

Summary of NRC Staff Review of National Academies Report

NRC is examining its current practice for control of solid material. As input to this effort, the National Academies (NA) submitted a report to the NRC containing findings and recommendations regarding alternatives for control of solid material.

This attachment presents a short discussion of the results in the NA report, the NRC staff's method for reviewing the NA report, and the results of the NRC staff's review of the NA's overarching findings and recommendations.

A. RESULTS OF THE NA REPORT

In response to an August 2000 contract request from the NRC, the NA delivered a report to the NRC in March 2002. An outline summary of the report and its preparation is contained in Attachment 2. The NA report contains 2 overarching findings and 7 recommendations to the NRC, as well as 31 specific findings. The following can be noted about the report:

- 1) Review of issues and factors: The report contains a broad review of a number of items, including the regulatory framework for control of solid materials, anticipated inventories, costs, dose analysis methods, measurement issues, international approaches, and stakeholder reactions.
- 2) Process for stakeholder involvement: The report's recommendations present, and focus strongly on, a decision-making process for moving forward, rather than recommending a specific method for control of solid material. In particular, 4 of the 7 recommendations (and 5 of the 10 chapters) contain discussion on problems caused by NRC's prior stakeholder involvement activities in related efforts and on the need for, and approaches to, rebuilding public confidence and trust and involving stakeholders in this effort.
- 3) Technical approaches for control of solid material: Although Task 4 of the Statement of Work in the August 2000 contract requested the NA to develop specific recommendations for the approach that should be used for control of solid materials, and for a numerical limit that should be set, the report does not address either of these items.

The report notes that this level of detail was not provided because the NA did not want to prescribe the outcome of the decision process, but that it was making several recommendations for a foundation from which to begin a broad-based stakeholder participatory decision-making process with which the NRC should move ahead without delay. Along those lines, the report presents recommendations regarding the nature of any standard, impacts and benefits that need to be considered, and technical analyses that are still needed.

B. APPROACH OF NRC'S ANALYSIS; USE OF PERFORMANCE GOALS

In its review of the NA report and recommendations, the NRC staff used as its bases NRC's Strategic Plan in NUREG-1614 which contains four performance goals for accomplishing the agency's mission. As noted in the Strategic Plan, the NRC's overall goal is to "conduct an effective regulatory program that allows our Nation to use nuclear materials safely for civilian purposes and in a manner that protects the public and the environment." To accomplish this goal, the Strategic Plan lists four performance goals, which are:

- 1) Maintain safety, protection of the environment, and the common defense and security;
- 2) Increase public confidence;
- 3) Make NRC's activities and decisions more effective, efficient, and realistic; and
- 4) Reduce unnecessary regulatory burden on stakeholders.

The Strategic Plan notes that protection of public health and safety remains paramount among our goals and will drive our decisions, however NRC recognizes that it must consider other key issues, including the effect of our decisions on the public's trust in our regulatory process, the industries we regulate, and our own effectiveness and efficiency.

C. NRC STAFF ANALYSIS OF RECOMMENDED ALTERNATIVES IN NA STUDY

As noted in Section A, the recommendations in the NA report present a process for moving forward, rather than a specific technical approach on how to control solid material. The NRC staff's review of this process considered its component pieces to better understand the pros and cons of each of the recommendations and their merit compared to the NRC's four performance goals. Based on this understanding of the process components, NRC staff could then develop options and recommendations for a path forward using components of the NA report.

The NA report does discuss the technical approaches for control of solid material but, as noted in Section A above, the report does not choose one, preferring instead that they be developed and evaluated as part of the process suggested in the report. Thus, the NRC staff's review of the NA report does not include a separate evaluation of the merits of the technical approaches themselves.

The sections below describe the NA report's overarching findings and recommendations and the NRC staff's review based on the four performance goals of its Strategic Plan.

