[7590-01-P]

NUCLEAR REGULATORY COMMISSION

10 CFR Parts 20

RIN 3150-AD65

Radiological Criteria for Controlling the Disposition of Solid Materials

AGENCY: Nuclear Regulatory Commission.

ACTION: Proposed Rule

SUMMARY: The Nuclear Regulatory Commission (NRC) is proposing to amend its regulations to provide radiological criteria for controlling the disposition of solid materials that originate in restricted or impacted areas of NRC-licensed facilities but which have no, or very small amounts of, residual radioactivity resulting from licensed operations. The proposed rule would result in more efficient and consistent licensing actions related to the routine handling of solid materials at licensed facilities by providing a clear and consistent regulatory framework for their disposition. The proposed rule contains requirements for the disposition of solid materials that include a set of allowed limited paths for disposition of solid materials; a dose criterion; tables of radionuclide concentrations which can be used for implementing the dose criterion; and recordkeeping provisions.

DATE: Submit comments by _____, 2005. Comments received after this date will be considered if it is practicable to do so, but the Commission is able to assure consideration only for comments received on or before this date.

ADDRESSES: You may submit comments by any one of the following methods. Please include the number RIN 3150-AD65 in the subject line of your comments. Comments on rulemakings submitted in writing or in electronic form will be made available to the public in their entirety on the NRC rulemaking website. Personal information will not be removed from your comments.

Mail comments to: Secretary, U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, ATTN: Rulemakings and Adjudications Staff.

E-mail comments to: SECY@nrc.gov. If you do not receive a reply e-mail confirming that we have received your comments, contact us directly at (301) 415-1966. You may also submit comments via the NRC's rulemaking website at http://ruleforum.llnl.gov. Address questions about our rulemaking website to Carol Gallagher at (301) 415-5905; email cag@nrc.gov. Comments can also be submitted via the Federal eRulemaking Portal at http://www.regulations.gov.

Hand deliver comments to: 11555 Rockville Pike, Rockville, Maryland 20852, between 7:30 am and 4:15 pm Federal workdays. (Telephone (301) 415-1966).

Fax comments to: Secretary, U.S. Nuclear Regulatory Commission at (301) 415-1101.

Publicly available documents related to this rulemaking may be viewed electronically on the public computers located at the NRC's Public Document Room (PDR), Room O1 F21, One White Flint North, 11555 Rockville Pike, Rockville, Maryland. The PDR reproduction contractor

will copy documents for a fee. Selected documents, including comments, may be viewed and downloaded electronically via the NRC rulemaking website at http://ruleforum.llnl.gov.

Publicly available documents created or received at the NRC after xxxxxxxx xx, 2005, are available electronically at the NRC's Electronic Reading Room at http://www.nrc.gov/reading-rm/adams.html. From this site, the public can gain entry into the NRC's Agencywide Document Access and Management System (ADAMS), which provides text and image files of NRC's public documents. If you do not have access to ADAMS or if there are problems in accessing the documents located in ADAMS, contact the NRC Public Document Room (PDR) Reference staff at 1-800-397-4209, 301-415-4737 or by email to pdr@nrc.gov.

Note: Public access to documents, including access via ADAMS and the PDR, has been temporarily suspended so that security reviews of publicly available documents may be performed and potentially sensitive information removed. However, access to the documents identified in this rule continue to be available through the rulemaking web site at http://ruleforum.llnl.gov, which was not affected by the ADAMS shutdown. Please check with the listed NRC contact concerning any issues related to document availability.

FOR FURTHER INFORMATION CONTACT: Frank Cardile, telephone: (301) 415-6185; e-mail: fpc@nrc.gov; USNRC, Office of Nuclear Material Safety and Safeguards, Mail Stop T8F3, Washington, DC 20555-0001. Specific comments on the generic environmental impact statement prepared as part of this effort should be directed to Phyllis Sobel; telephone: (301)

415-6714; e-mail pas@nrc.gov; USNRC, Office of Nuclear Material Safety and Safeguards, Mail Stop T7J8, Washington, DC 20555-0001.

SUPPLEMENTARY INFORMATION:

I. Introduction

The Nuclear Regulatory Commission (NRC) is proposing to amend its regulations to provide criteria for controlling the disposition of solid materials that have no, or very small amounts of, residual radioactivity resulting from licensed operations and which originate in restricted or impacted areas[1] of NRC-licensed facilities. Background information regarding this effort (including why NRC is conducting rulemaking; the scope of the rulemaking; and the process for decision-making, including alternatives which NRC considered) is contained in Section II. A discussion of NRC's decision regarding its proposed approach, including its rationale for the decision, is contained in Section III. Additional matters regarding this effort are discussed in Section IV. A section-by-section analysis of the rule text implementing the proposed approach is contained in Section V.

---

[1] A "restricted area" is defined in the NRC's regulations in 10 CFR § 20.1003. An "impacted area" is defined in the NRC regulations in 10 CFR § 50.2 (that definition is being added in these amendments to § 20.1003).

As part of this rulemaking effort, the NRC is maintaining a website on its activities regarding the disposition of solid materials at www.nrc.gov/materials.html. The website has information about current activities, relevant documents, opportunities for public comment, and summaries of public comments received to date.

II. Background

A. Why NRC is Conducting Rulemaking on Disposition of Solid Materials

Currently, NRC's existing regulations in 10 CFR Part 20 contain a framework of radiation standards to ensure protection of public health and safety from the routine use of materials at licensed facilities. These standards include a public dose limit and specific dose criteria on certain types of media released from licensed facilities, such as airborne and liquid effluent releases.

NRC's existing regulations currently also permit the release of solid materials from licensed facilities. Section 20.1501 requires that a radiation survey be conducted on solid material before it is allowed to leave restricted or impacted areas of a site. However, 10 CFR Part 20 does not contain a specific dose criterion to be used to verify that the solid material has no, or very small amounts of residual radioactivity. Instead, NRC's current approach is to make decisions on disposition of solid materials by using a set of existing guidelines that are primarily based on survey instrument capabilities. These existing guidelines are summarized in Appendix L of the draft Generic Environmental Impact Statement (DGEIS), NUREG-1812,

prepared as part of this rulemaking; these guidelines primarily include NRC's Regulatory Guide 1.86, "Termination of Operating Licenses for Nuclear Reactors," (January 1974) as well as other NRC guideline documents.

NRC's current approach for controlling the disposition of solid materials ensures protection of public health and safety. A report by the National Academies ("The Disposition Dilemma; Controlling the Release of Solid Materials from Nuclear Regulatory Commission-Licensed Facilities," 2002) supports this conclusion, noting that the current NRC approach for the disposition of solid materials "is sufficiently protective of public health that it does not need immediate revamping." However, because NRC's decisions on disposition of solid materials do not derive from a specific regulation, they are inefficient in that they lack an overall risk basis, consistency, and regulatory finality. Therefore, NRC is conducting this rulemaking as a means of improving NRC's regulatory process by incorporating risk-based criteria for disposition of solid materials into the Commission's regulations.

B. NRC's Main Focus in this Rulemaking

As noted, the principal reason for this rulemaking is to improve the efficiency and effectiveness of NRC's licensing process by establishing criteria for the disposition of solid materials in the Commission's regulations. In conducting this rulemaking, the NRC is guided by the goals in its Strategic Plan[2] of which the primary goal is protection of public health and safety and the environment. In particular, in proposing these amendments to its regulations, NRC's

[2] NUREG-1614, Volume 3, "Strategic Plan, FY2004-2009," (August 2004)

primary goal is that disposition of solid materials continue to be controlled in a manner that ensures protection of public health and safety and the environment. In addition, as noted in the Strategic Plan, NRC's intent is to conduct the rulemaking process in an open manner that informs stakeholders about the process and provides them with a reasonable opportunity to participate meaningfully in NRC's regulatory process.

C. Solid Materials Considered in this Rulemaking

There are various solid materials originating from restricted or impacted areas of NRC-licensed facilities that are no longer needed or useful at the facilities, or that otherwise need to be taken out of the restricted or impacted areas. Much of these materials have no residual radioactivity resulting from licensed operations; some of these materials may have very small amounts of radioactivity but at levels so low that potential exposures to them by the public would be a very small fraction of natural background radiation levels and of negligible health impact. These solid materials can include office furniture; metal components; equipment and tools; pipes; ventilation ducts; laboratory materials (gloves, beakers, etc.); routine trash (plastics, paper, glass); and concrete. Soil, soil-like materials and other similar process materials can also be present in restricted or impacted areas and needing disposition.

This rulemaking covers all NRC licensees, including: (a) academic -- university laboratories and small reactors that use or produce radioactive materials for research and teaching purposes; (b) medical -- hospitals and clinics that use radioactive materials for diagnostic and therapeutic medical purposes; (c) manufacturing -- facilities and laboratories that

manufacture products that contain and/or incorporate radioactive materials as part of their functional design (e.g., smoke detectors, certain types of gauges); and (d) power production -- reactor and fuel cycle facilities that produce and handle radioactive fuel and materials as part of the generation of electricity.

There are other solid materials at licensed facilities that contain larger amounts of radioactivity. These materials are kept separate from the solid materials with no, or very small amounts of, radioactivity and requirements already exist in NRC's regulations in 10 CFR Part 61 for their disposal at licensed low-level waste (LLW) disposal sites. These solid materials containing larger amounts of radioactivity are not the subject of this rulemaking. Examples of such material not considered in this rulemaking are components of the reactor system and sealed sources.

Additional discussion about the scope of the rulemaking is contained in Section III.C.

D. Information Gathering as Part of the Decision-Making Process for this Rulemaking

The NRC has been engaged in several information gathering activities as part of its decision-making for this rulemaking, in particular with regard to alternate approaches for disposition of solid materials. Three broad alternate approaches for disposition of solid materials that NRC has sought information about have included:

(1) Unrestricted release: In this approach, if a radiation survey of the material confirms that a criterion[3] that ensures protection of public health and safety has been met, solid material is allowed to be released and go to any or all of the non-licensed paths shown in Figure 1 (Paths G, S, and/or L). This approach has been referred to as "clearance";

(2) Limited disposition paths: In this approach, disposition of solid material is limited to one or more of the non-licensed paths shown in Figure 1 (e.g., Paths S and/or L) if it meets a dose-based release criterion[4] that ensures protection of public health and safety. This approach has been referred to as "conditional release" or "restricted release." Under this limited disposition path approach, the release of material from licensed facilities would not be allowed into the general stream of consumer goods (Path G); and

(3) LLW disposal only: In this approach, all solid material from restricted or impacted areas would be required to be disposed of in a licensed LLW disposal site (Path D of Figure 1).[4] This has been referred to as "prohibition".

---

[3] Under approach #1, a criterion could either continue to be based on the current approach which, as noted above, uses instrument detection capability as its basis, or it could be dose-based which would require amending NRC's regulations to include a dose-based criterion.

[4] Both approaches #2 and #3 would require amending NRC's regulations since they would involve changes to the current approach.

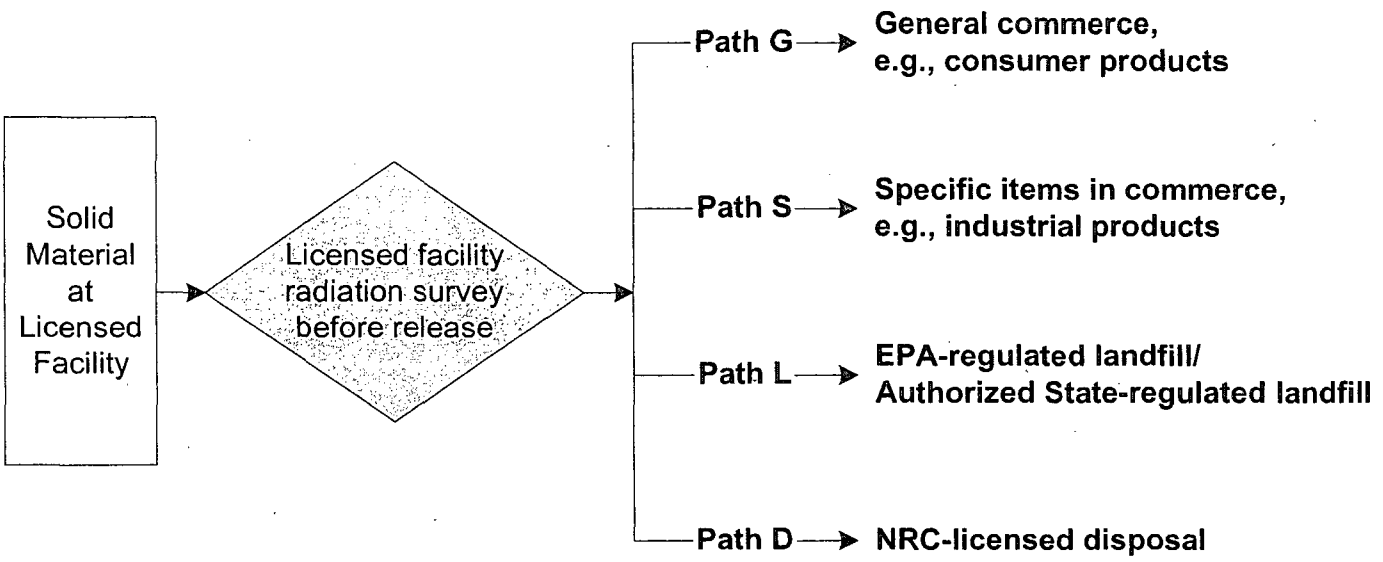

Figure I

The NRC has actively sought stakeholder participation and input on the alternate disposition approaches noted above. This effort has included conducting a scoping process related to the alternate approaches and their associated environmental impacts. Activities to solicit stakeholder input have included publishing papers for public comment in the Federal Register (FR) in June 1999 (64 FR 35090) and February 2003 (68 FR 9595) on alternate approaches for disposition of solid materials. In response, NRC received nearly 3,500 letters and e-mails from a range of different stakeholder groups that present a diverse set of views. In addition, the NRC held eight public meetings to solicit stakeholder views over the period of September 1999 to September 2003. Also, the NRC supported a study by the National Academies to obtain an independent review of the issues and alternatives. The National Academies held three meetings with stakeholder groups between January and June 2001; in March 2002, the National Academies provided a report containing nine recommendations to the

Commission referred to above in Section II.A (hereafter referred to as the "National Academies Report").

Input from stakeholders was considered in NRC's decision-making on the disposition of solid materials and is discussed further in Section III in the context of the discussion of this proposed rule, and also in Section IV. Generally, stakeholder views to date are centered on potential health impacts of the alternates and issues with implementing the alternates, including potential economic impacts on stakeholders. A detailed summary of stakeholder input on the alternates can be found in Appendix A of the DGEIS, NUREG-1812. A summary of stakeholder input can also be found in NUREG/CR-6682 and NUREG/CR-6682, Supplement 1.

The NRC has also considered other relevant Federal and international standards in this area. There is a range of Federal health protection standards covering both radiation and chemical materials. NRC has responsibility, under the Atomic Energy Act of 1954, as amended, for setting standards that assure the nation's civilian use of radioactive material is carried out in a manner which protects public health and safety and the environment. The Environmental Protection Agency (EPA) sets chemical standards; standards for radiation protection in the general environment; and standards for managing material at landfills under the Resource Conservation and Recovery Act (RCRA) which is one of the alternate approaches being considered by this rulemaking. International agencies (such as the International Atomic Energy Agency (IAEA) and the European Commission (EC)) as well as individual nations, are developing standards for controlling the disposition of solid materials. These international efforts are significant for the NRC because inconsistency in standards between the U.S. and other nations can result in issues regarding international trade.

In addition, as part of its information gathering, the NRC conducted reviews of various related reports. These reviews have included reports prepared by recognized national and international standards organizations like the National Academies, the National Council on Radiation Protection and Measurements (NCRP), the American National Standards Institute (ANSI), and the IAEA, all of which have issued findings about possible criteria for controlling the disposition of solid materials. The NRC also has considered a number of other reports suggested by stakeholders.

Finally, as part of its information gathering, the NRC has completed several technical studies to evaluate alternatives for controlling the disposition of solid materials. The results of these studies have been incorporated into the DGEIS. The DGEIS provides a detailed analysis of each of the alternate approaches, including their potential impacts on human health and the environment. The NRC has also conducted studies on the ability of radiation survey methods and instrumentation to verify radioactivity levels on solid materials so that a licensee can verify compliance with an alternate approach. The DGEIS, and the technical studies which form its basis, are available on NRC's website at the address noted in Section I.

III. Proposed Approach: Revisions to NRC Regulations in 10 CFR Part 20 on Disposition of Solid Materials

NRC has considered stakeholder input, relevant reports and standards in this area, and the results of the DGEIS. NRC has decided to propose amending its regulations primarily on the basis of whether a proposed standard would continue to ensure protection of public health

and safety and the environment. NRC also considered whether the regulation could be implemented in an efficient and effective manner and without unnecessary burden imposed on stakeholders as a result of the regulation. NRC considered these issues in an open forum so as to foster public confidence in the merits of the decision.

Section III.A describes the approach taken in this proposed rule. Section III.B discusses the rationale and technical basis supporting the proposed approach, including why it ensures protection of public health and safety and how the proposed approach is expected to be implemented in a manner that is more efficient and effective than NRC's current approach. Section III.C provides additional information on the scope and interfaces of this proposed rule. Section III.D provides consideration of other alternate approaches for disposition of solid materials.

A. NRC's Proposed Approach

The NRC has decided upon a proposed approach that is a balanced consideration of technical issues and overall stakeholder concerns and needs. Specifically, the NRC is proposing to amend its regulations for the disposition of solid materials to establish requirements that have the following four elements:

(1) A set of limited allowed disposition paths: solid material may be released from licensed control if it meets the dose criterion of #2, below, and if it goes to one of the following limited disposition paths: (a) disposal in EPA/State-regulated landfills; (b) re-use in a

pre-defined set of uses specified in the regulations; and (c) case-specific analysis and approval of proposed procedures for other disposition paths or doses;

(2) A dose criterion set at 1 mrem/yr[5]: based on scientific analysis and regulatory considerations, this dose criterion ensures protection of public health and safety; solid material meeting this dose criterion can be released from further licensed control by the NRC;

(3) A table of nuclide concentrations associated with the 1 mrem/yr dose criterion: these nuclide concentrations provide reasonable assurance that the dose criterion is met in an efficient and effective manner; and

(4) A recordkeeping system.

