpoints expressed during the workshops and scoping meetings. As was acknowledged by many participants during the workshops, it is not possible to accommodate all of the specific viewpoints presented, given the large range of views and opinions offered. However, the NRC staff believes that the draft criteria respond to the key themes that emerged from these workshops. This informal opportunity for comment represents another enhancement to the conventional rulemaking process and an opportunity for participants to see how the NRC staff responded to views in advance of formal Commission review of the proposed rule.

The NRC staff draft is formatted in the typical Federal Register format which will eventually be used to formally notice the proposed rulemaking for public comment. However, this document is still under active consideration, and has not been reviewed or approved by the Commission. Use has been made of the draft GEIS which is currently under review within the staff. Although, as noted below, the GEIS will be published in its entirety for formal public comment as part of the proposed rulemaking package, a summary of the GEIS analysis approach and general findings is provided as part of this "staff draft".

The NRC staff greatly appreciates the considerable time and effort of the many participants in the workshops and scoping meetings, and looks forward to the comments which will be offered on this draft. Comments will be most useful if they include the rationale for suggestions or positions. Comments received prior to March 11, 1994 will be included in the development of the proposed rule for Commission review and consideration. Comments received after that date will be accommodated to the extent possible, but the NRC staff cannot assure that these comments can be factored into the next draft.

The current schedule for this rulemaking provides for Commission review of the rulemaking package, including the draft GEIS, in May, 1994, and publication of the proposed rule and draft GEIS for formal public comment in the summer of 1994. Public comment received on the proposed rule and draft GEIS will be considered in development of the final rulemaking package which is currently scheduled for consideration by the Commission in May, 1995.

Donald A. Cool

Dr. Donald A. Cool, Chief
Radiation Protection and
Health Effects Branch

PROPOSED FEDERAL REGISTER NOTICE

NUCLEAR REGULATORY COMMISSION
10 CFR Part 20

AGENCY: Nuclear Regulatory Commission.

ACTION: Draft Radiological Criteria for Decommissioning

SUMMARY: The Nuclear Regulatory Commission is proposing to amend 10 CFR Part 20 of its regulations to provide specific radiological criteria for the decommissioning of soils and structures.

The proposed criteria would apply to the decommissioning of all facilities licensed under Parts 30, 40, 50, 60, 61, 70, and 72, as well as other facilities subject to the Commission's jurisdiction under the Atomic Energy Act and the Energy Reorganization Act. The Commission would expect to apply these criteria in determining the adequacy of remediation of residual radioactivity resulting from the possession or use of source, byproduct, and special nuclear material. For high-level and low-level waste disposal facilities (10 CFR Parts 60 and 61 respectively), the criteria would apply only to ancillary surface facilities that support radioactive waste disposal activities since criteria for closure of the remainder of the facility and termination of the license are already set out in 10 CFR Parts 60 and 61. For uranium mills, the criteria apply to decommissioning of the facility but not to the disposal of uranium mill tailings which is covered in Appendix A of 10 CFR Part 40. The criteria would apply to decommissioning of nuclear facilities that operate through their normal lifetime, as well as to those that may be shut down prematurely. However, they would not apply to sites already covered by a decommissioning plan approved by the Commission prior to the effective date of this rule.

The intent of this rulemaking is to provide a clear and consistent regulatory basis for determining the extent to which lands and structures must be

remediated before a site can be considered decommissioned. The Commission believes that inclusion of criteria in the regulations will result in more efficient and consistent licensing actions related to the numerous and frequently complex site remediation and decommissioning activities anticipated in the future. The Commission has reassessed the basis for the residual contamination levels contained in existing guidance in light of changes in basic radiation protection standards, improvements in remediation and radiation detection technologies, decommissioning experience obtained during the past 15 years, and comments received from workshops held as part of this rulemaking effort.

The NRC presently allows decommissioning on a site-specific basis using existing guidance. However, the Commission believes that codifying radiological criteria for decommissioning in the regulations would allow the NRC to more effectively carry out its function of protecting public health and the environment at decommissioned sites by providing for more efficient use of NRC and licensee resources, consistent application across all types of licenses, and a predictable basis for decommissioning planning. In addition it will eliminate protracted delays in decommissioning which result as licensees wait for generic regulatory criteria before proceeding with decommissioning of their facilities.

DATES: Submit comments by March 11, 1994. Comments received after this date will be considered if it is practical to do so, but the Commission is able to assure consideration only for comments received on or before this date.

ADDRESSES: Send comments to: Secretary, U.S. Nuclear Regulatory Commission, Washington, DC 20555. ATTN: Docketing and Service Branch.

Hand deliver comments to: 11555 Rockville Pike, Rockville, Maryland, between 7:45 a.m. and 4:15 p.m. Federal workdays.

Comments may be submitted electronically, in either ASCII text or Wordperfect format, by calling the NRC Enhanced Participatory Rulemaking on Radiological Criteria for Decommissioning Electronic Bulletin Board, 1-800-880-6091. (see Federal Register Vol.58, No.132, July 13, 1993). The bulletin board may be accessed using a personal computer, a modem, and most commonly available communications software packages. Set parity to none, data bits to 8, and stop bits to 1 (N,8,1) and use ANSI or VT-100 terminal emulation. Background documents on the rulemaking are also available for downloading and viewing on the bulletin board. For more information call Ms. Christine Daily, U.S. Nuclear Regulatory Commission, Washington, DC 20555. Phone (301) 492-3999; FAX (301) 492-3866.

Documents related to this rulemaking may be examired at the NRC Public Document Room, 2120 L Street NW. (Lower Level), Washington, DC. Many of these documents may also be viewed and downloaded electronically via the Electronic Bulletin Board established by NRC for this rulemaking.

FOR FURTHER INFORMATION CONTACT: James C. Malaro, Office of Nuclear Regulatory Research, U.S. Nuclear Regulatory Commission, Washington, DC 20555, telephone (301) 492-3764.

SUPPLEMENTARY INFORMATION: [Statement of Considerations]

INTRODUCTION

The Nuclear Regulatory Commission is proposing to amend 10 CFR Part 20 of its regulations to provide specific radiological criteria for the decommissioning of soils and structures.

The NRC is using an enhanced participatory process for developing the criteria. This process included a series of 7 workshops held from January through May 1993. The workshops were conducted at a very early stage of rulemaking to enhance participation of interested parties and the public with the following objectives: a) to ensure that the relevant issues have been identified; b) to exchange information on these issues; and c) to identify underlying concerns and areas of disagreement, and, where possible, approaches for resolution. In July 1993, the NRC staff also conducted 8 scoping meetings for the development of the Generic Environmental Impact Statement (GEIS) supporting the rulemaking.

The proposed criteria would apply to the decommissioning of all facilities licensed under 10 CFR Parts 30, 40, 50, 60, 61, 70, and 72, as well as other facilities subject to the Commission's jurisdiction under the Atomic Energy Act and the Energy Reorganization Act. The Commission would apply these criteria in situations where remediation of radioactive material residues resulting from use or possession of Source, Byproduct, and Special Nuclear Material is undertaken. For high-level and low-level waste disposal facilities (10 CFR Parts 60 and 61), the criteria would apply only to ancillary surface facilities that support radioactive waste disposal activities since criteria for closure of the remainder of the facility and termination of the license are already set out in 10 CFR Parts 60 and 61. For uranium mills, the criteria would apply to decommissioning of the facility but not to the disposal of uranium mill tailings, which is covered in Appendix A of 10 CFR Part 40 and Environmental Protection Agency standards in 40 CFR Part 192. The criteria would apply to decommissioning of nuclear facilities that operate through their normal lifetime, as well as to those that may be shut down prematurely. However, they would not apply to sites already covered by a decommissioning plan approved by the Commission prior to the effective date of

this rule.

The purpose of the rulemaking is to assure that decommissioning will be carried out with minimal impact on public and occupational health and safety and the environment. The proposed amendments enhance the existing regulatory framework by providing a clear and consistent regulatory basis for determining the extent to which lands and structures must be remediated before a site can be decommissioned. The Commission believes that inclusion of criteria in the regulations will result in more efficient and consistent licensing actions related to the numerous and frequently complex site decontamination and decommissioning activities anticipated in the future. The Commission has developed the basis for the residual contamination levels in light of changes in basic radiation protection standards, improvements in remediation and radiation detection technologies, decommissioning experience obtained during the past 15 years, and comments received from workshops held as part of this rulemaking effort.

Current regulations do not explicitly address radiological criteria for decommissioning.[1] The NRC presently allows decommissioning on a site-specific basis using existing guidance.[2] However, the Commission believes

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[1] In June 1988 the Commission published a final rule on General Requirements for Decommissioning Nuclear Facilities (53 FR 24018, 27 June 1988). However, this rule did not specifically address radiological criteria for decommissioned sites.

[2] Regulatory guidance, criteria, and practices include the following with emphasis on contamination levels that are As Low as Reasonably Achievable (ALARA): "Disposal or On-site Storage of Thorium or Uranium from Past Operations" Branch Technical Position, October 23,1981, 46 FR 52061; "Termination of Byproduct, Source, and Special Nuclear Materials Licenses", Policy and Guidance Directive FC 83-23, November 4, 1983; Termination of Operating Licenses for Nuclear Reactors" Regulatory Guide 1.86, June 1974 ; letter to Stanford University from James R. Miller, Chief, Standardization and Special Projects Branch, Division of Licensing, Office of Nuclear Reactor Regulation, NRC, Docket No. 50-141, April 21, 1982; "National Primary Drinking Water Standards," 40 CFR 141; "Radiation Dose Guidelines for Protection Against Transuranium Elements Present in the Environment as a Result of Unplanned Contamination," 42 FR 60956, November 30, 1977. Guidance is

that codifying radiological criteria for decommissioning in the regulations would allow the NRC to more effectively carry out its function of protecting public health and the environment at decommissioned sites by providing for more efficient use of NRC and licensee resources, consistent application across all types of licenses, and a predictable basis for decommissioning planning. In addition it will eliminate protracted delays in decommissioning which result as licensees wait for generic regulatory criteria before proceeding with decommissioning of their facilities.

BACKGROUND

The Nuclear Regulatory Commission (NRC) has the statutory responsibility for protection of health and safety and the environment related to the possession and use of source, byproduct, and special nuclear material under the Atomic Energy Act. One part of this responsibility is to assure safe and timely decommissioning of nuclear facilities which it licenses, and to provide guidance to licensees on how to plan for and prepare their sites for decommissioning. Decommissioning, as previously defined by the NRC, means to remove nuclear facilities safely from service and to reduce residual radioactivity to a level that permits release of the property for unrestricted use and termination of the license.[3]

Decommissioning activities are initiated when a licensee decides to terminate licensed activities. Decommissioning activities do not include the removal and disposal of spent fuel which is considered to be an operational activity or the removal and disposal of nonradioactive structures and materials beyond that necessary to terminate the NRC license. Disposal of nonradioactive hazardous waste not necessary for NRC license termination is not co ered by these regulations but would be treated by other appropriate agencies having

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specified in terms of acceptable levels of residual contamination at decommissioned sites.

[3] See, for example, 10 CFR Part 40.4

responsibility over these wastes. If nuclear facilities are to be reused for nuclear purposes, applications for license renewal or amendment or for a new license are to be submitted according to the appropriate existing regulation. Reuse of a nuclear facility for other nuclear purposes is not considered decommissioning because the facility remains under license.

Once licensed activities have ceased, licensees are required to decommission their facilities so that their licenses can be terminated. At present, this requires that radioactivity in land, groundwater, surface water, buildings, and equipment resulting from the licensed operation be reduced to levels that allow the property to be released for unrestricted use. Licensees must then demonstrate that all facilities have been properly decontaminated and that, except for any residual radiological contamination found to be acceptable to remain at the site, radioactive material has been transferred to authorized recipients. Confirmatory surveys are conducted by NRC, where appropriate, to verify that sites meet NRC radiological criteria for decommissioning.

There are currently about 24,000 licensees in the United States. About one third of these are NRC licensees, while the remainder are licensed by Agreement States through agreements entered into under the Atomic Energy Act, Section 274. Licensees include utilities, nuclear fuel fabricators, universities, medical institutions, radioactive source manufacturers, and companies that use radioisotopes for industrial purposes. About 50% of NRC's 7,500 materials licensees use either sealed radioactive sources or small amounts of short-lived radioactive materials. Sealed sources, including items such as check sources, do not pose a contamination problem unless the encapsulation is broken. Decommissioning of these facilities is typically simple because there is usually little or no residual radioactive contamination to be removed and disposed of.

Of the remaining 50%, a small number (e.g. radioactive source manufacturers, radiopharmaceutical producers, and radioactive ore processors) conduct operations which could produce substantial radioactive contamination in

portions of the facilities. At these sites, lands, facilities, or equipment may become contaminated through the use of radioactive material in forms which have not been encapsulated to prevent the spread or dispersal of material. When radioactive materials in unsealed forms are used, such as in the nuclear fuel fabrication industry, in production of radiopharmaceutical medicines, or in research, the equipment used to process and handle the material becomes contaminated by the small quantities of material that adhere to surfaces of valves, piping, etc. If material is spilled, then the area of the spill becomes contaminated. These facilities will have to be decontaminated to acceptable levels before they can be released for unrestricted use and their licenses terminated. The population of nuclear fuel cycle facilities which will require decommissioning includes 112 nuclear power plants (at 75 sites); 74 non-power (research and test) reactors; 14 fuel fabrication plants; 2 uranium hexafluoride production plants; 49 uranium mill facilities; and 9 independent spent fuel storage installations.

Essentially everything which comes in contact with the radioactive material must be considered contaminated and checked for the presence of residual radioactive material. Thus, areas surrounding facilities could become contaminated by the movement of material, equipment, and people into and out of the areas containing the radioactive material. NRC requires that contamination control procedures be used to minimize or prevent the movement of radioactive materials into other areas. Nevertheless, some areas may become contaminated over the course of time due to breakdowns in the control procedures. Contamination may also be spread by the movement of water or other fluids containing the radioactive materials through or along piping, equipment, walls, floors, sumps, drains, etc. In some cases, this has resulted in the release of significant quantities of radioactive material into the ground under or around buildings and facilities.

