**Workshop on Control of Solid Materials**
**November 1-2, 1999**
**U.S. Nuclear Regulatory Commission**
**Auditorium**
**11545 Rockville Pike**
**Rockville, MD**

**Meeting Summary**

**Monday, November 1, 1999**

## I. Welcome and Introductions

Donald Cool, Director, Division of Industrial and Medical Nuclear Safety, U.S. Nuclear Regulatory Commission (NRC), began the meeting by welcoming everyone to the roundtable discussion of the third NRC Workshop on Control of Solid Materials. He mentioned that the issues for discussion during the workshop have been debated for a long time, and that there are currently no national standards in place today, under either the Environmental Protection Agency's (EPA) environmental standards, or NRC regulations. In addition, he noted that there are many materials in the environment that contain radioactivity that is either naturally occurring, or results from human activities. He stressed that in an age of increasing environmental consciousness, the effort to ensure public health and safety, assure the proper control and isolation of materials, as well as minimize the use of new resources, has become an increasingly complex task.

Dr. Cool added that many facilities currently contain potential valuable materials that may contain small amounts of radioactivity. He noted that, presently, the approach to determine whether those materials are safe to release is not consistent. Dr. Cool, therefore, emphasized that the NRC is seeking to engage in dialogue during the workshop and discuss whether and under what conditions materials that contain low levels of radioactivity should be disposed of in an appropriately licensed facility, or safely reused or recycled. He suggested that the NRC and the participants in the Workshop share a common purpose of applying appropriate controls on the risks posed to individuals and to the environment. Dr. Cool informed the participants that these workshops provide an opportunity for interaction and are part of an enhanced process to find an appropriate regulatory vehicle for establishing a national standard, if appropriate.

He noted that the workshop is intended to provide the participants the opportunity to hear and interact with NRC staff but more importantly, to explore and discuss the various approaches and options for control of solid materials. Dr. Cool emphasized the importance for NRC to understand the rationale of the participants' recommendations in order to develop one or more

approaches to bring to the Commission in March of 2000. In conclusion, he introduced the Meridian Institute, the facilitators of the workshop, and stated that he looked forward to two days of interesting and useful dialogue.

Barbara Stinson, Senior Partner, Meridian Institute, explained to the participants that Meridian Institute is a non-profit, neutral facilitation and mediation organization. She added that Meridian's role is to provide the support needed during the workshop to conduct useful discussions. Ms. Stinson noted that the roundtable format for this workshop differs from the first two workshops and was being used so that participants from diverse interests could pursue back-and-forth discussion and more in-depth exploration of the issues of concern. She then initiated a round of introductions.

## II. Session 1 - Why are we here today?

Patricia Holahan, Division of Industrial and Medical Nuclear Safety, U.S. NRC, gave the first presentation that focused on the purpose of the workshop and what NRC is doing under the current initiative.

After Dr. Holahan's presentation, Ms. Stinson initiated the discussion by asking the participants to ask questions of clarification, provide comments about the presentation, and identify critical issues to address during the workshop.

***Questions of Clarification***

A scrap industry representative asked if NRC is considering a potential rulemaking because the material in question is under NRC's authority. He also asked if the licensees, who are in possession of the material, are government or private. Dr. Holahan replied that NRC is indeed involved because the material is under NRC authority. She also noted that licensees are both private and government entities. She provided some examples of federal facilities, including the following: the Department of Veterans Affairs; the National Institute of Health; the U.S. Department of Agriculture; the Department of the Army, Navy and Air Force; and, several Department of Defense (DOD) facilities, not including weapons complexes. In addition, Dr. Holahan provided the following examples of other NRC-regulated licensees: nuclear power plants, as well as non-power reactors; research reactors and research facilities; universities; research and development facilities; facilities that manufacture radioisotopes; radiographers; and consumer-type products, such as smoke detectors and watches. Dr. Holahan also mentioned that NRC does not regulate Department of Energy (DOE) facilities. Dr. Cool added that under a proposed rulemaking, NRC would still have no jurisdiction over DOE's decisions to release materials from their facilities, unless that material is moved to a NRC-licensed facility.

In terms of a rulemaking process, a metals industry representative asked who might benefit from the rulemaking, and what would happen if criteria were established that create conflicting needs and wants. Dr. Holahan noted that NRC has many interested parties, including the public, licensees, and Congressional interests. In regards to the participant's second question, she explained that when NRC makes a decision, they first take all public input and comments, then look at the health and environmental impacts and cost effectiveness of all the alternatives, and use all the above factors to develop input for decision making to bring to the Commission.

A scrap industry representative noted that this proposed rulemaking is not the first time NRC has examined the issue of potential release of material and asked NRC to explain the outcome of the first attempt to do so. Dr. Holahan explained that several years ago NRC issued a policy statement called Below Regulatory Concern (BRC), which was later withdrawn by the Commission. Dr. Cool added that BRC was developed by the NRC to enunciate criteria for guiding specific decisions and activities, and not to specifically release any materials. He continued that the decisions facing the Commission and various licensees, as well as issues concerning the amounts and kind of materials are still prevalent and the Commission is currently considering developing criteria.

The scrap industry representative also asked why EPA decided not to pursue a rulemaking on this issue. An EPA representative replied that based on EPA's technical and economic studies, they decided that the amount of material coming from decommissioned power plants and DOE sites was very small compared to the amount of material currently recycled in the United States (U.S.). He added that EPA decided to prioritize their work by focusing on orphan radioactive sources that ended up in scrap metal, and to work with the international community, specifically the International Atomic Energy Agency (IAEA), where there was increasing amounts of potentially contaminated material due of loss of control.

A public interest representative noted that NRC is claiming to consider all the options available, but the Issues Paper presents the options as being limited. He then asked how NRC plans to consider the other options recommended by the public or other stakeholders. Dr. Holahan emphasized that NRC believes that all alternatives are on the table for consideration and the purpose of the workshops is to look at all the alternatives. She emphasized that in order to pursue anything other than the current case-by-case approach, a rulemaking is required. She added that all the options for developing a standard for release, including zero millirems (mrem) per year above background levels, are open for consideration.

A representative from the steel industry asked if there is documentation that estimates the amount of material containing low levels of radioactivity. He suggested that such information is needed to do a cost/benefit analysis. Dr. Holahan mentioned that NRC is currently developing that information. Robert Nelson, Chief, Special Products Section, Division of Waste Management,

U.S. NRC, added that NRC currently does not have any numbers established, but the EPA study released in 1997 contains some numbers regarding the amount of material in consideration. A scrap industry representative noted that the annual reuse conference, sponsored by the Association of Radioactive Metal Recyclers (ARMR), has assimilated the inventories done throughout the DOE complex and power plants. For DOE, he noted that the number ranges from 1 million to 1.8 million tons of all types of metal, not including building materials. For power plants, he estimated a number in the range of 600,000 tons of metals over a 40-year time frame that considers the decommissioning process.