The rationale for each element of the proposed amendments is described in Sections III.B.1-B.4. As discussed in Sections III.B.1-B.4, this approach both ensures protection of public health and safety and is efficient and effective in not imposing undue burdens for implementation. A section-by-section analysis of rule text implementing the proposed approach is provided in Section V.

---

[5] 1 mrem/yr = 0.01 milliSievert per year (mSv/yr)

B. Rationale Supporting NRC's Proposed Approach

B.1 The Set of Allowed Limited Disposition Paths

A discussion of NRC's basis for choosing the limited disposition path approach is contained in Section III.B.1.1. A discussion of specific details related to the limited disposition path approach is contained in Section III.B.1.2.

B.1.1 Basis for Selecting Limited Disposition Path Approach

NRC discussed with stakeholders and gathered information about a range of alternate approaches for the disposition of solid material, discussed in Section II.D, above, i.e., unrestricted release of solid material (either by continuing the current approach or issuing a proposed rule), limited disposition paths, and disposal of all material at licensed LLW disposal.

NRC believes that public health and safety would be protected if it established requirements for unrestricted release of solid material at a 1 mrem/yr dose criterion. Based on reports prepared by the NCRP and other scientific organizations, material released at this level would be a very small fraction of NRC's public dose limit in 10 CFR Part 20 and result in a negligible individual dose (See Section III.B.2, below) and a number of stakeholders supported use of this alternative. However, there have been concerns expressed by metals and concrete industry stakeholders about the unrestricted release alternative because they believe their

businesses would be negatively impacted by public reaction to the introduction of solid material from licensed facilities in their products. In addition, citizen and environmental groups expressed concerns about unrestricted release of solid material from licensed facilities into general commerce. In reflecting on these same issues, the NCRP, in Report No. 141, notes that, despite the relative safety of a 1 mrem/yr clearance level, "there are significant concerns from the recycling industry and the public over unrestricted release of scrap metal into the public domain," and that rulemaking in this area should consider avoiding placing material in consumer products. In addition, our review of stakeholder comments indicates that there is little stakeholder support for proceeding with the unrestricted release alternative, even amongst nuclear industry representatives.

At the same time, the NRC does not believe that a complete prohibition on all releases of material with very low amounts of, or no, residual radioactivity from restricted or impacted areas is appropriate. First, as noted above, the potential risks associated with allowing some releases of material meeting a 1 mrem/yr dose criterion are negligible. Secondly, as discussed below, results from the DGEIS indicate that a prohibition alternative is much more expensive than the other alternates. This is in concert with findings in NCRP Report No. 141 which states that an approach for disposition of solid material (having no, or very small amounts of, residual radioactivity) that allows some form of release from licensed control (either for unrestricted release or in a limited manner) should be a priority because the potential radiological hazards of these materials are so low that their exemption from continued regulation is deemed warranted and because funds unnecessarily spent on controlling trivial risks in one sector are not available for application to the control of "real" risks elsewhere. NCRP Report No. 141 states that disposal of these materials as LLW is an alternative that should be exercised only as a last

resort. The National Academies Report also noted that certain risks, for example those associated with transportation of solid materials, could be lower for other alternatives, like the landfill alternative, than the prohibition alternative.

To provide further consideration of the alternatives of Section II.D, the NRC completed a cost-benefit analysis in the DGEIS based on potential environmental and public health impacts and economic considerations. The analysis includes such items as impacts and costs of: radiation surveys of solid materials before they are released to ensure that the levels are below release criteria; transport of solid materials to EPA-regulated landfills, to use in a road-bed, or to NRC-licensed LLW facilities; and disposal of solid materials in EPA-regulated landfills or NRC-licensed LLW facilities. The results from the DGEIS indicate that, compared to a No-Action alternative of retaining the current approach, the costs and benefits of the alternatives for disposition of solid materials are: (a) the unrestricted release alternative has a net positive incremental cost-benefit at a 1 mrem/yr dose criterion; (b) an alternative of limited disposition also has net positive incremental cost-benefit at a 1 mrem/yr dose criterion, although slightly larger than the unrestricted release alternative; and (c) the prohibition alternative has a substantial net negative cost-benefit. The difference in costs and benefits between the unrestricted release and limited disposition alternatives is not considered significant for regulatory decision-making. However, the prohibition alternative is significantly less cost-effective. This analysis is in line with the National Academies Report which concluded that the landfill disposal alternative could be significantly less costly than prohibition, and with the NCRP Report No. 141 which indicated that the "prohibition" approach is a costly alternative due to the high prevailing costs of disposal at licensed LLW disposal facilities, the costs of transportation to LLW disposal facilities, and issues of access to the limited number of LLW disposal facilities.

With regard to issues of disposal capacity, the DGEIS indicates that for the prohibition alternative the amount of solid material under the scope of this rulemaking needing disposition would exceed the available disposal capacity at LLW disposal facilities. With regard to the limited path alternative (which includes disposal at landfills as an allowed path), the DGEIS found that, given the current and projected disposal capacity at EPA/State-regulated landfills, there is sufficient capacity to accommodate even an alternative in which all solid material is sent to landfills.

Thus, based on the above, the NRC has decided upon a proposed approach that it believes is a balanced consideration of technical issues and overall stakeholder concerns and needs. The proposed approach would limit where solid material, meeting a 1 mrem/yr dose criterion, released from licensed control can go to the following disposition paths: (1) disposal in EPA/State-regulated landfills; (2) re-use in a limited pre-defined set of uses (specifically concrete in road bed construction and re-use of tools and equipment); and (3) case-specific analysis and approval of proposed procedures for other disposition paths and approaches. The disposition paths considered in this proposed approach are consistent with NCRP Report No. 141 which suggests an approach that would initially prohibit recycling into certain consumer products, including products used by children, in food preparation, personal items, or household items and which notes that it is possible to designate certain acceptable restricted industrial uses where direct contact of solid material with the general public can be minimized and/or avoided. Similarly, the National Academies Report also notes the merits of an approach focusing on restricted uses and/or landfill disposal. This approach is also consistent with the diverse range of stakeholder comments which sought uniform standards for release, but which

were either concerned about unrestricted release or did not specifically support an unrestricted release approach.

NRC's proposed approach of limited disposition paths represents an improvement over its current approach in that it provides a clear risk-based dose criterion, and associated radionuclide concentrations, for disposition of solid materials. Even for the case-specific component, a risk-based dose criterion is proposed to form the basis for decisions rather than the measurement-based guidelines used now. Thus, the proposed rule enhances consistency and regulatory finality in decisions made regarding disposition of solid materials. With regard to the disposition paths, as noted in Section III.C, below, for much of the materials covered by this rule (e.g., trash, equipment and tools, concrete), the allowed disposition paths are fairly broad and similar to what licensees currently do with the materials. For some materials (e.g., bulk metals), the paths are more limited, however there remains the case-specific provision for requesting alternate disposition.

B.1.2 Specific Details on Limited Disposition Approach

In deciding upon this limited disposition path approach for solid material, the NRC is guided by goals of ensuring protection of public health and safety and the environment and efficiency and effectiveness in implementation. Some stakeholders saw the limited disposition path approach, in particular with regard to landfills, as a means to provide additional protection of public health and safety citing EPA requirements on storage, treatment, and other controls at landfills. Others expressed concern about the feasibility and potential regulatory burdens of the

disposition paths proposed and the ability of the disposition paths to limit where material goes and protect public health and safety. The discussion below addresses these areas with regard to the ability of the limited disposition path approach to both protect public health and safety and be able to be implemented in an efficient and effective manner.

Although the proposed rule would authorize disposal of solid material from NRC-licensed facilities in an appropriate EPA/State regulated landfill facility, it is the operator and/or regulator of each landfill facility who will determine if a transfer to a specific facility will be allowed to take place. Similarly, for intended end uses, a particular recipient is not required to take the material and can decide whether or not to take the material based on various factors. Licensees will have to be aware of monitoring practices for incoming shipments to landfills or other destinations as part of their business practices, in addition to complying with the nuclide concentrations in this proposed regulation. These various market forces will be in addition to the requirements for protection of public health and safety that the NRC places on licensees.

B.1.2.1 Feasibility of Limited Disposition Paths

With regard to feasibility of use of landfills for disposition of solid materials, some stakeholders stated that EPA, as well as State and local governments, have jurisdiction over requirements related to material that may go into landfills, and it is not clear whether the landfills would accept material from licensed facilities released under the dose criterion of the proposed NRC regulation. These stakeholders noted that many States have bans against release of radioactivity into landfills. Also, some stakeholders noted that difficulties in siting

landfills could be more acute if concerns over radioactivity increased, even if the radioactivity was present at very low levels.

NRC believes that disposal in a landfill regulated under Subtitle D of RCRA is a feasible option for disposition of solid material because this rule is proposing to set a dose criterion at a very small fraction (1/100) of NRC's public dose limit and at a negligible individual dose level of 1 mrem/yr (see Section III.B.2), ensuring protection of public health and safety such that material below those levels do not require any further licensing control by NRC. This material could then be kept out of general commerce if disposed of under the regulatory scheme of RCRA. RCRA was enacted by Congress in 1976 to ensure that solid wastes from human activities are managed and disposed of in a manner that ensures protection of public health and safety and the environment. One of the principal programs for managing solid wastes under RCRA is Subtitle D which includes minimum federal standards, as well as guidelines for State plans, for non-chemically-hazardous solid wastes. Specifically, Subtitle D: (a) sets criteria for disposal facilities for these solid wastes; (b) encourages States to develop plans to manage these solid wastes; and (c) prohibits open dumping of solid waste. Under Subtitle D, EPA provides information, guidance, policy, and regulations to deal with solid waste issues. States and local governments are the primary planning, regulating, and implementing agencies for the management of solid wastes under Subtitle D. Three broad types of landfills covered under RCRA Subtitle D are municipal solid waste landfills (MSWLF), construction and demolition landfills, and industrial landfills. MSWLFs typically receive household wastes (e.g., appliances, newspapers, containers, food wastes, and miscellaneous organic waste). MSWLFs also may receive commercial and industrial solid wastes, although they are less likely to take large bulk industrial items like water tanks, large concrete slabs, etc. Construction and demolition landfills

typically take road material, excavated material, and demolition/construction/renovation wastes. Industrial wastes are non-hazardous solid wastes from manufacturing or industrial processes. Industrial landfills can be located on industrial/manufacturing facility sites and receive wastes only from those facilities.

NRC's decision to authorize disposition of solid material in RCRA Subtitle D landfills is similar to a suggested approach in a June 26, 2003, comment letter, from the Association of State and Territorial Solid Waste Management Officials (ASTSWMO). In its letter, ASTSWMO suggested an approach which uses a 1 mrem/yr clearance-type level and which would not result in a change to landfill operations or need for any additional engineered features, nor subject an EPA/State regulated landfill to any extra controls, or special monitoring or treatment of leachate, groundwater, or landfill gases. The levels in the solid material released under this proposed rule would be at levels noted in the ASTWMO letter, and no change in landfill operations should be needed. In addition, EPA noted in an Advance Notice of Proposed Rulemaking (ANPR) (68 FR 65120, November 18, 2003) on criteria for disposal of "low-activity" radioactive wastes in RCRA landfills that some States have determined that RCRA Subtitle D facilities may offer sufficient protection for certain types of radioactive material. For example, the State of Michigan, in conjunction with the NRC, concluded in 2001 that certain very low-activity wastes (as concrete rubble) from the decommissioning of the Big Rock Point nuclear facility could be sent to a RCRA Subtitle D landfill (66 FR 63567).

Based on the above (as well as the discussions in Section III.B.1.2.1 and III.B.1.2.2), NRC is including disposal in a RCRA Subtitle D landfill as one of the acceptable disposition paths under this proposed rule. At this time, because NRC does not want to prejudge eventual

EPA decisions regarding RCRA Subtitle C[6] landfills, a licensee request to dispose of solid material in a RCRA Subtitle C landfill would need to be addressed under the case-specific element of the proposed rule.

Finally, as noted above, there is no requirement that a landfill operator take the material, and such factors as market forces and agreements between generator and operator will determine whether material released under NRC's standard for protection of public health and safety are accepted at the landfill.

With regard to the limited path alternative that would restrict material to certain end uses, a fairly uniform concern expressed by a range of stakeholders (including the metals industry, licensees, and States) was whether it is feasible or practical to establish a generic approach for restricted use. These stakeholders noted that developing a rule with generic standards for defined restricted uses would be difficult because of difficulties and regulatory

---

[6] EPA separately has initiated an effort to consider modifying its Subtitle C regulations and published an Advanced Notice of Proposed Rulemaking (65 FR 65119, November 18, 2003) soliciting stakeholder input on a potential regulatory framework for disposal of low-activity waste in RCRA Subtitle C facilities. Subtitle C establishes a system for controlling chemically-hazardous solid waste from the time it is generated until its ultimate disposal. To this end, there are RCRA C regulations (40 CFR Parts 260-264) for the generation, transport, treatment, storage, and disposal of chemically-hazardous wastes. EPA's ANPR indicated that it is considering a range of allowable dose limits for disposal in Subtitle C facilities different from the criteria being considered in this NRC proposed rulemaking. In a January 14, 2004, letter, the Commission stated that it believed that the approach described in the ANPR has the potential to provide a safe and economical alternative for the disposition of low activity radioactive waste. EPA is coordinating with NRC on the ANPR effort and if EPA decides to move forward with a rulemaking for Subtitle C facilities, NRC would need to take conforming regulatory action in a separate rulemaking. As discussed above, this NRC rulemaking effort is proposing requirements for disposition of materials below a dose criterion of 1 mrem/yr which is a risk level well below the chemical hazard considered at Subtitle C facilities.

burden in enforcement of controls limiting disposition paths over entities not covered by NRC regulations and the likelihood that it is not economically practical for a steel mill to routinely process the limited quantities of material from licensed facilities for a specific set of limited end uses.

Some stakeholders suggested that NRC should proceed with a rulemaking that would not include a generic approach for limited disposition, but instead provide a regulatory framework and process, similar to the current 10 CFR § 20.2002 disposal approval process, so that licensee plans involving limited disposition could be characterized and dealt with on a case-specific basis rather than in a generic standard. This would allow the NRC, and the public, to review specific details of a particular limited disposition. NRC agrees in part with these comments; therefore, the case-specific approach is one of the elements of its limited disposition approach. Examples of materials that would be considered as part of a case-specific approach are:

(1) Metal recycle: Developing scenarios for recycling of metals is difficult and stakeholders have not provided any clear process by which metal could be generically directed for recycle into a non-licensed industrial or construction related end uses (e.g., bridges, etc.). Thus, the NRC has decided that any consideration of restricted recycling of metal could only be proposed by a licensee under the case-specific element of this proposed rule;

(2) Soil and soil-like materials: It is difficult to develop a generic set of radionuclide concentrations for soil based on either NUREG-1640 or RS-G-1.7 (see Section III.B.3.1, below, for a discussion of the content of NUREG-1640 and RS-G-1.7 and their use in this rulemaking), in part because of the wide variability of soil behavior and general soil uses and, also, because NRC's review has indicated that the nuclide concentrations of RS-G-1.7 are not sufficiently conservative for the range of possible dispositions of soil. Thus, disposition of soil would be considered under the case-specific element of the proposed rule.

However, the NRC's review of its technical information bases has indicated that it is also feasible for this proposed regulation to contain a generic approach for certain materials and end uses; therefore, the NRC is including in this proposed rule a set of pre-defined limited end uses listed below (Section III.B.1.2.2 discusses the ability of these end uses to limit where solid materials would go):

(1) Concrete in road-bed construction: NUREG-1640 (see Section III.B.3.1, below) reviewed various concrete re-use scenarios and notes that recycle and re-use of reclaimed concrete from licensed facilities in uses such as road-bed construction is its most likely destination because of the physical nature of reclaimed concrete. Other uses of reclaimed concrete are less likely and result in much lower exposure compared to use in road bed made with reclaimed concrete;

(2) Re-use of solid materials, equipment, and tools in their original form, in industrial or construction settings, for their original intended purpose and function: For most large and/or stationary components at a licensed facility (e.g., scaffolds, cranes, trucks, office furniture, etc.), NRC considers this a feasible approach for limiting where these items go and restricting them from general consumer use. Discussion of how this approach would work to limit where solid materials go is contained in Section III.B.1.2.2 and in Section III.B.4, including maintenance of records of the type and amount of material released, the destination of the material, and the nuclide level of the material.

There is a class of smaller pieces of equipment and tools that are used by workers which may be transported by an individual in and out of restricted/impacted areas as part of routine conduct of work in those areas (e.g., hand tools, testing equipment). The NRC considered restricting further use of these items to only industrial/construction settings and requiring records of the end destination of these items. However, given the very low dose criterion and low allowable nuclide concentrations in these proposed amendments, the NRC has determined that trying to direct each small tool to an industrial/construction use, and maintaining records of such transfers, would be unduly burdensome, given the very low risk involved. Instead, the NRC has decided that the proposed amendments should direct that these items be limited to re-use in their original form for their original intended purpose and function and that required records can be limited to specifying the specific tool or equipment removed from the restricted/impacted area and the residual nuclide concentration of the item (See Section III.B.4). This approach is similar to the method for handling such items under NRC's current approach which the NRC (and the National Academies Report) believes ensures

protection of public health and safety. However, the proposed approach represents an improvement because it enhances the current approach for these materials by placing them under the 1 mrem/yr dose criterion (including its associated nuclide concentrations) and the limited disposition paths and recordkeeping requirements of this proposed regulation.