In addition to contamination, some licensed operations can produce radioactive materials through the process of activation. In this process, materials become radioactive when they are bombarded by neutrons generated in certain

nuclear operations. Examples of such operations include nuclear reactors, where metal reinforcing bars in concrete surrounding the reactor vessel may become radioactive through neutron bombardment. These activated materials may also need to be removed or disposed of during decommissioning.

Several hundred NRC and Agreement State licenses are terminated each year. The majority of these licenses involve limited operations, produce little or no radioactive contamination, and do not present complex decommissioning problems or potential risks to public health or the environment from residual contamination. However, as the nuclear industry matures, it is expected that more and more of the larger nuclear facilities which have been operating for a number of years will reach the end of their useful lives and have to be decommissioned. Thus both the number and complexity of facilities that will require decommissioning is expected to increase.

The NRC has a program underway to effect timely decommissioning of about 50 sites, which warrant special NRC oversight either because they have not been decommissioned properly in the past or have been engaged in the decommissioning process for an extended period. The Commission has established a Site Decommissioning Management Plan (SDMP)[NUREG-1444, October 1993] for effecting timely decommissioning of these problem facilities. Sites being handled under the SDMP vary in degree of radiologic hazard, cleanup complexity, and cost. Some sites comprise tens of acres that require assessment for radiological contamination, whereas other sites have contamination known to be limited to individual buildings or discrete piles of tailings or contaminated soil. Many sites involve active licenses, but some sites involve formerly licensed sites, or sites where the responsible party is unable or unwilling to perform cleanup. These sites also vary in degree of completion of decommissioning. At some sites, little or no decontamination work has been done, whereas at other sites, decommissioning is underway or license termination is in the offing.

The effort to have these SDMP sites remediated and decommissioned has been

hampered in part because licensees view the absence of definitive radiological criteria as an incentive to defer decommissioning pending issuance of formal NRC requirements. The General Accounting Office (GAO), which has been critical of the Commission's inability to effect timely decommissioning of these sites, has recommended that the NRC enhance its decommissioning efforts by reconsidering its radiological criteria for decommissioning[4].

Until new criteria are in place, the Commission intends to proceed with decommissioning nuclear facilities on a site-specific basis considering existing criteria coupled with the concept that residual radioactivity be as low as is reasonably achievable (ALARA). Case and activity-specific decisions concerning decommissioning of sites will continue to be made as necessary during the pendency of this rulemaking process. Because the SDMP sites could pose unnecessary environmental and public risks or financial burdens if they are not decommissioned in a timely manner, the Commission's effort to effect timely decommissioning of these sites is proceeding in parallel with this proposed rulemaking action. The NRC published an Action Plan to ensure timely remediation of sites listed in the SDMP in the Federal Register in April 1992.[5] It should be noted that the NRC does not intend to require additional remediation of sites in response to criteria established in this rulemaking, provided that the licensee or responsible party has already remediated the site, or was in the process of remediating the site in full accordance with an NRC-approved decommissioning plan at the time of promulgation.

Internationally, most efforts have been focussed upon development of criteria for waste disposal and recycle of radioactively contaminated materials, using guidance published by the International Atomic Energy Agency. Decommissioning criteria have generally been established on a case specific basis. This approach is the same as the current approach employed in the United States

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[4] GAO Report to Congress, "NRC's Decommissioning Procedures and Criteria Need to Be Strengthened", GAO/RCED-89-119, May 1989

[5] 57 FR 13389, April 16, 1992.

pending the development of radiological criteria through formal requirements. The NRC staff is not aware of other international efforts similar to this rulemaking to define radiological criteria for decommissioning.

THE ENHANCED PARTICIPATORY RULEMAKING PROCESS

The normal pattern for NRC rulemaking is the development of a proposed rule by the NRC staff for Commission consideration, publication of the proposed rule for public comment, consideration of the comments by the NRC staff, and preparation of a final rule, as appropriate, for Commission approval. As directed and approved by the Commission, the NRC staff has enhanced participation in the early stages of this rulemaking process through a series of workshops for affected interests. These workshops were held from January through May, 1993 in Chicago, IL; San Francisco, CA; Boston, MA; Dallas, TX; Philadelphia, PA; Atlanta, GA; and Washington, D.C. The workshops elicited informed discussions of options and approaches for developing radiological criteria, and the rationale for options and approaches. While these workshops were not designed to seek "consensus" in the sense that there is agreement on how each issue should be resolved, the workshops were conducted at a very early stage of rulemaking to enhance participation of interested parties and the public with the following objectives: a) to ensure that the relevant issues have been identified; b) to exchange information on these issues; and c) to identify underlying concerns and areas of disagreement, and, where possible, approaches for resolution. It is the Commission's hope that the interactions among the participants in the workshop environment also fostered among the participants a clearer mutual understanding of the positions and concerns of all of the participants. These workshops provided a number of themes, such as consideration of restricted use options, increased public participation in the site decommissioning process, and a desire to return sites to levels which are indistinguishable from natural background, which form the basis upon which the Commission has developed the provisions of this

rulemaking.

Concurrent with the NRC rulemaking on radiological criteria for decommissioning, the Environmental Protection Agency (EPA) is proceeding to develop standards and guidance for Federal agencies in the area of radiation protection, including standards for the cleanup of contaminated sites. The EPA National Advisory Council on Environmental Policy and Technology, Subcommittee on Residual Radioactivity, held a public meeting in November 1993 to discuss the issues associated with the EPA rulemaking. The NRC and EPA have coordinated their efforts in this area in order to ensure that effective and consistent site cleanup standards are established, while minimizing duplication of effort. Accordingly, the EPA was an important participant in the NRC rulemaking workshops and is a cooperating agency in the preparation of the GEIS for the rulemaking. The NRC has also consulted extensively with EPA throughout the rulemaking process. It is anticipated that the information gathered during the workshops on the NRC standards will also be relevant and useful to the EPA efforts in the area of site cleanup standards. The objective of the NRC and EPA cooperative efforts is to attempt to reach an agreement that the NRC standards established in the enhanced participatory rulemaking are sufficient to provide adequate protection to the public health and safety for NRC-licensed sites. The EPA efforts could then focus on the site clean-up standards for non-NRC licensed sites, such as DOE and DOD facilities. This is consistent with the principles and procedures set forth in a recent Memorandum of Understanding between the NRC and EPA to guide each agency's actions in areas of mutual regulatory concern.[6]

COMMENTS FROM WORKSHOPS

On December 11, 1992, the Commission published in the Federal Register (57 FR 58727) a notice that it was preparing to initiate rulemaking on establishing

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[6] Federal Register, Vol. 57, 54127, November 16, 1992, "Memorandum of Understanding Between the Nuclear Regulatory Commission and the Environmental Protection Agency"

radiological criteria for the decommissioning of NRC-licensed facilities. The notice listed a schedule for 7 workshops throughout the United States beginning in January, 1993. The purpose of the workshops was to solicit commentary from affected interests on the fundamental approaches and issues that must be addressed in establishing radiological criteria for decommissioning. Written comments on approaches and issues also were solicited.

On June 18, 1993, the Commission published in the Federal Register (58 FR 33570) a notice of intent to prepare a Generic Environmental Impact Statement (GEIS) as part of the rulemaking action on radiological criteria for decommissioning. The notice listed 8 meetings throughout the United States to be held in July, 1993 for the purpose of discussing and receiving public comment on what should be covered in the GEIS. Comments made at these "Scoping Meetings", the workshops, and related written comments have been considered by the NRC staff in its preparation of this proposed rule and the draft GEIS.

Overview of Comments

Over 7,000 comments were presented at the 7 Workshops, 8 Scoping Meetings, and in related letters. The NRC staff considered these comments in the development of this proposed rule and the Draft GEIS.

NRC held rulemaking workshops in Chicago, IL; San Francisco, CA; Boston, MA; Dallas, TX; Philadelphia, PA; Atlanta, GA; and Washington, D.C. between January and May 1993. The worksnop comments have been summarized in NUREG/CR-6156, "Summary of Comments Received from Workshops on Radiation Criteria for Decommissioning." This report summarizes 3,635 comments categorized from transcripts of the seven workshops and 1,677 comments from 100 NRC docketed letters from individuals and organizations. NUREG/CR-6156 merely catalogues the comments and viewpoints; no analysis or response to the comments is included. The comments reflect a broad spectrum of viewpoints on the issues

related to radiological criteria for decommissioning and associated subjects.

The comments reflect a spectrum of viewpoints on the issues in this rulemaking on radiological criteria for decommissioning. The comments show little evidence of general agreement on issues except that most parties appear to agree that (1) the rulemaking should proceed, and (2) the Commission's activities in decommissioning should recognize that it is not reasonable to expect all nuclear facilities to be remediated to a level that permits termination of the license and release of the facility for unrestricted use. While a number of additional themes emerged from the workshops, these themes cannot be characterized as having the general agreement of all of the workshop and meeting participants.

Transcripts of the workshops and scoping meetings and copies of related letters are available for inspection or copying for a fee in the NRC Public Document Room, 2120 L Street, NW, (Lower Level), Washington, DC.

The NRC also held public meetings on the scope of the Generic Environmental Impact Statement (GEIS) during July 1993 in Washington, D.C.; San Francisco, CA; Oklahoma City, OK; and Cleveland, OH. Comments from these meetings were reviewed and comments which differed substantially from those from the workshops are also summarized in the body of NUREG/CR-6156. A summary of all of the comments from the GEIS scoping meetings is included as an appendix to this report.

Summary and Discussion of Comments

1. Need For and Scope of Rule.

Almost all commenters supported the NRC's plans to develop radiological decommissioning standards and recommended that the rulemaking go forward

expeditiously. Some commenters recommended that the NRC consider and possibly establish both radiological and chemical decommissioning standards. Most commenters stated that the NRC should establish standards for both unrestricted and restricted release of sites.

In response, the NRC is proceeding with a rulemaking which will establish radiological criteria for decommissioning. NRC's schedule calls for issuance of a final rule by May 1995.

NRC's authority is limited by law primarily to ensuring protection of the public health and safety from radiological and nuclear hazards associated with source, special nuclear, and byproduct material. NRC has refrained from extending its reach to address non-radiological hazards except where specifically authorized by Congress (e.g., uranium mill tailings) or where these hazards would not otherwise be adequately controlled because of a regulatory void. Consequently, NRC is not proposing to include provisions in the radiological criteria to address non-radiological hazards. Although the rule will not establish criteria for disposition of nonradioactive hazardous and other wastes, licensees are reminded that they must continue to meet applicable Federal, state, and local standards for disposition of such wastes.

The proposed rule provides for both unrestricted release and restricted termination of the license. If a licensee can not satisfy the conditions for license termination, the license will not be terminated.

2. Basis for Radiological Criteria

Several commenters recommended that NRC decommissioning standards be based on and be consistent with the scientific information and advice of such organizations as the National Council on Radiation Protection and Measurements (NCRP) and the International Commission on Radiological Protection (ICRP). One commenter suggested that the NRC should determine whether the standards are to

be technologically-based or politically-based; if the latter, don't waste time on technological input.

In response, it should be noted that the NRC and its predecessor agency, the Atomic Energy Commission, have generally followed the basic radiation protection recommendations of the ICRP and its U.S. counterpart, the NCRP, in formulating basic radiation protection standards. Recommendations of the ICRP and the NCRP were relied on in the revision of 10 CFR Part 20, "Standards for Protection Against Radiation," which were published in May 1991 and which were implemented by licensees on or before January 1, 1994. The proposed radiological criteria for decommissioning continues this practice but the proposed rule also recognizes the public's interest in and potential for contributing to the decommissioning process. The public's involvement through participating in the development of the criteria in this rulemaking and through participation on Site Specific Advisory Boards as specified in this rule is expected to aid in the conduct of a decommissioning program that is understandable, technologically sound, and responsive to the concerns of affected parties.

Several commenters recommended that the NRC consider adopting a risk limit standard equating to a radiation dose of 25 to 100 millirems per year. According to two commenters a 100 millirems per year limit would increase the cancer risk in the population only slightly above its normal incidence rate. One commenter believes that radiation damage per unit of exposure may increase at smaller doses. Other commenters stated that there may be a threshold for radiation effects and that there may be no adverse health effects at low radiation levels.

In response, in the Supplementary Information for the revised 10 CFR Part 20, "Standards for Protection Against Radiation," the NRC stated that the standards are based upon the assumptions that (1) Within the range of exposure conditions usually encountered in radiation work, there is a linear relationship, without threshold, between dose and probability of occurrence of

stochastic (random) health effects such as latent cancer and genetic effects; (2) The severity of each type of stochastic health effect is independent of dose; and (3) nonstochastic (nonrandom) radiation-induced health effects can be prevented by limiting exposures so that doses are below the thresholds for their induction.

In the absence of convincing evidence that there is a dose threshold or that low levels of radiation are beneficial, the Commission believes that the assumptions regarding a linear nonthreshold dose-effect model for cancers and genetic effects and the existence of thresholds only for certain nonstochastic effects are prudent for formulating radiation protection standards and planning radiation protection programs.

The Commission believes the dose limits and ALARA requirements of the proposed radiological criteria for decommissioning provide a reasonable basis for protection of public health and safety and the environment. However, the Commission has also determined that decommissioning activities should not be allowed the entire dose limit of 100 mrem/y for members of the public. The Commission has selected a value which is a relatively small fraction of the limit, consistent with other decisions of both the EPA and NRC for unrestricted access to areas.

Many commenters recommended that the NRC establish as its decommissioning standard a risk/dose limit on the order of the variability of natural background radiation occurring across the United States. The reasons given were that no health risks are attributable to background radiation variations and studies show that there is no increase in cancer incidence over a wide range of background radiation in the U.S.