***Critical Issues and Concerns***

Ms. Stinson asked each participant at the table to provide their input on important issues of concern to address during the workshop. The participants' comments are summarized below.

A union representative expressed interest in hearing from NRC regarding the lawfulness of past operations, such as Oak Ridge and others, as well as the recent authorization by Tennessee to recycle potentially radioactive metal without NRC oversight. Dr. Cool responded that the NRC is currently in the process of answering a series of questions from Congressmen Marky, Klink and Dingell related to the Tennessee and release of solid materials issue. He emphasized that the legal issues will be carefully looked at on all levels and by the Commission before a response is given to Congress. Dr. Cool noted that NRC is engaging in an effort to understand what exactly took place at various facilities in the past, and part of the enhanced participatory process is to hear input and discussion from interested parties regarding such issues. In addition the union representative asked NRC to provide information regarding the lawfulness of the NUREG 1640 document, which he suggested was written by a NRC contractor with a conflict of interest.

The union representative also noted the importance for NRC to address the following issues, which are outlined in a document written by the Paper, Allied-Industrial, Chemical and Energy Workers International Union (P.A.C.E.) (See the public document record to read the document in full): public trust; worker safety; conflict of interest issues; and accounting for all of the radioactive material under NRC jurisdiction.

An industry representative expressed the need for an explanation of NRC's legal authority to set standards for authorizing release of radioactive materials from facilities. Another industry representative noted that the options for a rulemaking seem to focus on recycling, while disposal and reuse without recycle have not been fully investigated and considered as viable options. In addition, he mentioned that the traceability of the materials once they leave a facility, to examine potential pathways and ensure the potential exposures and health risks, is another important issue to address.

A public interest representative raised several critical issues of concern to address, including the following: 1) false negatives, i.e., the uncertainties involved with surveying equipment and the surveyors themselves that may deem a material safe when, in actuality, it is not; 2) negative economic incentives that promote releasing material without cleaning it; 3) technical uncertainties associated with the aggregate of potential releases and the limits of survey methods to reasonably survey residual radiation; and lack of public confidence due to a long legacy of mismanagement of contaminated sites, the public belief that this issue is prejudged due to NRC's endorsement of the Oak Ridge project, the recent staff requirements memo (SRM), and the BRC policy.

In relation to public trust, a nuclear industry representative noted that a safe and consistent standard that is completely protective of human health and safety will help build public confidence that the materials released from licensed facilities are safe. A metals industry representative expressed uncertainty that the public will accept a rule that ensures the material is safe. He noted that, based on the history of orphaned sources licensed by NRC, control and regulations do not necessarily prevent the release of contaminated materials.

Also in regards to public and stakeholder confidence, a scrap industry representative suggested that in order to foster confidence, the public needs to understand the issue. He added that in order to understand the issue, the public should investigate the issue themselves, rather than be given documents that are difficult to understand, such as Regulatory Guide 1.86. In addition, he recommended that NRC should allow the public to answer the issues of concern on their own and explain to NRC how they understand the problem, and recommend how they would like NRC to protect them. He suggested that this approach, rather than NRC's current method of looking at how the public will allow a rulemaking, will build public confidence.

An Agreement State representative noted that there is great concern and fear of an inconsistent national standard. She indicated that, without a consistent standard that is scientifically defensible and protective of human health, the public will have a lack of confidence. She emphasized the importance of working together to establish a standard that everyone can embrace.

In regards to setting a standard, a metals industry representative suggested that NRC should take a leadership role and convince others, including the international community, that their approach is the most reasonable.

A State representative recommended addressing the questions of whether or not there should be a rule, and whether a rule create a better situation than the current case-by-case approach. He then added that if a rule is made, discussion needs to take place regarding what materials it will cover, whether it will promote free or restricted release, what the standard level will be, and what the

criteria will be to determine that standard. He suggested setting a number that does not create a lot of conflict between various entities. A nuclear industry representative recommended including all materials in a potential rulemaking.

A Federal government representative suggested addressing how NRC's import/export regulations would be affected by a proposed rulemaking. He added that the IAEA approved an action plan for control of orphan sources and could be made available as additional information.

A Tribal representative stressed the importance of informing and involving tribes in decision-making processes. He also emphasized the importance of the federal government and Tribal liaisons to understand Tribal culture and beliefs when making a decision. He noted that tribes tend to be left out of policy issues until it is too late, and Tribal sovereignty issues are forgotten.

A representative from the nuclear medical industry asked that the following three principals be served for whatever controls NRC decides to implement: 1) adequate protection for the members of the nuclear medicine profession, the patients and the public; 2) the rule should not be an impediment to delivering or restricting health care; and 3) implementation methods should be practical, simple, economical, as well as effective. A State representative also provided three points to consider for a potential rulemaking: 1) ensure that clearance levels do not increase the number of non-incidents, where alarms go off unnecessarily; 2) the need for oversight and enforcement of clearance levels; 3) the potential for the public to move away from using recycled metals because they might contain radioactivity. Similarly, an industry representative described the significant efforts of the steel industry to encourage the recyclability of metals and expressed concern regarding the impacts of a rulemaking on the public's trust in the industry's products.

In addition, an industry representative noted that radiation phobia should be discussed explicitly because many individuals are refusing important medical treatment based on their fear, and are not aware that there are safe levels of radioactivity, and that we in fact live in a sea of radioactivity.

An EPA representative stressed the importance of conducting a proper and accurate analysis of the health and environmental impacts involved with this potential rulemaking. He suggested that a proper analysis should take monitoring, false alarms and other technical and policy issues that were raised into account.

In conclusion, a public interest representative encouraged NRC to strongly consider the need for radiation protection, not only for human beings, but also for the environment and its various biosystems. In addition, she emphasized the need to focus on moving to a zero mrem/year release, and to also create a program that would seek out and recapture materials that were released in the past.

## III. Session 2 - How does what we are discussing today fit into the overall picture?

Dr. Holahan gave the second presentation that discussed: the types of solid materials and the NRC licensees involved with this issue; the potential radiation dose being considered and how it compares to the dose received from other radiation sources; and, information on what other countries, agencies, and/or States are doing with regard to the control of solid materials.