Overarching findings #1 and 2 and NRC conclusions on the overarching findings

The NA report presented two overarching findings. Overarching finding 1 (OA1) notes that NRC's current approach on control of solid materials is workable and sufficiently protective of public health and safety and does not need immediate revamping. However, OA1 also notes that the current approach is inconsistently applied, is not explicitly risk-based, and has no guidelines for volume-contaminated material and, therefore, NRC should move ahead without delay and start a process of evaluating alternatives to the current system. Overarching finding 2 (OA2) notes that broad stakeholder involvement in NRC's decision-making process on alternatives is critical, as the likelihood of acceptance of an NRC decision greatly increases

when the process engages all responsible stakeholder viewpoints and is perceived as fair and open in discussing advantages and disadvantages of alternatives. OA2 thus notes that NRC must focus on the process and not prescribe an outcome for disposition of solid material which must evolve from the process.

In general, the staff agrees with OA1 and OA2. In particular, OA1 is consistent with discussions in the Issues Paper and SECY-00-0070, which noted that potential exposures received as a result of material released are a fraction of public health guidelines and that the current approach is flexible and a useful tool that is currently in use and well understood. The Issues Paper and SECY-00-0070 have also previously noted that the current case-by-case approach has certain problems including: implementation by licensees; inconsistent release levels; lack of risk-informed criteria; and the need to sometimes expend large NRC resources to respond to problems caused by different instrument detection capabilities and to Congressional inquiries about safety of the current approach. In addition, OA2 is consistent with discussions in SECY-00-0070 regarding use of an open process for developing a national standard based on a full evaluation of health and environmental impacts, cost-benefit analyses, and the wide diversity of public comment on various courses of action. OA2 is also consistent with requirements of the Administrative Procedures Act (APA) and the National Environmental Policy Act (NEPA), and with NRC's Strategic Plan for accomplishing the agency's mission through the four performance goals.

An issue not addressed in OA1 or OA2 is the relationship of the level of radiological risk associated with alternatives for control of solid material with the potentially large amount of NRC resources that would be needed in any process undertaken and the issues of public confidence and trust raised by the NA. This is discussed further in section C.2 below.

C.1 Recommendation 1 (R1) : NRC should devise a new decision framework that would develop, analyze, and evaluate a broader range of alternative approaches to the disposition of solid materials. At a minimum, these alternatives should include the current case-by-case approach, clearance, restricted use (the NA report refers to this alternative as "conditional clearance"), and no release.

C.1.1 NRC staff review:

With respect to the performance goals of maintaining public health and safety and of increasing public confidence, R1 is consistent with NRC's intentions in this area, as noted in the Issues Paper, to use an APA and NEPA process to evaluate the full range of alternatives (including unrestricted use, restricted release, not permitting release, and "other" alternatives as determined during the process). Some specific "other" alternatives are noted in Table 8-1 of the NA report and would be considered as part of further NRC analyses. R1 is also consistent with NRC's intent, as discussed in the Issues Paper, to evaluate factors such as health and safety, environmental impacts, cost-benefit, ability to implement, international and national standards, impacts that may be competing, net collective impact, and industries that may be adversely affected (including metal recycling industries).

R1 is also consistent with the findings in SECY-00-0070 which noted the "extensive and wide-ranging" comments received from various stakeholders in public meetings and in over 800 public comment letters (including the metals and concrete industries, citizens groups and

individuals, licensees and licensee representatives, and other organizations). SECY-00-0070 also noted the need for additional analyses and evaluation of other factors to support decision-making for all of the alternatives.

With regard to the performance goals of efficiency and effectiveness and reducing unnecessary burden, R1 is consistent with NRC's guidelines in NUREG/BR-0058, "Regulatory Analysis Guidelines of the U.S. Nuclear Regulatory Commission," under which evaluation of the full range of alternatives is intended to reduce unnecessary burden on stakeholders by considering costs and ability to implement any proposed new requirement. However, the NA report leaves certain questions open because it does not provide sufficient supporting information as to whether the alternatives that it suggests are workable or practical, especially with regard to concerns expressed in earlier stakeholder comments. In particular:

- 1) The NA report lists restricted use at landfills as a possible alternative. However, the report does not indicate or confirm that local landfills would accept solid materials released from NRC facilities or assess the overall feasibility of sending scrap metal for disposal at Resource Conservation and Recovery Act (RCRA) landfills (the Issues paper had noted that many RCRA Subtitle C and D landfills have prohibitions against accepting radioactive material).
- 2) In its discussion of restricted use where material is released from licensed control, the report does not address concerns associated with assuring that material intended for either a landfill or other specified use would be transported to and remain at the designated site and not be diverted to a general recycling facility or dispositioned in some other manner, e.g, directly to users. The Issues Paper noted these concerns, and Attachment 2 of SECY-00-0070 noted commenter concerns about these issues.
- 3) The report does not provide specific information as to how the "no-release" alternative in the report differs from the "prohibition" option in the Issues Paper which involved sending "solid material that has been in an area where radioactive material has been used or stored" to a low-level waste disposal facility. It may be interpreted that the "no release" option would extend the "prohibition" option to include all material on site. If this is the case, the report does not present information to respond to licensee stakeholders' concerns that a no-release alternative would disrupt normal day-to-day operations and would be a significant waste of resources with no accompanying health benefit.

C.1.2 NRC staff conclusion on R1

Based on the above, NRC staff agrees with R1 that it is important to study a broad range of alternatives and associated impacts and other factors listed in Box 9-2 of the NA report, including those identified by stakeholders and listed in the NA report. The staff has been in the process of studying these items as part of its technical development (see Attachment 3).

However, NRC considers R1, and its associated findings, limited in scope because they do not address technical and policy considerations related to the workability or practicality of certain alternatives suggested.

C.2 Recommendation 2 (R2): The NRC's decision-making process on the range of alternative approaches should be integrated with a broad-based stakeholder participatory decision-making process and include:

- 1) A commitment by NRC to establish and maintain a meaningful and open dialogue with a wide range of stakeholders;
- 2) An ad-hoc advisory board that would advise NRC in its consideration of approaches for the disposition of solid materials. The advisory board would suggest additional stakeholder mechanisms that NRC could use in the decision process, including establishing a NEPA process, alternative dispute resolution, and partnering, arbitration, mediation, or a combination of such methods;
- 3) Assistance to the NRC as needed from outside experts in order to: (a) assist it in establishing the ad hoc stakeholder advisory board and to facilitate dialogue between NRC and stakeholders during the decision-making process, and (b) assess, evaluate, and perhaps conduct portions of the stakeholder involvement program and make recommendations, as appropriate.

C.2.1 NRC staff review

In its general review of the NA report, the staff notes that the report does not balance the performance goals of the Strategic Plan in making its specific recommendations. In particular, R2 would tend to increase public confidence, however the report does not assess how factors related to the performance goals of maintaining health and safety, and efficiency and effectiveness, should also be considered. Specifically, the report does not integrate R2 with OA1 which notes that the current approach is sufficiently protective of public health and Recommendation 5 (R5) which notes that a 10 $\mu\text{Sv/yr}$ (1 mrem/yr) level is within risk ranges for developing health-based standards for exposure to radiation in the U.S., is a small fraction of natural background radiation, and is widely accepted by recognized national and international organizations. Thus, while R2 and the associated processes may provide useful information to aid in increasing public health and safety, OA1 and R5 appear to indicate that it is neutral with regard to making a significant difference in maintaining public health and safety

With respect to the area of public confidence, R2, and specifically R2-1, are consistent with the NRC's stated approach for accomplishing the agency's mission in the Strategic Plan in which it is noted that, as successful regulators, NRC must consider the effects of its decisions on the public. The Strategic Plan was developed with input from the public, those that NRC regulates, and other interested parties. R2-1 is also consistent with the NRC's intended process in this area, in particular:

- 1) The NRC's overall intent, as stated in the Issues Paper, was to seek to enhance public participation by conducting facilitated public meetings before any formal rulemaking would begin to elicit early and active public input on major issues through informed discussion of options. In so doing, NRC staff held 4 public meetings in fall 1999 in various regions of the country to provide an opportunity for a broader public involvement and also invited stakeholders to a meeting with the Commission in May 2000 to air their views. The specific objectives of NRC's process were twofold. The first objective was

to address relevant issues by identifying them, exchanging information on them, and identifying underlying concerns and areas of disagreement; the second objective was, where possible, to identify approaches for resolution. To accomplish these objectives, the Issues Paper contained a number of items for discussion including: (1) regulatory framework; (2) alternatives, including “other” alternatives identified in the process; (3) issues and questions associated with each alternative, including whether restricted use was feasible; (4) protection of public health and safety, including potential for multiple exposures; (5) economic factors, including impacts on other industries; (6) analysis of pathways for exposure, including the pathways to consider; (7) EPA, DOE, and international considerations; and (8) NRC resources to conduct a rulemaking.

- 2) As noted in SECY-00-0070, the NRC did obtain a wide range of views from stakeholders attending the public meetings and in over 800 letters that were received (including comments from citizens groups and individuals expressing concerns about health impacts; metals and concrete industry representatives expressing concerns about potential severe economic impacts; and licensees and licensee organizations expressing concerns that a “no release” option would disrupt normal day-to-day operations without accompanying health benefit). In addition, the Commission stakeholder meeting were attended by a similar range of stakeholders. Thus, the first of NRC’s objectives in the Issues Paper was at least partly accomplished, although the latter was not.

However, R2 (and Findings 8-2 and 8-4) indicates that, despite NRC’s effort to seek public input, there are serious problems with stakeholder trust and confidence in NRC, and that obtaining stakeholder trust will be a difficult task for NRC. Findings 8.2 and 8.4 note that these problems stem in part from:

- 1) The LTR effort in which, after a proposed rule was issued with a 0.15 mSv/yr (15 mrem/yr) criteria following a successful public process, the level was changed to 0.25 mSv/yr (25 mrem/yr) in the final rule without additional public process. Stakeholders indicated they would not participate in a process on control of solid material because it appeared to be too much like the LTR process.
- 2) Some stakeholder views that NRC has prejudged this effort towards the clearance, or restricted release, option.
- 3) Public concern about health effects of radiation and metals industry concerns about severe economic problems associated with clearance.

As noted above, R2 does not also take into account how considerations of efficiency and effectiveness or regulatory burden should be considered. Specifically, R2-2 and R2-3 do not address balancing potential health impacts of various technical approaches for controlling solid material against expended staff and stakeholder resources in establishing standards or NRC legal or regulatory authority issues. In particular,

- 1) Implementing R2-2 and R2-3 could involve significant expenditure of resources whereas OA1 and R5 indicate that levels being considered are protective of public health, within risk ranges for developing health-based standards for exposure to radiation in the U.S., and widely accepted by recognized national and international organizations. Based on

experience with similar efforts, NRC resources involved in a major effort like this could be about 10 to 15 FTE and a million dollars in contract support. Thus a major consideration for NRC is to assess how best to assign its limited resources when there are other regulatory issues with greater potential health and safety impacts.

- 2) R2-2 does not consider legal and agency authority issues associated with an advisory committee and the nature of whether and how their advice would be used by the Commission, nor does it consider efficiency issues as to the length of time it would take to set up, and develop results from, such a committee which would have to be chartered under the Federal Advisory Committee Act .
- 3) R2-2 does not consider other approaches, other than an advisory board, for soliciting stakeholder input that may also have merit. Other processes could include the enhanced participatory process carried out during the LTR proposed rule stage, which Chapter 8 of the NA report notes was a success; use of an established advisory body, such as the Advisory Committee on Nuclear Waste, which already has a charter to advise the Commission on issues such as control of solid materials and which can seek assistance from experts on various topics; or use of focused meetings as forums for seeking advice and recommendations from stakeholders on specific topics which would be in keeping with a metals industry comment (see SECY-00-0070, Attachment 2) on convening a panel of stakeholders to work out acceptable solutions.

C.2.2 NRC staff conclusion on R2

The staff agrees that it is important that NRC have a commitment to integrate stakeholder input into its decision-making process. The staff notes that the Strategic Plan, the APA and NEPA processes, and specific aspects of prior efforts, have shown a commitment by NRC that its decision-making process should be integrated with broad-based stakeholder participation.