In response, the Commission believes that the goal for decommissioning should be the return of the facility to levels approximating background. However, the Commission recognizes that demonstrating that radioisotope levels at a

site are indistinguishable from background will be a complex task involving sophisticated sampling, measuring, and statistical analysis techniques. The Commission also recognizes that the difficulty of the task can vary substantially depending on a number of factors including the radionuclide in question, the background level for that and other radionuclides at the site, and the temporal and spatial variations in background radiation at the site. Therefore, the Commission is proposing that the cumulative TEDE to the average member of the critical group from all radionuclides that could contribute to residual radioactivity and are distinguishable from background does not exceed 3 mrem (0.03 mSv) per year. One of the reasons three millirem per year was selected is because variations of this magnitude are barely distinguishable from the dose from background radiation. Three mrem/y is well within the variability of natural background radiation across the U.S. and also within those variations experienced seasonally at particular sites.

3. Individual vs Collective Doses.

Several comments were made concerning how risk standards should be applied to the population who may be exposed to residual radioactivity at a released site. Most commenters favored applying a risk limit to individuals and believed it unnecessary to specify a collective dose limit (i.e. a limit on the cumulative dose in person-rem/y to the entire exposed population). One commenter remarked that if collective dose is used, it should be applied in a comprehensive manner; for example, in evaluating an appropriate cleanup standard the doses to the public from transporting material off site for disposal should be evaluated against the doses received by the public around the site if the material is left in place.

In response, the NRC has considered both the collective doses to populations and the individual doses to the average member of the most highly exposed group of individuals (critical group). These considerations are reflected in the calculations presented in the GEIS prepared in support of this rulemaking.

The GEIS concludes t'at the individual dose is controlling and that consideration of collective doses is not useful in distinguishing between alternative regulatory alternatives. In the scenarios considered, the annual collective dose is quite small. Therefore, the Commission concludes that limiting individual dose to the levels specified in the criteria will assure that collective doses will be small and that the public health will be adequately protected. This is consistent with past Commission practice in establishing radiological criteria.

4. Statement of Radiological Criteria.

In developing the proposed cleanup criteria, attention was focused on four approaches: (1) establish an annual risk or dose limit for an individual, (2) establish an annual risk or dose goal, (3) require use of best available technology, and (4) require return of the site to background radioactivity.

Most commenters from state governments, the nuclear utilities, the fuel cycle industry, the medical community and non-fuel cycle industry, cleanup contractors, and professional society/standard setting organizations favored a risk-based or dose-based standard over a standard based on best available technology or return to background. Most commenters from citizen/environmental organizations and some from other organizations favored a return-to-background standard. Many commenters objected to a best effort/best available technology standard for various reasons including the belief that it would be extremely subjective.

In response, the Commission agrees that the goal of decommissioning should be to reduce residual radioactivity at a site to levels that are indistinguishable from background. Therefore, the proposed rule would establish the following goal for decommissioning: (1) reduce the concentration of individual radionuclides which could contribute to residual radioactivity

at the site to a level which is indistinguishable from background, (2) release the site for unrestricted use, and (3) terminate the license. For purposes of determining when further ALARA efforts need not be considered, the Commission would consider that this objective had been met if the cumulative TEDE to the average member of the critical group from all radionuclides that could contribute to residual radioactivity and are distinguishable from background does not exceed 3 mrem (0.03 mSv) per year. Three millirem per year is a small fraction of the NRC's 100 mrem/y dose limit for individual members of the public, is barely distinguishable from variations in local and national radiation background levels, and is consistent with the 10^{-4} level of lifetime risk used by EPA for Superfund. Dose based criteria were selected over risk based criteria for ease of implementation.

The proposed rule would also establish a dose limit for release of the site of 15 millirem per year (mrem/y) TEDE for residual radioactivity distinguishable from background and require that the licensee reduce this residual radioactivity to as close to the goal of indistinguishable from background as reasonably achievable. Sites meeting this criterion, including all those sites that also achieve the decommissioning goal, would be considered acceptable for release for unrestricted use and termination of the license. Fifteen mrem/y TEDE is consistent, in terms of risk, with the NRC release limits for low level waste facilities (10 CFR 61.41), is consistent with the individual dose protection limit in the EPA Environmental Radiation protection Standards for the Management and Disposal of Spent Nuclear Fuel, High-level and Transuranic Wastes, 40 CFR 191 (58 FR 66398, December 20, 1993), is well below the 9×10^{-4} upper level of lifetime risk used by EPA for Superfund, and provides a substantial safety margin below the NRC's 100 mrem/y dose limit individual members of the public members of the public (10 CFR 20.1302). Use of a dose limit is consistent with long standing NRC (and AEC) regulatory practices for protecting radiation workers and the public. The use of a limit also provides a clear measure for determining the acceptability of a site, and a clear basis for determinations of compliance with the regulations.

5. Consistency and Compatibility.

Many commenters urged that all regulatory agencies (EPA, NRC, State and local governments, etc.) use the same radiological criteria for decommissioning and that the agencies be consistent in how they apply the criteria. Some commenters said that the NRC's adoption of a risk/dose limit of 100 millirem per year, with a proper application of ALARA, would result in a 10^{-6} annual risk and a 10^{-4} lifetime risk, which would be consistent with the EPA's Superfund remediation goals . Other commenters recommended that State and local governments be at liberty to adopt more stringent requirements.

In response, the NRC is hopeful that the proposed criteria developed through the enhanced participatory rulemaking process will be acceptable to all regulatory agencies and will be consistent and compatible with the requirements of other regulatory agencies. The EPA and NRC have overlapping authority in the area of developing radiological criteria for decommissioning for nuclear sites. In addition, decommissioned sites, if not remediated properly, could later be subject to remedial action under EPA Superfund requirements. This is an outcome which is viewed as undesirable by both the EPA and NRC, and is considered unlikely because the proposed NRC criteria are designed to be consistent with the risk range incorporated in EPA's Superfund requirements. NRC and EPA are developing decommissioning criteria in parallel rulemaking efforts. The NRC and EPA are coordinating their efforts in this area to ensure that effective and consistent site decommissioning standards are established, while minimizing duplication of effort. Accordingly, the EPA was an important participant in the NRC rulemaking workshops and is a cooperating agency in the preparation of the GEIS for the rulemaking. The NRC has also consulted extensively with EPA throughout the rulemaking process. The objective is that EPA will be able to make a finding that NRC decommissioning criteria provide adequate protection for the public and the environment and will exclude NRC licensees from the EPA cleanup standards. In addition, State and local governments will have opportunities to participate in individual decommissioning actions carried out under the proposed

regulation.

6. Finality.

Several commenters stated that the NRC's decommissioning standard should be long-lasting and provide a final solution for decommissioning sites that are contaminated with radioactive material. The NRC's standard should be consistent with EPA rules to assure that a site remediated under NRC's rules will not require further remediation under EPA rules.

Some commenters questioned whether it is possible to have finality in decommissioning standards, because of likely new information and improved technology in the future. They stated that sites should continue to be remediated as necessary to meet new standards. Those opposed stated that rules should be changed only if a substantial increase in public safety can be demonstrated.

In response, the Commission believes that actions taken under the criteria in this rule need not be revisited unless, based on new information, there is reason to believe that residual radioactivity remaining at the site could result in significant public or environmental harm. Therefore, once a site has been decommissioned and the license terminated in accordance with the criteria in the rule, the Commission will require additional cleanup only if, based on new information, it determines the level of residual radioactivity at the site substantially violates these criteria.

Based on the NRC's experience in the SDMP and other decommissioning programs, it is important to provide a high level of assurance that decommissioning actions conducted under the current criteria will not need to be revisited in the future under potentially more restrictive criteria. Licensees have indicated a genuine reluctance to commit the large financial and corporate resources necessary for complex decommissioning projects without such

assurances. Uncertainty with future criteria and the potential need for additional remediation introduces havoc in the planning and conduct of effective decommissioning. Without some degree of finality in the criteria, licensees may be motivated to forestall decommissioning actions pending development of more favorable criteria or less expensive decommissioning technologies and waste disposal options. This approach manifests itself in extended administrative appeals and litigation, which often redirects licensee resources away from efforts to reduce levels of contamination.

At the same time, the NRC recognizes that there may be legitimate needs for addition remedial actions in the future if significant additional contamination is discovered at a site or if the technical basis on which the criteria are founded changes significantly, indicating that potential future residents of the sites may be at significantly greater risk than previously anticipated. Therefore, the proposed criteria allow for additional remediation if necessary if additional significant contamination is identified or if changes in the risk or health basis for the criteria indicates such remediation is necessary to protect the public against significant radiological risks.

As noted in item 5. above, the EPA and NRC are working together closely in this rulemaking. Upon completion, the EPA will determine through a formal notice and comment rulemaking whether the NRC's rule provides adequate protection for public health and the environment. This should minimize the risk that in the future tne EPA would require additional cleanup of a site which has been decommissioned in accordance with the criteria in this rule.

7. Community Involvement.

Many commenters recommended that the rulemaking should provide for and ensure local citizen group participation in overseeing the decommissioning of

contaminated sites and the enforcement of requirements. Also, the role of tribal authorities should be addressed. Some commenters stated that the NRC should ensure citizen participation in decommissioning from the earliest stage of cleanup.

In response, the Commission believes it is important for the public to not only be fully informed of the decommissioning actions at a particular site but also to be able to effectively participate in site decommissioning decisions. The proposed rule provides specific mechanisms for public participation in the decommissioning process, where such participation is important to ensuring that the public is adequately informed about proposed decommissioning activities or that the public and environment is adequately protected in conjunction with reliance on institutional controls to restrict site access after license termination. These are in addition to whatever hearing opportunities are provided for a particular category of site by the Commission's existing requirements.

Upon the receipt of a decommissioning plan from the licensee, or a proposal by the licensee for restricted release of a site, or whenever the Commission deems such notice to be in the public interest, the Commission would: (1) notify local and state governments in the vicinity of the site and Indian Nation or other indigenous people that have treaty or statutory rights that could be affected by the decommissioning, (2) publish a notice in the Federal Register as well as in other media, such as local newspapers, which are readily accessible to individuals in the vicinity of the site, and (3) solicit public comment on the proposed decommissioning action.

For decommissioning actions where the licensee proposes to request license termination with land use restrictions, the licensee would be required to convene a Site Specific Advisory Board (SSAB) for the purpose of obtaining advice from affected parties regarding the proposed decommissioning. The SSAB would function at the planning stages of decommissioning, at the time the licensee is developing the decommissioning plan for the facility. The purpose

of the SSAB is to provide recommendations to the licensee on:

(1) Whether there are ways to reduce residual radioactivity to the levels which would permit release for unrestricted use which are technically achievable, would not be prohibitively expensive, and would not result in net public or environmental harm;

(2) Whether provisions for institutional controls proposed by the licensee will: (a) provide reasonable assurance that the TEDE from residual radioactivity distinguishable from background to the average member of the critical group will not exceed 15 mrem (0.15 mSv) TEDE per year, (b) be enforceable, (c) impose undue burdens on the local community or other affected parties; and

(3) Whether the licensee has provided sufficient financial assurance to enable an independent third party to assume and carry out responsibilities for any necessary control and maintenance of the site.

The licensee would be responsible for the establishing the SSAB and the developing appropriate ground rules and operating procedures with the advice of the SSAB.

Membership of the SSAB, to the extent that representatives are willing to participate, would have to: (1) Reflect the full range of interests in the affected community and region and be composed of individuals who could be directly affected by residual radioactivity at the decommissioned site, and (2) Include representatives from the licensee; local and state governments; workers; persons residing in the vicinity of the site; citizen, environmental, environmental justice, and other public interest groups; and Indian Nation or other indigenous people that have treaty of statutory rights that could be affected.

Meetings of the SSAB would be open to the public. The licensee would be

required to provide adequate public notice of the location, time, date, and agenda for the meetings at least two weeks in advance of each meeting. All records generated or reviewed by the SSAB would become part of the decommissioning docket, and would be available for public inspection.

8. Stability and Flexibility

Several commenters stated that decommissioning standards are needed by the NRC to facilitate long-term planning by the nuclear industry and to provide stability against constantly changing criteria over the years. Some commenters stated that even generic standards may not be completely stable because they will need to be changed as a result of newly perceived health effects and improvements in technology.

Many commenters indicated that the rule must be flexible enough to accommodate site differences, e.g., types of radionuclides present, the geology and environmental surroundings, individuals who may be exposed, and possible exposure patterns.

Most commenters favored a generic standard over site specific standards. While supporting the establishment of a generic standard, some urged the NRC to permit site-specific considerations and site-specific modeling for licensees to demonstrate compliance, and to assure participation by local communities. One commenter stated it would be a mistake to use a generic ALARA evaluation for all sites. Several commenters recommended site-specific ALARA assessments. Some commenters, particularly in the GEIS scoping meetings, suggested that the rule only provide the process for establishing site specific criteria.

In response, the Commission agrees that there is a need for consistent and

stable radiological criteria for the decommissioning of licensed nuclear facilities throughout the United States. Therefore, this rulemaking would establish a single set of radiological criteria which would apply to the decommissioning of all sites. However, the Commission also recognizes the need for flexibility in applying these criteria because of constraints posed by site specific conditions (e.g. geology, hydrology, meteorology, and radiation background levels) and to provide opportunity for meaningful participation by local communities in individual decommissioning actions. Therefore, the proposed rule provides for site-specific implementation of the generic criteria. The Commission is publishing regulatory guidance along with the rule which describes methods for site-specific implementation of the criteria. This guidance includes conduct of site characterization and surveys, specific radionuclide concentration and surface activities that would be considered by the NRC staff to meet the decommissioning goal and limit, and modeling acceptable to the staff to develop more site specific values of concentration or surface activity based upon the factors unique to the facility being decommissioned.