B.1.2.2 Ability of Disposition Paths to Limit where Solid Materials Go and Maintain Exposures below the Dose Criterion

The limited disposition approach is intended to restrict disposition of material to certain authorized uses and/or to landfills to minimize the likelihood of release of material from licensed facilities into the general stream of commerce, in particular consumer goods, and so that doses are maintained below the 1 mrem/yr dose criterion discussed in Section III.B.2. An issue raised by stakeholders regarding limited disposition is how will it be assured that restrictions function in an efficient and effective manner to limit where material can go and thus protect the public, while not being a burden on regulators and the public.

NRC has decided that, given the nature of the material within the scope of this rule and the very low dose criterion of 1 mrem/yr in this proposed rule, that a combination of the provisions listed here (as well as the recordkeeping provisions discussed in Section III.B.4) provide an appropriate level of assurance that public health and safety is protected while minimizing unnecessary burden.

(1) Considerations related to directing and limiting material to landfills or to the defined end use: The proposed rule contains specific requirements which direct licensees as to allowed destinations for solid material. Therefore, licensees must be able to provide reasonable assurance that solid material is being disposed of, for example under the regulatory scheme of RCRA, specifically 40 CFR Part 257 and 40 CFR Part 258, and/or actually placed into road bed construction. The proposed rule is performance-based in that it does not stipulate the nature of the assurance that the licensee will maintain, beyond the recordkeeping requirements noted in Section III.B.4, although it is expected that a licensee, in order to comply with the proposed rule, would maintain some agreement with the landfill that the material is to be, in fact, disposed of by burial in the landfill. For most solid materials considered here, there is little recycle value (e.g., routine trash) and thus it is likely that the material will be disposed of by burial at the landfill. However, for certain materials such as bulk metals, NRC is aware that there may be some economic impetus for a landfill to recycle the material. The potential for this to occur should be minimized by the requirements of the proposed rule, noted above, for licensees to dispose of solid material under the regulatory scheme of RCRA coupled with the fact that most major bulk shipments of metal would be made at the time of decommissioning or other large facility outage and that most bulk metal shipments would be to industrial or construction and demolition landfills, rather than MSWLFs. Both of these considerations lend themselves to better direction by the licensee regarding the need for disposal (and not recycle) of the metal by the landfill.

Once solid material is disposed of at a landfill for disposal, NRC believes that RCRA controls associated with landfill operations and closure provide for a level of isolation

from the public that provides ample assurance of protection of public health and safety, especially given the very low dose criterion of 1 mrem/yr being proposed in this rulemaking. As noted by the June 26, 2003, ASTSWMO comment letter, such a low dose should not require any changes in RCRA D landfill design or operations. Under RCRA, EPA has developed Federal criteria in 40 CFR Part 257, for proper design and operation applicable to all RCRA Subtitle D landfills, and in 40 CFR Part 258 specifically for MSWLFs. The criteria in Part 257 contain: provisions to ensure that wastes in solid waste disposal units do not threaten surface water, ground water, biota, and flood plains; and precautions to restrict public access to the facility. The criteria in 40 CFR Part 258 address location, operation, design, ground water monitoring, corrective action, closure and post-closure care, and financial responsibility for MSWLFs. The EPA ANPR notes that recent standards for RCRA D facilities in 40 CFR Part 258 require them to have engineered features that are similar to RCRA C facilities. Many States have adopted the criteria in 40 CFR Parts 257 and 258 into their State solid waste programs although the extent of adoption varies; thus there can be a range in standards for landfill operation and design among the fifty States for RCRA Subtitle D landfills within the requirements of 40 CFR Parts 257 and 258. A review of certain State standards indicates that some impose engineered features beyond those required by 40 CFR Part 257. A dose criterion of 1 mrem/yr would limit potential doses to levels substantially lower than, and well within the variation in, background radiation levels received from the surrounding geologic material and other materials present in the landfills.

Similarly, it is likely that solid materials, such as rubbled concrete or specific components, will remain in their pre-defined allowed end uses (e.g., road bed

construction or re-use of a scaffold). It is NRC's view that use of a very low dose criterion like 1 mrem/yr, that is a very small fraction of background, makes it unlikely that any future uses of the material would result in reconcentrating residual levels of radioactivity to levels that could impact public health and safety.

(2) Placing bounds on nuclide concentrations that can be released so as to limit and potential exposures: Despite the relative protectiveness of the landfill regulatory structure, NRC recognizes that it is difficult to provide absolute assurance that solid material goes to, and stays at, a landfill or other designated end use. There is also variation in landfill standards in 40 CFR Parts 257 and 258 for the different types of RCRA Subtitle D landfills (MSWLF, construction and demolition, and industrial); variation in implementing landfill design requirements among the 50 States; and variation in site characteristics at different landfills (e.g., wet versus arid sites). Some stakeholders expressed concern that there would be a significant regulatory burden in dealing with this material once it reached potential recipients.

NRC has decided that, given the very low level of risk posed by the material released, a reasonable approach that provides assurance of protection and should not be burdensome, is to apply the unrestricted release path nuclide concentration tables of IAEA's RS-G-1.7 (see Section III.B.3.1, below) for material released for the limited disposition paths of this proposed rule. This is a reasonably conservative approach because, for the same 1 mrem/yr dose criterion, an unrestricted release is generally associated with lower (more restrictive) nuclide concentrations than a limited path release, for which persons are exposed in a more limited manner. Thus, it can be

assured that even in the unlikely event that all materials released in a year from a licensee were inadvertently diverted for unrestricted release (despite the requirements of the proposed rule directing it to a limited use or disposal), a 1 mrem/yr dose would not be exceeded, and it could also be assured that an isolated unrestricted release would result in doses well below 1 mrem/yr. Because, as discussed in Section III.B.2, below, a dose criterion set at 1 mrem/yr is well below NRC's public dose limit and considered a negligible individual dose by national and international scientific organizations, this approach and this level of assurance is considered appropriate to ensure protection of public health and safety. This approach also could provide reasonable assurance that the dose resulting from disposal in a landfill would be less than 1 mrem/yr for the variety of RCRA Subtitle D landfill types, designs, and local conditions.

It is not expected that the approach in this proposed rule of requiring that the lower unrestricted release nuclide concentrations of RS.G-1.7 be met would result in significant additional burden. NRC's review of the various analyses and results in RS-G-1.7 (see Section III.B.3.1, below) indicates that the limiting nuclide concentrations for various scenarios and population groups are within a reasonable range of each other. Also, the lower unrestricted release nuclide concentrations are not dissimilar from levels which licensees currently measure when using NRC's current approach.

(4) Inspections: To aid in assuring that there is not unrestricted release of solid material, periodic inspections can provide continuing confirmation or verification that the regulations are being followed. The inspections would look at how licensees identify

and survey materials for release, and address the end use of such materials by checking shipment records to recipients.

B.2 The 1 mrem/yr Dose Criterion

In establishing a 1 mrem/yr dose criterion, NRC is guided by considerations of providing reasonable assurance that the dose criterion ensures protection of public health and safety and by considerations of efficiency and effectiveness in its implementation. The NRC has reviewed stakeholder input, reports by other scientific organizations, other Federal health protection standards, studies cited by commenters, and technical analyses presented in the DGEIS.

Based on its review of information gathered, it is the NRC's view that, compared to other relevant standards and considering the body of evidence from scientific studies, a dose level of 1 mrem/yr clearly ensures protection of public health and safety and can be used as a dose criterion for release of solid material from any further licensed control.

As noted in Section III.B.2.1, a dose criterion set at 1 mrem/yr for solid materials is well below and a very small fraction (1/100) of the public dose limit of 100 mrem/yr[7] in NRC's regulations in 10 CFR Part 20, a level that NCRP and the International Commission on Radiation Protection (ICRP) have indicated provide adequate protection of public health and safety. This 1 mrem/yr criterion for solid material is also in the range of, but smaller than, other

[7] 100 mrem/yr = 1 mSv/yr

Federal agency standards and allowable risk ranges for other specific media such as gas and liquid effluents.

In particular, a 1 mrem/yr dose criterion also comports with technical findings in reports prepared by various recognized scientific organizations cited in Section III.B.2.2., as regards to its very small potential risk. In particular, NCRP Report No. 141, "Managing Potentially Radioactive Scrap Metal," notes that a dose below 1 mrem/yr can be defined as a "negligible individual dose" and that doses that fall into this range have an associated average annual excess risk below which "efforts to reduce radiation exposure to the individual is unwarranted." NCRP Report No. 141 also cites several health effects studies and notes that this dose is in a risk range (10^{-7} to 10^{-6} per year) that is generally regarded as "trivial." As noted in Section III.B.2.3, a dose criterion of 1 mrem/yr represents a minute fraction (1/300) of natural background and is also a small fraction of the variability in natural background across the U.S. that members of the public are exposed to without health impact. The NRC is cognizant of studies and reports on radiation health effects cited by citizen and environmental groups that are different from the current scientific consensus views. To assist it in improving its understanding of health effects of low amounts of radiation, NRC continues, as described in Section III.B.2.2, below, to review and support further research. Despite this continuing study, the NRC is confident in the information it does have to determine that a standard of 1 mrem/yr ensures protection of public health and safety for disposition of solid material from any further licensed control.

More detail on the NRC's review of considerations of protection of public health and safety is provided in Sections III.B.2.1 - B.2.4. Considerations of how the dose criterion would

be implemented in manner that ensures protection of public health and safety and is effective and efficient through use of measurable nuclide concentrations and appropriate recordkeeping are discussed in Sections III.B.3 and III.B.4, below.

B.2.1 Consistency with other NRC/EPA Standards

The NCRP in its publication No. 116 (Chapter 15) recommends that, for continuous exposure, the effective dose to members of the public not exceed 100 mrem/yr from all man-made sources, excluding medical and natural background sources. Similarly, ICRP, in Table 6 of Publication 60, recommends a limit of 100 mrem/yr as the dose limit for the public. Consistent with these bodies, the NRC issued 10 CFR Part 20 (56 FR 23360) in 1991 that established a public dose limit of 100 mrem/yr in 10 CFR 20.1301. These national and international bodies also note and agree that, although the limit for the public dose should be 100 mrem/yr from all man-made sources combined, it would seem appropriate that the amount that a person would receive from a single source should be further reduced to a fraction of the limit. This would thus account for the possibility that an individual may be exposed to more than one source of man-made radioactivity and limit the potential that an individual would receive a dose at the public dose limit.

The 1 mrem/yr dose criterion for solid materials in this rulemaking is well below and a very small fraction (1/100) of the public dose limit of 100 mrem/yr in NRC's regulations in 10 CFR Part 20 and also well below NRC's standards in 10 CFR 20.1403 for license

termination of facilities at 25 mrem/yr[8], which is a "sufficient and ample" margin below the public dose limit for that application (62 FR 39058, July 21, 1997).

The 1 mrem/yr dose criterion for solid materials is comparable to, and smaller than, standards and design objectives set by both NRC and EPA for other specific media being released from licensed facilities. NRC sets design objectives in 10 CFR Part 50 Appendix I limiting gaseous and liquid effluents from power reactors to less than 5 mrem/yr[9] and 3 mrem/yr[10], respectively. The EPA has responsibility for setting generally applicable radiation protection standards in the environment. Currently, the EPA has a drinking water standard of 4 mrem/yr[11], which has been implemented under the Safe Drinking Water Act (1974) in 40 CFR Part 141 and a national emissions standard for air pollutants at 10 mrem/yr[12], which has been implemented under the Clean Air Act, in 40 CFR Part 61. Finally, the risk associated with the 1 mrem/yr dose criterion is below the range of acceptable lifetime risks of 10^{-6} to 10^{-4} that the National Academies Report notes that EPA has used in developing health-based dose standards for exposure to radiation.

B.2.2 Recommendations from National and International Scientific Bodies Regarding Dose Criteria

---

[8] 25 mrem/yr = 0.25mSv/yr

[9] 5 mrem/yr = 0.05 mSv/yr

[10] 3 mrem/yr = 0.03 mSv/yr

[11] 4 mrem/yr = 0.04 mSv/yr

[12] 10 mrem/yr = 0.1 mSv/yr

There are differing views from stakeholders on studies containing recommendations on health impacts. Some commenters cited studies by various national and international scientific organizations that state that there are negligible health impacts from radioactivity at levels near 1 mrem/yr. Others stakeholders stated that health effects of low dose radiation are greater than predicted for current radiation limits and cited other studies indicating concerns about impacts at low radiation doses.

In considering these comments, NRC notes that in developing its overall radiation protection standards, NRC reviews a number of reports and studies by recognized scientific organizations. For this rulemaking, NRC considered how these organizations address this specific issue, in particular, the use of a dose criterion of 1 mrem/yr. The organizations include the National Academies, the ICRP, and the NCRP, IAEA, and ANSI. To supplement this review, NRC also reviewed information from other studies, noted below, cited by commenters.

During 2002, the National Academies/National Research Council prepared the National Academies Report for NRC on disposition alternatives for solid material. The National Academies is a society of scientists and engineers operating under the authority of a charter granted to it by the U.S. Congress in 1863, and providing advice to the federal government on scientific and technical matters. The National Research Council is the principal operating agency of the National Academies in providing services to the government, the public, and the scientific and engineering communities. As noted in the National Academies Report, the members of the committee responsible for the 2002 National Academies Report were chosen

by the National Academies for their special competencies and with regard for appropriate balance.

One of the findings of the National Academies Report was that NRC's current approach for disposition of solid materials (which is generally in the range of 1 mrem/yr although currently not based on a specific dose criterion) is sufficiently protective of public health that it does not need immediate revamping. However, the report also noted that, for the sake of efficiency of regulation, NRC should move ahead with a process for evaluating alternatives.

In discussing a 1 mrem/yr dose criterion, Recommendation #5 of the National Academies Report noted that 1 mrem/yr is: (a) a small fraction of the dose received per year from natural background sources; (b) significantly less than the dose we receive from our own bodies due to radioactive potassium and other elements and due to routine medical procedures; (c) within the range of acceptable lifetime risks of 10^{-4} to 10^{-6} used by EPA in developing health-based standards for exposure to radiation; (d) able to be measured with radiation measurement technologies available at reasonable cost; and (e) widely accepted by recognized national and international organizations.

ICRP was established in 1928 as a Commission linked to the International Congresses of Radiology and is supported by a number of international organizations and by many governments. ICRP issues recommendations on the fundamental principles and quantitative bases upon which appropriate radiation protection measures can be established. ICRP's "Recommendations of the International Commission on Radiological Protection"

(ICRP 60, 1990) recommends that the grounds for exempting material from regulation are that a source gives rise to small individual doses, of the order of 1 mrem/yr, and the protection is optimized.

The NCRP is a nonprofit corporation chartered by the U.S. Congress to develop and disseminate information and recommendations about protection against radiation and to cooperate with the ICRP and other national and international organizations with regard to these recommendations. NCRP publications are developed by recognized experts in the fields of radiation protection and health effects. In NCRP Report No. 116, "Limitation of Exposure to Ionizing Radiation", 1 mrem/yr is considered a Negligible Individual Risk Level, which is defined as a level of average annual excess risk below which "efforts to reduce radiation exposure to the individual is unwarranted." NCRP Report No. 141, "Managing Potentially Radioactive Scrap Metal", notes the growing consensus among national and international communities to choose a criterion of 1 mrem/yr, in part, because a dose at this level can be considered "trivial." NCRP notes the ICRP's recommendation that 1 mrem/yr is appropriate for cessation of regulatory control and that the risk associated with 1 mrem/yr is within a range that is almost universally regarded as trivial. NCRP No. 141 further notes that, in NCRP No. 95, "Radiation Exposure of the U.S. Population from Consumer Products and Miscellaneous Sources", levels near or above 1 mrem/yr in consumer products and other miscellaneous sources have not resulted in actions to avoid or mitigate potential exposures. For these reasons, NCRP No. 141 states that it is NCRP's position that a "few" mrem/yr would be an appropriate dose criterion for a clearance standard.

The IAEA's standards largely reflect the recommendations of the ICRP and have been adopted by many of its member countries. IAEA's "Safety Series No. 89, Principles for the

Exemption of Radiation Sources and Practices from Regulatory Control", recognized that there was "no internationally unified policy for excluding or exempting (e.g., clearing) sources from regulatory control." The first criterion of dealing with this issue was setting a level of trivial dose. The publication noted that most authors proposing values of trivial individual dose have set the level of annual risk which is held to be of no concern to the individual at 10^{-7} to 10^{-6}. Based on this risk, the IAEA concluded that the level of trivial individual effective dose equivalent would be in the range of 1 to 10 mrem/yr. Because an individual could be exposed to radiation doses from multiple cleared sources or practices, the IAEA concluded that doses on the order of 1 mrem/yr per practice would be reasonable.

In addition, the NRC reviewed the ANSI national standard (ANSI/HPS N13.12-1999) which contains criteria for unrestricted release of solid materials and includes a dose limit of 1 mrem/yr. This standard, which was jointly issued by the ANSI and the Health Physics Society (HPS), contains guidance on the clearance of solid materials based on 1 mrem/yr, or higher dose levels when justified on a case-by-case basis, taking into account exposures to multiple sources. The standard recommends maintaining the as low as reasonably achievable (ALARA) principle because it provides an adequate margin of safety below the public dose limit of 100 mrem/yr total effective dose equivalent (TEDE).

In general, in establishing its basic protection standards, NRC relies on national and international scientific authorities, such as those noted above. NRC believes that reports by NCRP and ICRP provide a widely held consensus view by national and international scientific authorities on radiation dose responses and accepts their principal conclusions on the matter of dose standards for controlling the disposition of solid materials.

To help ensure that studies and estimates of risk continue to provide wide ranging and accurate information on which to base decisions, the NRC considers a variety of sources of information concerning health effects attributed to exposure to ionizing radiation and also actively and continually monitors research programs and reports concerning health effects of ionizing radiation. Two primary sources of information are the National Academies/National Research Council and the United Nations Scientific Committee on the Effects of Atomic Radiation (UNSCEAR). Both groups provide an independent and comprehensive evaluation of the health risks associated with radiation exposure.