Despite these prior NRC efforts, the NA report indicates that there is significant distrust and lack of confidence in NRC and that obtaining trust and confidence will be a difficult process. Thus, NRC's process for evaluating alternatives for control of solid material will need to address these concerns regarding stakeholder involvement as part of a reasoned and balanced evaluation of potential alternatives against the four performance goals. At issue is coordinating a satisfactory level of agency commitment amongst the various stakeholders.

C.3 Recommendation 3 (R3): NRC should adopt an overarching policy statement describing the principles governing the management and disposition of solid materials. A good starting point for developing such a policy would be review and discussion of IAEA Safety Series No. 89 (SS89) with a broad based stakeholder group to provide a foundation for evaluating alternatives for control of solid material.

C.3.1 NRC staff review

As noted above, the NA report did not balance the four performance goals in making its recommendations. In particular, R3 does not indicate how, or to what extent, it will contribute to maintaining health and safety.

The recommendation for an overarching policy statement can increase public confidence and is consistent with the NRC's intent, as expressed in the Issues Paper, to provide consistency in NRC's regulatory framework for control of all materials and to "foster discussion" about issues and alternatives before a rulemaking would begin. The recommendation is also consistent with the Strategic Plan which presents strategic goals and specific performance measures for assuring that the agency's mission for protecting public health and safety is met.

However, R3 does not appear to make NRC's activities more efficient or effective or to reduce unnecessary regulatory burden. In particular:

- 1) It appears more appropriate to build NRC's overall policy statement into whatever rulemaking or guidance revision process is undertaken, rather than going through a separate process of developing a policy statement. For example, if a rulemaking were undertaken, an supplemental Issues Paper or Advance Notice of Proposed Rulemaking (ANPR) could clearly delineate the thought process of how a rule might be formulated and criteria developed.
- 2) The four performance goals of the Strategic Plan already provide NRC's policy and approach for evaluating issues, including those related to control of solid materials. The Strategic Plan was developed and issued in 2000 and incorporated input from the public, licensees, and other interested parties. Thus, creating a separate policy statement would not seem to be efficient of NRC's resources because a broad-based safety policy already exists in the Strategic Plan.
- 3) If R3 is suggesting inclusion of some of the specific approaches regarding exemptions in SS89, then those may be premature and too controversial to present in a policy statement, and better addressed in an open NEPA/APA public comment process.
- 4) Developing a general policy could be repetitive of activities associated with the Below Regulatory Concern Policy which had significant expenditure of resources for a controversial policy that later was withdrawn.
- 5) Findings 2.5 and 3.5 note that regulation of technologically enhanced naturally-occurring radioactive material (TENORM) is inconsistent or absent and that TENORM represents a large quantity of solid material. Chapter 9 indicates that NRC should consider that consistency with other regulations for other materials would be important, such as naturally occurring and accelerator produced radioactive material (NARM and NORM). However, the NA report does not contain a recommendation regarding NRC's role in control of these materials, nor does it address the implications of the findings, such as potential legal issues and prior efforts of the EPA in developing regulations for TENORM, or NRC resources that would be needed for such an effort

C.3.2 NRC staff conclusions on R3

NRC staff agrees that it is important to have an overarching decision framework to govern our evaluation of this issue. However, the staff notes that NRC already has in place the Strategic Plan which contains performance goals to attain the agency's mission. The Strategic Plan contains a decision framework similar to SS89 but has been developed specifically to guide

NRC's daily work. Thus, it may be more efficient of agency resources to use the Strategic Plan as a policy-level, decision framework that can be applied to the process for control of solid materials, rather than developing a new and separate policy as suggested by R3.

C.4 Recommendation 4 (R4): A dose-based standard should be employed as the primary standard when considering clearance or restricted use . To employ such a standard, a range of scenarios must be considered, a critical group selected, and concentration levels associated with the dose standard developed which can be used in practice. The NRC should also consider the pros and cons of establishing a separate collective dose standard.