After Dr. Holahan's presentation, Ms. Stinson opened the discussion for questions of clarification.

***Questions of Clarification***

A union representative began by referring to a slide discussing the authority of States and asked if Tennessee had the authority to amend Manufacturing Sciences Corporation's (MSC) license to permit the release of volumetrically contaminated nickel and, if they did have the authority, under what agreement? Dr. Cool responded that Tennessee issued the MSC license in accordance with its agreement. He also noted that the General Counsel is currently looking to verify an answer regarding Tennessee's authority to issue such a license.

Also in regards to the MSC/BNFL case, the union representative asked if any analyses were done on exposure pathways for workers involved in the recycling process and at steel mills. Dr. Holahan explained that NUREG 1640 looks at the different scenarios and pathway analyses for critical groups, workers, individuals who handle the material, as well as the consumers. An EPA representative noted that EPA's study that was completed in 1997 did not look at workers from the BNFL-MSC plant, but looked at exposure pathways for workers beyond licensed areas; for example, scrap workers, and people in the steel mill who handle slag. A participant representing a professional association added that the Oregon National Laboratory and DOE also conducted studies of worker exposure pathways for situations similar to the BNFL case. He noted that the results of those studies were used by the American National Standard Institute (ANSI). The union representative stressed that further consideration by NRC of worker exposure in the BNFL case, specifically, must be given.

A public interest representative asked what the additive risk would be to an individual who receives accumulated doses of radioactivity, from recycled material containing low levels of radioactivity and other contaminants in the biosystem, from multiple sources on multiple occasions. Dr. Holahan explained that NRC does not have a specific answer yet, but is currently examining that information necessary to appropriately address those issues within the analysis of the different alternatives for a potential rulemaking.

A union representative asked if NRC's relationship with the DOE or EPA's rulemaking on import/export standards will affect the rulemaking. Dr. Cool noted that NRC works closely with

DOE to understand what they are doing and to coordinate with them. He also mentioned that DOE is a member of the interagency steering committee on radiation standards, which is a federal effort to maintain coordination of regulating efforts. A DOE representative added that DOE tries to maintain consistent regulatory approaches with both DOE's requirements and with NRC and Agreement States' requirements. In regards to EPA, Dr. Cool explained that there are ongoing efforts to maintain close coordination between NRC and EPA, and any EPA standards or criteria for import and export need to be factored into NRC's considerations for a potential rulemaking.

A representative from the metals industry referred to the relationship between release levels and the analytical capabilities of the detectors and asked if material is cleared at any particular release level, whether it would set off a detector at a mill. Mr. Nelson replied that NRC is researching detection measurement techniques and possible technology to use in developing a regulatory guide for implementing a standard. A steel industry representative added that if material is released under DOE Order 5400-5 or Regulatory Guide 1.86, it will set off an alarm.

***Comments and Issues of Concern***

A scrap industry representative noted that, in a recent meeting in Geneva hosted by the European Commission, a team of radioactive contaminated metallurgic scrap specialists representing 11 nations stated that they were not prepared to accept the European Commission's free release values of one mrem/year. He noted that it was his perception that the acceptance levels and acceptance criteria advocated by the industry and the public were considered by all 11 nations present as a more important issue than the release values set by the government. Dr. Holahan noted that she was not aware of that meeting and was interested in learning more about it.

Following up on the portion of the presentation comparing potential dose criteria, of levels anywhere between zero to ten mrem/year, to that of doses received from natural and man-made sources, a representative from the nuclear medical industry noted that patients are often exposed to several million mrems of radiation for therapeutic treatment, and experience no detectable adverse consequences. In response, a scrap industry representative noted that the decision to receive x-rays or receive medical treatment involving radiation is an individual's conscious decision. He added that the crux of the issue is that the industry is driven by the public's perception and reaction to the perceived safety of recycled material. He noted that public opinion should, therefore, drive what is done with contaminated materials based on their understanding of the issue.

The scrap industry representative asked the roundtable participants to take a public perspective and, if asked to choose between a baby stroller for your child or grandchild that was made: 1) from conventionally recycled materials, or 2) from material that was culled from a nuclear power facility, which would they select. In response, an Agreement State representative noted that, with

a dose-based standard, the stroller made from recycled materials that potentially came from a licensed facility would not have adverse impacts on her grandchild. She added that she would, therefore, choose the stroller that would not collapse and have immediate impacts on the child. Also in regards to the stroller issue, another State representative noted that no stroller will be completely risk free and the question, rather, becomes whether there is enough risk in the stroller to put a baby in it or not.

Referring back to an earlier discussion on public perception and concern, a nuclear energy industry representative noted that collective and chronic exposure are large concerns of the public, based on what he has heard. He clarified that NRC is addressing those issues. He added that NUREG 1640 indicates that NRC looks at the collective implications and tries to deal with them. He also noted that NUREG 1640 clearly shows that chronic exposure is protective. An Agreement State representative noted that NUREG 1640 is a document open to comments and criticisms for improvement and suggested that those who see flaws in the document should provide NRC with their comments.

A steel industry representative explained that steel mills have systems that detect levels of radiation above background, and if a material containing levels above background is released from a facility, steel mills will typically reject them.

In regards to materials to consider, a State representative suggested looking at sewage and sewage sludge and other waste from medical patients, such as diapers or paper towels. She noted that there is currently a gap between patient waste that is allowed to be released, and landfill acceptance criteria.

On behalf of her committee, an Agreement State representative recommended that there be a rulemaking and that a dose-based standard be developed. She added that States will then be able to promulgate and recommend a similar standard that is applicable to naturally-occurring and accelerator-produced radioactive material (NORM/NARM).

A Federal government representative concluded the session by noting that the Europeans are faced with the threat of materials being sold off and hard currency getting into the commercial market, and are, therefore, moving quickly to set a standard. In terms of overall safety of materials purchased from oversees, he suggested that there needs to be a basis of confidence that there is no additional threat of that item coming into the U.S.

**Public comment**

At this point in the agenda, the observers in the audience were given the opportunity to provide their comments. Some individuals of the audience read written statements, which are provided in full in the appendices.

The first observer to speak was John Hamrick, Manager of Health, Safety, and Environmental Affairs for Umetco Minerals Corporation. He noted that there appears to be a misconception that there is a lack of a national standard, which, he added, is not true. He explained that EPA has promulgated a release standard for uranium recovery facilities of five picocuries per gram radium above background. He also stated that there is disconnect between what NRC considers protective. He mentioned that NRC supports 100 mrem/year exposure as protective, but on the other hand, they are beginning from a dose of zero as a standard for a potential rulemaking. In addition, he stated that if a one mrem/year standard is adopted, this clearance rule will affect DOE, particularly Title I cleanup facilities under Uranium Mill Tailings Radiation Control Act (UMTRCA), because almost all of those facilities are leaving materials above five picocuries per gram radium. In conclusion, he asked if NRC plans to accept EPA's calculation of dose for coal ash, or if NRC staff plans to verify that independently.