UNSCEAR was established in 1955 to address concerns regarding the effects of radiation on human health and the environment. The Committee was requested to collect, assemble and evaluate information on the levels of ionizing radiation and radionuclides from all sources (natural and man-made) and to study their possible effects on man and the environment. The Committee continues to produce the UNSCEAR Reports, which are detailed reports to the U.N. General Assembly. These reports are regarded by the scientific community as authoritative and balanced reviews of exposures from natural radiation sources, from nuclear power production and nuclear tests, exposures from medical radiation diagnosis and treatment, and from occupational exposure to radiation. They also include detailed studies on cancer induced by radiation; the mechanisms of the development of cancer and the body's repair systems against it; the risks of hereditary diseases induced by exposure to radiation; and the combined effects of radiation and other (for instance chemical) agents. Important consideration also is given to the assessment of the radiological consequences of accidents, such as the Chernobyl accident. Reports published in 2000 and 2001 are the latest in the UNSCEAR series. The next series of reports is expected to be available around 2006.

NRC is co-funding a review by the National Academies/National Research Council of the Biological Effects of Ionizing Radiation (BEIR) VII report. The BEIR Committee has conducted major reviews of the scientific data on health risks of low levels of ionizing radiation in past years, and similar reviews were published by UNSCEAR. These studies have provided more certainty about radiation risks at high doses and dose rates. In BEIR's 1990 report (BEIR V), the BEIR Committee stated that "studies of populations chronically exposed to low-level radiation, such as those residing in regions of elevated natural background radiation, have not shown consistent or conclusive evidence of an associated increase in the risk of cancer." The BEIR Committee continues to review and evaluate molecular, cellular, and animal exposure data and human epidemiological studies to evaluate the health risks related to exposure to low-level ionizing radiation. BEIR VII also will provide a comprehensive evaluation of the health risks associated with radiation exposure.

The NRC is also monitoring the 10-year Low Dose Radiation Research Program, sponsored by the Department of Energy (DOE), which is designed to better understand the biological responses of molecules, cells, tissues, organs, and organisms to low doses of radiation. Using traditional toxicological and epidemiological approaches, scientists have not been able to demonstrate an increase in disease incidence at levels of exposure close to background. The use of new techniques and instrumentation to measure biological and genetic changes following low doses of radiation will provide a better understanding of how radiation affects cells and molecules and a more complete scientific input for decisions about the adequacy of current radiation standards. The data obtained is reviewed by other groups like the National Academies and UNSCEAR to provide an independent review of this health effects information. NRC reviews the programs and data being generated by the DOE and National Academies-sponsored research as well as the reports published by the National Academies

and UNSCEAR. All of these data sources are used by the NRC for estimating radiological risk, establishing protection and safety standards, and regulating the use of radioactive materials.

The scientific studies by the National Academies, DOE, and UNSCEAR indicate that there is considerable scientific uncertainty as to whether any adverse health risks exist following exposure to very low levels of radiation, such as 1 mrem/yr. Although it is well understood that radiation at high doses and high dose rates may induce cancer and genetic effects (see National Academies report, *Health Effects of Exposure to Low Levels of Ionizing Radiation* (BEIR V), 1990), the incidence of biological effects for very low levels of radiation exposure at low dose exposure rates, should they exceed, is so small that it may not be detected. In addition, in an August 2004 position statement, the HPS noted that risks of health effects from exposures below 5000 to 10,000 mrem/yr[13] are either too small to be observed or are nonexistent; the 1 mrem/yr dose criterion in this proposed rule is 5000 to 10,000 times lower than the health effect levels cited in the HPS in their position statement.

Some stakeholders cited studies and reports on radiation health effects that are different from the current scientific consensus views. NRC collected and reviewed a number of the reports, books, and studies that were cited in the public comment letters (and noted in the DGEIS, Appendix A). One of the publications cited by stakeholders was by Green Audit, an environmental consultancy, published, on behalf of the European Committee on Radiation Risk (ECRR), a review and analysis entitled, *Health Effects of Ionizing Radiation Exposure at Low Doses for Radiation Protection Purposes* (2003). The authors of the report believe that the health risks associated with inhalation or ingestion of radioactive material are grossly

[13] 5000 mrem/yr = 50 mSv/ur; 10,000 mrem/yr = 100 mSv/yr

underestimated by the ICRP. A new methodology for estimating radiation exposure was proposed in the ECRR document. Specifically, the new methodology retains the ICRP's system of radiation weighting factors and tissue weighting factors, but includes two additional factors: a biophysical factor and a biochemical enhancement factor, for enhanced hazard weighting for certain kinds of internal exposure to radioactive material. The result of this alternate methodology would be a very substantial increase in effective dose.

The ECRR report was reviewed in detail by the National Radiological Protection Board (NRPB) in the United Kingdom. NRPB staff observed that the methodology proposed by Green Audit for estimating radiation risk from internal emitters did not have a sound scientific basis and that the new weighting factors proposed by Green Audit appear to have little or no supporting scientific evidence. Similarly, Green Audit criticized the ICRP's value of a risk factor used to convert radiation dose to health risk and proposed its own value, but also failed to provide a scientific basis for its own selection. The NPRB report, in noting that ICRP radiation protection recommendations and radiation dosimetry methodologies are based on extensive knowledge of health effects of ionizing radiation, concluded that the "recommendations of the ICRP provide a sound technical basis for radiological protection standards. In particular, risks from internal emitters are acceptably well understood and may, in some cases, be overestimated by ICRP."

Much of the other background material referred to in comment letters is not directly related to specifics of this rulemaking, including the materials covered, and/or does not focus on the effects of low level radiation. Also, some of the studies cited for review are difficult to consider because conclusions cannot be drawn from events that only include a "test" group and not a control group. In addition, there are a multitude of factors that could have contributed to

the adverse affects on the populations in each of the situations cited. As noted above, the consideration of a range of available data are a part of the reason why NRC continues to support further research to continue to improve its understanding of health effects and is specifically co-funding the BEIR VII study. Nevertheless, the NRC is confident in the information it does have to determine standards that ensure protection of public health and safety.

In applying the basic radiation protection information, discussed above, NRC (and other scientific organizations) use the linear no-threshold theory (LNT) dose response model as a regulatory policy tool, rather than as a scientifically certain predictor of health effects. While the association between radiation exposure and the development of cancer is mostly based on populations exposed to comparatively very high levels of ionizing radiation (e.g., Japanese atomic bomb survivors, and recipients of selected procedures), few if any similar effects are expected from the exposure to much lower doses at levels near 1 mrem/yr. Thus, there is no data to unequivocally establish occurrence (or lack thereof) of cancer following exposure to low doses and dose rates for any individual -- below about 10,000 mrem. Although there is no data to prove any health effects occur at lower levels, the NRC conservatively uses the LNT dose response model to assume that any amount of radiation may pose some risk for causing cancer or hereditary effect, recognizing that the model is likely to overestimate radiation risk, and specifically uses it in developing the radiation dose standards in its regulations for protection of public health and safety.

B.2.3 Comparability to Background Radiation

In considering health impacts of very low doses of radiation, it is noted that humans have evolved in a world constantly exposed to low doses from everyday sources of radiation (such as solar and cosmic radiation, radon, certain foods, etc.) which expose people to background radiation and to wide variations in background each day from place to place with no discernible effect on health (see http://www.nrc.gov/reading-rm/doc-collections/fact-sheets/bio-effects-radiation.html). The average radiation exposure in the U.S. from all such natural sources is approximately 300 mrem[14] per year. The proposed dose criterion of 1 mrem/yr is a minute fraction (less than 1/300) of these background levels of radiation received in routine activities and is also a small fraction of background variations which are, themselves, well below the levels where health effects are expected to occur, as discussed in Section III.B.2.2. In addition, man-made sources of radiation from medical, commercial, and industrial activities contribute another 60 mrem[15] to our annual radiation exposure. Of this, diagnostic medical procedures account for about 40 mrem[16] each year and can range up to between 500 to 1,000 mrem[17] without any documented adverse effects. In addition, some consumer products such as tobacco, fertilizer, welding rods, gas mantles, luminous watch dials, and smoke detectors can contribute another 10 mrem to our annual radiation exposure.

B.2.4 Effect of Exposures from Multiple Sources of Cleared Materials Meeting the Dose Criterion

---

[14] 300 mrem = 3 mSv

[15] 60 mrem = 0.6 mSv

[16] 40 mrem = 0.4 mSv

[17] 500 mrem = 5 mSv; 1000 mrem = 10 mSv

Concerns were raised by stakeholders that there could be exposures to multiple products or scenarios as a result of solid material released from licensed facilities, even if individual releases met the NRC's dose criterion. This issue of "multiple exposures" is discussed in detail in Appendix E of the DGEIS. The DGEIS notes that the possibility of multiple exposures concurrently applying to an individual implies that the individual would be exposed to very low amounts of radioactivity as a result of more than one potential situation due to material released from licensed facilities (e.g., from products made from solid materials, disposal in landfills, material present in a road bed, etc.). In considering this, the DGEIS notes that the potential for the same individual to be involved in concurrent scenarios is physically constrained by the relatively limited amount of materials that could be released from licensed facilities, geographical distances between licensees, and the different locations where scenarios could occur. In addition, the limited disposition paths required by this proposed rule minimizes the number of potential exposure scenarios to the public, in particular with regard to any recycle into general commerce. Furthermore, realistically conservative models are used to estimate potential dose to a "critical group" which are likely to overestimate the dose to any specific individual. Based on these varied considerations, and the 1 mrem/yr individual dose criterion, the DGEIS notes that the likelihood of multiple exposure scenarios gets small as the number of potential concurrent scenarios increases and that any combined exposures from multiple exposures will be far below the NRC's public dose limit of 100 mrem/yr noted in Section III.B.2.1, above.

B.3 Table of Nuclide Concentrations Associated with the Dose Criterion

B.3.1 Table of Nuclide Concentrations

The proposed rule is supplementing the dose criterion of 1 mrem/yr with a table of measurable nuclide concentrations to facilitate confirmation that the dose criterion has been met (i.e., if a licensee can demonstrate for a solid material being considered for release, that the nuclide concentrations are less than the table values, this will provide assurance that the 1 mrem/yr dose criterion has been met). Based on the studies and activities noted in Sections III.B.3.1.1 and III.B.3.2, below, NRC has concluded that the dose criterion of 1 mrem/yr can be effectively modeled, measured, and monitored for compliance so that there is reasonable assurance that the dose criterion will not be exceeded.

B.3.1.1 Basis for Nuclide Concentrations

Since doses in the environment can not be easily measured, "dose models" are used to model the behavior of nuclides in the environment so as to translate the residual nuclide concentrations on, or in, a solid material to a potential dose to an individual. There were comments received from some stakeholders about the ability of such dose models to accurately model potential doses. The following provides a discussion of the technical studies performed to provide reasonable models for estimating potential doses and efforts to confirm the accuracy of such models.

Several organizations, including NRC, IAEA, the EC, and the HPS have developed reports containing tables that relate measurable nuclide concentrations to a dose of 1 mrem/yr. Each of these reports evaluate various exposure scenarios and pathways by which potential population groups might be exposed, based on the potential release of a range of materials with various nuclide concentrations. These reports also provide a method for converting the

actual measured concentrations when the materials are released to the potential dose received by the various receptors.

NRC's report (NUREG-1640, "Radiological Assessments for Clearance of Materials from Nuclear Facilities") contains analyses of various potential uses of materials (steel, aluminum, copper, concrete, trash, reused tools and equipment, and soil) and resultant potential exposures as a result of different dispositions of solid materials. The capability of the models in NUREG-1640 to evaluate the relationship between material released and a dose criterion of 1 mrem/yr was reviewed by the National Academies and peer reviewed as part of NUREG-1640's preparation. In particular, the National Academies Report noted the technical soundness of NUREG-1640 and recommended that for any dose-based approach for disposition of solid materials, NRC should use the conceptual framework of NUREG-1640 to assess dose implications.

The IAEA developed RS-G-1.7 ("Application of the Concepts of Exclusion, Exemption, and Clearance") to assist countries in setting standards for exemption, exclusion, and clearance from regulatory control. RS-G-1.7 is based on a consideration of various exposure pathways, scenarios, and potential receptors of released materials developed to encompass all typical exposure situations for all material types. The NRC has reviewed IAEA's RS-G-1.7 concentrations and, as discussed in the DGEIS, found these concentrations reasonably consistent with NUREG-1640. A strong advantage in the use of the internationally-accepted nuclide concentrations in RS-G-1.7 is that their use in this proposed NRC regulation would promote consistency among nations in setting standards for release of solid materials from regulatory control and minimize issues with international commerce.

Therefore, NRC has decided to use the nuclide concentrations in RS-G-1.7 in this proposed regulation (specifically in a proposed amended Appendix B to Part 20) because of the benefits associated with consistency in international standards and commerce, and because NRC's review of RS-G-1.7 and NUREG-1640 indicates that the use of either document can provide reasonable assurance that the nuclide concentrations used ensure protection of public health and safety. Using the tables from RS-G-1.7 establishes a uniform table of nuclide concentrations that must be met in order to assure compliance with the 1 mrem/yr dose criterion. As discussed below, for certain situations, NRC is supplementing the nuclide concentration information from RS-G-1.7 with data from NUREG-1640.

It is important to note that the nuclide concentrations in RS-G-1.7 and NUREG-1640 have been developed, as noted above, for a range of scenarios and pathways, and that the nuclide table taken from these documents and proposed for use in an amended Appendix B to Part 20 is based on the limiting scenario of unrestricted release. However, the proposed rule only authorizes limited disposition pathways. Thus, use of these tables provides a realistically conservative approach that provides assurance that, despite uncertainties in assumptions or possible scenario modeling, a 1 mrem/yr dose criterion will be met. At the same time, use of these reasonably conservative uniform nuclide concentrations from RS-G-1.7 is not considered to add significant additional burden because NRC's review of the various analyses and results in RS-G1.7 and NUREG-1640 indicates that the limiting nuclide concentrations for various population groups for alternate disposition paths are within a range of each other that protects public health and safety and, also, the nuclide concentrations in RS-G-1.7 are not dissimilar from what is currently being measured when using NRC's current approach.

B.3.1.2 Specific Considerations in Use of the Nuclide Tables

There are some specific considerations regarding the use of the tables from RS-G-1.7 which are discussed in this section.

The nuclide concentrations in Table 2 of RS-G-1.7 contain a list of nuclides of artificial origin that were derived independently from this NRC rulemaking and are based on use of the same 1 mrem/yr dose as the criterion contained in this proposed regulation. Because the RS-G-1.7 Table 2 nuclide concentrations are based on the same 1 mrem/yr dose, the Table 2 values have been directly transferred into this proposed regulation in Appendix B of 10 CFR Part 20. RS-G-1.7 also contains a set of concentrations in its Table 1 for radionuclides of natural origin which uses a higher dose basis for natural radionuclides than the dose criterion of this rule. Hence, for nuclides of natural origin, the NRC has decided not to use the RS-G-1.7 values but instead to use radionuclide values taken from NUREG-1640 normalized to a 1 mrem/yr dose criterion.

Additionally, the nuclide tables in RS-G-1.7 are expressed in terms of the quantity of the nuclides contained within the volume of the solid material (Bq/gm) which, as noted above, are included in the proposed regulations in Appendix B to 10 CFR Part 20. However, in many situations, surface concentrations will be more readily measurable (indeed, NRC's current approach for considering release of solid materials in Regulatory Guide 1.86 includes a table (Table 1) of acceptable surface concentration levels (in dpm/100cm^2)). Therefore, it is useful to continue to have guidelines based on surface values. Since IAEA has not yet developed such

information on surface concentrations, NRC has developed a table of acceptable surface concentrations that provides assurance of compliance with the 1 mrem/yr criterion and is simple to implement. The surface concentrations appear in the draft regulatory guidance document, NUREG-1813, that is being issued with this rule. Including the surface concentrations in a guidance document makes their use more flexible and allows flexibility to change in the event that IAEA develops further guidance on surface concentrations. Specific factors used in developing the surface concentrations are as follows:

(1) Basis: The volume concentrations contained in RS-G-1.7, and in proposed Table 4 of Appendix B, were used as a basis;

(2) Conversion to surface concentrations: The volume concentrations of RS-G-1.7 were converted to surface concentrations by using information and analyses in NUREG-1640 on ratios of the mass of various solid materials to their surface areas (referred to as "mass-to-surface ratios"). There is a wide range of materials and types of equipment covered by this rule which have mass-to-surface ratios that range over more than two orders of magnitude (e.g., 0.5 - 200 gm/cm^2 for various pieces of metal equipment; 25 - 1000 gm/cm^2 for concrete for various buildings; and 0.05 gm/cm^2 for trash);

(3) Simplicity in presentation: As noted above, Table 1 in Regulatory Guide 1.86 contains surface radionuclide concentrations. Table 1 has been in use for several years and some stakeholders did note a common understanding on its use. Thus, the proposed table placed in NUREG-1813 contains a set of surface nuclide concentrations that groups nuclides in a manner similar to the existing Table 1 in Regulatory Guide 1.86.

The surface nuclide concentrations in the guidance document, NUREG-1813, are reasonably consistent with the existing values in Regulatory Guide 1.86, and thus should be straightforward to implement;

(4) Compliance with other Federal regulations: Solid materials released from further license control by NRC under this proposed regulation will likely be transported in a variety of manners, and there needs to be consistency between NRC's requirements and Department of Transportation (DOT) regulations in 49 CFR Part 173 for transport of material (see also Section V.D, below). The surface concentrations used in NUREG-1813 are less than or equal to the values in DOT transport guidelines.