C.4.1 NRC staff review:

If a rulemaking with clearance or restricted use is conducted, R4 is considered by the staff as consistent with the four performance goals.

In particular, R4 reflects agency policy to be risk-informed in agency decisions and is consistent with the Issues Paper which noted that NRC was considering a dose-based standard so that NRC reviews would be conducted in a consistent manner to protect public health and safety. R4 is also consistent with SECY-00-0070 which noted that a disadvantage of the current detectability-based approach is that it is inconsistent with a "risk-informed" approach that relates regulatory requirements to the potential risk that might be associated with the regulated activity.

C.4.2 NRC Staff conclusion on R4

If a rulemaking with clearance or restricted use is considered, the staff agrees with the need to consider use of a dose-based standard.

C.5 Recommendation 5 (R5): An individual dose standard of 10 $\mu\text{Sv/yr}$ (1 mrem/yr) provides a reasonable starting point for the process of considering options for a dose-based standard. This starting point is reasonable because 10 $\mu\text{Sv/yr}$ (1 mrem/yr) is: (1) a small fraction of the dose received per year from natural background sources; (2) significantly less than the dose we receive from our own body due to radioactive potassium and other elements and to routine medical procedures; (3) within the range of acceptable lifetime risks used in developing health-based standards for exposure to radiation in the United States; (4) able to be measured with radiation measurement technologies available at reasonable cost; and (5) widely accepted by recognized national and international organizations. The final selection of an individual dose standard should nonetheless be a policy choice, albeit one informed by the above considerations.

C.5.1 NRC staff review

With regard to maintaining public health and safety, R5 (and its supporting findings) is consistent with the broad range of potential alternative dose levels, from 0 to 0.1 mSv/yr (10 mrem/yr), presented in the Issues Paper and in SECY-00-0070. These documents presented a discussion of factors influencing these levels, such as comparisons with background and its variability, EPA requirements on permissible levels such as coal ash, NCRP discussion of the trivial risk at these levels, the capability of instruments to measure at these levels, and other factors.

With regard to increasing public confidence, R5 does not significantly aid the discussion nor provide insight into how this recommendation could be used to foster public confidence. In particular:

- 1) It does not explain sufficiently what is meant by use of 10 $\mu\text{Sv/yr}$ (1 mrem/yr) as a “starting point,” nor does it correlate it to Findings 5.2 and 6.3 concerning dose modeling and measurement. It is recognized that having a firm number at this time would seem to be contrary to R2 and not appropriate before beginning a decision-making process. To properly assess the dialogue that will occur in any process, the staff has been and will continue to evaluate levels both above and below this level for all alternatives.
- 2) It does not provide added information regarding risk management implications of the 10 $\mu\text{Sv/yr}$ (1 mrem/yr) value other than to reference other sources and put the information into context. In particular, R5 does not indicate how to use risk management discussions to address public comments ranging from those which state that 10 $\mu\text{Sv/yr}$ (1 mrem/yr) is a level that scientific studies consider negligible to those that express concerns about its health effects. R5 also does not indicate how to discuss risk management issues with stakeholders that express concern that NRC is not fully disclosing the health effects and uncertainties from low levels of radiation. Although the staff presented information similar to that in Finding 5.1 at the 1999 public meetings, existing stakeholder concerns remained unchanged.

With regard to efficiency and effectiveness and regulatory burden, R5 is consistent with international levels being considered which could thus make NRC’s decisions more effective and efficient in dealing with import issues (see Recommendation #7). R5 is consistent with regulatory analysis guidelines of NUREG/BR-0058 in that any process would need to evaluate whether having a lower level in a standard could impose burden in extra cost of having to measure lower levels with no additional health benefit

C.5.2 NRC Staff conclusions on R5

The staff agrees that a level of 10 $\mu\text{Sv/yr}$ (1 mrem/yr) can represent a “starting” point in assessing alternatives, however it notes that any process conducted must assess a broad range of impacts and factors in evaluating alternatives and the starting point suggested in R5 is only one alternative amongst several. However, R5 has not provided substantial scientific discussion to advance the understanding of risk management issues or resolve disagreements amongst stakeholders in this area.