Ray Turner with the David Joseph Company spoke next. He referred to earlier discussions regarding the various estimations of the volume of potentially contaminated material that is available for recycle. He then asked both NRC and DOE what the frequency of release of that material would be, especially non-ferrous materials, assuming those materials are released and a release criteria level is met. He observed that if six million pounds of nickel were put on the American market, the stainless steel and nickel market would be destroyed.

Winonah Hauter, representing Public Citizen, spoke on behalf of the organization to explain why they decided not to participate in the workshop process. She listed the following reasons for their choice not to participate: 1) they believe the process is biased; 2) based on the June, 30 1998 SRM, NRC has prejudged the outcome of the proceeding; and, 3) the Commission's recent decision to continue with the workshop, although many organizations refused to participate, shows that NRC is not interested in public input. She emphasized that their time is better used educating the public, rather than discussing what they feel NRC has already decided to do. She noted that a proceeding that is based on a document (NUREG 1640) that was developed by a consulting group with an economic interest in the outcome, is not a fair beginning. She suggested that this process is part of an effort by the nuclear industry to lower its costs and make decommissioning cheaper. In conclusion, she noted that the workshop is not a genuine effort to consider the public's concerns and is a thinly veiled attempt to meet NRC's legal obligations to involve the public.

Terry Johnson, Director of Radiation Safety, George Washington University, observed that there are no proven health consequences at the dose levels under consideration (between zero and

10mrem) for a potential standard. He added that around 10,000-20,000 mrem, depending on the expert, is the threshold where observed consequences are found. He emphasized that regulating 1 – 100 mrems is an ethical issue that would burden society, nuclear medicine, clinical pathology, and valuable things done in industry because of a theory that is not proven.

Diane D'Arrigo, with Nuclear Information and Resource Service, provided the final comments for this period. She read a statement from several national and international organizations opposing atomic waste release, clearance, and recycling into the marketplace. The statement also described her reasoning for not participating in the rulemaking process. (See the public document record to read the statement in full).

## V. Session 3 - How does NRC currently handle control of solid materials?

Anthony Huffert, Division of Waste Management, Office of Nuclear Materials, Safety and Safeguards, U.S. NRC, presented information on the current NRC case-by-case approach, and the amount of solid materials released to date under current practices.

After the presentation, Michael Lesnick, Senior Partner, Meridian Institute asked the participants to ask for points of clarification regarding the information presented in the slides, and then turn to comments and issues of concern.

***Questions of Clarification***

In regards to the Tennessee issue, a union representative noted that, according to his understanding, some plutonium was included in part of the material that was licensed for release. He then asked NRC what the standard is for plutonium and how much plutonium has gone out. From a materials point-of-view, Mr. Huffert explained that NRC does not have an exact number on how much plutonium is out there, but they are currently studying the amount of plutonium released by NRC.

A State representative asked how much time and resources is spent on the current case-by-case analyses, and how many are done per year. Mr. Huffert explained that for materials, NRC receives few on-site disposal requests, but the reviews can be extremely complex and can take several months. He added that people within NMSS routinely work on Full Time Employment (FTE) and require several hundred hours per year. Mr. Essig, NMSS, U.S. NRC noted that for reactors, NRC receives a couple of requests per year from non-agreement States for on-site disposal. He continued to explain that those requests require the licensee to conduct an extensive environmental pathway analysis, which NRC evaluates and determines whether or not it is reasonable.

For clarification, a public interest representative noted that Regulatory Guide 1.86 is sometimes written into facility licenses, which would permit routine releases of materials that meet the limits under Regulatory Guide 1.86. He then asked, if facilities are releasing materials under such circumstances and how frequently facilities release those materials. Mr. Huffert noted that at material facilities these types of releases occur on an ongoing basis and are not routinely tracked. Dr. Cool noted that facilities that use unsealed sources, such as university medical research facilities, are the ones that require Regulatory Guide 1.86 to be written into their licenses. He estimated that those licensees comprise approximately 20-30 percent of licenses for material facilities. For reactor facilities, Mr. Essig mentioned that, to his knowledge, 1.86 is not written into the license.

***Comments and Issues of Concern***

Referring to relicensing activities, a nuclear energy industry representative acknowledged that nearly 80 percent of the existing nuclear power plants are likely to relicense under today's economic conditions. Assuming that percentage, he added that relicensing would extend the time period of releasing potentially contaminated solid materials.

A nuclear industry representative explained that at a nuclear generator facility, if surveyed material does not contain levels above background, it will be cleared for release. If it does contain levels above background, he noted that the material is not released and methods for disposal are determined, which can involve applying for a 20.302 or 20.2002 process. He emphasized that these case-by-case approaches are waste disposal decisions, not release decisions. Mr. Huffert noted that, unlike nuclear reactor facilities, material facilities do not have a no-detectable policy for materials. He explained that although reactor and material facilities have different policies, the policies are very similar. For example, he mentioned that the no-detectable policy uses similar threshold levels as Regulatory Guide 1.86, which is the policy for material facilities.

Also in reference to Regulatory Guide 1.86, a scrap industry representative noted that it does not provide a guide for releasing volumetrically contaminated materials. He continued by reading a statement from the Issues Paper that mentioned that NRC allows release of volumetrically contaminated material if monitors do not detect levels above background. He asked if such materials have been released, even though the levels could be present volumetrically and could be released if the material were melted. Dr. Cool responded that the statement was true primarily for medical licenses that have provisions allowing them to hold their various materials for decay until a survey shows no detectable activity, after which, the material goes to a biohazardous landfill or another criteria. He concluded that this is not the case for metal. To add to Dr. Cool's clarification, a nuclear industry representative noted that other materials, such as soils, sediments, and incinerator ash from facilities may contain volumetric contamination. He emphasized that it is not actually known if those materials contain contamination because the levels are not

detectable, but they are subject to surveys and analyses. If they pass the criteria, he explained that the materials are then released to a disposal site, but they have not been recycled to date.