As stated above, the Commission believes that generic criteria should be established for decommissioning. The Commission believes that codifying radiological criteria for decommissioning in the regulations would: (1) allow the NRC to more effectively assure protection of public health and the environment at decommissioned sites; (2) result in more efficient use of NRC and licensee resources; (3) lead to more consistent and uniform application across all types of licenses; (4) provide a more stable basis for decommissioning planning; and (5) eliminate protracted delays in decommissioning which result as licensees wait for generic regulatory criteria before proceeding with decommissioning of their facilities.

The NRC does not favor the option suggested of providing a process based rule, whereby the criteria codified would only be for the process to be used in establishing site specific radiological criteria. Such an approach would be essentially the same as the option of remaining with the current status quo.

In general, a site specific approach can lead to considerable delays and increased uncertainty on the part of all parties associated with the decommissioning. Further, such an approach would be inappropriate and burdensome for the large number of licensees using sealed sources or radionuclides with relatively short half-lives.

9. ALARA Considerations.

Under the ALARA concept, decommissioning activities are continued beyond meeting applicable risk/dose limits in efforts to reduce radiation exposures As Low As Reasonably Achievable (ALARA). Most commenters recommended that the NRC's radiological criteria should incorporate this principle. Several commenters stated that state and local governments should be involved in ALARA determinations. However, other commentors expressed distrust of the licensees' and regulatory agencies' application of the ALARA process because it involves financial tradeoffs and licensees are motivated to maximize their profits.

In response, the proposed rule requires application of the ALARA concept, provided that potential doses are constrained within limiting doses under a range of conditions. NRC anticipates that many licensees, particularly sealed source users or those who use relatively short-lived radioactive materials, will strive for the decommissioning goal, in which case ALARA considerations are not required. For licensees that cannot or choose not to achieve the decommissioning goal, state and local governments and other affected parties will be involved in ALARA determinations through opportunities to comment on the decommissioning proposals and participation on the Site Specific Advisory Board. This level of involvement provides for transparent application of the ALARA considerations and safeguards against excessive licensee attention to cutting costs to maintain profit margins.

Many commenters stated that for the most effective use of resources and

fairness, the NRC must consider in the risk-benefit balance not only radiological risks to workers and the public, but also non-radiological risks and indirect risks associated with the regulation of decommissioning activities.

In response, the Commission agrees that all significant public and environmental risks should be considered. The GEIS for this rulemaking assesses both radiological and non-radiological impacts for the proposed rule and several alternative actions, including the alternative of no remedial action. In addition the proposed rule would require that the licensee, when determining ALARA for a specific decommissioning, consider all significant radiological and non-radiological risks resulting from residual radioactivity and from the decommissioning process itself (including transportation and disposal of radioactive wastes generated in the process).

In some cases, the necessary ALARA analysis will go beyond the relatively simple cost-benefit analysis that has typically been applied in the nuclear industry in limiting worker exposures because the types of risks being considered are not things which can be easily quantified or compared. For example, transforation poses immediate risks in terms of fatalities due to highway accidents in hauling the radioactive contamination to appropriate disposal sites. Some individuals and organizations have suggested that these anticipated fatalities should not be considered as having the same seriousness or likelihood as the potential deaths at some point in the future of individuals that may inhabit former nuclear sites after license termination. ALARA, or perceptions of what should be considered as ALARA, may also vary because of values placed on minimizing the number of new sites, preserving existing resources, or preserving viable industries for jobs. Each of these factors were discussed in the workshops, and the Commission believes that these same factors may need to be considered in determining the ALARA level for remediation at a particular site. The NRC is developing guidance on how the ALARA process could be applied in evaluating alternative radiological criteria for decommissioning on a site-specific basis.

Another commenter stated that, "there is no ecological or conservation basis for establishing radiation protection standards different from those ...involved in any other health issue for which benefits are weighed against costs."

In response, the Commission agrees with the above stated conclusion that, as a guiding principle, radiation protection standards do not warrant different treatment than those for other health issues. In this regard, the Commission has carefully considered both the criteria and the implementation of those criteria in other environmental remediation programs (e.g., the EPA Superfund program). The Commission believes the criteria proposed in this rulemaking are generally consistent with those used in other environmental remediation programs.

Several commenters stated that cleaning up to any specified level is technically achievable; it is simply a matter of how much it will cost. Some said that they believed decommissioning costs to return sites to unrestricted use could be so high that the sites should be kept under continued control and maintained as a restricted area. Some commenters suggested that money saved on unnecessary decommissioning activities might be used in other activities more beneficial to the public. Other commenters stated that money saved on decommissioning costs would not necessarily be available for societal betterment.

In response, the proposed rule recognizes that it may not be reasonable to remediate some sites to a level that permits release for unrestricted use. The costs involved, either in dollars or in p ten'ial harm to the environment or people, may be prohibitive. In these cases, the proposed rule provides for termination of the license under restricted conditions. The Commission is also aware that in some unusual cases sites may have to remain under license indefinitely. For example, the NRC is aware of certain sites that are so contaminated elevated levels of the naturally occurring radionuclides uranium,

thorium, and their decay products that it would be extremely difficult and costly to satisfy the proposed criteria for unrestricted or restricted release. In these cases, the Commission anticipates that the sites would have to remain under a license indefinitely until new, more efficient technologies are developed or the financial resources become available to pay for more complete remediation. The Commission has no authority over expenditure of funds that might be saved by avoiding what were termed "unnecessary decommissioning activities".

10. Site Remediation .

According to several commenters the cost of decommissioning could be high, but remediation technologies are believed by most commenters to be available for achieving whatever level is set by the NRC. The NRC should describe acceptable methodologies for remediation and measurement to reduce subjective judgments and should ensure that workers who perform remediation are appropriately trained and protected.

Prior to the effective date of the final rule, the NRC will provide guidance on acceptable methodologies for demonstrating compliance with the Commission's residual radioactivity criteria. However, the Commission does not believe that it would be appropriate to prescribe, *a priori*, the methods to be used. Licensees need to be able to take advantage of whatever safe methodologies may be available for achieving remediation which approaches or meets the goal for decommissioning.

Workers performing decommissioning must receive training in radiation protection according to the requirements of the Commission's requirements in 10 CFR 19.12, "Instructions to Workers." Likewise, workers participating in decommissioning activities will be subject to all of the provisions of 10 CFR Part 20, including requirements related to personnel monitoring, respiratory protection, occupational dose limits, and ALARA. In this regard, the

Commission does not view the conduct of decommissioning activities to be any different from other operational activities licensed by the Commission.

11. Demonstrating Compliance

Several commenters stated that demonstration of compliance with NRC decommissioning rules and applicable radiological limits is a major issue. The Commenters believe the NRC must provide clear guidelines with respect to the kinds of measurements that are necessary and the models that are acceptable to demonstrate compliance. With respect to measurements, guidance should cover: (1) acceptable measurement methods, (2) extent of measurements needed, (3) use of field instruments versus laboratory instruments, (4) statistical sampling, and (5) calibration standards and measurement certification. With respect to models and methodologies, guidance should be provided on their use, uncertainties, and how to apply site specific characteristics. The NRC must make sufficient confirmatory measurements to check that the standards have been met and NRC should enforce the standards.

Several commenters pointed out that, whatever risk standard the NRC may adopt, compliance will likely need to be determined by a computer model except for small operations when contamination levels are within specified generic criteria. Other commenters stated that decontamination limits should be established and dose modeling should not be relied on to demonstrate compliance. Comments were split on whether risk limits might be needed for different exposure pathways.

In response, prior to the effective date of the final rule, NRC plans to issue specific guidance which includes conservative radiation levels, surface contamination limits, and radioactivity concentrations for use by licensees who elect not to apply models to demonstrate compliance. Guidance on measurements covering the above listed five subjects will also be provided. The NRC appreciates that guidance is essential especially where the licensee

must demonstrate compliance with criteria which require reduction of residual radioactivity to near background levels. The NRC expects to make sufficient confirmatory measurements to assure compliance with the criteria.

The proposed rule limits the total exposure from all pathways and does not set limits for individual pathways. Since different pathways will be more important to public dose depending on the radioisotope involved, site specific parameters, and the circumstances under which the site might be used after decommissioning, the Commission believes that no useful purpose would be served by placing limits on individual pathways. In the selection of conservative default values for use by licensees who do not wish to utilize site-specific modeling, the most critical pathways and scenarios of exposure are assumed to be dominant. The absence of limits on individual pathways provides the licensee with more flexibility in limiting radiation exposures while at the same time providing adequate overall public protection.

12. Sites which Cannot be Released for Unrestricted Use.

Many commenters stated that the NRC should establish standards for both unrestricted and restricted release of sites, while others recommended that the NRC require sites in all instances to be remediated suitably for unrestricted use. Some commenters stated that sites should continue to be licensed by the NRC if they cannot be reasonably decontaminated. Also, commenters stated that the NRC should consider the option of restricted future use of decommissioned facilities only after a rigorous public participation process. Many commenters stated that unrestricted release should be the goal, but realistically some sites cannot be remediated suitably for such release.

In response, the proposed rule provides for both unrestricted release and restricted termination of the license under prescribed conditions. The requirement that the licensee convene a Site Specific Advisory Board early in the development of proposed decommissioning plans should help assure

substantive public participation in decisions concerning possible restricted termination of the license. As previously discussed, the Commission is aware of sites, such as sites with significant volumes of thorium contamination, that would require extensively remedial efforts to achieve the proposed requirements for restricted or unrestricted release. If such sites cannot be remediated to achieve at least the restricted release criteria, then the site license would remain in effect indefinitely until technology or resources become available to achieve compliance with the criteria. In the interim period, NRC would ensure appropriate control of the licensed site on a site-specific basis, including access restrictions, environmental monitoring, personnel monitoring, posting, mitigative actions, and other measures directed at ensuring the stability of the radioactive material and protection of the public health and the environment.

13. Waste Disposal.

Several commenters questioned whether there is enough space at a regional disposal facility for the voluminous soils and other materials that are expected from decommissioned sites. Other commenters stated that irrespective of where or how wastes are disposed, the costs of nuclear waste management will be high. Some commenters suggested that the option of leaving radioactive wastes on-site should be considered as a temporary or intermediate option to permit decay of radioactive wastes and allow time for resolving long-term waste disposal problems.

In response, the Commission recognizes that decommissioning to radiation levels approaching background may produce large volumes of low-level waste which could affect the availability of regional disposal capacity. However, the proposed rule would require the licensee to consider significant radiation doses and risks resulting from transportation and disposal of radioactive wastes generated in the decommissioning process when determining ALARA for a specific decommissioning action. If disposal capacity were to become

temporarily limited, on-site storage and containment of wastes may be necessary until a disposal site becomes available. The radiological and non-radiological impacts associated with disposal of the types of radioactive waste generated in decommissioning were considered in NRC's development of the Environmental Impact Statement in support of the low-level waste disposal requirements in 10 CFR Part 61. Impacts associated with extended storage of waste on-site or at a centralized storage facility would typically be considered as part of environmental analysis in support of issuing or renewing facility licenses or of approving decommissioning actions at a licensed facility.

14. Minimizing Generation of Waste.

Many commenters recommended that the NRC discourage or stop licensing those nuclear operations that generate nuclear wastes. Several commenters stated that environmental organizations would be willing to talk about ways to decommission nuclear operations and to dispose of radioactive materials only if power plants were no longer permitted to operate. Other commenters supported the continuation of nuclear power. One commenter urged the NRC not to take sides for or against nuclear power and stated that the policy debate on the relative merits of various power-generating options should be held in another forum (e.g., Congress). Some commenters observed that high costs of decommissioning and waste disposal could help to minimize waste generation. Some commenters recommended that the rulemaking should deal with source reduction of nuclear wastes. Some commenters suggested that decommissioning proposals should be submitted and approved at the design stage, and, consequently, newer facilities should be easier to decommission.

In response, the NRC agrees that licensed facilities should be encouraged in designing and operating nuclear facilities to minimize the generation of radioactive waste and facility contamination. The proposed rule would require applicants for licenses after the effective date of the rule to

describe in the application how facility design and procedures for operation will minimize contamination of the facility and the environment, facilitate eventual decommissioning, and minimize the generation of radioactive waste.

15. Radon.

Many commenters recommended that the NRC should impose limits to control exposure from radon emissions at decommissioned sites because radon exposures could be a significant health problem. Commenters in favor of NRC setting a radon standard stated it should be possible to make a good estimate of how much radon comes from licensed material. Commenters not supporting the NRC's setting a radon standard stated that the need to deal with radon at licensed sites should be considered site-to-site and radon control should be left to local zoning boards and housing authorities.

In response, the Commission believes that it is not possible using current technology to measure or distinguish concentrations of radon which will produce radiation doses of a few mrem TEDE/y above background. This believe is based on (1) recognition of the ubiquitous nature of radon in the general environment, (2) large uncertainties in the models used to project radon concentrations in indoor air based on soil concentrations, and (3) limitations of existing measurement techniques in distinguishing between elevated radon concentrations and radon attributed to natural sources. Therefore, the Commission does not propose to establish a separate standard for radon. Instead exposure to radon at decommissioned sites would be controlled by requiring the licensee to reduce the residual concentrations of radon precursors like uranium, thorium, and radium to levels within the limit for unrestricted use and, using the ALARA principle, toward levels which are indistinguishable from background levels.

16. Environmental and Social Considerations.

Many commenters recommended that the NRC develop standards for protecting natural ecosystems in addition to standards protecting humans. Others expressed concern for environmental protection without recommending for or against establishing separate environmental standards. A large number of commenters recommended that protection of human health is sufficient to protect any known ecological system, so only a standard for protecting humans is needed, and that this is the view of the International Commission on Radiological Protection.

Many commenters recommended that case-by-case consideration should be given for special environmental and social/cultural issues associated with homeland, historical sites, and Native American lands, because they contain religious sites and sacred areas.

Several commenters cautioned against establishment of unnecessarily restrictive decommissioning standards that could cause severe environmental damage trying to clean up soil and vegetation to background levels because such actions could totally change a site's ecology.