B.3.2 Ability to Accurately Measure the Nuclide Concentrations

Once a set of nuclide concentrations corresponding to a dose criterion is established, there must be reasonable assurance that these nuclide concentrations can be accurately measured. Some stakeholders expressed concerns about the ability to measure the radionuclide releases accurately. An approach to demonstrate that radionuclides at these low levels can be accurately measured is discussed in draft NUREG-1761, "Radiological Surveys for Controlling Release of Solid Materials," July 2002. This report was submitted for public comment and modified in response to the comments. Information from NUREG-1761 indicates that radionuclide concentrations at levels corresponding to 1 mrem/yr for any of the alternate disposition paths can be measured accurately with existing survey and detection instruments.

To assure that the actual measurements are made and documented accurately, NRC has prepared, and is issuing with this rule, a Draft Regulatory Guide, NUREG-1813, for licensees to follow in implementing the requirements of this proposed rule. Issues of assuring that licensees carry out such approaches relate to planning for establishing procedures for designing a survey, and to the quality assurance (QA) and quality control (QC) of the measurement process. An interagency working group from EPA, DOD, DOE, and NRC incorporated a series of planning steps for survey design (called Data Quality Objectives and developed by the EPA) and QA/QC principles into a document, referred to as MARSSIM (Multi-Agency Radiation Survey and Site Investigation Manual, NUREG-1575), for surveying lands and structures. The MARSSIM methodology was adopted by NRC in NUREG-1757.

In a similar manner for solid materials (like equipment, concrete, trash, etc.), NUREG-1813, which is based on the concepts of NUREG-1761 and MARSSIM, provides specific information on implementing the requirements of the regulation, including information about design, performance, and documentation of radiological surveys of materials to ensure nuclide concentrations are measured accurately and with consistency. At this time, the interagency working group is also developing methods for improving the conduct of radiation surveys for solid materials at very low radiation levels; the group intends to issue guidance as a supplement to MARSSIM in a document called MARSAME (Multi-Agency Radiation Survey and Assessment of Materials and Equipment); NRC is participating in that effort.

B.4 Recordkeeping

As part of this proposed rule, the NRC is including a requirement for recordkeeping. Licensees would be required to maintain records indicating the nature of the material released (e.g., type and quantity of solid material, and nuclides present and information on their concentrations) and its destination (e.g., the landfill or specific end use). The exception, as noted in Section III.B.1.2.1, is for tools and equipment carried from restricted/impacted areas by an individual as part of routine conduct of business. For this material, licensees would only be required to maintain records regarding the specific tool or equipment removed from the restricted/impacted area and the nuclide level of the item. The records required by these proposed regulations will aid in allowing verification that the dose criterion has been met and provide reasonable assurance that the material was delivered to one of the authorized destinations. The records required are considered an appropriate level of control for a material which NRC considers to be of negligible health consequence.

Some commenters expressed concern that they would not know what doses would result from products made from recycled materials and that materials should be tagged before release. Because the limited disposition path approach in this proposed rule will limit the potential for exposure to products made from recycled materials and because the dose criterion used in this proposed rule is set at a negligible individual dose level of 1 mrem/yr, there are not requirements for tagging or marking released materials because this would add regulatory burden without commensurate health and safety benefit. In addition, in conjunction with a dose criterion of 1 mrem/yr, it is unlikely that any future uses would result in reconcentrating residual radioactivity to levels that could impact public health and safety.

C. Other Considerations, Including Scope, Interfaces, and Regulatory Finality

To provide additional clarification in considering the implementation of this proposed rule, it is useful to discuss the scope of areas that this proposed rule would apply to and those that it would not, as well as interfaces with other NRC requirements and regulations. Areas of scope and interface include: materials covered by this rule; materials not covered by this rule; transfer of material from one licensee to another for continued use in a restricted or impacted area; and interface with the provisions of 10 CFR, Subpart E, on license termination. This section also discusses questions of regulatory finality regarding the release of solid materials from licensed control.

C.1 Materials within the scope of this rule

As noted in Section II.C, materials present in restricted or impacted areas and needing disposition are subject to the provisions of proposed §§ 20.2008, 20.2009, and 20.2108. The materials include metals (tanks, pipes, ventilation ducts, etc); equipment and tools; routine trash (plastics, paper, glass); office furniture, laboratory materials (gloves, beakers, etc.); concrete; and soil, soil-like materials, and other process materials. All of this material would need to be evaluated and surveyed for radioactivity (either by use of process knowledge or direct measurement) and sent to one of the disposition paths required by § 20.2008. For much of the materials (equipment and tools, routine trash, concrete, etc), the allowed disposition paths are fairly broad and similar to what licensees currently do with such materials. If a licensee wishes to use an alternate disposition path than those in § 20.2008 for other types of material like metal components, the licensee can apply to the NRC for approval of specific disposition procedures under § 20.2009. In addition, if a license wishes to use an alternate disposition path than those in § 20.2008 for materials covered by § 20.2008, the licensee may also apply for the alternate path under § 20.2009.

As noted above, materials within restricted and impacted areas would be subject to the requirements of proposed §§ 20.2008, 20.2009, and 2108. However, it may be that basing decisions on disposition of solid materials from a "restricted area" is not appropriate because the definition of restricted area in Part 20 is based on limiting access for the purpose of protecting an individual against undue risks from exposure to radiation. Some licensees create restricted areas to protect individuals from exposure to ambient external radiation fields, and not necessarily based on the residual radioactivity in or on solid material. Thus, a more appropriate scope to define what material is covered by this rule may be the term "impacted area" which is currently defined in Part 50 as "areas with some reasonable potential for residual radioactivity in excess of natural background." (The term "non-impacted area" is also defined in Part 50 as an area with "no reasonable potential for residual radioactivity in excess of natural background"). In MARSSIM, NUREG-1575, these same terms, impacted and non-impacted areas, are used to signify the extent of surveys needed to release the areas from license control. It is further noted in NUREG-1575, Figure 2.4, that there is no survey required for a non-impacted area in order to release it from licensed control; for impacted areas (even for those areas that are not expected to contain any residual radioactivity or expected to contain very small amounts of radioactivity) a range of survey requirements are indicated. A similar logic can be drawn for those solid materials present in impacted vs. non-impacted areas, and it would seem reasonable that this proposed rule on disposition of solid materials should therefore only apply to materials from impacted areas. Thus, it may be appropriate to use only the term "solid materials originating in impacted areas" when indicating the scope of materials covered by this rule. This would mean that for various NRC licensees, like medical facilities or research laboratories, which may define restricted areas broadly based on facility design, NRC could better focus its disposition and recordkeeping requirements on solid materials from those areas for which there was reasonable potential for the presence of residual radioactivity. Licensees

could either designate the entire restricted area as an impacted area or could be more focused as to those areas it was designating as an impacted area, whichever was more cost-effective.

C.2 Materials not within the scope of this rule

(1) Materials outside the restricted or impacted areas: Solid materials not currently nor having a history of ever having been located in restricted or impacted areas, and considered to be free of radioactivity resulting from licensed operations, are not currently required to be part of a disposition radiological survey program. Such materials can include furniture, glass bottles, paper, equipment, or trash in administrative buildings or office areas. This rulemaking does not propose to alter this approach; therefore, materials in these areas are not covered by the provisions of this proposed rule.

(2) Materials with larger amounts of radioactivity: There are other solid materials at licensed facilities that contain larger amounts of radioactivity (e.g., reactor system components, sealed sources, etc.) that are routinely kept separate from solid materials with no, or very small amounts of, radioactivity. Because requirements already exist in NRC's existing regulations in 10 CFR Part 61 for their disposal at licensed low-level waste (LLW) disposal sites, they are not covered by the provisions of this rulemaking.

(3) Treated process materials: Treated process materials, which are materials whose properties have been modified or are unique to the process from which they originate, such as spent ion-exchange resins, sludge from spent ion-exchange process systems, microspheres, oily sludge and sediments, spent filters and filter sludge, spent charcoal

beds, and incinerator ashes; and materials that have been solidified or stabilized, contain chelating agents, pathogenic or infectious biotic agents, and pyrophoric or explosive chemicals, are not within the scope of this rulemaking. These materials were not part of the scope of this effort and were not analyzed in the supporting technical basis or in the DGEIS. As noted in #5, below, these materials can continue to use the provisions of § 20.2002 for their disposal.

(4) Liquids and gases: These materials currently have requirements related to their release in 10 CFR Parts 20 and 50 and were not part of the scope of this effort and were not analyzed in the supporting technical basis or in the DGEIS, and are excluded from scope of this rulemaking.

(5) Materials covered under existing 10 CFR 20.2002: Currently, licensees can apply to the Commission for approval of procedures to dispose of licensed material at either onsite or offsite land burial. The requirements for procedures to seek Commission approval in the new proposed § 20.2009 are similar to those in § 20.2002; however, the proposed § 20.2009 procedures apply more broadly because they also allow licensees to also seek alternate dispositions such as some limited re-use not already approved in § 20.2008. In addition, § 20.2009 specifically applies only to the solid materials and soil materials defined in this proposed rule and not to the treated process materials discussed in #3, above, which can still use the provisions of § 20.2002 for their disposal.

(6) Materials associated with persons leaving restricted or impacted areas: Licensee personnel and others come and go from restricted areas on a routine basis. Licensees

are required to monitor workers for radiation dose. It is industry practice for workers to pass through a personnel frisker before they leave the restricted area under existing requirements of 10 CFR Part 20. The provisions of this proposed rule do not apply to those persons or their personal items such as jewelry, watches, etc.

(7) Material intentionally made radioactive as part of manufacturing or research process at a licensed facility: Some facilities are licensed by NRC to introduce radioactive material into products or to conduct research using radioactive materials. Handling of these materials is subject to other requirements in 10 CFR and they are not subject to the provisions of this proposed rule.

(8) Materials associated with Radiological Disperson Device (RDDs) incidents: The scope of this rule only includes release of solid materials from licensed control at facilities licensed by the NRC and/or Agreement States. The proposed rule is not applicable to emergency provisions associated with handling or setting criteria for cleanup of RDD events.

C.3 Transfer of solid material from one licensee to another for use in a restricted or impacted area

Nothing in this proposed rule would preclude a licensee from transferring material and equipment to another NRC or Agreement State licensee for re-use in a regulated environment. There are already existing requirements for such transfer and this proposed rule, which would set criteria for release from licensed control; this proposed rule does not alter that.

C.4 Relationship to the Requirements of 10 CFR Part 20, Subpart E

Subpart E to 10 CFR Part 20 contains requirements for license termination of licensed sites. Section 20.1402 of Subpart E contains radiological criteria for unrestricted use of a site based on a dose criterion of 25 mrem/yr and, in addition, provisions for reducing radioactivity to levels that are ALARA. These requirements were set in the rulemaking for the license termination rule (62 FR 39058, July 21, 1997) based on considerations related to providing a sufficient and ample margin of safety below NRC's public dose limit of 100 mrem/yr to ensure protection of public health and safety, and cost-benefit considerations of further reducing the dose below 25 mrem/yr for lands and structures.

In the Issues Paper (64 FR 35090, June 30, 1999) released to solicit early comment on this rulemaking on disposition of solid materials, it was noted that there are different circumstances between Subpart E and the issues associated with disposition of solid material. Specifically, it was noted that the Subpart E dose limit of 25 mrem/yr is based on a single release of structures and land at a site, whereas, in contrast, release of solid materials could involve periodic releases over the lifetime of the facility. Hence, in developing the dose criterion for this rulemaking on disposition of solid material, as discussed in Section III.B.2, above, the NRC uses considerations such as: more limiting fractions of the public dose limit to account for the potential for multiple releases and exposures; similarity to the range of requirements in 10 CFR Part 50, Appendix I, for other media such as air and liquid effluents; and consideration of NCRP Report Nos 116 and 141 regarding the negligible nature of a 1 mrem/yr standard.

D. Consideration of Other Alternate Approaches for Disposition of Solid Materials

Another alternative considered was use of ANSI Standard N13.12. The National Technology Transfer and Advancement Act of 1995 (NTTAA), Public Law 104-113, requires all Federal agencies and departments, in carrying out policy objectives or activities, to use technical standards developed or adopted by voluntary consensus standards bodies, except when utilization of such standards "is inconsistent with applicable law or otherwise impractical." The ANSI standard presents screening clearance criteria for unrestricted release of solid materials based on an annual dose limit of 1 mrem. However, for the reasons discussed in Sections III.A and III.B, above, the NRC is proposing a rulemaking approach that limits disposition of solid materials, based on a 1 mrem/yr dose criterion (similar to ANSI N13.12) and an associated set of nuclide concentrations based on RS-G-1.7. Thus, NRC's approach incorporates certain elements of ANSI N13.12, but does not use it in its entirety. NRC regards this approach as appropriate given the range of considerations discussed above. Other rationale for why the ANSI N13.12 was not used in its entirety are discussed in the DGEIS and, for the reasons noted in the DGEIS, NRC believes that use of the ANSI standard is impractical.

Another alternate discussed by some stakeholders, and referred to in the National Academies Report, was recapture of solid material already released from licensed facilities. As noted in Section I, NRC's current approach allows release of solid material if it is below a measurement-based guideline. Some stakeholders requested that NRC include as part of its alternatives, review of previous releases and their recapture. However, NRC is not proceeding with this approach as part of this rulemaking for two reasons. First, as noted in the National Academies Report, NRC's current practice protects public health; therefore, attempting to find and retrieve materials released under the current approach would be unduly burdensome given

the National Academies' finding. Secondly, this rulemaking is setting criteria for disposition of material currently at licensed facilities and available for release; as such, the recapture approach is out of the scope of this rulemaking.

IV. Discussion of Stakeholder Input on Other Issues

In addition to the discussion of alternatives for disposition of solid materials, stakeholders also provided comments on other issues associated with this rulemaking, in particular with regard to: stakeholder involvement in the rulemaking process; development of NRC's technical basis; the relationship to the Below Regulatory Concern (BRC) Policy; and State, other Federal agency, and international related issues. Stakeholder comments are summarized in the DGEIS, Appendix A. A discussion of considerations related to those concerns are contained in the following sections.

A. Stakeholder Involvement in the Rulemaking Process:

As discussed briefly in Section II.D, NRC has had a continuing effort, both early in the process and during its decision-making, to seek stakeholder input on major issues associated with this effort. This has included release of several documents, including a June 1999 "Issues Paper," and a Scoping FRN and web-based Information Packet issued in February 2003, all of which invited written and/or electronic comment on the issues, and the holding of 11 public meetings during the period September 1999 through September 2003 with stakeholders (including 3 convened by the National Academies as part of their study on this subject) at which NRC have heard a range of viewpoints from a diversity of stakeholders on alternatives and

possible impacts (stakeholders included metals and cement industries; citizen and environmental groups; licensees and licensee organizations; State and Federal agencies; Tribal organizations; and organizations such as the HPS). Summaries of stakeholder input received through these various forums are presented in various documents, including Appendix A of the DGEIS, in the background section of NRC's website at www.nrc.gov/materials.html, and in NUREG/CR-6682.

It can be noted that NRC's June 1999 Issues Paper stated that NRC was seeking public comment, and participation at a series of meetings, before the start of any formal rulemaking, in order to solicit early and active public participation on major issues associated with disposition of solid materials with the specific objectives of identifying relevant issues; exchanging information on these issues; identifying concerns and areas of disagreement, and, where possible, approaches for resolution.

Despite a boycott by citizens groups of the first two meetings in Fall 1999, the NRC held two additional meetings that were attended by several citizens groups. In addition, the meetings during 1999 were attended by metals industry groups and cement industry groups, both of whom expressed concern about aspects of certain alternatives. The meetings were also attended by State and landfill groups who provided information on issues related to landfill disposal, and by various licensee groups (including representatives from university laboratories and hospitals) who provided input on unique issues associated with disposition of solid material at their facilities. In addition to the 4 public meetings held in 1999, the NRC also received over 900 written comment letters and emails on the June 1999 Issues Paper from a range of stakeholder groups, including citizens groups and individuals. As a follow-up, the NRC held a meeting in January 2000 to specifically hear from representatives of the metals industry about

their concerns related to clearance; and in May 2000, the NRC invited 14 different stakeholder groups (including several citizens groups, the metals industry, States, and licensees) to a Commission meeting to provide representatives of those groups the opportunity to present their views directly to the Commissioners.

Following that presentation of information in May 2000, the Commission sought further information on this subject by requesting the National Academies to provide an independent analysis of alternatives for disposition of solid materials. As discussed in Section II.D, above, the National Academies held three meetings with a range of stakeholder groups in 2001 and provided the Commission with a report on its findings, including nine recommendations, in March 2002. Subsequently, the NRC sought additional public comment on alternatives for disposition of solid materials via a FRN in February 2003; stakeholders were also invited to comment via an "Information Packet" placed on NRC's website in February 2003. The NRC held a workshop in May 2003 at which 30 invited stakeholder groups provided their additional views on alternatives. Also, the NRC held an additional meeting open to the public, at which NEI, representing utility licensees, was afforded the opportunity, at their request, to provide additional information about their views on disposition of solid materials. The NRC also received over 2600 written comment letters and e-mails in response to the February 2003 FRN from a range of stakeholder groups.

Thus, the NRC has participated in 11 meetings with a range of stakeholder groups and is in receipt of over 3500 comment letters and emails representing viewpoints from a wide range of stakeholders. Information gathered in this effort has included: identification of economic concerns by the metals and cement industries; concern by the public over the potential presence of solid materials, even at very low levels of radioactivity, from licensed

facilities into general commerce and consumer products; reference to various health studies regarding low levels of radioactivity; identification of practical issues of how solid materials are handled at the range of facilities NRC licenses, including (as noted above) small licensees like university laboratories and hospitals and larger ones like manufacturers and power reactors; issues of feasibility related to limiting solid materials to only a selected set of defined uses; and viewpoints on both sides of the issue associated with disposal of solid materials in RCRA landfills at radioactivity levels near 1 mrem/yr. The NRC has benefitted enormously from this process in the depth and breadth of knowledge that it has now regarding disposition of solid materials and appreciates greatly those who took the time to participate in this process. NRC believes that it has a deep and broad understanding of the range of issues and viewpoints associated with the alternatives.