Referring to the example of the current case-by-case approach that discussed offsite disposal septic tank waste from a power plant, a public interest representative noted that when steel is put aside, dilution becomes the major problem with other materials, such as sewage sludge, soil, etc. He noted that radioactive material can be diluted almost to the point where it would be considered insignificant, except it would still be released from a biosphere perspective. He suggested that dilution is a major issue at DOE sites because it is easy for a generator to meet virtually every standard if they have the resources, time and a willing municipal sewer system. Mr. Essig explained that the volume of sewage sludge discussed in the case-by-case example provided in the presentation was small compared to volume available for dilution. He also mentioned that in all cases, any evaluation of an environmental pathway analysis would take account of and credit for an appropriate amount of dilution. In a later session, a public interest representative suggested that if a material is subject to dilution, it should be surveyed before it is diluted.

Based on the conversations, an industry representative suggested that rather than establish a blanket criteria for all materials, another option is to allow free release of materials that have no detectable levels, which is a majority of the material being discussed, and then focus on the materials that are left. For the remaining materials, he suggested developing separate rules for the each material.

***Experience with the Current Case-by-Case Approach***

To provide a personal experience with the current case-by-case approach, a nuclear industry representative described his involvement with gaining approval to remove gravel and rock containing small amounts of radioactivity (a fraction of a mrem) from a nuclear power plant. To gain approval to send the material to a landfill, he noted that they had to go through a lengthy process of working with the NRC and the State of Florida (an Agreement State), and of completing a dose assessment and a rigorous analysis. He noted that this experience could have been simpler with a national standard to use as criteria for determining whether the material was acceptable for release to a LLW site.

Based on her experience, an Agreement State representative noted that without a clear standard, the case-by-case approach involves a great deal of research and staff time to review and evaluate and ensure that disposal is protective of health and the environment. She added that the current approach takes staff time away from other concerns that have more immediate health and safety impacts.

A State representative explained that her State used Regulatory Guide 1.86 to clean up two cases of tritium contamination from tritium signs. When consulting with NRC on the problems, she

mentioned that NRC asked if the State preferred an exemption to Regulatory Guide 1.86, which she understood as an exemption to clean up to those levels. She then noted that even though in her case the State cleaned until levels were safe, she wondered how many times exemptions have been given.

An industry representative stated that he understood that case-by-case is time intensive, but passing that time to others downstream, such as the steel industry or other members of the general public who do not have the training or expertise, is not an acceptable solution either.

## VI. Session 4 - What are other alternatives for addressing control of solid materials?

Frank Cardile, Office of Nuclear Material Safety and Safeguards, U.S. NRC, gave a presentation on other alternatives for addressing control of solid materials. The alternatives he discussed included: 1) Continue the current practice (case-by-case); 2) Set acceptable dose levels in a regulation which must be met before materials could be released for unrestricted use; 3) Establish restrictions limiting release of solid materials to certain authorized uses; and, 4) Establish a regulation that does not permit release of materials that had been in an area where radioactive material was used or stored. After Mr. Cardile's presentation, the discussion was then opened to the participants for questions and comments, or suggestions for other alternatives.

### *Questions of Clarification*

A public interest representative began the discussion by asking the following three questions: 1) Are the potential dose rates of 0, 0.1, 1 or 10 based on the elimination of the linear hypothesis? 2) Why is there nothing in the alternatives regarding finding, tracking, and recapturing materials already released into the biosphere? 3) How would NRC determine subsequent dose levels and distribution within the recipient of the radioactive component as they continue to decay during secondary and subsequent reuses of the materials? In regards to the first question, Dr. Cool stated that for purposes of outlining a control system, NRC has assumed a linear hypothesis. The public interest representative then continued to ask whether NRC also assumes lifetime probability of fatal cancer and severe genetic defects, or that there may be other fatal non-cancer impacts on human health, particularly as the potentially released materials combine with other sources of exposure. Dr. Cool responded that the linear hypothesis does assume fatal cancer induction, and the International Committee on Radiation Protection (ICRP) and other institutions have moved towards a broader spectrum of risk, including morbidity. In regards to synergistic effects, he noted that they would be looked at but not as part of the environmental impact analysis. In regards to the second question, Mr. Cardile explained that NRC is open to recapturing materials already released as an alternative, and they are looking into the various aspects of recapture.

A metals industry representative asked to what extent are segregated materials (from unaffected and radioactive areas) coming out of NRC and DOE facilities. He also asked if those materials

are maintained in a segregated form or if they are co-mingled. Dr. Holahan noted that a question on the table is how to separate those materials and NRC is looking to the participants for their suggestions. A DOE representative explained that contaminated materials are not co-mingled with materials from unaffected areas and are kept apart to the extent that they can verify that they are different.

***Other Suggested Alternatives***

Several participants suggested other alternatives to consider in addition to the four presented. Those recommendations are bulleted below.

- Find, track and recapture materials already released into the biosphere.
- After authorized use is done and the material is surveyed, the material could either go to a low-level waste (LLW) burial site, go back to another license or authorized use, or allow it to be free-released (because of the decay that occurred) to a LLW site.
- Treat authorized use like a general license, which is not licensed by NRC but has abilities to handle the radioactive material and has certain obligations to return or dispose of the material within NRC regulations.
- Develop different regulations on a material-by-material basis, if it is practical. Use pilot programs to consider different situations.
- Limit the alternatives based on uncertainties in the data or risk assessments. There may be information on some radionuclides that provide a better sense of how it might be used. Other radionuclides may not have enough information to predict how it will be used or who might be exposed.
- Dedicate a facility to handle contaminated materials, rather than release them. A caution for this alternative is worker dose.
- For steel, expand restricted release to allow recycling of materials back into the licensed facilities. A nuclear industry representative noted that recycling of materials within the nuclear community does currently occur, and it has been economical to do so.
- At nuclear facilities, segregate the materials from radioactive areas from the materials in unaffected areas.
- Develop a new category of waste called low, low-level waste (L3W). If materials are treated as waste, rather than recyclable, the public will have a different perception, attitude and acceptance of the material. Also, there does not appear to be an economic need for recycled materials containing low-levels of radioactivity.
- Adopt the American National Standard Institute (ANSI) Committee N13 report on clearance. (A position statement from the Health Physics Society (HPS) regarding adopting this was distributed. (See the public document record to read the document in full).
- Controlled release: material never leaves DOE or NRC control.
- In addition to surveys, there should be radiation detectors set at or near background levels to coordinate with the levels used by steel mills to measure the materials that come into the mill.