In response, the NRC considered the possible need for radiation standards specifically designed to protect the environment. This analysis is reflected in the draft GEIS. Based on this analysis, the Commission concludes that the radiological criteria in the proposed rule which are designed to protect public health should also provide adequate environmental protection.

However, the Commission recognizes there may be environmental or cultural issues associated with a particular decommissioning action which require special consideration. These issues can best be handled on a site-by-site basis as part on the decommissioning plan review process and as part of the Commission's environmental review under the National Environmental Policy Act (NEPA). Where necessary, opportunity for public comment and use of a the Site Specific Advisory Board will provide a mechanism for local citizens and other affected parties to be directly involved in addressing these issues.

17. Recycle.

Comments were offered for and against whether NRC should permit recycling of contaminated materials. Those in favor recommended recycling to save resources. Those opposed recommended against recycling to limit public risk. Other commenters stated that the International Atomic Energy Agency (IAEA) has recommended that the maximum dose to any individual from recycled material not exceed one millirem per year.

In response, although the proposed rule does not specifically address recycle, the Commission believes the radiological criteria in the proposed rule provide reasonable assurance that future inadvertent recycle of soils or structures following decommissioning of a site will not adversely affect public health. The analysis which supports the rule, although it does not specifically take recycle into account, is based on prudently conservative scenarios which tend to overestimate expected public doses.

In cases where the licensee meets the goal that residual radioactivity be indistinguishable from background, the potential doses from inadvertent recycle are expected to be insignificant. In cases where the residual radioactivity cannot be reduced to the point that it is indistinguishable from background, the licensee will have to consider inadvertent recycle when conducting the ALARA analysis for the site. Therefore, steps can be taken on a site-specific basis to impose additional restrictions if inadvertent recycle appears to pose a significant potential problem at that site.

The Commission plans to consider separately the issues of how to deal with cases where the licensee proposes to release material containing residual radioactivity intentionally for reuse or recycle either as a part of decommissioning or ongoing operations. In the interim the Commission will continue to be review such actions on a case-by-case basis.

RATIONALE FOR THE PROPOSED RULE

CONCEPTUAL BASIS

The overall conceptual basis for decommissioning, as proposed in this rulemaking, consists of a goal for the decommissioning process, a limit on the dose considered acceptable for release of a site, provisions for restricted termination of a license when physical remediation activities cannot achieve the limit, and the application of the ALARA principle with enhanced provisions for public participation.

The *Goal* for decommissioning a site is to reduce the concentration of each radionuclide which could contribute to residual radioactivity at the site to a level which is indistinguishable from background. Since this may not be achievable in all situations, due, for example, to instrument capabilities, the Commission will consider that the decommissioning goal has been met if the cumulative Total Effective Dose Equivalent (TEDE) to the average member of the critical group from all radionuclides that could contribute to residual radioactivity and are distinguishable from background does not exceed 3 mrem (0.03 mSv) per year.

The *Limit* for release of a site is 15 mrem/y (0.15 mSv/y) TEDE for residual radioactivity distinguishable from background. If doses from residual radioactivity are less than 15 mrem/y TEDE, the Commission will terminate the license and authorize release of the site for unrestricted use following the licensee's demonstration that the residual radioactivity at the site has been reduced to as close to the goal as reasonably achievable. If the goal can be achieved by the licensee, no further analysis or remediation would be required.

The Commission expects the licensee to make every reasonable effort to reduce residual radioactivity to levels which will allow unrestricted release of the site. However, the Commission will consider terminating a license in cases

where restrictions must be imposed on the use of the site to assure that public doses are maintained below the 15 mrem/y (0.15 mSv/y) TEDE limit, provided the licensee:

(1) can demonstrate that further reductions in residual radioactivity necessary to comply with the 15 mrem/y TEDE limit for unrestricted use are not technically achievable, would be prohibitively expensive, or would result in net public or environmental harm,

(2) has made adequate provisions for institutional controls to reduce annual TEDE from residual radioactivity distinguishable from background to the average member of the appropriate critical group to 15 mrem (0.15 mSv) TEDE,

(3) has provided sufficient financial assurance to enable an independent third party to assume and carry out responsibilities for any necessary control and maintenance of the site, and

(4) has reduced the residual radioactivity at the site so that the TEDE from residual radioactivity would not exceed 100 mrem (1 mSv) per year even if the restrictions applied in the termination were no longer effective in limiting the possible scenarios or pathways of exposure.

The Commission will not normally consider terminating a license under circumstances where the TEDE to the average member of the critical group from residual radioactivity at the site would exceed 100 mrem (1 mSv) per year if the site were to be released for unrestricted use.

DEFINITIONS

The following definitions already present in the regulations would be revised:

The definition of *Background Radiation* (10 CFR 20.1003) would be revised so that fallout from past nuclear accidents like Chernobyl which contribute to background radiation and are not under the control of the licensee are included in the definition. The Commission does not believe it is reasonable for licensees to be required to remediate material over which they have no control, and which is present at comparable levels in the environment both on and off of the site.

The definition of *Decommission* would be revised to also provide for termination of a license and release of property under restricted conditions. This revision was requested by a large number of commenters at the workshops on decommissioning. Those commenters felt that the NRC should recognize that it may not be feasible to decontaminate some sites to a level appropriate for unrestricted use and restrictions on the subsequent use of such sites could be used to provide an additional measure of public protection.

The following new definitions would be added:

The *Critical Group* would be defined as the group of individuals reasonably expected to receive the greatest exposure to residual radioactivity given the circumstances under which the analysis would be carried out. For example, if the site were to be released for unrestricted use the Critical Group would be the group of individuals reasonably expected to be the most highly exposed considering all reasonable potential future uses of the site. This would include renovation of structures, water use, and industrial, residential, and agricultural uses of the land and structures. If the site were to be released with restrictions, the licensee would have to assess both the dose to the average member of the group of individuals reasonably expected to be the most highly exposed assuming that the proposed restrictions were successfully imposed and adhered to (the "Critical Group" appropriate to this set of circumstances) and the dose to the average member of the group of individuals reasonably expected to be the most highly exposed if the proposed restrictions were to fail (in essence the "Critical Group" for unrestricted termination of

the license).

This is a departure from the requirement in 20.1302 where, for licensed activities, the licensee is required to assess the dose to "the individual likely to receive the highest dose". However, in contrast to licensed facilities where public doses normally result from activities that are carefully prescribed and controlled, the public doses from residual radioactivity at decommissioned sites may result from a variety of activities for which the maximally exposed individual is much more difficult to precisely define. Furthermore, in ongoing operations as licensed by the Commission, it is possible to update or keep track of who might be likely to receive the highest exposure. In decommissioning, there will be no ongoing mechanism which would allow for adjustments of imposition of additional controls. Therefore, the Commission believes it is more prudent to use the average member of the Critical Group for assessing TEDE from residual radioactivity after the license is terminated, since this provides a reasonably conservative estimate of public risk without attempting to speculate on which specific individual may be expected to receive the highest dose.

The practice of defining and using a Critical Group when assessing individual public dose from low levels of radioactivity similar to those expected from a decomissioned site is proposed in Section 5.5.1 of the 1990 recommendations of the International Commission on Radiological Protection (ICRP 60) and has been adopted in the current draft of the Environmental Protection Agency (EPA) Draft Federal Radiation Protection Guidance for Exposure of the General Public. For the purpose of this Subpart, the licensee would be required to estimate the dose to the average member of the critical group from residual radioactivity remaining at the site.

Readily Removable would refer to residual radioactivity, as defined below, which is removable using non-destructive, common, housekeeping techniques (e.g., washing with detergent and water) that do not generate large volumes of

radioactive waste requiring subsequent disposal. This would not include techniques that produce chemical wastes that are expected to adversely affect public health or the environment. Readily removable would also not refer to residual contamination dispersed in soil under conditions where removal of the residual radioactivity could only be accomplished by moving large volumes of soil.

Residual Radioactivity would include radioactivity in structures, materials, soils, groundwater, and other media at the site resulting from licensed activities at the site. This would include radioactivity from all licensed and unlicensed sources used by the licensee, but would exclude background radiation. This term should not be confused with the term "residual radioactive material" which appears in 10 CFR 40.4.

Site Specific Advisory Board (SSAB) would be a committee constituted by the licensee to provide advice to the licensee on decommissioning.

SCOPE

The proposed rule would apply to the decommissioning of all facilities licensed by the Commission except for facilities or portions thereof (e.g., waste disposal sites and uranium mill tailings) which are already specifically covered in the regulations. The proposed rule would not apply to sites already covered by a Commission approved decommissioning plan, if the plan was approved prior to the effective date of the rule. This provision is designed to encourage licensees to continue with ongoing and planned decommissioning.

The proposed rule provides for both unrestricted and restricted release of sites. If a site does not satisfy the conditions for release, the license will not be terminated.

Once a site has been decommissioned and the license terminated in accordance

with the criteria in this proposed rule, the Commission would require additional cleanup only if, based on new information, it determines that residual radioactivity remaining at the site could result in significant public or environmental harm.

RADIOLOGICAL CRITERIA

The proposed rule would establish a dose limit for release of a decommissioned site of 15 millirem per year (mrem/y) TEDE for residual radioactivity distinguishable from background. The proposed rule would also require that the licensee reduce any residual radioactivity to as close to indistinguishable from background as reasonably achievable. The 15 mrem/y TEDE dose limit was selected to provide both a substantial margin of safety below the NRC's dose limit for members of the public and an appropriate limit for the acceptability of release of a facility which would no longer be subject to regulatory control. In selecting this limit, the staff took into account recommendations of the ICRP and NCRP and those criteria promulgated by EPA and NRC which provide acceptance criteria for areas where unrestricted access in the vicinity of facilities is permitted, such as generally applicable environmental standards established by EPA and the criteria used for remediation of contaminated sites under the superfund (CERCLA) program. The dose value of 15 mrem/y TEDE is generally consistent with the risks implied by those criteria, and with the remediations which have been achieved.

Several workshop commenters argued that the NRC's 100 mrem/y dose limit for individual members of the public (10 CFR 20.1301) should be used as the limit for decommissioning. However, the limit proposed in this rulemaking constitutes only a fraction of the 100 mrem/y dose limit. The Commission considers this additional margin of safety necessary for the following reason. The limit in 20.1301 is intended to apply to all sources under the licensee's control. However, in the case of decommissioning, the site is no longer under the control of the licensee. Thus, the Commission believes allocation of the

total dose limit to the decommissioning of a single facility would be inappropriate. This decision is consistent with the recommendations of both ICRP and NCRP, which include discussions of constraints for specific sources and practices in order to avoid a summation of exposures approaching the dose limit.

The proposed rule would also establish a goal for decommissioning. This goal would be to reduce the concentration of individual radionuclides which could contribute to residual radioactivity at the site to a level which is indistinguishable from background, release the site for unrestricted use, and terminate the license. The Commission would consider that this goal had been met if the cumulative TEDE to the average member of the critical group from all radionuclides that could contribute to residual radioactivity and are distinguishable from background does not exceed 3 mrem (0.03 mSv) per year. Three millirem per year was selected because it is a small fraction of the 15 mrem/y limit, is comparable to local variations in dose from background radiation, and is substantially smaller than national variations in dose from background radiation. In addition, information obtained by the NRC staff from its GEIS studies indicate that the general trend for typical NRC licensed facilities is for remediation costs to rise rapidly when attempting to reduce doses from residual radioactivity in the vicinity of 3 mrem/y. However, when all risks to the public including those from transportation and waste disposal are considered there is not a commensurate reduction in risk.

The Commission recognizes that demonstrating that radionuclide levels at a site are indistinguishable from background is a complex task involving sophisticated sampling, measuring, and statistical analysis techniques. The difficulty of the task can vary substantially depending on a number of factors including the radionuclide in question, the background level for that and other radionuclides at the site, and the temporal and spatial variations in background radiation at the site. Therefore, in order to assist the licensee in making such determinations, the Commission will publish specific guidance on acceptable methods which can be used by the licensee to demonstrate that

the concentrations of specific isotopes at the site are indistinguishable from background. The Commission will also publish guidance on acceptable methods for selecting critical groups and estimating annual TEDE to the average member of the critical group. This guidance will include a discussion of the type of scenarios and exposure pathways which should be considered, and computer models for estimating the annual TEDE to the average member of the critical group. The computer models will be screening models which employ generically derived conservative assumptions and factors. However, licensees will be able to substitute assumptions and factors more appropriate to a particular site if they can demonstrate that these factors and assumptions reasonably reflect the existing and projected conditions at the site. Licensees may also use other models or methods for estimating TEDE, provided they can demonstrate to the Commission that these models or methods provide reasonable estimates for the site to be decommissioned.

The proposed rule would broaden the definition of decommissioning to include release for restricted use in addition to release for unrestricted use. The underlying approach for restricted release is that the risk for a member of the public should be limited to acceptable levels, irrespective of whether that individual is exposed during the conduct of some occupation or in residential or recreational activities. Thus, the conditions for restricted release are premised on restricting the use of the site so that average individual doses do not exceed the 15 mrem/yr dose limit. While the circumstances of the exposure (i.e., the duration or pathway) may thus be varied, the underlying risk limit remains respected for any critical group of individuals.

Licensees unable to meet the requirements for unrestricted use would be allowed to request permission to release sites for res ricted use with subsequent termina*ion of the license if they can demonstrate that the following conditions have been met.

(1) Further reductions in residual radioactivity are not technically achievable, the cost of achieving further reductions would be prohibitively

expensive, or further reductions would directly produce environmental or public harm that is clearly excessive compared to the health or environmental benefits achieved through such reductions now or in the future.

The Commission has proposed this provision as the fundamental basis for determining when a restricted termination of a license would be appropriate. The three conditions, namely technical achievability, prohibitive expenses, and excessive environmental or public harm are the areas in which the Commission believes that alternative considerations should be examined as part of the overall process of determining what the most appropriate action for a site is. Clearly, if remediation is simply not possible, given the technological capabilities in existence at the time of decommissioning, some other types of alternatives must be appropriate.