The NRC is now issuing this proposed rule which it believes represents a reasonable position based on the information gathering process it has conducted. The evolution of alternatives from what was initially discussed with stakeholders to the content of the proposed rule clearly indicates that the process was not pre-determined and also that NRC made considerable use of stakeholder views in formulating its proposed rule. The information used in NRC's decision-making has included input from stakeholders, review of reports by other organizations in this area, review and comparison with other related health standards, and development of technical bases (including dose analysis and survey procedures) and NEPA analysis on disposition of solid materials. NRC is issuing this proposed rule and the DGEIS for public comment and also plans to discuss this issue further with stakeholders to solicit additional input on these documents.

B. Development of Technical Basis and DGEIS

NRC has expended substantial effort to review and develop technical information in order to be able to provide a complete analysis of all reasonable alternatives for disposition of solid materials. Principal factors affecting decisions on alternatives could include impacts on human health and the environment, cost-benefit considerations, impacts on other industries, and the capability to survey the material for the various alternatives. Thus, to support decision-making on all alternatives, technical information has been developed which includes inventories of solid material potentially available for release; assessment of individual and collective radiation doses which could occur depending on the alternative selected, including the potential for exposure to multiple sources; and costs associated with handling, surveying, transport, disposal, and possible uses of these materials. NRC also developed information on methods that could be used for performing radiation surveys of solid material available for release. The types of solid materials which have been analyzed as part of this effort have included metals, concrete, soil, and other materials found at nuclear facilities, including lead, glass, paper, wood, plastic, and ordinary trash.

A principal support document prepared by NRC as part of the technical basis for the proposed rule is NUREG-1640 (Volumes 1 and 3, published September 2003; Volume 2, published October 2004; Volume 4, published May 2004). NUREG-1640 includes an assessment of inventory of solid materials at licensed facilities covered by this rulemaking and those potentially available to be released or sent to a LLW disposal site under a prohibition alternative. NUREG-1640 also assesses pathways by which an individual could be exposed as a result of release of solid materials, either for general or limited recycle, reuse, or disposal in a landfill. As discussed in Section III.B.3.1, in an effort separate from development of NUREG-

1640, the IAEA developed RS-G-1.7 to assist countries in setting standards for exemption, exclusion, and clearance from regulatory control. RS-G-1.7 is based on a consideration of various exposure pathways, scenarios, and potential receptors of released materials developed to encompass all typical exposure situations for all material types. The NRC has reviewed IAEA's RS-G-1.7 concentrations and, as discussed in the DGEIS, found these concentrations reasonably consistent with NUREG-1640. Dose pathways for individuals for the prohibition alternative are not explicitly analyzed in NUREG-1640 or RS-G-1.7 because there would not be release pathways. Pathways related to prohibition were analyzed in the 10 CFR Part 61 Final EIS (NUREG-0945).

An additional NRC technical report is NUREG-1761, published June 2004. NUREG-1761 provides technical information on survey approaches for a range of possible alternatives for control of solid material, including approaches that would be taken for both non-release and release alternatives (including considerations for a range of nuclide concentrations).

The NRC studies noted above, as well as the DGEIS, are available on the NRC website.

The DGEIS (NUREG-1812), being issued along with this proposed rule, includes an analysis of the impacts (including collective doses) and costs associated with all of the alternatives for disposition of solid materials. The analyses and results are available for public review and comment. Also, based on the analyses conducted, the NRC has issued Regulatory Guidance (NUREG-1813) for assuring that radiation surveys are conducted in a manner that will confirm that the licensee has met the criteria of this regulation; NUREG-1813 is also available for public review and comment. With the issuance of these documents for review and

comment, the NRC considers that it has an appropriate basis upon which to make a decision regarding criteria for disposition of solid materials and can proceed with this proposed rule.

With regard to stakeholder comments that indicated that additional study of health effects is needed before proceeding with this proposed rule, NRC has a substantial basis for making decisions in this area based on the scientific knowledge already in hand. A more complete discussion of health effects, including current and ongoing studies, is contained in Section III.B.2. As noted in that section, NRC is also continuing to follow current studies in this area to further assess the adequacy of its regulations.

Some stakeholders stated that NUREG-1640 should not be used in any further analysis or decision-making, because the initial contractor in its preparation, SAIC, was found to have a COI. However, the NRC has peer reviewed and verified the scientific accuracy of NUREG-1640 and based on its review believes that NUREG-1640 forms a robust basis for analysis of potential exposures and for decision-making on alternatives. NRC's review included an independent technical review of draft NUREG-1640 by the Center for Nuclear Waste Regulatory Analyses (CNWRA) which found that SAIC performed a high-quality analysis in draft NUREG-1640. In addition, the National Academies reviewed NUREG-1640 along with other technical documents and stated in its final report that draft NUREG-1640 provides a "conceptual framework that best represents the current state of the art in risk assessment, particularly with regard to its incorporation of formal uncertainty," as judged by recommendations of the National Academies study committee and other committees of the National Research Council. The National Academies Report also noted the questions of contractor COI associated with development of the draft NUREG-1640; however, the report also noted that the mathematics and completeness of scenarios considered in draft NUREG-

1640 had been verified through an audit carried out by another NRC contractor. The National Academies also carried out its own review that confirmed the reasonableness of several dose factor analyses although its report did note certain improvements that were needed to NUREG-1640, including a thorough review of certain parameters, scenarios, and assumptions to complete the reassessment of draft NUREG-1640. Partly in response to the CNWRA and National Academies reviews, NRC had its new contractor, SC&A, review and revise various parameters, scenarios, and assumptions, and following an additional peer review the final NUREG-1640 was issued, in four volumes from September 2003 to October 2004. Based on these various independent reviews, NRC considers the revised NUREG-1640 appropriate for use in its further analyses and rulemaking. As discussed in Section III.B.3.1, above, NRC has used NUREG-1640 both to review the content of IAEA's RS-G-1.7 and to supplement its radionuclide concentration tables; the methods of NUREG-1640 could also be used as part of a licensee's submittal under the case-specific provisions of this proposed rule.

C. Relationship of This Rulemaking to NRC's Earlier BRC Policy

Some stakeholders stated that this effort is similar to NRC's previous efforts to establish a BRC policy[18] in the early 1990s. These stakeholders also stated that the public had spoken at

---

[18] The BRC policy was an effort by the NRC to develop a general statement of Commission policy (July 3, 1990, 55FR 27522) that would provide a broad framework for making decisions on exempting, from regulatory control, certain practices involving small quantities of radioactive material, including recycle of solid materials. There was extensive public comment, from licensees, the States, and citizens groups when the BRC policy was issued. The Commission decided that a more extensive public involvement process in establishing such a decision framework would be beneficial and hence instituted a moratorium on the BRC Policy in July 1991. Subsequently, in October 1992, the U.S. Congress enacted the Energy Policy Act of 1992 which revoked the BRC Policy Statement. Subsequently, the NRC envisioned conducting rulemakings to implement through the APA process some of the approaches of the BRC policy; the license termination rulemaking completed in 1997 (62 FR 39058, July 21, 1997) was an example of such a rulemaking.

that time in opposition to the BRC policy, which helped result in passage of the Energy Policy Act in 1992 revoking BRC.

Although the general subject matter of this rulemaking is similar to that of the BRC Policy (e.g., to provide a clear, consistent, regulatory framework for regulating the disposition of solid materials in a manner that ensures protection of public health and safety), the NRC's current use of a rulemaking process to establish a regulatory basis is unlike the broad policy-setting approach of the BRC policy, which initially sought to establish a policy on releases prior to a full Administrative Procedures Act (APA) process. The NRC's current rulemaking process (as discussed in Section V.A, above) has, and is continuing to, include public participation in consideration of alternatives under the APA. NRC also has included certain enhanced features such as several public meetings and review by the National Academies, and a NEPA analysis of alternatives (also subject to public review) that includes assessment of: potential scenarios and pathways for radiation exposure; feasibility and economic impact of alternatives; radiation survey capabilities; and the environmental impacts and cost-benefit of alternative approaches. This rulemaking process will improve the efficiency and effectiveness of NRC's current case-by-case licensing process by incorporating criteria for disposition of solid materials into a legally binding regulation, while assuring that disposition of solid materials continues to be controlled in a manner that protects public health and safety.

D. Other Federal Agency, State, and International Interfaces

As a means of including views from other agencies in this process, DOE, EPA, and State agencies have been represented at the stakeholder meetings discussed in Sections II.D and

I.V.A, above. Considerations related to discussions with these agencies have been used in development of various parts of this rulemaking (including the draft rule text and the draft regulatory guidance in NUREG-1813). In addition, DOE, EPA, and the State of Massachusetts (representing the Conference of Radiation Control Program Directors and the Organization of Agreement States) have been cooperating agencies in the development of the DGEIS.

With regard to DOE, it can be noted that DOE has a separate effort to disposition scrap metal from DOE facilities. NRC's effort is for solid materials being considered for disposition from NRC/Agreement State licensed facilities. Materials from DOE facilities that are also NRC licensees were included in NRC's analysis in the DGEIS. Other sources of solid materials are discussed in the DGEIS in Section 3.8 on cumulative impacts.

With regard to EPA, NRC has worked with EPA to develop technical bases on estimating exposures from various scenarios and pathways that could result from release of solid materials. With regard to considerations related to landfill disposition of solid materials, the NRC has reviewed various EPA regulations and documents regarding landfill requirements, met with EPA to discuss requirements in this area, and included EPA as a cooperating agency on the DGEIS. The NRC also has considered various comments from State agencies on its rulemaking, considered State requirements in this area, and, as noted above, included State representatives in the rulemaking process.

With regard to international agencies, as noted above in Section III, NRC has included in its proposed rule nuclide concentrations taken from IAEA's RS-G-1.7, associated with a 1 mrem/yr dose criterion, so that the proposed NRC rule ensures protection of public health and

safety and maintains consistency with international standards. There also could be potential issues relating to export-import of materials; however, NRC's regulations in 10 CFR Part 110 already contain requirements for export and import of material. Today's proposed amendments do not change those requirements or the procedures associated with them.

An additional area where NRC considered Federal agency interface is related to potential issues with transport regulations issued by the DOT. Solid materials released from further licensed control by NRC under this proposed NRC regulation will likely be transported in a variety of manners, and there needs to be consistency between NRC's requirements and DOT's requirements in 49 CFR Part 173 for transport of material. Based on NRC's analyses, the amended tables in Appendix B to 10 CFR Part 20 and in NUREG-1813 will be less than the DOT values. Further discussion regarding how licensees should continue to assure such consistency is provided in NUREG-1813.

V Section-by-Section Analysis of Proposed Rule

§ 20.1003 Definitions.

This section would be amended to add definitions of the terms "impacted area," "reuse," "solid materials," "soil," "soil-like materials," and "process materials."

The new term "impacted area" would be added to 10 CFR Part 20 to reflect the origin of the solid materials that are the subject of this rule. This definition is consistent with the definition of "impacted area" in 10 CFR Part 50.

The new term "reuse" would be added to reflect the NRC proposed disposition path of limited disposition alternative. Certain solid materials as indicated in the proposed rule may be released in their original form for their original intended purpose (*e.g.*, scaffolds, cranes, forklifts, hand tools, testing equipment, etc.).

The new term "solid materials" would be added to distinguish such solid material that would be regulated under this rule based on the analysis made in the DGEIS and supporting technical basis.

The new terms "soils," "soil-like materials," and "process materials" would be added to describe the types of materials that would be dispositioned pursuant to the proposed 10 CFR 20.2009. Proposed § 20.2009 would ensure that these materials could be dispositioned on a case-by-case basis with the same dose limit as solid material. Even though these types of materials are considered solid in form, they were not analyzed in the DGEIS and therefore, would not be considered in the realm of material that can be dispositioned under § 20.2008.

§ 20.2001 General requirements.

This section would be amended to reflect additional disposition options under § 20.2008 for solid material, § 20.2009 for soils, soil-like materials, and process materials, and § 20.2009 for case-specific review requirements for disposition of these various materials. Sections 20.2008 and 20.2009 would be included in the list of referenced sections in subsection 20.2001(a)(4).

§ 20.2008 Limited disposition of solid material.

Section 20.2008 includes requirements for the limited disposition of solid material. The effect of this requirement is to exempt material released under § 20.2008 from further NRC licensing and regulatory requirements. Licensees meeting the conditions/requirements set forth in § § 20.2008(b) and 20.2008(c) can release solid material without further Commission approval.

§ 20.2008(a) Dose limits and compliance for release of solid material.

This new section would be added to indicate a dose criterion of 1 mrem/yr for limited disposition which ensures protection of public health and safety for disposition of solid material, consistent with other radiation and chemical protection standards, and can be modeled and verified by measurement. The discussion regarding the proposed dose criterion can be found in Section III.B.2, above.

§ 20.2008(b) Dose limits and compliance for release of solid material.

This new section introduces the various solid material disposition paths permitted under the proposed rule. New subsections 20.2008(b)(1), 20.2008(b)(2), 20.2008(b)(3), and 20.2008(b)(4) provide the acceptable disposition paths for release of solid materials. Subsection 20.2008(b)(1) would allow for disposition of solid materials in an EPA or State authorized RCRA landfill. Proposed subsections 20.2008(b)(2), 20.2008(b)(3), and 20.2008(b)(4) allow for disposition in a set of defined non-licensed end uses. Subsection 20.2008(b)(2) would allow the release of concrete for use in road bed construction. Subsection 20.2008(b)(3) would allow the

reuse of solid materials, equipment, and tools in their original form, in industrial or construction settings, for their original intended design purpose and function. It is intended that these particular materials would only be reused in industrial and construction settings. Subsection 20.2008(b)(4) would be added to the regulations to differentiate between the larger, more stationary pieces of material that would be reused in subsection 20.2008(b)(3) and the equipment and tools that would be removed from the restricted and/or impacted areas by an individual as part of the routine conduct of work. It is intended that these materials would be reused in their original form for their original intended design purpose and function. These equipment and tools that would be the subject of subsection 20.2008(b)(4) would not be required to have as detailed recordkeeping requirements as the material described in subsection 20.2008(b)(3). This difference in requirements is because, as noted in Section B.1.2.1 trying to direct each of the equipment and tools under subsection 20.2008(b)(4) to an industrial/construction use, and maintaining records of such transfers, would be unduly burdensome, given the very low risk involved.

§ 20.2008(c) Dose limits and compliance for release of solid material.

New § 20.2008(c) would reference a table of volumetric concentrations for solid materials. Discussion regarding the use of the nuclide concentrations can be found in Section III.B.3, above. Use of the table means that licensees can demonstrate compliance more efficiently. The volumetric table was taken directly from IAEA's RS-G-1.7 and is located in the proposed amended Part 20, Appendix B, Table 4. The surface concentrations were derived from the volume concentrations in IAEA's RS-G-1.7 and are contained in NUREG-1813. If more than one radionuclide is released, the licensee shall determine the fraction of the limit in Table 4 of

Appendix B to Part 20 or NUREG-1813, as applicable, represented by the concentration of each radionuclide. The sum of the fractions for each radionuclide must not exceed unity.

§ 20.2009 Case-Specific Review Requirements for Disposition.

This new section would be added to 10 CFR Part 20 to include provisions under which a licensee would request a case-specific approval for disposition of solid materials, and soil, soil-like materials, and process materials, and would outline the requirements for a case-specific analysis. The effect of this requirement is to exempt material released under § 20.2009 from further NRC licensing and regulatory requirements.

§ 20.2009(a) Case-Specific Review Requirements for Disposition.

This new section would stipulate how and at what dose level soils, soil-like material, and process material could be dispositioned. Since analysis of this type of material was not included in the DGEIS, a case-specific review and approval would be required.

§ 20.2009(a)(1) Case-Specific Review Requirements for Disposition.

New subsection 20.2009(a)(1) would include a dose criterion of 1 mrem/yr for disposition of soils, soil-like material, and process material, which is consistent with other radiation and chemical protection standards, and can be modeled and readily verified by measurement.

Discussion regarding the proposed dose criteria can be found in III.B.2 of the Statement of Considerations.

§ 20.2009(a)(2) Case-Specific Review Requirements for Disposition.

This section would only allow for disposition of soils, soil-like material, and process material in an EPA or State authorized RCRA landfill. Licensees that want to disposition soils, soil-like material, and process material under this provision must meet the requirement in § 20.2009(e).

§ 20.2009(b) Case-Specific Review Requirements for Disposition.

This new section would stipulate that licensees who would like to disposition soils, soil-like material, and process material into disposition paths other than the path indicated in § 20.2009(a)(2) (i.e., to landfills) would need a case-specific review since analysis of other pathways for these types of material were not included in the DGEIS. The dose criterion of 1 mrem/yr must be met to disposition soil, soil-like materials, and process materials under provisions of § 20.2009(b). Licensees that want to use this section must also meet the requirements of § 20.2009(e).

§ 20.2009(c) Case-Specific Review Requirements for Disposition.

This new section would address case-specific approval for procedures not otherwise authorized in § 20.2008(b) or § 20.2008(c). An alternative disposition path for solid materials may be proposed, but must maintain a dose criterion of 1 mrem/yr. Also, a different nuclide concentration from that cited in 10 CFR Part 20, Appendix B, table 4, may be proposed as long as the 1 mrem/yr dose criteria is met. Licensees that want to use this section must also meet the requirements of § 20.2009(e).

§ 20.2009(d) Case-Specific Review Requirements for Disposition.

This new section would address case-specific approval for disposition of solid materials, soil, soil-like materials, and process materials in an EPA or State authorized RCRA landfill at a different dose than what is required in § 20.2008(a) or § 20.2009(a)(1). Under the provisions of this subsection, a licensee could request a case-specific approval for a dose limit higher than the 1 mrem/yr dose criteria in § 20.2008(a) for solid materials and in § 20.2009(a)(1) for soils, soil-like material, and process material, if the material is intended to be dispositioned in a RCRA D landfill and if analyses and procedures are included to ensure that doses are maintained ALARA and within the dose limits of Part 20.