***Comments on Alternatives Presented in the Issues Paper and Other Issues of Concern***
In regards to non-release of contaminated solid materials and highly restricted rules for release of materials or equipment that entered radioactive areas, a nuclear medical industry representative stressed that both of those scenarios would impair the health care delivery system. He stated that a rule should balance public and professional health protection and the ability of the public to conduct business economically and safely. He added that the nuclear medicine profession cannot tolerate regulations that hamper its ability to function. In addition, he noted that balance is needed between the debatable theoretical risk of using radioactive material to treat patients and the actual adverse health affects of not receiving treatment if someone is ill or has a serious disease.

A union representative commented that the alternatives should discuss recapture, monitoring and other kinds of devices to track the materials to provide the public with providence and ensure legal liability. He concluded that controls are critical if these materials will be potentially exposed to the public.

An Agreement State representative mentioned that she and her Committee decided that clearance limits for unrestricted use would be more conservative than those for restricted release, but would be more efficient and universal in their application. She added that any rule should have provisions for case-by-case evaluations and exception for unique circumstances. In addition, she suggested that options for restricted use of some materials should be included in the discussion of the alternatives.

A nuclear energy industry representative suggested that free release criteria is needed before one can develop effective restricted release scenarios. He also added that people are looking to see if a market will exist for restricted end use of material.

A participant representing the nuclear medical industry noted that the medical industry is not comfortable with case-by-case approach and would like to see a proposed rulemaking establish a clear and uniform standard uses dose-based methodology, rather than survey information. He added that an intermediate facility, such as EnviroCare, would be helpful to avoid the necessity of releasing material to a full-fledged waste facility.

Concluding the session, a public interest representative noted that the fundamental concern of the environmental community is the multiplicity of sources that, once out of control, are impossible for an individual to detect, know about, or be willing to accept the additive doses for those sources. She continued that the issue comes down to the term "species responsibility," meaning that the concern goes beyond our own well being and economic benefits or losses to the generations that follow us. In conclusion, she noted that society likes to operate on the

precautionary principal that says, when in doubt, don't. She then noted that the society's conclusion is that with this issue there is doubt, and therefore, materials should not be released.

## VII. Input on the enhanced participatory rulemaking process

Before moving on to the next session, Ms. Stinson asked the participants to provide their input on the Enhanced Participatory Rulemaking process. She explained that, in the past, it involved pubic meetings prior to the rule making proceeding, and rule making with public notice and comment. Ms. Stinson noted that for this case, the Commission and many participants have suggested that enhanced participatory rulemaking needs to be more significant. She mentioned that the first phase of this process, the pre-decisional phase, is between now and March of 2000, which is when NRC staff gives the Commission a paper and briefing on results of the public meetings and other comments, and a recommendation on whether to proceed with a rulemaking. She added that the final workshop for initial public discussion is on December 7-8 in Chicago, IL. From March of 2000 forward, Ms. Stinson noted that NRC will presumably enter into a second phase involving either a rulemaking process or not. In the event that they do proceed with a rulemaking, Ms. Stinson suggested that would be useful for NRC to have advice on what kind of public involvement there should be. She then asked the participants for their input.

A public interest representative asked if potential meetings that follow the Chicago workshop would be open to the public. Dr. Cool replied that any additional meetings would follow a public notification process, which would be a 10-day advance notice. He also noted that the working group that would prepare the recommendation is planning to have a couple of meetings held in an open forum.

Other suggestions to improve the enhanced participatory rulemaking process included the following:

- Follow up on information requests and questions raised by the stakeholders.
- An NEI representative offered to facilitate a tour of some facilities to provide interested stakeholders a hands-on opportunity to understand what materials would be released and why they feel the need to release materials from their facilities.
- Several participants suggested having smaller group meetings that are topic-specific that would enable the participants to understand other positions and also enable NRC to understand the concerns and input in greater depth.
- To gain public confidence, approach the issue from a frank historical perspective and acknowledge past mistakes. Also, NRC should be honest with the public about their intent with a rulemaking and the economic drivers behind it. Stakeholders need to understand other viewpoints, as well as the origin of the proposed rule. Then, there should be a debate in a context other than a NRC-sponsored event.
- Set up chat rooms for each specific topic that would allow individuals to respond with an

email when they choose. They would also allow the issues to be addressed before a meeting so that more substantial issues can be discussed in-depth. Dr. Holahan mentioned that NRC established a list serve last week. She also suggested exploring the potential of using the technical conference forum web site.

- Have a point person from NRC from whom people could seek information.
- Allow NRC to raise some of its concerns about the realities of implementing a rule.
- Bring in an independent technical consultant to be engaged in the issue that various interest groups have confidence in.
- Discuss the impacts of the international community going forward with a standard, if the U.S. does not.
- NRC should permit and encourage discussion of the disposal difficulties associated with the continued generation of radioactive materials and wastes.
- First make sure the stakeholders and the public understands the issue and its associated problems completely, and then allow the stakeholders to tell NRC what they will accept as safe and how to solve the problems. Then the NRC can create a rule that will satisfy the public

## VII. Public comment

After the conclusion of the roundtable discussion, Mr. Lesnick turned to the observers for public comment.

George Zinke with Entergy observed that, based on the conversations, it seems there will be opposing views for some time. He cautioned the NRC staff against solutions that are too easy, such as just accepting the status quo because this issue is too hard to resolve, or having a rulemaking and establishing a new standard that adds to the current conflicting standards. He recommended coming to resolution on the current problems, rather than creating one. Mr. Zinke also encouraged NRC to continue with the enhanced rulemaking process, and recommended that the Commission also be involved with the other regulatory agencies, both Federal and State.

Tony LaMastra, American Iron and Steel Institute (AISI) noted that he observed two misunderstandings. He mentioned that the first misunderstanding is that a load of uniformly contaminated material raises background levels and is, therefore, not detected. He explained that sophisticated monitoring systems are capable of detecting it. He mentioned that the second misunderstanding regards levels of detectability. He emphasized that the detection rates are very high and monitors have extremely sensitive detection capabilities. He added that NRC's differing guidelines for detectability for reactors and materials licenses is confusing for the general public and suggested that NRC should take a position on a guideline.

On behalf of the Sierra Club, Judith Johnsrud read a quotation from the Sierra Club's Low Level

Radioactive Waste Policy Statement which recommended the following for low level radioactive waste: terminate production of fuel cycle wastes and isolate such wastes in the safest and least environmentally damaging way achievable; isolate LLW by technology that results in zero release activity; and, material that the NRC or other agencies classified as low level radioactive waste as of January 1, 1989, should continue to be classified as such, and to be isolated only in facilities licensed specifically for that purpose. (See the public document record to read the statement in full).