In terms of excessive costs, the Commission recognizes that there may be situations where removal and disposal of large quantities of material is simply not reasonable from a cost standpoint. An example of this type of situation which has already been addressed is the disposal of mill tailings, where a separate set of standards has been developed, including provisions for institutional control. The third condition, excessive environmental or public harm, has been included in recognition that while remediations may be technically possible, and within the overall resources of society, that the net damage, through removal and disposal of materials, alteration of ecosystems, or displacement of populations, could be sufficiently large that they ought not be undertaken. Considerations of this nature are best determined through public participation, which is provided through provisions for a Site Specific Advisory Board.

(2) There are adequate provisions for institutional and/or other passive controls which will provide reasonable assurance that the TEDE from residual radioactivity to the average member of the critical group will not exceed 15 mrem (0.15 mSv) per year. Institutional controls would have to be enforceable by a responsible government entity or in a court of law in response to suits

by affected parties.

This provision gives the fundamental dose limit for considerations of restricted termination. At the core of the requirement is the philosophy that an individual should not be exposed to a greater level of risk than that established for unrestricted use releases. Thus, the application of restrictions must be able to reduce the average dose to the appropriate critical group to the same 15 mrem/year value used as the limit for unrestricted use. However, in the restricted use situation, the critical group will be different from the critical group that would need to be considered in the unrestricted situation. For example, a restriction might be imposed which would prevent residential applications or agricultural uses of the facility. These restrictions would mean that critical group would have different exposure characteristics (e.g., 8 hours per day while working in a building) and thus a larger quantity of radioactivity could be allowed to remain onsite for the same dose.

(3) There is sufficient financial assurance to enable an independent third party to assume and carry out responsibilities for any necessary control and maintenance of the site. Acceptable financial assurance mechanisms would include: (i) prepayment as described in §30.35(f)(1); (ii) surety method, insurance, or other guarantee method as described in §30.35(f)(2); or (iii) statement of intent in the case of Federal, State, or local government licensees, as described in §30.35(f)(4).

This provision has been included to assure that mechanisms have been established, if necessary, to ensure the continued effectiveness of the controls that may be used to meet the dose limit. The ongoing effectiveness of the restrictions would not necessarily be the responsibility of the former licensee, but could be vested in other organizations, local governments, etc., which would continue cognizance of the action. This could include periodic monitoring, overviews of site access restrictions, or other activities that might be necessary to support the proposed controls. Under this provision,

the amount of financial assurance that would be needed would be determined on a site specific basis, taking into account the proposed restrictions, and the recommendations of the Site Specific Advisory Board.

(4) Residual radioactivity at the site has been reduced so that if the site were released for unrestricted use, the TEDE from residual radioactivity to the average member of the critical group is as low as reasonably achievable, and would not reasonably be expected to exceed 100 mrem (1 mSv) per year. This limit coincides with the NRC dose limit for public exposure in 10 CFR Part 20.

This final condition is premised on the assumption that circumstances could develop under which the restrictions, such as land use or deed restrictions, might no longer be effective in limiting the exposure scenarios. If, for example, a restriction against residential or agricultural use were no longer effective in preventing those uses of the land, then the assumptions about the exposure of the critical group would no longer be valid. While this is, for planning purposes, not assumed to occur, the Commission believes it is appropriate to have a "safety net" to prevent exposures in excess of the public dose limits.

The development of this provision also has the effect of requiring that some remediation be conducted at the site, rather than simply allowing a licensee to develop a series of restrictions. The Commission believes it is appropriate that basic measures be taken to reduce the risk and dose that could result from a site, and that the public dose limits form the minimum acceptable level of protection that should be provided in the unlikely event that restrictions are not effective in reducing the magnitude and scenarios of exposure.

The Commission recognizes there may be unusual circumstances in which the licensee may wish to seek an exemption from one or more of the provisions of this subpart. For example, the licensee may feel it is unnecessary to clean up a site to the requirements for unrestricted release because the site is

contained within a larger area whose use will be restricted for the foreseeable future. The Commission believes these rare circumstances can adequately be handled under existing provisions in 10 CFR 20.2301 which provides opportunity for the licensee to request an exemption from any of the provisions of 10 CFR Part 20.

The Commission also recognizes there may be special environmental or cultural issues associated with a particular decommissioning action which would require more stringent implementation of the requirements in this subpart. For example, there may be social or cultural issues which have to be considered because the site is on or contiguous to historical sites or Native American lands which contain religious or sacred areas. However, the Commission believes these issues can best be handled on a site-by-site basis as part of the licensing process and, in most cases, would be taken into consideration when establishing ALARA residual radioactivity levels for a site. The Commission does not believe that further reductions in dose would be necessary to meet social or cultural issues if the limit for unrestricted use is achieved and ALARA has been applied. Where necessary, the provisions for public comment and for a Site Specific Advisory Board will provide a mechanism for local citizens and other affected parties to be directly involved in addressing these issues.

PUBLIC PARTICIPATION IN THE DECOMMISSIONING PROCESS

The Commission believes it is important for the public to not only be fully informed of the decommissioning actions at a particular site but also to be able to effectively participate in site decommissioning decisions. The proposed rule will provide for public participation in the decommissioning process through three mechanisms. These are in addition to whatever hearing opportunities are provided for a particular category of site by the Commission's existing rules.

Upon the receipt of a decommissioning plan from the licensee, or a proposal by the licensee for restricted release of a site pursuant to 20.1405, or whenever the Commission deems such notice to be in the public interest, the Commission shall:

(1) notify local and state governments in the vicinity of the site and Indian Nation or other indigenous people that have treaty or statutory rights that could be affected by the decommissioning; and

(2) publish a notice in the Federal Register as well as in other media, such as local newspapers, which are readily accessible to individuals in the vicinity of the site, and

(3) solicit public comment on the proposed decommissioning action.

These provisions are designed to provide affected individuals and organizations with both information about the proposed decommissioning, and an opportunity to provide their comments on the licensee's proposal. The Commission believes it is particularly important to provide the notice in a forum that is accessible to local individuals. This forum may vary from site to site, but would usually include providing the notice to local media for publication.

For decommissioning where the licensee does not propose to meet the conditions for unrestricted release, the proposed rule would require that the licensee convene a Site Specific Advisory Board (SSAB) as described in 20.1407 for the purpose of obtaining advice from affected parties regarding the proposed decommissioning. The purpose of the SSAB would be to provide recommendations to the licensee on:

(1) whether there are ways to reduce residual radioactivity to a level necessary to comply with the provisions of 20.1404 which are technically achievable, would not be prohibitively expensive, and would not result

in net public or environmental harm;

(2) whether provisions for institutional controls proposed by the licensee will:

(a) provide reasonable assurance that the TEDE from residual radioactivity distinguishable from background to the average member of the critical group will not exceed 15 mrem (0.15 mSv) TEDE per year

(b) be enforceable

(c) impose undue burdens on the local community or other affected parties

(3) Whether the licensee has provided sufficient financial assurance to enable an independent third party to assume and carry out responsibilities for any necessary control and maintenance of the site.

The areas in which the SSAB would be expected to provide recommendations parallel the areas that a licensee must address as part of its proposal for a restricted termination of license. The intent of the provision is to provide a mechanism for early public involvement in the development of the decommissioning plan for the site. To the extent that local public involvement may be vital to the successful implementation of land use restrictions, involvement of representatives of local government, affected citizens, Native Americans, and other interested parties in the Site Specific Advisory Board is important to the long-term effectiveness of the decommissioning action. In order for the participation to be most effectiv , it should come during the development of the plan, rather than as comment after the licensee has spent significant resources to develop its proposal. Hence, the recommendations of the SSAB are to included in the decommissioning plan, along with the licensee's disposition of those recommendations. It is important to note that the opportunity for comment provisions would still be applicable, even when a

SSAB had been used in the development of the decommissioning plan.

SITE SPECIFIC ADVISORY BOARD

The SSAB has been patterned after the recommendations contained in the Interim Report of the Federal Facilities Environmental Restoration Dialog Committee (FFERDC)', a consensus document developed by over 40 members of a committee chartered by the U. S. Environmental Protection Agency (EPA). The diverse members of the FFERDC represented Federal, Tribal, State, environmental, labor, and citizen interests. It is designed to respond to the desire expressed by many workshop commenters that local affected parties have early and substantive input into the decommissioning process on a site specific basis. The SSAB would supplement, and not supplant, existing NRC procedures which provide for public input into the regulatory process. The Commission believes that increasing the opportunity for early public involvement in the decommissioning process is an effective way to provide an information exchange and to assure credible and defensible licensing decisions, especially when the long-term effectiveness of the land use restrictions may depend on community knowledge and involvement in their development and application.

Licensee notification to the Commission of intent to decommission in accordance with 30.36(b), 40.42(b), 50.82(a), 70.38(b) or 72.54 would have to specify whether the licensee intends to reduce residual radioactivity at the site to levels which would allow the site to be released for unrestricted use. If not, the licensee would be required to submit, along with the notification, a plan for establishing and supporting an SSAB.

The licensee would be responsible for establishing the SSAB and developing appropriate ground rules and operating procedures for the SSAB with the advice

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' Interim Report of the Federal Facilities Environmental Restoration Dialog Committee, Recommendations For Improving the Federal Facilities Environmental Restoration Decision-Making and Priority Setting Processes, February 1993

of the SSAB. The SSAB would consist of about 10 members plus an *ex officio* representative from the Commission. This number of members is expected to allow for adequate representation of affected parties without allowing the group to become so large that it cannot perform its function effectively. The licensee would be required to provide adequate administrative support for SSAB activities and provide the SSAB access to studies and analyses pertinent to the proposed decommissioning.

Membership of the SSAB, to the extent that representatives are willing to participate, would have to: (1) Reflect the fullest practical range of interests in the affected community and region and be composed primarily of individuals who could be directly affected by residual radioactivity at the decommissioned site, and (2) Include representatives from the licensee; local and state governments; workers; persons residing in the vicinity of the site; citizen, environmental, and public interest groups; and Indian Nation or other indigenous people that have treaty of statutory rights that could be affected.

Meetings of the SSAB would be open to the public. The licensee would be required to provide adequate public notice of the location, time, date, and agenda for the meetings at least two weeks in advance of each meeting. All records generated or reviewed by the SSAB would become part of the decommissioning docket, and would be available for public inspection.

In most cases it is expected that the work of the SSAB would be completed once they had formally submitted their advice to the licensee. However, there may be some cases (e.g. where the licensee's plan is substantially altered following NRC review) in which the SSAB may have a continuing role in providing advice to the licensee. In any case, it is anticipated that the SSAB would be dissolved once the license has been terminated.

GENERAL PROVISIONS

Readily Removable Residual Radioactivity

It is clear that in some cases structures can easily be decontaminated to levels well below those necessary to reduce individual doses from residual radioactivity at a decommissioned site to a few mrem TEDE/y above background. Past decommissioning practice has been based on the premise that "the licensee should make a reasonable effort to eliminate residual radioactivity,"[8] and some previously released structures have been decontaminated to levels below those specified in Regulatory Guide 1.86 for some nuclides. Therefore, the Commission proposes to require that all readily removable residual radioactivity be removed from a site before it is decommissioned. This is considered a necessary and reasonable step toward assuring that doses to the public from residual radioactivity are ALARA. For the purpose of this proposed regulation, the Commission has defined *Readily Removable* to mean removable using non-destructive, common, housekeeping techniques (e.g. washing with moderate amounts of detergent and water) that do not generate large volumes of radioactive waste requiring subsequent disposal. This would not include techniques that produce chemical wastes that are expected to adversely affect public health or the environment. It would also not include removal and transport of soil except in those instances where small discreet areas of contamination can be removed by digging up a few shovels full of soil.

The intent of these proposed provisions is to define the basic types of remediation that should be undertaken as a matter of good practice regardless of whether the site otherwise meets the NRC residual radioactivity criteria. However, it is not the Commission's intent to require more substantive remediation without the benefit of careful planning and ALARA considerations. The Commission specifically solicits comments on how to best define the activities that should be included under this provision.

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[8] Regulatory Guide 1.86 "Termination of Operating Licenses For Nuclear Reactors,n June 1974, pg. 3.

Radioactive Materials Previously Disposed of at the Site

Under NRC regulations, licensees may dispose of radioactive wastes on their own property. Before 1981, NRC regulations (10 CFR 20.304) allowed disposal, without prior approval, of limited quantities of specified nuclides under prescribed conditions. On July 28, 1981, 10 CFR 20.304 was revoked because the Commission did not have sufficient assurance that such disposals would be adequately protective. However, onsite disposal can still be undertaken by individual licensees under 10 CFR 20.2002 (previously §20.302), provided the disposal is specifically approved by the NRC or an Agreement State. If this buried radioactive material is considered to be part of the licensee's total site inventory for decommissioning purposes, some licensees will likely be required to remove all or part of this material prior to decommissioning the site. This position may be controversial because it can be argued that materials already disposed of in accordance with existing NRC requirements should no longer be considered part of the licensees inventory of radioactive material. Nevertheless, removal of the previous burials may be necessary to achieve the proposed radiological criteria and ensure sufficient protection of the public and environment.

In this proposed rulemaking, the Commission takes the position that public risk is the overriding factor. Therefore all residual radioactivity at the site, including that previously disposed of in accordance with NRC requirements in §§20.304, 20.302, and 20.2002 must be included in determining whether the licensee meets the radiological criteria in the proposed rule. However, the Commission is aware that the balancing of risks, costs, and benefits may be substantially different for exhuming buried material than they would be for decontamination of surface soils and structures. Therefore, it is expected that before any decision is made to exhume radioactive material previously disposed of at a site, the licensee will perform a site specific analysis of the overall risks, costs, and benefits of this action.