§ 20.2009(e) Case-Specific Review Requirements for Disposition.

This new section would describe the requirements that are needed for a case-specific application for proposals made under § 20.2009(a), § 20.2009(b), and § 20.2009(c). These requirements are modeled after existing language in § 20.2002.

§ 20.2009(e)(1) Case-Specific Review Requirements for Disposition.

This new subsection would ensure that a description of the material (including physical, chemical, and radiological properties), the manner in which the material would be dispositioned, and a description of the nature of controls or restrictions to prevent the material from going to an unrestricted release would be included in an application. Similar text is found in § 20.2002(a).

§ 20.2009(e)(2) Case-Specific Review Requirements for Disposition.

The language in new subsection 20.2009(e)(2) would require an analysis and evaluation of pertinent information on the nature of the environment. Similar text is found in § 20.2002(b).

§ 20.2009(e)(3) Case-Specific Review Requirements for Disposition.

This new subsection would be added to ensure that the nature and location of other potentially affected licensed and unlicensed facilities would be described in the application. Similar text is found in the current disposal requirements in § 20.2002(c).

§ 20.2009(e)(4) Case-Specific Review Requirements for Disposition.

The language in new subsection 20.2009(e)(4) would be added to require doses to be maintained within the dose limit in § 20.2008(a) for solid materials or in § 20.2009(a)(1) for soils, soil-like material, and process material. The regulation would restrict licensees to the 1 mrem/yr dose/yr criteria for limited disposition of these materials.

§ 20.2009(f) Case-Specific Review Requirements for Disposition.

This new section would describe the requirements that are needed for a case-specific application for proposals made under § 20.2009(d). These requirements are modeled after existing language in § 20.2002.

§ 20.2009(f)(1) Case-Specific Review Requirements for Disposition.

This new subsection would ensure that a description of the material (including physical, chemical, and radiological properties), the manner in which the material would be dispositioned, and a description of the nature of controls or restrictions to prevent the material from going to an unrestricted release would be described in an application. Similar text is found in § 20.2002(a).

§ 20.2009(f)(2) Case-Specific Review Requirements for Disposition.

The language in new subsection 20.2009(e)(2) would require an analysis and evaluation of pertinent information on the nature of the environment. Similar text is found in § 20.2002(b).

§ 20.2009(f)(3) Case-Specific Review Requirements for Disposition.

This new subsection would be added to ensure that the nature and location of other potentially affected licensed and unlicensed facilities would be described in the application. Similar text is found in the current disposal requirements in § 20.2002(c).

§ 20.2108(a): Records of waste disposal and material disposition.

The title of this section would be revised to indicate that records need to be maintained for material that is dispositioned as well as disposed.

This section would be revised to include three new subsections 20.2108(a)(1), (2), and (3). New subsection 20.2108(a)(1) would include the requirements that were in the previous § 20.2108(a), which requires licensees to maintain records of disposal of licensed materials made under §§ 20.2002, 20.2003, 20.2004, 20.2005, 10 CFR Part 61 and disposal by burial in soil, including burials authorized before January 28, 1981.[6]

A new subsection 20.2108(a)(2) would include recordkeeping requirements for materials dispositioned under §§ 20.2008(b)(1), 20.2008(b)(2), 20.2008(b)(3), and 20.2009. Licensees would be required to maintain records of the types and amounts of material shipped, the destination of the material, the date it was delivered to its destination, and the radionuclides in the material released, in a format indicating that the released concentration value was in compliance with the criteria in Table 4 of Appendix B to Part 20 or surface concentration values specified in NUREG-1813, as applicable. These records would aid in providing reasonable assurance that the material would be delivered to one of the authorized destinations noted in §§ 20.2008(b)(1), 20.2008(b)(2), 20.2008(b)(3), and 20.2009, above.

A new subsection 20.2108(a)(3) would add recordkeeping requirements for materials regulated under § 20.2008(b)(4). Licensees would be required to maintain records of tools and equipment that are removed on a routine basis by an individual from the restricted and/or impacted areas. Those records should include a listing of the radionuclides released in a format indicating that volumetric radioactivity was in compliance with the criteria in Table 4 of Appendix B to 10 CFR Part 20 or surface concentration values specified in NUREG-1813, as applicable.

---

[6]A previous § 20.304 permitted burial of small quantities of licensed materials in soil before January 28, 1981, without specific Commission authorization.

These records are deemed appropriate for these equipment and tools given the very low risk involved, as noted in Section B.1.2.1.

Section 20.2108(b) would be revised to indicate that records for the materials regulated under §20.2108(a)(1) and 20.2108(a)(2) need to be retained until the Commission terminates each pertinent license requiring the record. Requirements for disposition of these records, prior to license termination, remain unchanged from the existing regulations. A new sentence was added to indicate that the retention for records material regulated under § 20.2108(a)(3) would only be for 3 years after the record is made. This retention period was determined to be adequate since it is similar to the timeframe set for retaining records of surveys under § 20.2103(a).

APPENDIX B TO PART 20 - ANNUAL LIMITS ON INTAKE (ALIs) AND DERIVED AIR CONCENTRATIONS (DACs) OF RADIONUCLIDES FOR OCCUPATIONAL EXPOSURE; EFFLUENT CONCENTRATIONS; CONCENTRATIONS FOR RELEASE TO SEWERAGE; SOLID MATERIAL RELEASE CONCENTRATIONS

The title of this section would be revised to include concentration values for solid material release.

INTRODUCTION

This section would be revised to include a sentence, at the end of the paragraph, regarding the inclusion of a new table 4, which provides concentration values for the release of solid materials.

NOTATION

The first sentence of this section would be revised to state that the values in the new table 4, as in the existing tables 1, 2, and 3, are presented in the computer "E" notation.

TABLE 4 "SOLID MATERIAL RELEASE"

A new section would be added to introduce Table 4, which includes volumétric nuclide concentration release values for solid material. Table 4 contains measurable nuclide concentrations applicable to the limited disposition of solid materials under § 20.2008. Concentration values are based on annual doses of 1 mrem to an average member of the critical group. Values for artificial radionuclides are from the International Atomic Energy Agency's report RS-G-1.7, "Application of the Concepts of Exclusion, Exemption, and Clearance." Values for naturally occurring radionuclides are based on NUREG-1640, "Radiological Assessments for Clearance of Materials from Nuclear Facilities."

VI. Agreement State Compatibility

Under the "Policy Statement on Adequacy and Compatibility of Agreement State Programs" which became effective on September 3,1997 (62 FR 46517), NRC program elements (including regulations) are placed into four compatibility categories. In addition, NRC program elements also are identified as having particular health and safety significance or as being reserved solely to the NRC. Compatibility Category A are those program elements that are basic radiation protection standards and scientific terms and definitions that are necessary to understand radiation protection concepts. An Agreement State should adopt Category A program elements in an essentially identical manner to provide uniformity in the regulation of solid material on a nationwide basis. Compatibility Category B are those program elements that apply to activities that have direct and significant effects in multiple jurisdictions. An Agreement State should adopt Category B program elements in an essentially identical manner. Compatibility Category C are those program elements that do not meet the criteria of Category A or B, but the essential objectives of which an Agreement State should adopt to avoid conflict, duplication, gaps, or other conditions that would jeopardize an orderly pattern in the regulation of solid material on a nationwide basis. An Agreement State should adopt the essential objectives of the Category C program elements. Compatibility Category D are those program elements that do not meet any of the criteria of Category A, B, or C, and thus do not need to be adopted by Agreement States for purpose of compatibility.

The compatibility characterization of the existing sections in Part 20 that were proposed to be amended based on the implementation of this rule, remain the same. Section 20.2001, General Requirements, was categorized as a Category C prior to the proposed amendments and

remains a Category C based on the result from implementation of the procedure in Management Directive 5.9, "Adequacy and Compatibility of Agreement States". A Category C compatibility ensures that Agreement States adopt the essential objectives of the provision in order to eliminate confusion regarding the disposition of solid material on a nationwide basis. All of the new definitions included in § 20.1003, Definitions, have been designated as Category A compatibilities because according to Management Directive 5.9, these are scientific definitions that are necessary to understand radiation protection concepts and are needed to ensure uniformity in the implementation and understanding of these key concepts on a nationwide basis. The new sections that have been added to 10 CFR Part 20, § 20.2008, Dose Limits and Compliance for Release of Solid Materials, and § 20.2009, Case-specific Review Requirements for Disposition, have been designated Category B compatibilities based on the results from following the procedure in Management Directive 5.9. These new sections, § 20.2008 and § 20.2009, could have transboundary issues with transporting or distributing of such material, if not designated as Category B. The recordkeeping requirements in § 20.2108(a) are categorized as Category C to ensure that licensees in Agreement States keep a minimum set of records important to keeping track on where the material goes. The limits established in Table 4 of Appendix B in 10 CFR Part 20 would be designated as a Compatibility A according to Management Directive 5.9, since Compatibility Category A has been established for all rules dealing with specific quantities and/or dose standards (such as the 1 mrem/yr limit).

VII. Draft Generic Environmental Impact Statement: Availability

As required by the National Environmental Policy Act of 1969, as amended, and the NRC's regulations in 10 CFR § 51.20, the NRC has prepared a DGEIS (NUREG-1812) for this proposed rule.

The DGEIS is available for inspection in the NRC Public Document Room at NRC headquarters in Rockville, Maryland. Single copies of the DGEIS may be obtained by written request or telefax (301-415-2260) from: Office of Administration, Attention: Distribution and Services Section, U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001. The DGEIS is also available on the NRC website at the address noted in Section I.

VIII. Paperwork Reduction Act Statement

This proposed rule amends information collection requirements that are subject to the Paperwork Reduction Act of 1995 (44 U.S.C. 3501 et seq.). These requirements were approved by the Office of Management and Budget, approval number 3150-0014.

The public reporting burden for this collection of information is estimated to average _____ hours per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments on any aspect of this collection of information, including suggestions for reducing the burden, to the Information and Records Management Branch (T-6

F33), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by Internet electronic mail to BJS1@NRC.GOV; and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202, (3150-0011 and 3150-0093), Office of Management and Budget (OMB), Washington, DC 20503.

Public Protection Notification

The NRC may not conduct or sponsor, and a person is not required to respond to, a collection of information unless it displays a currently valid OMB control number.

IX. Regulatory Analysis

The Commission has prepared a regulatory analysis on this proposed regulation. The analysis examines the costs and benefits of the alternatives considered by the Commission. The analysis is available for inspection in the NRC Public Document Room at NRC headquarters in Rockville, Maryland. Single copies of the regulatory analysis may be obtained by written request from the Regulations and Guidance Branch, Office of Nuclear Material Safety and Safeguards, U.S. Nuclear Regulatory Commission, Washington, DC 20555. The regulatory analysis can also be viewed at NRC's website at the address noted in Section I, above.

X. Regulatory Flexibility Certification

As required by the Regulatory Flexibility Act of 1980, 5 U.S.C. 605(b), the Commission certifies that this rule, if adopted, will not have a significant economic impact upon a substantial number of small entities. Although the final rule would cover approximately 22,000 licensees regulated by the NRC and Agreement States, small entities covered by this rule are primarily licensees that possess and use only materials with short half-lives or materials only in sealed sources. Efforts related to control of solid materials for these licensees are simple and require only that sealed sources are properly disposed of or that short-lived materials are allowed to decay. Complete details of the cost analysis are contained in the regulatory analysis.

XI. Backfit Analysis

NRC has determined that the backfit rule does not apply to this proposed rule; therefore, a backfit analysis is not required for this proposed rule because it does not involve any provisions that would impose backfits as defined in 10 CFR 50.109, 70.76, 72.62, and 76.76. The existing regulations in 10 CFR Part 20 provide a framework of radiation standards to ensure the protection of public health and safety from the routine use of materials at licensed facilities. These standards include a public dose limit and specific dose criteria on certain types of media released from licensed facilities such as liquid effluent releases. Under current regulations, every disposition of solid material requires NRC review and approval. This proposed rule would establish specific criteria for controlling the disposition of solid materials including a dose limit and nuclide concentration values. Solid materials meeting the requirements of the proposed rule could be dispositioned in accordance with the rule without seeking prior NRC approval.

Licensees seeking to disposition solid material not meeting the criteria of the rule would continue to be required to seek case-specific approval from the NRC. The proposed rule also includes changes to the information collection and reporting requirements in 10 CFR 20.2108 which are not subject to the provisions of the backfit rule. Accordingly, the proposed rule's provisions do not constitute a backfit and a backfit analysis need not be performed.

List of Subjects

10 CFR Part 20

Byproduct material, Criminal penalties, Licensed material, Nuclear materials, Nuclear power plants and reactors, Occupational and public dose limits, Occupational safety and health, Packaging and containers, Permissible doses, Radiation protection, Reporting and recordkeeping requirements, Respiratory protection, Special nuclear material, Source material, Surveys and monitoring, Waste treatment and disposal.

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. 552 and 553; the NRC is proposing to adopt the following amendment to 10 CFR Parts 20.

PART 20 - STANDARDS FOR PROTECTION AGAINST RADIATION

1. The authority citation for Part 20 continues to read as follows:

AUTHORITY: Secs. 53, 63, 65, 81, 103, 104, 161, 182, 186, 68 stat. 930, 933, 935, 936, 937, 948, 953, 955, as amended (2 U.S.C. 2073, 2093, 2095, 2111, 2133, 2134, 2201, 2232, 2236), secs. 201, as amended, 202, 206, 88 stat. 1242, as amended, 1244, 1246, (42 U.S.C. 5841, 5842, 5846).

2. In § 20.1003, new definitions Impacted area, Reuse, Solid materials, Soil, Soil-like materials, and Process materials are added in alphabetical order to read as follows:

§ 20.1003 Definitions.

* * * * *

Impacted area means an area with some reasonable potential for residual radioactivity in excess of natural background or fallout levels.

Reuse means to release solid material in its original form for its intended original use.

Solid materials means material such as concrete, asphalt, metal, trash, equipment, supplies, and tools used by licensees in restricted and/or impacted areas of a facility. Soils, soil-like materials, process materials, and treated process materials are excluded from this definition.

Soil means unconsolidated earthy material over bedrock with no specific distinction as to its composition, nor its initial origin from either onsite or offsite locations.

Soil-like materials means material such as backfill consisting of a mixture of soil with rocks, gravel, or sand, with no distinctions made as to the material's initial origins or proportions of constituents.

Process materials means material such as material with soil-like or cementitious properties, including sediments, sands, filter cake, sludge, and crushed slag, among others.

* * * * *

3. In § 20.1009, paragraph (b) is revised to read as follows:

§ 20.1009 Information collection requirements: OMB approval.

* * * * *

(b) The approved information collection requirements contained in this part appear in §§ 20.1003, 20.1101, 20.1202, 20.1203, 20.1204, 20.1206, 20.1208, 20.1301, 20.1302, 20.1403, 20.1404, 20.1406, 20.1501, 20.1601, 20.1703, 20.1901, 20.1902, 20.1904, 20,1905, 20.1906, 20.2002, 20.2004, 20.2006, 20.2102, 20.2103, 20.2104, 20.2105, 20.2106, 20.2107, 20.2108,

20.2110, 20.2201, 20.2202, 20.2203, 20.2204, 20.2205, 20.2206, 20.2301, and Appendices F and G to 10 CFR Part 20.

* * * * *

4. In § 20.2001, paragraph (a)(4) is revised to read as follows:

§ 20.2001 General requirements.

(a) * * *

(4) As authorized under §§ 20.2002, 20.2003, 20.2004, 20.2005, 20.2008, or 20.2009.

* * * * *

5. A new section is added to 10 CFR Part 20 to read as follows:

§ 20.2008 Limited disposition of solid material.

Solid materials, originating in restricted and/or impacted areas of a facility will be considered acceptable for release if:

(a) the residual radioactivity that is distinguishable from background radiation results in a TEDE, to an average member of the critical group, that does not exceed 1 mrem (0.01 mSv) per year;

(b) the solid material is conditionally released for only certain limited disposition paths, as follows:

(1) Disposal of solid material by burial in an EPA RCRA landfill regulated under 40 CFR Parts 257 and 258, or in a State landfill as authorized by the EPA pursuant to 40 CFR Part 271;

(2) Use of concrete in road bed construction;

(3) Reuse of solid materials, equipment, and tools in their original form, in industrial or construction settings for their original intended design purpose and function (*e.g.,* scaffolds, cranes, forklifts);

(4) Reuse of equipment and tools in their original form for their original intended design purpose and function, that are removed by an individual from the restricted and/or impacted areas on a routine basis (*e.g.,* hand tools, testing equipment); and

(c) the nuclide volumetric concentrations do not exceed the values specified in Table 4 of Appendix B to Part 20; or the nuclide surface concentrations do not exceed the values specified in NUREG-1813. If more than one radionuclide is released, the licensee shall determine the fraction of the limit in Table 4 of Appendix B to Part 20 or NUREG-1813, as applicable, represented by the concentration of each radionuclide. The sum of the fractions for each radionuclide must not exceed unity.

6. A new section is added to 10 CFR Part 20 to read as follows:

§ 20.2009 Case-Specific Review Requirements for Disposition.

(a) A licensee must apply to the Commission for case-specific approval of proposed procedures for disposition of soils, soil-like material, and process material originating in restricted and/or impacted areas of a facility. A submittal will be considered acceptable for release if a case-specific analysis, as described in § 20.2009(e), demonstrates that:

(1) the residual radioactivity that is distinguishable from background radiation results in a TEDE, to an average member of the critical group, that does not exceed 1 mrem (0.01 mSv) per year; and

(2) the material is disposed by burial in an EPA RCRA landfill regulated under 40 CFR Parts 257 and 258, or in a State landfill as authorized by the EPA pursuant to 40 CFR Part 271.

(b) For soils, soil-like material, and process material, a licensee may apply to the Commission for case-specific approval of proposed procedures, not otherwise authorized in § 20.2009(a)(2), if a case-specific analysis is submitted per § 20.2009(e).