Terry Johnson from George Washington University expressed concern that the representation from the medical field at the table is not broad enough, considering the economic burden that would result from any new regulation. He explained that, as the definition of solid radioactive waste goes to lower levels of activity, the adverse economic impacts on the medical industry increase.

Ray Turner, David Joseph Companies mentioned that recently four cargo ships of normal scrap metals were rejected oversees because monitors detected levels just barely above background. He stressed that the economic impacts involved with a cargo being rejected oversees can range from about five to 10 million dollars. He also emphasized that scrap metal dealers are addressing a zero tolerance level on an international basis.

Dr. Cool concluded the day's discussion by thanking everyone for an interesting and useful day. He also expressed appreciation of all the thoughts provided.

**Tuesday, November 2, 1999**

Barbara Stinson welcomed everyone back for the second day of the workshop. She noted that during the first day a lot of time was spent learning about some of the basic elements of the participants' positions and issues. She mentioned that today's discussions will explore some of the outcomes and the potential impacts of the various alternatives that have been put forward, including the four in the Issues Paper and those suggested in earlier discussions. After reviewing the highlights from the previous day's discussion, she introduced the next presentation on the agenda.

## I. How should solid material controls be assured under various alternatives?

Anthony Huffert and Robert Nelson, NMSS, U.S. NRC, discussed how control of solid material should be assured under the various alternatives, which also can be found in sections two and three in the Issues Paper. After the presentation, Mr. Huffert opened the discussion to the participants.

Michael Lesnick initiated the discussion by asking the participants to describe real-world control systems that are in place today and what systems are needed in the future.

A union representative began by providing data points related to real-world situations and then asked some associated questions. The data points include: 1) A testimony given by the Paducah union president, Dan Fuller, which stated that a DOE survey of the Paducah facility found that many DOE contractors were not properly monitoring internal ingestion of radiation doses to workers. 2) Mike Mobley, a State regulatory official, has publicly stated that many DOE materials are released and are not controlled. 3) Before the BNFL contract was signed it was understood that the materials under the contract would have certain restrictions. It was later found that there were no restrictions and no DOE control. In regards to those data points, the union representative followed with two questions: 1) Can NRC provide workers and citizens with assurance that continued releases will not continue? Dr. Cool noted that this question is precisely why NRC is asking how to conduct surveys that will prevent such releases. 2) What do you tell States about worker exposure? For NRC licenses, Dr. Cool noted that if worker exposures are likely to exceed ten percent of the limits, regulations require the worker exposures to be monitored, and workers must be annually apprised of their doses.

A metals industry representative suggested implementing stronger and more stringent standards into the proposed rule for surveying materials out of the facility. He added that instrumentation to detect low levels of radiation is commercially available, and that having such technology at a facility should be a requirement in addition to the controls already in place. He also suggested developing a sorting method at facilities to separate materials with above background readings from those with no detectable levels.

A public interest representative expressed three concerns with controls for solid materials. He commented on the inherent technical limitations of survey equipment. He stressed that if there are significant uncertainties with the ability to take measurements for certain radionuclides, the materials contaminated with those radionuclides should not be released. The second concern he raised was economics. He observed that there is strong economic incentive to maximize the amount of material released without cleaning it to avoid disposal costs. He then emphasized the importance of ensuring proper liability, oversight and effective monitoring of the releases that take place. The third concern he raised was the realities of implementation, which included uncertainty of the instrumentation, possibilities for false negatives, and the risk involved with improper releases.

To clarify a misconception about the level of control currently imposed, a representative from the nuclear energy industry noted that there are currently extreme controls at NRC facilities to ensure that contaminated materials are not released, and that workers and the public are protected from radioactive materials. He agreed with the public interest representative that there are practical

limitations of technology. He then emphasized the need for a measurable level that people can use to sort what is clean from what is not.

Another nuclear industry representative also provided a point of clarification. He noted that steel from a nuclear power plant is almost never volumetrically contaminated. He added that a reactor vessel, or something similar, is the only metal that is volumetrically contaminated and would never be surveyed for release. Both nuclear energy industry representatives agreed that, for steel, no volumetrically contaminated material would be released. A State representative noted that other volumetrically contaminated materials, such as soil, from nuclear power plants have left a site for disposal and are not always properly controlled.

An industry representative explained that for certain isotopes, such as thorium, it is difficult to distinguish between background levels that are naturally present at a facility, and contamination levels that are brought into the facility with a product. He added that the limits for thorium are so strict and it is present in so many materials, there is no practical way to control it. He also noted that, from the industry perspective, he does not want contaminated material to be recycled because he does not want improper blame for melting material that was improperly disposed of by someone else, for example. In addition, he added that he supports recapture and his facility tries to recapture all the sources. He explained that DOE and NRC have programs to identify orphan sources and attempt to recapture them. He concluded that he is looking for practical standard that will have no medical or health impacts on the consumer.

A public interest representative described some personal experiences to provide examples of why there is a serious problem in any of the assurances. For example, she explained that, after setting off an alarm while leaving the Three Mile Island site, she was told not to worry about it because the monitors were unreliable. She also described an incident where some trucks that were used to ship hazardous materials also shipped foodstuffs without being cleared in between. She suggested that problems with contamination need to be taken care of at the source. Referring to an earlier discussion regarding comparing contaminant levels to natural background level, she expressed concern that the figures for background may incorporate indoor radon and that there can be inadequate control for the material that would subsequently be released.

An Agreement State representative also provided a real-life situation where confusion with the guidance available for performing an adequate survey tied up a lot of the State's resources and cost the licensee a significant amount of money. She added that more specific guidance is needed to prevent similar situations. On behalf of the E-23 Committee, she also mentioned that licensees' monitoring capabilities need to be evaluated and upgraded, as appropriate. The following technical issues should be considered: the technical requirements for the calculations in meeting a 1mrem dose/based standard; and, the variability in background models and equations.

With regard to surveying, a federal government representative noted that there should be an oversight verification function that is more technical than portal monitors. He expressed that portal monitors can confirm that a material is safe for release, but trained people who understand what they are doing should perform the measurements. An industry representative also agreed that portal monitors should not be the point of control for the material being released from a regulated facility. Another industry representative indicated that he also understood that they should not be the point of control, but if there is not a system in place for the material being cleared, the steel mill then becomes the control for this material. He noted that the steel mill will not set the monitors to measure for any health-based standard, but rather, they will set them as close to background as possible to protect the mill from an orphan source. Another federal government representative added that the U.S. Department of State is working with the IAEA to address international border control problems by using portal monitors at customs. He noted that the monitors would not be control points, but would serve as additional alarms.