This position is consistent with positions already taken by the NRC on this

issue. In the Supplementary Information to the Final Rule "General Requirements for Decommissioning Nuclear Facilities" (53 FR 24021, June 27, 1988), the Commission states it will "take a hard look at the extent to which the site has been used to dispose of low level radioactive wastes by land burial, and will decide what remedial measures including removal of such wastes offsite, are appropriate before the site can be released for unrestricted use." In the Site Decommissioning Management Plan (SDMP) the staff notes that "disposals performed under 10 CFR 20.304 have at several sites required exhumation during the decommissioning, and takes the position that acceptability of such burials will be assessed in future decommissioning procedures."[9,10]

Use of Actual Measurements

Although the Commission recognizes that it will be necessary in many cases for the licensee to use modelling to estimate the TEDE to the average member of the critical group from residual radioactivity at the site, the proposed rule requires that estimates be validated using actual measurements to the maximum extent practical. The reason for this is that validation of estimates using actual measurements reduces the uncertainty associated with the estimates and provides a greater measure of assurance that radiological requirements are being met. It is expected that validation would be carried out in accordance with the survey requirements in 10 CFR 20.1501. Information and guidance related to surveys and use of measurement techniques have been published in draft form for public comment as NUREG/CR-5849. A draft Regulatory Guide is being published with this proposed rulemaking which specifically addresses

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[9] SECY-91-096, Enclosure 1 "Site Decontamination Management Program, Revision 1 (January 1991)" p. 16.

[10] The draft Regulatory Guide on "Standard Format and Content for Decommissioning Plans for Nuclear Reactors" states that the licensee plan should indicate the extent of waste burial onsite and the remedial measures appropriate before the site can be released for unrestricted use.

these topics. The Commission plans to publish further guidance in final form prior to the effective date of the final rule.

Time Frame

There is some difference of opinion on how far into the future calculations should be carried out for the purpose of establishing acceptable residual radioactivity levels for decommissioned sites. Current NRC staff calculates projected doses out to 1000 years in the future in evaluating radiological impacts associated with residual radioactivity. This is consistent with current DOE practice.[11] EPA's high level waste regulations require that cumulative releases to the environment be calculated out to 10,000 years.[12] However, there are some who think such calculations should be carried out to provide estimates of potential contamination of groundwater for tens or even hundreds of thousands of years into the future.

When predicting thousands of years into the future, uncertainties become very large because of major potential changes in the geohydrologic regime at the site over these long periods of time. When the potential consequences of exposure to the radioactive source are great, e.g., as in the case of a high level waste repository, distant future calculations may provide some insight concerning the relative magnitude of consequences. However, the consequences of exposure to residual radioactivity at levels near background are small, and considering the large uncertainties, long term modeling of near background doses may be virtually meaningless. In light of this, the Commission does not believe it would serve any useful purpose to attempt to estimate radiation doses from residual radioactivity thousands of years into the future.

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[11] Order DOE 5400.5 "Radiation Protection of the Public and Environment."

[12] 40 CFR 191 (Note: 40 CFR 191 was remanded by the U.S. Court of Appeals for the First Circuit in July, 1987, and is being reconsidered by EPA.)

Although theoretical maximum doses for a few isotopic decay chains do not occur for hundreds or thousands of years, for most radionuclides of interest in decommissioning the peak dose occurs in less than 1000 years. Therefore, the Commission proposes to require that TEDE estimates be based on the greatest annual dose expected within the first 1000 years after decommissioning. This annual dose must be interpreted as the TEDE delivered in that year, including the committed dose equivalent from radionuclides taken into the body during that year.

Risk Considerations in ALARA Calculations

A number of commenters at the workshops on decommissioning stated that all risks should be taken into account when setting requirements for decommissioning a site. A principal concern was that the Commission, in an attempt to reduce residual radioactivity levels at a site, would establish cleanup requirements which could result in an overall risk increase, or in risk transference, rather than risk reduction. For example, in an attempt to clean up a site for decommissioning, the licensee may, by transporting large volumes of debris from the site, increase risk to persons along transportation routes and at the site where the material is finally disposed of. In addition, disposal of large quantities of low-level radioactive debris at licensed low-level waste disposal sites could deplete the capacity of existing sites and ultimately result in a proliferation of licensed disposal sites for low-level radioactive waste.

The Commission, recognizing the validity of these concerns, proposes to require that the licensee, when determining ALARA, consider all significant radiation doses and risks resulting from residual radioactivity and the decommissioning process itself, including transportation and disposal of radioactive wastes generated in the process. This analysis would be part of the decommissioning plan, and would be available for comment by interested parties under the public participation provisions described earlier in this

notice.

MINIMIZATION OF CONTAMINATION

Many commenters at the workshops on decommissioning expressed the opinion that the Commission should be giving more emphasis to ensuring that licensed facilities are designed and operated in a way which would minimize the amount of radioactive contamination generated at the site during its operating lifetime. The Commission is sympathetic with this view. Therefore, the Commission proposes to require that when designing and operating nuclear facilities the licensee give specific attention to features and procedures which would facilitate decommissioning the site, reduce the amount of radioactive waste to be disposed of, and minimize the overall public risk associated with decommissioning.

Specifically the Commission proposes to require the following activities related to minimization of contamination:

(1) Applicants for licenses shall describe in their applications how facility design and procedures for operation will minimize contamination of the facility and the environment, facilitate eventual decommissioning, and minimize the generation of radioactive waste. This provision is a prospective requirement for new licensees to examine contamination and waste minimization early in the process of facility design and license approval.

(2) Applicants for amendments that involve a substantial modification of the licensed facility or operating procedures shall describe, where applicable, how the facility or procedural modifications minimize contamination of the facility or the environment, facilitate eventual decommissioning, and minimize generation or radioactive waste. This provision has been included in the proposal to cover new activities at existing licensees where there exists the

opportunity to examine, for the new activities being proposed, the issues of minimization of contamination. This provides a parallel requirement for the requirement for new licensees.

(3) Each licensee subject to the decommissioning provisions of 10 CFR Parts 30.35, 40,42, 50.82, 70.38, or 72.54 shall, within three years of the effective date of this rule, incorporate into its radiation protection program procedural modifications to minimize contamination of the facility or the environment, facilitate eventual decommissioning, and minimize generation or radioactive waste.

The Commission considers that under existing regulations it is reasonable to expect licensees to provide for ease of decommissioning and minimization of waste when designing and operating facilities. However, given past experience, the Commission believes that these new requirement are necessary to focus licensees attention on the type of facility design and good housekeeping practices needed to minimize the types of problems the Commission has had to face with problem sites like those addressed in the Commission's Site Decommissioning Management Plan (NUREG-1444, October 1993).

RELATIONSHIP BETWEEN THE GENERIC ENVIRONMENTAL IMPACT STATEMENT AND SITE-SPECIFIC DECOMMISSIONING ACTIONS

The Generic Environmental Impact Statement prepared by the Commission on this rulemaking evaluates the environmental impacts associated with the remediation of several types of NRC-licensed facilities to residual radioactivity levels ranging from 100 mrem/yr TEDE down to 0 mrem TEDE (background). The Commission believes that the generic analysis will encompass the impacts that will occur in any Commission decision to decommission an individual site. Therefore the Commission plans to rely on the GEIS to satisfy its obligations under the National Environmental Policy Act in regard to individual

decommissioning decisions that meet the 15 mrem/yr criterion for unrestricted use. This would include those facilities that meet the decommissioning goal or achieve doses from residual radioactivity up to 15 mrem/yr. However, the Commission will still initiate a preliminary environmental review in regard to any particular site to determine if the generic analysis encompasses the range of environmental impacts at that particular site.

The proposed rule also provides for the termination of the license and the release of a site under restricted conditions if the licensee can demonstrate that the use of land use restrictions or other types of institutional controls will provide reasonable assurance that the 15 mrem/yr limit can be met. The types of controls, and their contribution to providing reasonable assurance that the 15 mrem/yr limit can be met for a particular site, will differ for each site in this category. Therefore, the environmental impacts cannot be analyzed on a generic basis and the Commission will conduct an independent environmental review for each site-specific decommissioning decision where land use restrictions or institutional controls are relied on by the licensee.

The Commission also anticipates that are certain classes of licensees who will have no difficulty meeting the return to background goal in Section 20.1404(a) of the proposed rule, for example, sealed source licensees. The GEIS indicates that the decommissioning of these licensees' facilities will not individually or cumulatively have a significant effect on the human environment. Therefore, for these categories of licensees, the Commission is proposing to amend 10 CFR 51.22 of the Commission's regulations to specify that the decommissioning of these types of licenses are actions eligible for categorical exclusion from the Commission's environmental review process.

USE OF LAND USE RESTRICTIONS OR OTHER TYPES OF INSTITUTIONAL CONTROLS TO ALLOW TERMINATION OF THE LICENSE AND RELEASE OF THE SITE UNDER RESTRICTED CONDITIONS

Although the Commission anticipates that most licenses can be terminated for unrestricted use, the Commission also anticipates that there may be situations where the site radiological criteria can only be met through the use of land use or other types of institutional controls which will restrict the site to specific uses. For example, there may be some sites where unrestricted use for agricultural purposes or residential uses would cause the proposed criteria to be exceeded. However, restricting the same site to industrial or commercial uses would enable the site to meet the 15 mrem/y TEDE dose limit because the exposure pathways would be limited. The licensee, with the advice of the Site Specific Advisory Board, would propose certain types of land use or institutional controls in the decommissioning plan submitted for Commission approval, to provide reasonable assurance that the site would be limited to the types of uses that would enable the proposed criteria to be met. Examples of these controls include traditional zoning controls to restrict the use of the site to specific uses, the imposition of deed restrictions such as restrictive covenants or equitable servitudes to restrict the land to certain uses, negative easements where the licensee-landowner agrees to restrict the use of the land to specified uses, licensee agreements to restrict the use of certain portions of the land (for example, restricting access to a particular building), or even some type of government ownership of the property. Whatever type of controls are proposed by the licensee, the licensee must demonstrate that the controls proposed have a reasonable expectation of enforcement. A decommissioning plan that is dependent on land use or institutional controls whose enforcement are speculative would not be approved.

IMPLEMENTATION

The Commission will publish regulatory guidance along with the proposed rule which describes methods for site-specific implementation of the criteria. This guidance will include conduct of site characterization and surveys,

default values for radionuclide specific concentration and surface activities which would be considered by the NRC staff to meet the decommissioning goal and limit, and modeling procedures acceptable to the staff to develop site specific concentration or surface activity limits based upon the factors unique to the facility being decommissioned.

The Commission recognizes that demonstrating that radionuclide levels at a site are indistinguishable from background will be a complex task involving sophisticated sampling, measuring, and statistical analysis techniques. The difficulty of the task can vary substantially depending on a number of factors including the radionuclide in question, the background level for that and other radionuclides at the site, and the temporal and spatial variations in background radiation at the site. Therefore, in order to assist the licensee in making such determinations, the Commission will publish specific guidance on acceptable methods which can be used by the licensee to demonstrate that the concentrations of specific isotopes at the site are indistinguishable from background.

SUMMARY OF DRAFT GENERIC ENVIRONMENTAL IMPACT STATEMENT

On June 18, 1993, the NRC announced in the Federal Register (FRN) its intent to prepare a Generic Environmental Impact Statement (GEIS) in accordance with the requirements of the National Environmental Policy Act (NEPA) which requires that federal agencies incorporate environmental issues into their decision-making processes. The FRN included a discussion of the proposed action and a description of the GEIS scoping process. As part of that scoping process the FRN invited comment on the scope of the GEIS and indicated that oral comment on the proposed action and alternatives could be presented at any of eight public scoping meetings to be held in Washington DC, San Francisco, Oklahoma City, and Cleveland during July 1993. The FRN also indicated that written comments on the GEIS scope could be submitted to the NRC.

The NRC has used the information and comments received during the scoping process outlined above and technical analyses done by NRC staff and by its contractors to prepare the draft GEIS based on the requirements of NEPA. The approach followed in preparation of the draft GEIS is as follows:

1. Develop a reasonable listing of alternative regulatory actions with regard to establishing radiological criteria for decommissioning;

2. For each regulatory alternative, analyze and compare: (a) incremental radiological and non-radiological impacts to workers, members of the public, and the environment, and (b) incremental costs;

3. Based on the analyses of impacts and costs, and in accordance with 10 CFR 51.71(e), provide a preliminary recommendation regarding proposed rulemaking on radiological criteria for decommissioning.

The principal regulatory alternatives considered in the draft GEIS include:

1. Continue the current NRC practice of using existing guidance on a case by case basis - "no regulatory change";

2. Issue a rule containing residual radioactivity criteria for decommissioning based on: a) risk (i.e. risk goal, risk limit, or a combination of the two), b) "best" available technology, or c) return to background. A range of alternative residual dose criteria to an individual at the site following completion of decommissioning are considered, including 100, 60, 30, 10, 3, 1, .3, .1, .03, and "0" mrem/yr above background.

In addition to evaluating remediation and release for unrestricted use, the draft GEIS also considers potential impacts and costs of meeting regulatory requirements through a combination of remediation and restricting the use of the site following decommissioning.

Because of the varied nature of facilities covered by this rulemaking, the GEIS uses reference facilities in estimating impacts and costs. This use of reference facilities is similar to the approach used in the 1988 GEIS (NUREG-0588) which supported the rulemaking on decommissioning funding, planning, and timing. These reference facilities are considered to be sufficiently representative of facilities licensed by NRC to serve as a basis for assessing impacts and costs associated with the regulatory alternatives being evaluated. The following reference facilities were considered: power reactor, research reactor, test reactor, ISFSI, uranium fabrication plant, UF6 Plant, uranium mill, sealed source manufacturer, radiochemical manufacturer, broad R&D facility, rare earth processor, and users of sealed sources or short-lived nuclides.

Estimates of residual radioactivity levels expected at each reference facility at the end of its operating life are based on past experience and published sources. These estimates include the amount and areal extent of contamination on structural and land surfaces and also the profile of that contamination below structural and land surfaces.