C.6 Recommendation 6 (R6): For any dose-based alternative approach to control of solid materials, the NRC should use the conceptual framework of draft NUREG-1640 to assess dose implications. However, NRC must first establish confidence in the NUREG’s numerical values, expand the scope of its applicability, and overcome certain limitations. At a minimum, the following actions are required: (1) review the parameter distributions and median values for each parameter in the report; (2) develop complete scenarios and dose factors for restricted use; (3) provide sufficient information to calculate collective doses; (4) expand the current set of scenarios to compute additional dose factors for human error and multiple exposure pathways; and (5) an independent group of experts should provide peer review of these activities.

C.6.1 NRC staff review

It is important to note, in discussing R6, that NRC is developing a broad assessment of impacts and other factors as part of an overall technical basis to support decision-making. NUREG-1640 is only one piece of this technical information base and is more limited in scope than the NA report and R6 appear to imply. Thus, the staff's review here addresses R6 in the context of the entirety of NRC's technical bases development and clarifies the role of NUREG-1640 in relation to other technical studies being conducted by the staff.

With respect to the performance goals of maintaining public health and safety as well as increasing public confidence, it is important that there be a scientifically rigorous and traceable tool for evaluating potential impacts. R6 is consistent with NRC's intention in this area to prepare a broad, peer-reviewed technical basis which is also presented for public review and comment. In particular:

- 1) R6 and Finding 5.4 (which state that NRC should use the conceptual framework of NUREG-1640 to assess dose implications) are consistent with NRC's broad approach in preparing this document, which includes completion of an independent peer review of the report and issuing a final NUREG-1640 to incorporate the responses to comments on the report.
- 2) R6-1 (with regard to reviewing parameter distributions) is consistent with NRC's broad approach in finalizing NUREG-1640 which involves reassessment of parameters and parameter distributions as an integral part of responding to all comments. Where changes to the parameters or further explanation of their rationale are needed, they are planned for inclusion in the final version of NUREG-1640.
- 3) R6-2 (and supporting Finding 5.6), on evaluation of restricted use criticizes NUREG-1640 for not addressing all alternatives, in particular restricted use, and thus appearing biased. While R6-2 is consistent with NRC's intent, noted in the Issues Paper, to evaluate a broad range of alternatives, the criticism in R6-2 does not note that the analyses conducted in NUREG-1640, to date, is useful for a broad range of alternatives based on the following:
 - a) With restricted use there is the potential that the "restrictions" may not be fully implemented and that unanticipated exposures could exceed the dose criterion for that release. For example, metals intended for restricted release to an authorized use might be diverted to a more general use or could prematurely enter the general commerce pool of scrap metal if the authorized use ended earlier than expected. The assurance that the material remains in its restricted use depends on the controls in place for the authorized uses. Thus, the analyses contained in NUREG-1640 provides a bounding analysis which can be useful for assessing restricted use scenarios.
 - b) The critical group for restricted use may be similar to that for clearance.
- 4) R6-3 calls for sufficient information to enable calculation of collective doses to support consideration of a collective dose standard. This is consistent with NRC's intent, as discussed in the Issues Paper, to evaluate collective doses, and in particular to conduct

an "assessment of collective doses to different population groups," and with NRC's current effort to evaluate collective doses as part of a follow-on work to develop a technical basis for Commission decisions.

- 5) R6-4 (and Finding 5.6) calls for scenarios that include human error and multiple exposure pathways. These recommendations are addressed below:
 - a) The recommendation for the analysis of human error is consistent with NRC's approach to incorporate realism into its analyses. The impacts of human errors on the dose factors depend both on the frequency of errors and the magnitude of the error. Based on review of data, distributions of frequencies and magnitudes can be estimated and could include accident scenarios.
 - b) The recommendation on the evaluation of multiple exposures is consistent with NRC's intent, as discussed in the Issues Paper and in SECY-00-0070. The discussions in SECY-00-0070 reflect stakeholder information obtained during the fall 1999 public meetings and in the public comment letters. It is also consistent with NRC's current effort to evaluate multiple exposure scenarios as part of follow-on work for the technical information base (see Attachment 3).