(c) For solid material, a licensee may apply to the Commission for case-specific approval of proposed procedures, not otherwise authorized in § 20.2008(b) or § 20.2008(c), if a case-specific analysis is submitted per § 20.2009(e).

(d) For solid material, soils, soil-like material, and process material that are dispositioned to an EPA RCRA landfill regulated under 40 CFR Parts 257 and 258, or in a State landfill as authorized by the EPA pursuant to 40 CFR Part 271, a licensee may apply to the Commission for case-specific approval of doses other than required in § 20.2008(a) or § 20.2009(a)(1), if a case-specific analysis of licensee procedures is submitted per § 20.2009(f) that demonstrates that doses are maintained ALARA and are within the dose limits of this part for solid material, soil, soil-like material, and process material.

(e) Each application for §§ 20.2009(a), 20.2009(b), and 20.2009(c) shall include:

(1) A description of the material to be released, including the physical, chemical, and radiological properties important to risk evaluation, and the proposed manner and conditions of the disposition of this material, including a description of the nature of the controls or restrictions that would keep the material from going to an unrestricted use; and

(2) An analysis and evaluation of pertinent information on the nature of the environment; and

(3) The nature and location of other potentially affected licensed and unlicensed facilities; and

(4) Analyses and procedures to ensure that doses are maintained within the dose limit in § 20.2008(a) for solid materials or within the dose limit in § 20.2009(a)(1) for soils, soil-like material, and process material.

(f) Each application for § 20.2009(d) shall include:

(1) A description of the material to be released, including the physical, chemical, and radiological properties important to risk evaluation, and the proposed manner and conditions of the disposition of this material, including a description of the nature of the controls or restrictions that would keep the material from going to an unrestricted use; and

(2) An analysis and evaluation of pertinent information on the nature of the environment; and

(3) The nature and location of other potentially affected licensed and unlicensed facilities; and

7. § 20.2108, should be revised to read as follows:

§ 20.2108 Records of waste disposal and material disposition.

(a) Each licensee shall maintain the following:

(1) Records of disposal of licensed materials made under §§ 20.2002, 20.2003, 20.2004, 20.2005, 10 CFR Part 61 and disposal by burial in soil, including burials authorized before January 28, 1981.[6]

(2) Records of disposition of solid materials, equipment, and tools and soils, soil-like materials, and process materials made under §§ 20.2008(b)(1), 20.2008(b)(2), 20.2008(b)(3), and 20.2009 including (a) the types and amounts of material shipped, (b) the destination of the material, (c) the date it was delivered to its destination, and (d) the radionuclides released in a format indicating that volumetric radioactivity were in compliance with the criteria in Table 4 of Appendix B to Part 20 or surface concentration values specified in NUREG-1813, as applicable.

(3) Records of disposition of solid materials made under § 20.2008(b)(4), including (a) the tools and equipment that are removed from the restricted and/or impacted areas on a routine basis and (b) the radionuclides released in a format indicating that radioactivity were in

[6]A previous § 20.304 permitted burial of small quantities of licensed materials in soil before January 28, 1981, without specific Commission authorization.

compliance with the criteria in Table 4 of Appendix B to Part 20 or surface concentration values specified in NUREG-1813, as applicable.

(b) The licensee shall retain the records required by paragraph (a)(1) and (a)(2) of this section until the Commission terminates each pertinent license requiring the record. Requirements for disposition of these records, prior to license termination, are located in §§ 30.51, 40.61, 70.51, and 72.80 for activities licensed under these parts. The licensee shall retain the records required by paragraph (a)(3) of this section for 3 years after the record is made.

* * * * *

8. Part 20, Appendix B, should be revised to modify the title to read as follows:

APPENDIX B TO PART 20 - ANNUAL LIMITS ON INTAKE (ALIs) AND DERIVED AIR CONCENTRATIONS (DACs) OF RADIONUCLIDES FOR OCCUPATIONAL EXPOSURE; EFFLUENT CONCENTRATIONS; CONCENTRATIONS FOR RELEASE TO SEWERAGE; SOLID MATERIAL RELEASE CONCENTRATIONS

9. Part 20, Appendix B, Introduction, should be revised to add a sentence at the end to read as follows:

INTRODUCTION

* * *

Table 4 provides concentrations values for the release of solid materials.

10. Part 20, Appendix B, Notation, 1st sentence, should be revised to read as follows:

NOTATION

The values in Tables 1, 2, 3, and 4 are presented in the computer "E" notation.

* * *

11. Part 20, Appendix B, should be revised to add a new section to read as follows:

* * *

TABLE 4 "SOLID MATERIAL RELEASE"

Table 4 contains measurable nuclide concentrations applicable to the limited disposition of solid materials under § 20.2008. Concentration values are based on annual doses of 1 mrem to

an average member of the critical group. Values for man-made radionuclides are from the International Atomic Energy Agency's report RS-G-1.7, "Application of the Concepts of Exclusion, Exemption, and Clearance." Values for naturally occurring radionuclides are based on NUREG-1640, "Radiological Assessments for Clearance of Materials from Nuclear Facilities."

* * * * *

12. Part 20, Appendix B, should be revised to add a new Table 4 to read as follows:

13. Part 20, Appendix B, should be revised to add a new Table 4 to read as follows:

Table 4

Solid material release concentrations

Atomic No.	Nuclide	Volume pCi/g
1	Hydrogen-3	2.7E+03
4	Beryllium-7	2.7E+02
6	Carbon-14	2.7E+01
9	Fluorine-18*	2.7E+02
11	Sodium-22	2.7E+00
11	Sodium-24*	2.7E+01
14	Silicon-31*	2.7E+04
15	Phosphorus-32	2.7E+04
15	Phosphorus-33	2.7E+04
16	Sulfur-35	2.7E+03
17	Chlorine-36	2.7E+01
17	Chlorine-38*	2.7E+02
19	Potassium-40**	2.7E+01
19	Potassium-42	2.7E+03
19	Potassium-43*	2.7E+02
20	Calcium-45	2.7E+03
20	Calcium-47	2.7E+02
21	Scandium-46	2.7E+00
21	Scandium-47	2.7E+03
21	Scandium-48	2.7E+01
23	Vanadium-48	2.7E+01
24	Chromium-51	2.7E+03
25	Manganese-51*	2.7E+02
25	Manganese-52	2.7E+01
25	Manganese-52m*	2.7E+02
25	Manganese-53	2.7E+03
25	Manganese-54	2.7E+00
25	Manganese-56*	2.7E+02

Table 4

Solid material release concentrations

Atomic No.	Nuclide	Volume pCi/g
26	Iron-52	2.7E+02
26	Iron-55	2.7E+04
26	Iron-59	2.7E+01
27	Cobalt-55*	2.7E+02
27	Cobalt-56	2.7E+00
27	Cobalt-57	2.7E+01
27	Cobalt-58	2.7E+01
27	Cobalt-58m*	2.7E+05
27	Cobalt-60	2.7E+00
27	Cobalt-60m*	2.7E+04
27	Cobalt-61*	2.7E+03
27	Cobalt-62m*	2.7E+02
28	Nickel-59	2.7E+03
28	Nickel-63	2.7E+03
28	Nickel-65*	2.7E+02
29	Copper-64*	2.7E+03
30	Zinc-65	2.7E+00
30	Zinc-69*	2.7E+04
30	Zinc-69m*	2.7E+02
30	Zinc-65m*	2.7E+02
31	Gallium-72*	2.7E+02
32	Germanium-71	2.7E+05
33	Arsenic-73	2.7E+04
33	Arsenic-74*	2.7E+02
33	Arsenic-76*	2.7E+02
33	Arsenic-77	2.7E+04
34	Selenium-75	2.7E+01
35	Bromine-82	2.7E+01

Table 4

Solid material release concentrations

Atomic No.	Nuclide	Volume pCi/g
37	Rubidium-86	2.7E+03
38	Strontium-85	2.7E+01
38	Strontium-85m*	2.7E+03
38	Strontium-87m*	2.7E+03
38	Strontium-89	2.7E+04
38	Strontium-90	2.7E+01
38	Strontium-91*	2.7E+02
38	Strontium-92*	2.7E+02
39	Yttrium-90	2.7E+04
39	Yttrium-91	2.7E+03
39	Yttrium-91m*	2.7E+03
39	Yttrium-92*	2.7E+03
39	Yttrium-93*	2.7E+03
40	Zirconium-93*	2.7E+02
40	Zirconium-95	2.7E+01
40	Zirconium-97*	2.7E+02
41	Niobium-93m	2.7E+02
41	Niobium-94	2.7E+00
41	Niobium-95	2.7E+01
41	Niobium-97*	2.7E+02
41	Niobium-98*	2.7E+02
42	Molybdenum-90*	2.7E+02
42	Molybdenum-93	2.7E+02
42	Molybdenum-99	2.7E+02
42	Molybdenum-101*	2.7E+02
43	Technetium-96	2.7E+01
43	Technetium-96m*	2.7E+04
43	Technetium-97	2.7E+02

Table 4

Solid material release concentrations

Atomic No.	Nuclide	Volume pCi/g
43	Technetium-97m	2.7E+03
43	Technetium-99	2.7E+01
43	Technetium-99m*	2.7E+03
44	Ruthenium-97	2.7E+02
44	Ruthenium-103	2.7E+01
44	Ruthenium-105*	2.7E+02
44	Ruthenium-106	2.7E+00
45	Rhodium-103m*	2.7E+05
45	Rhodium-105	2.7E+03
46	Palladium103	2.7E+04
46	Palladium109	2.7E+03
47	Silver-105	2.7E+01
47	Silver-110m	2.7E+00
47	Silver-111	2.7E+03
48	Cadmium-109	2.7E+01
48	Cadmium-115	2.7E+02
48	Cadmium-115m	2.7E+03
49	Indium-111	2.7E+02
49	Indium-113m*	2.7E+03
49	Indium-114m	2.7E+02
49	Indium-115m*	2.7E+03
50	Tin-113	2.7E+01
50	Tin-125	2.7E+02
51	Antimony-122	2.7E+02
51	Antimony-124	2.7E+01
51	Antimony-125	2.7E+00
52	Tellurium-123m	2.7E+01
52	Tellurium-125m	2.7E+04

Table 4

Solid material release concentrations

Atomic No.	Nuclide	Volume pCi/g
52	Tellurium-127	2.7E+04
52	Tellurium-127m	2.7E+02
52	Tellurium-129*	2.7E+03
52	Tellurium-129m	2.7E+02
52	Tellurium-131*	2.7E+03
52	Tellurium-131m	2.7E+02
52	Tellurium-132	2.7E+01
52	Tellurium-133*	2.7E+02
52	Tellurium-133m*	2.7E+02
52	Tellurium-134*	2.7E+02
53	Iodine-123	2.7E+03
53	Iodine-125	2.7E+03
53	Iodine-126	2.7E+02
53	Iodine-129	2.7E-01
53	Iodine-130*	2.7E+02
53	Iodine-131	2.7E+02
53	Iodine-132*	2.7E+02
53	Iodine-133*	2.7E+02
53	Iodine-134*	2.7E+02
53	Iodine-135*	2.7E+02
55	Cesium-129	2.7E+02
55	Cesium-131	2.7E+04
55	Cesium-132	2.7E+02
55	Cesium-134	2.7E+00
55	Cesium-134m*	2.7E+04
55	Cesium-135	2.7E+03
55	Cesium-136	2.7E+01
55	Cesium-137	2.7E+00

Table 4

Solid material release concentrations

Atomic No.	Nuclide	Volume pCi/g
55	Cesium-138*	2.7E+02
56	Barium-131	2.7E+02
56	Barium-140	2.7E+01
57	Lanthanum-140	2.7E+01
58	Cerium-139	2.7E+01
58	Cerium-141	2.7E+03
58	Cerium-143	2.7E+02
58	Cerium-144	2.7E+02
59	Praseodymium-142*	2.7E+03
59	Praseodymium-143	2.7E+04
60	Neodymium-147	2.7E+03
60	Neodymium-149*	2.7E+03
61	Promethium-147	2.7E+03
61	Promethium-149	2.7E+04
62	Samarium-151	2.7E+04
62	Samarium-153	2.7E+03
63	Europium-152	2.7E+00
63	Europium-152m*	2.7E+03
63	Europium-154	2.7E+00
63	Europium-155	2.7E+01
64	Gadolinium-153	2.7E+02
64	Gadolinium-159*	2.7E+03
65	Terbium-160	2.7E+01
66	Dysprosium-165*	2.7E+04
66	Dysprosium-166	2.7E+03
67	Holmium-166	2.7E+03
68	Erbium-169	2.7E+04
68	Erbium-171*	2.7E+03

Table 4

Solid material release concentrations

Atomic No.	Nuclide	Volume pCi/g
69	Thulium170	2.7E+03
69	Thulium171	2.7E+04
70	Ytterbium-175	2.7E+03
71	Lutetium-177	2.7E+03
72	Hafnium-181	2.7E+01
73	Tantalum-182	2.7E+00
74	Tungsten-181	2.7E+02
74	Tungsten-185	2.7E+04
74	Tungsten-187	2.7E+02
75	Rhenium-186	2.7E+04
75	Rhenium-188*	2.7E+03
76	Osmium-185	2.7E+01
76	Osmium-191	2.7E+03
76	Osmium-191m*	2.7E+04
76	Osmium-193	2.7E+03
77	Iridium-190	2.7E+01
77	Iridium-192	2.7E+01
77	Iridium-194*	2.7E+03
78	Platinum-191	2.7E+02
78	Platinum-193m	2.7E+04
78	Platinum-197*	2.7E+04
78	Platinum-197m*	2.7E+03
79	Gold-198	2.7E+02
79	Gold-199	2.7E+03
80	Mercury-197	2.7E+03
80	Mercury-197m	2.7E+03
80	Mercury-203	2.7E+02
81	Thallium-200	2.7E+02

Table 4

Solid material release concentrations

Atomic No.	Nuclide	Volume pCi/g
81	Thallium-201	2.7E+03
81	Thallium-202	2.7E+02
81	Thallium-204	2.7E+01
82	Lead-203	2.7E+02
82	Lead-210**	2.7E+01
83	Bismuth-206	2.7E+01
83	Bismuth-207	2.7E+00
84	Polonium-203*	2.7E+02
84	Polonium-205*	2.7E+02
84	Polonium-207*	2.7E+02
84	Polonium-210**	2.7E+01
85	Astatine-211	2.7E+04
88	Radium-225	2.7E+02
88	Radium-226**	2.7E+00
88	Radium-227	2.7E+03
88	Radium-228**	2.7E+00
89	Actinium-227**	2.7E+00
90	Thorium-226	2.7E+04
90	Thorium-228**	2.7E+00
90	Thorium-229	2.7E+00
90	Thorium-230**	2.7E+01
90	Thorium-232**	2.7E+00
91	Protactinium-230	2.7E+02
91	Protactinium-231**	2.7E+00
91	Protactinium-233	2.7E+02
92	Uranium-230	2.7E+02
92	Uranium-231	2.7E+03
92	Uranium-232	2.7E+00

Table 4

Solid material release concentrations

Atomic No.	Nuclide	Volume pCi/g
92	Uranium-233	2.7E+01
92	Uranium-234**	2.7E+01
92	Uranium-235**	2.7E+00
92	Uranium-236	2.7E+02
92	Uranium-237	2.7E+03
92	Uranium-238**	2.7E+01
92	Uranium-239*	2.7E+03
92	Uranium-240*	2.7E+03
93	Neptunium-237	2.7E+01
93	Neptunium-239	2.7E+03
93	Neptunium-240*	2.7E+02
94	Plutonium-234*	2.7E+03
94	Plutonium-235*	2.7E+03
94	Plutonium-236	2.7E+01
94	Plutonium-237	2.7E+03
94	Plutonium-238	2.7E+00
94	Plutonium-239	2.7E+00
94	Plutonium-240	2.7E+00
94	Plutonium-241	2.7E+02
94	Plutonium-242	2.7E+00
94	Plutonium-243*	2.7E+04
94	Plutonium-244	2.7E+00
95	Americium-241	2.7E+00
95	Americium-242*	2.7E+04
95	Americium-242m	2.7E+00
95	Americium-243	2.7E+00
96	Curium-242	2.7E+02
96	Curium-243	2.7E+01

Table 4

Solid material release concentrations

Atomic No.	Nuclide	Volume pCi/g
96	Curium-244	2.7E+01
96	Curium-245	2.7E+00
96	Curium-246	2.7E+00
96	Curium-247	2.7E+00
96	Curium-248	2.7E+00
97	Berkelium-249	2.7E+03
98	Californium-246	2.7E+04
98	Californium-248	2.7E+01
98	Californium-249	2.7E+00
98	Californium-250	2.7E+01
98	Californium-251	2.7E+00
98	Californium-252	2.7E+01
98	Californium-253	2.7E+03
98	Californium-254	2.7E+01
99	Einsteinium-253	2.7E+03
99	Einsteinium-254	2.7E+00
99	Einsteinium-254m	2.7E+02
100	Fermium-254*	2.7E+05
100	Fermium-255*	2.7E+03

** = naturally occurring

* = half life less than 1 day

Atomic No.	Nuclide Category	Volume (pCi/g)
---	Any nuclides not listed above with beta-gamma decay modes other than alpha emissions and without regard to half-lives	2.7E+00
---	Any nuclides not listed above with alpha or spontaneous fission decay modes and with half-lives less than 10 days	2.7E+00
---	Any nuclides not listed above with alpha or spontaneous fission decay modes and with half-lives equal to or greater than 10 days	2.7E-01

Dated at Rockville, Maryland, this ____ day of _____ 2005.

For the Nuclear Regulatory Commission

Annette Vietti-Cook
Secretary of the Commission.

NRC FORM 8C
(7-94)
NRCMD 3.57

COVER SHEET FOR CORRESPONDENCE

USE THIS COVER SHEET TO PROTECT ORIGINALS OF MULTI-PAGE CORRESPONDENCE