The draft GEIS considers the following impacts (expressed in terms of risk) associated with the regulatory alternatives:

(1) Radiation exposure to persons <u>after</u> completion of decommissioning and license termination at the alternate residual dose criteria indicated above, including: a) exposure to persons working in facility buildings, and b) exposure to persons living on facility lands and using facility lands for agriculture, drinking water, etc;

(2) Impacts to persons <u>as a result of</u> decommissioning actions needed to reduce structure and land contamination to meet the alternate residual dose criteria including: (a) radiation exposure to workers performing decommissioning actions to reduce contamination in structures and lands, and non-radiological health impacts from construction accidents while

performing those actions, and (b) radiation exposure to workers and public resulting from transport of decommissioning wastes to licensed disposal sites, and non-radiological health impacts from accidents during this transport.

Impacts on the socioeconomic, biological, physical, and cultural environments from the regulatory alternatives are also considered in the draft GEIS.

The draft GEIS considers the following costs associated with the regulatory alternatives: (1) cost to reduce and dispose of contamination in structures and lands to meet decommissioning requirements, and (2) cost of radiological surveys required to demonstrate that decommissioning requirements have been met.

The draft GEIS considers the incremental reduction in risk realized in reaching alternative residual dose criteria (i.e., the risk averted by achieving a lower dose criterion) and the costs incurred in achieving those incremental reductions in risk. Based on this analyses, trends and patterns observed in preliminary results of the draft GEIS support the general requirements indicated in the draft criteria, namely the establishment of a goal and limit for decommissioning, consideration of the capability to distinguish low levels of radiation from background, and the need to consider the use of ALARA and to consider restricted use of a site based on case-specific contamination conditions.

The current schedule provides for Commission review of the proposed rule on establishing radiological criteria for decommissioning and the draft GEIS in May 1994. Publication of the proposed rule and draft GEIS for formal public comment is anticipated to occur in the summer of 1994. At that time the draft GEIS, containing the analysis of alternative regulatory actions, will be available for full public comment. Public comment received on the draft GEIS will be considered in development of the final GEIS and the final rule.

REVISION OF 10 CFR PART 20 PROPOSED BY THE NRC STAFF

For the reasons set out in the preamble and under the authority of the Atomic Energy Act of 1954, as amended, the Energy Reorganization Act of 1974, as amended, and 5 U.S.C. 553, the NRC is proposing to adopt the following amendments to 10 CFR Part 20.

PART 20 - RADIOLOGICAL CRITERIA FOR DECOMMISSIONING

Subpart A

20.1003 Definitions

The definition of "background radiation" is revised to read as follows:
Background radiation means radiation from cosmic sources; naturally occurring radioactive material, including radon (except as a decay product of source or special nuclear material); and global fallout as it exists in the environment from the testing of nuclear explosive devices or from past nuclear accidents like Chernobyl which contribute to background radiation and are not under the control of the licensee. "Background radiation" does not include radiation from source, byproduct, or special nuclear materials regulated by the Commission.

Critical Group means the group of individuals reasonably expected to receive the greatest exposure to residual radioactivity for any applicable set of circumstances.

Decommission means to remove a facility or site safely from service and reduce residual radioactivity to a level that permits (1) release of the property for unrestricted use and termination of the license, or (2) release of the

property under restricted conditions and termination of the license.

Readily Removable means removable using non-destructive, common, housekeeping techniques (e.g. washing with moderate amounts of detergent and water) that do not generate large volumes of radioactive waste requiring subsequent disposal or produce chemical wastes that are expected to adversely affect public health or the environment.

Residual Radioactivity means radioactivity in structures, materials, soils, groundwater, and other media at a site resulting from activities under the licensee's control. This includes radioactivity from all licensed and unlicensed sources used by the licensee, but excludes background radiation. It also includes radioactive materials remaining at the site as a result of previous burial at or discharged from the site in accordance with 10 CFR Part 20.

Site Specific Advisory Board (SSAB) means a committee constituted by the licensee to provide advice to the licensee on decommissioning.

Subpart E Radiological Criteria for Decommissioning

20.1401 Scope

(a) The criteria in this subpart apply to the decommissioning of facilities licensed under Parts 30, 40, 50, 60, 61, 70, and 72, as well as other facilities subject to the Commission's jurisdiction under the Atomic Energy Act and the Energy Reorganization Act. For high-level and low-level waste disposal facilities (10 CFR Parts 60 and 61), the criteria apply only to ancillary surface facilities that support radioactive waste disposal activities. For uranium mills, the criteria apply to decommissioning of the

facility but not to the disposal of uranium mill tailings (Appendix A of 10 CFR Part 40).

(b) The criteria in this subpart do not apply to sites already covered by a decommissioning plan approved by the Commission before [insert effective date of rule].

(c) Once a site has been decommissioned and the license terminated in accordance with the criteria in this proposed rule, the Commission would require additional cleanup only if, based on new information, it determines that residual radioactivity remaining at the site could result in significant public or environmental harm.

20.1402 Concepts

The *Goal* for decommissioning a site is to reduce the concentration of each radionuclide which could contribute to residual radioactivity at the site to a level which is indistinguishable from background. Since this may not be achievable in all situations, due, for example, to instrument capabilities, the Commission will consider that the decommissioning goal has been met if the cumulative Total Effective Dose Equivalent (TEDE) to the average member of the critical group from all radionuclides that could contribute to residual radioactivity and are distinguishable from background does not exceed 3 mrem (0.03 mSv) per year.

The *Limit* for release of a site is 15 mrem/y (0.15 mSv/y) TEDE for residual radioactivity distinguishable from background. If doses from residual radioactivity are less than 15 mrem/y TEDE, the Commission will terminate the license and authorize release of the site for unrestricted use following the licensee's demonstration that the residual radioactivity at the site has been reduced to as close to the goal as reasonably achievable.

The Commission expects the licensee to make every reasonable effort to reduce residual radioactivity to levels which will allow unrestricted release of the site. However, the Commission will consider terminating a license in cases where restrictions must be imposed on the use of the site to assure that public doses are maintained below the 15 mrem/y (0.15 mSv/y) TEDE limit, provided the licensee:

(1) can demonstrate that residual radioactivity at the site is ALARA and that further reductions in residual radioactivity necessary to comply with the 15 mrem/y TEDE limit for unrestricted use are not technically achievable, would be prohibitively expensive, or would result in net public or environmental harm,

(2) has made adequate provisions for institutional controls to reduce annual TEDE from residual radioactivity distinguishable from background to the average member of the appropriate critical group to 15 mrem (0.15 mSv) TEDE,

(3) has provided sufficient financial assurance to enable an independent third party to assume and carry out responsibilities for any necessary control and maintenance of the site, and

(4) has reduced the residual radioactivity at the site so that the TEDE from residual radioactivity would not exceed 100 mrem (1 mSv) per year even if the restrictions applied in the termination were no longer effective in limiting the possible scenarios or pathways of exposure.

The Commission will not normally consider terminating a license under circumstances where the TEDE to the average member of the critical group from residual radioactivity at the site would exceed 100 mrem (1 mSv) per year if the site were to be released for unrestricted use.

20.1403 General Provisions

(a) When calculating TEDE, the licensee shall base estimates on the greatest annual TEDE dose expected within the first 1000 years after decommissioning. Estimates shall be validated using actual measurements to the maximum extent practical.

(b) When determining ALARA under 20.1404(b) or 20.1405(a), the licensee shall consider all significant risks to humans and the environment resulting from the decommissioning process (including transportation and disposal of radioactive wastes generated in the process), and from residual radioactivity remaining at the site following termination of the license.

(c) During decommissioning, all readily removable residual radioactivity shall be removed from the site or disposed of on site in accordance with 20.2002 of this part.

20.1404 Radiological Criteria for Unrestricted Release

(a) The goal for decommissioning is to reduce the residual radioactivity in structures, materials, soils, groundwater, and other media at the site to meet the following conditions:

(1) the concentration of a radionuclide that could contribute to residual radioactivity is indistinguishable from the background radiation concentration for that radionuclide; and

(2) for all radionuclides that could contribute to residual radioactivity and are distinguishable from background radiation, the cumulative TEDE to the average member of the critical group from all

such radionuclides does not exceed 3 mrem (0.03 mSv) per year.

(b) A site will be considered acceptable for unrestricted use if the residual radioactivity that is distinguishable from background radiation results in a TEDE to the average member of the critical group that does not exceed 15 mrem (0.15 mSv) per year, and is as close to the decommissioning goal as reasonably achievable.

20.1405 Criteria for License Termination Under Restricted Conditions

A site will be considered acceptable for license termination under restricted conditions if:

(a) The licensee can demonstrate that further reductions in residual radioactivity necessary to comply with the provisions of 20.1404 are not technically achievable, would be prohibitively expensive, or would result in net public or environmental harm; and

(b) The licensee has made provisions for institutional controls that provide reasonable assurance that the TEDE from residual radioactivity distinguishable from background to the average member of the critical group will not exceed 15 mrem (0.15 mSv) TEDE per year. Institutional controls shall be enforceable by a responsible government entity or in a court of law in response to suits by affected parties; and

(c) The licensee has provided sufficient financial assurance to enable an independent third party to assume and carry out responsibilities for any necessary control and maintenance of the site. Acceptable financial assurance mechanisms are: (i) funds placed into an account segregated from the licensee's assets and outside the licensee's administrative control as described in §30.35(f)(1); (ii) surety method, insurance, or other guarantee method as described in §30.35(f)(2); or (iii) a

statement of intent in the case of Federal, State, or local government licensees, as described in §30.35(f)(4); and

(d) Residual radioactivity at the site has been reduced so that if the institutional controls were no longer in effect, the TEDE from residual radioactivity distinguishable from background to the average member of the critical group is as low as reasonably achievable and there is reasonable assurance that the TEDE to that member would not exceed 100 mrem (1 mSv) per year.

20.1406 Notification and Public Participation

(a) Upon the receipt of a decommissioning plan from the licensee, or a proposal by the licensee for restricted release of a site pursuant to 20.1405, or whenever the Commission deems such notice to be in the public interest, the Commission shall:

(1) notify local and state governments in the vicinity of the site and any Indian Nation or other indigenous people that have treaty or statutory rights that could be affected by the decommissioning.

(2) publish a notice in the Federal Register and in a forum, such as local newspapers, which is readily accessible to individuals in the vicinity of the site and solicit comments from affected parties.

(b) For decommissioning where the licensee does not propose to meet the conditions for unrestricted release pursuant to 20.1404, the licensee shall convene a Site Specific Advisory Board (SSAB) as described in 20.1407 for the purpose of obtaining advice from affected parties regarding the proposed decommissioning.

20.1407 Site Specific Advisory Board

(a) The SSAB should provide advice to the licensee, as appropriate, on:

(1) whether there are ways to reduce residual radioactivity to a level necessary to comply with the provisions of 20.1404 which are technically achievable, would not be prohibitively expensive, and would not result in net public or environmental harm;

(2) whether provisions for institutional controls proposed by the licensee:

(a) will provide reasonable assurance that the TEDE from residual radioactivity distinguishable from background to the average member of the critical group will not exceed 15 mrem (0.15 mSv) TEDE per year,

(b) will be enforceable, and

(c) will impose undue burdens on the local community or other affected parties.

(3) Whether the licensee has provided sufficient financial assurance to enable an independent third party to assume and carry out responsibilities for any necessary control and maintenance of the site.

(b) The decommissioning plan submitted by the licensee in accordance with 10 CFR Parts 30.35, 40.42, 50.82, 70.38, or 72.54 shall include the recommendations of the SSAB and the licensee's proposed analysis and disposition of this advice.

(c) Membership of the SSAB shall, to the extent that representatives are

willing to participate:

(1) Reflect the full range of interests in the affected community and region, and be composed of individuals who could be directly affected by residual radioactivity at the decommissioned site,

(2) Be selected from individuals nominated by organizations which represent these interests, and

(3) Include representatives from the licensee; local and state governments; persons residing in the vicinity of the site; citizen, environmental, environmental justice, and other public interest groups; and Indian Nation or other indigenous people that have treaty or statutory rights that could be affected.

(d) The SSAB shall consist of approximately 10 members plus an *ex officio* representative selected by the Commission.

(e) Licensee notification to the Commission of intent to decommission in accordance with 30.36(b), 40.42(b), 50.82(a), 70.38(b) or 72.54 shall specify whether the licensee intends to decommission in accordance with 20.1405. Licensees proposing to decommission in accordance with 20.1405, shall submit a plan for establishing and supporting an SSAB.

(f) The licensee shall be responsible for the establishing the SSAB and the developing appropriate SSAB operating procedures with the advice of the SSAB.

(g) The licensee shall provide adequate administrative support for SSAB activities and shall provide the SSAB access to studies and analyses that are readily available to the licensee and are pertinent to the proposed

decommissioning.

(h) Meetings of the SSAB shall be open to the public. The licensee shall provide adequate public notice of the location, time, date, and agenda for the meetings at least two weeks in advance of each meeting. All records generated or reviewed by the SSAB shall become part of the docket, and shall be available for public inspection.

20.1408 Minimization of Contamination

[NOTE: IT MAY BE MORE APPROPRIATE TO PLACE THESE REQUIREMENTS IN PARTS 30, 40, 50, ETC. INSTEAD OF PART 20]

(a) Applicants for licenses after [insert effective date of rule], shall describe in the application how facility design and procedures for operation will minimize contamination of the facility and the environment, facilitate eventual decommissioning, and minimize the generation of radioactive waste.

(b) Applicants for license amendments that involve a substantial modification of the licensed facility or operating procedures after [insert effective date of rule], where applicable, shall describe how the facility or procedural modifications minimize contamination of the facility or the environment, facilitate eventual decommissioning, and minimize generation of radioactive waste.

(c) Each licensee subject to the decommissioning provisions of 10 CFR Parts 30.35, 40,42, 50.82, 70.38, or 72.54 shall, within three years of the effective date of this rule, incorporate into its radiation protection program procedural modifications to minimize contamination of the facility or the environment, facilitate eventual decommissioning, and minimize generation or radioactive waste.