With regard to efficiency and effectiveness in preparation of a detailed technical basis, R6 does not note that, as part of the overall NEPA process, NRC staff would develop an overall assessment of impacts and other factors. As noted above, NUREG-1640 is only one component of this technical basis and is purposely limited in scope. R6-2 (on analyzing other scenarios), R6-3 (on collective doses), and R6-4 (on multiple exposures) are consistent with analyses that would be required by a NEPA process, an NRC rulemaking, and a regulatory analysis process. They are also consistent with the Issues Paper and with SECY-00-0070, Attachment 1, which discussed analyses needed for all the alternatives, including evaluation of multiple exposures. Analyses for other alternatives, collective doses, and multiple exposures are ongoing under existing contracts, separate from NUREG-1640.

R6 and Finding 5.7 indicates that NRC should not simply use the dose factors of NUREG-1640 to derive clearance standards for other categories of slightly radioactive solid material without first assessing the appropriateness of the underlying scenarios.

- 1) Finding 5.7 is consistent with NRC's current plans for other material at licensed sites such as soil and routine trash. For soil, NRC is conducting an effort separate from NUREG-1640 to develop dose factors; an initial effort in this area, NUREG-1725, was published to provide background information useful for developing parameters. For trash and similar materials, NRC has contracted to develop a supplement to NUREG-1640 for dose factors specific to the pathways for those materials.
- 2) Finding 5.7 does not recognize that NUREG-1640 does analyze mixtures of transuranics at NRC licensees, such as fuel facilities and rare earth facilities. Mixtures of radionuclides are addressed and apply equally to transuranics. Of course, the analyses are limited to radiological assessments, and requirements for disposition of solid materials with hazardous chemical properties need a separate assessment. Specific efforts related to Department of Energy (DOE) materials rest with DOE, which is developing information for a Programmatic Environmental Impact Statement (see

Attachment 4). NRC exchanges pathway modeling information specific to control of solid materials with DOE, where appropriate.

- 3) Finding 5.7 also mentions TENORM. Except as addressed in the AEA, the NRC does not regulate TENORM, however, the NUREG-1640 approach for assessing TENORM would not treat it as a material *per se*.

C.6.2 NRC Staff conclusions on R6

The staff notes that the NA report appears to indicate that all technical work is being conducted as part of NUREG-1640. In reality, NRC is developing an assessment of impacts and other factors as part of an overall technical basis to support decision-making. NUREG-1640 is only one component of this technical basis, i.e., development of information on individual dose factors, and was not intended to form the entire technical basis for assessing impacts and other factors to support decision-making. The staff agrees that its assessment should include evaluation of a broad range of alternatives, including their impacts and costs; these analyses are either underway or being considered in various NRC-sponsored studies.

The staff agrees that its assessment should include evaluation of a broad range of alternatives, including their impacts and costs. Such analyses is underway or being considered in the various studies underway at this time

C.7 Recommendation 7 (R7): The NRC should continue to review and assess, and participate in, the ongoing international effort on control of solid materials and develop a scientific rationale for consistency between concentration levels associated with dose criteria that may be adopted by the US and by other countries. However, NRC should ensure that the technical basis for the concentration levels is not adjusted for consistency unless these adjustments are supported by scientific evidence.

C.7.1 NRC staff review

The staff considers R7 to be consistent with the four performance goals and with the information in the Issues Paper and in Attachment 1 of SECY-00-0070, which noted that NRC should consider policies set by other nations and international agencies.

R7 (and Finding 5.3) is also consistent with NRC staff view that an effort to benchmark dose factors for radionuclides common to NUREG-1640 and other international studies is appropriate. The technical basis for differences will be examined as part of the staff's technical information base. In addition, R7 is consistent with NRC's approach to assist in developing IAEA standards so that NRC can maintain cognizance of international approaches.