The federal government representative noted that standards will drive some of the measurement systems. He described that a range of options has been discussed. He explained that with "zero to zero" the first zero indicates that no material leaves an area that is possibly subject to contamination. The second zero, he added, is measurably indistinguishable from background. Based on that information, he stated that surveying and measurements are tied to a standard.

Dr. Lesnick concluded the session by thanking everyone for bringing in their experience, concerns, and realities to the table to create a very helpful discussion.

## II. Session 6 – What studies are being done to develop information to evaluate alternatives?

Anthony Huffert and Robert Meck, Senior Health Physicist, U.S. NRC, presented information regarding the radiological evaluation of the clearance of material and equipment from nuclear facilities (NUREG 1640), and also discussed the radiological evaluation of soil. After the two presentations, the participants were asked for their comments and suggestions for additional analysis.

### *Comments Regarding NUREG 1640*

In reference to conflict of interest, a union representative stressed that in order to evaluate NUREG 1640, he would like to know when, and what, SAIC disclosed to the NRC about its work for DOE, BNFL, and others that were beneficiaries of release or involved with release. Dr. Meck replied that when NRC awards a contract, it is constrained by federal procurement regulations, which include conflict of interest disclosures. He added that NRC closely adheres to those regulations. He mentioned that the Office of the General Counsel (OGC) is investigating SAIC's work and the information is forthcoming. The union representative then asked Dr. Meck

if NRC knew that SAIC was doing regulatory compliance work for BNFL. He also asked if Dr. Meck could provide names of those who SAIC works for, in addition to NRC. Dr. Meck indicated that he was not able to provide that information.

On behalf of the general public, a public interest representative also expressed concern about the NUREG 1640 and about SAIC's role in working with BNFL. In regards to public perception, he emphasized the importance for issues to be evaluated in a thorough and unbiased manner.

In addition, the public interest representative provided several comments on NUREG 1640. First, he noted that there are a number of assumptions based on the identified critical group. He then suggested that there are broader assumptions that go into the modeling and it is important to make them fully transparent. Dr. Meck replied that the assumptions can be found in Appendix B in Chapter 2 of the report. Second, the public interest representative mentioned that the report focuses solely on the critical group, and does not address the public's concern of aggregate impacts on non-critical groups. In response, Dr. Meck noted that the report was not designed for that purpose. Third, the public interest representative suggested providing a sense of the uncertainties of the estimates made in the report. Dr. Meck mentioned that uncertainties are included in all of the results at five percent, 50 percent, the mean, and 95 percent. Later in the discussion, the public interest representative suggested looking at certain factors that are more or less determinant of the final result. For example, he explained that a certain exposure pathway, or assumption, determines the dose that an individual from a critical group will get.

One participant from the metals industry observed that the report did not address the problem of deselection of steel products that may contain residual amounts of radioactivity. Dr. Meck explained that deselection aspects are more in the realm of a cost/benefit analysis and involve policy decisions beyond the scope of NUREG 1640. The participant noted that there are no controls in place for materials after they leave a facility, and without controls or traceability, there is no mechanism to prevent the material from ending up in a hip replacement or tooth filling, for example. In response, Dr. Meck mentioned that the report identified the groups that could potentially get the greatest dose. He also commented that the other scenarios are under study for the aggregate dose.

Another metals industry representative noted that they found disagreements with some of the assumptions and modeling done with respect to steel. Rather than try to fix those assumptions, he added that the task group decided instead to put their efforts into convincing the NRC that recycling steel back into the commerce is a short sighted, inequitable process that they do not want.

From an analysis point-of-view, a nuclear energy industry representative commented that NUREG 1640 does a good job of looking at the potential dose implications of the selected

materials, which indicate a dose factor of essentially zero for the average citizen. However, he expressed concern that the report only covers four materials when, in fact, a spectrum of materials are released every day. To that end, he urged NRC to review and consider the ANSI standard. Concluding his comments, he recommended removing the technical jargon from the report to make the assumptions and information as transparent as possible.

A public interest representative expressed concern that the dose to an average member of a critical group is not considered in the report. She and another public interest representative suggested that a maximally exposed individual is a more appropriate person to focus on. Dr. Meck explained that the information presented in the 95$^{th}$ percentile in the report represents the average member of a critical group. He added that the Commission will decide whether to use the average member, or the reasonable maximally exposed individual.

As a final point, the public interest representative emphasized that NRC should assess the impacts of the aggregate dose on human health. Dr. Meck responded that NRC is studying the aggregate question and is also aware and concerned about it. The participant suggested that until such studies are completed and available, the rulemaking endeavor should be put on hold.

A metals industry representative asked why nickel was not included as a metal for release analysis purposes in NUREG 1640. In addition, he asked if the discussion of includes brass and bronze and, if so, what were the volumes. Dr. Meck explained that nickel was not included because it is not a large mass item for NRC licenses. A federal government representative added that there is some risk assessment information available and more is being done. In regards to the second question, he noted that their studies showed that brass and bronze were similar enough to copper that they could find the critical group by analyzing copper.

A State representative noted that the Monte Carlo techniques used to estimate probability distributions for dose factors and modeling different materials is a good improvement over the earlier EPA work. Also, after reading Appendix J in the report, she realized that materials are being recycled into many different uses, changing pathways and exposure. For example, slag is recycled into concrete, which then goes into building block, which then exposes people. She observed that people who spend a lot of time in a single room, such as invalids, and are subject to such exposures, were excluded from the critical group.

***Comments Regarding Radiological Evaluation of Clearance of Soils***

Following Mr. Huffert's presentation, a nuclear industry representative noted that he was unclear about what was meant by recycled soils in the presentation. Mr. Huffert clarified that the term "recycled" means it could be used for another purpose. He listed the rural resident, the suburban resident, the commercial farm, and a public use facility as some of the scenarios NRC has identified for recycled soils.

A public interest representative followed-up by asking Mr. Huffert when the soil analysis would be complete. Mr. Huffert responded that the first step is to complete the draft report on soil use scenarios by this month. The next step, he added is to do the dose calculations. He mentioned that they hope to complete the individual dose factors in time for the other cost/benefit analyses for the other materials. The public interest representative emphasized that the timing of the report is important because the public needs that type of information to make an educated review for this rulemaking.

In regards to the soil analyses, another public interest representative expressed concern that recent meetings between NRC and the U.S. Department of Agriculture (USDA) regarding research work on contaminated soils were not open to the public. She suggested opening all such meetings to the public with a 14-day advance public notice. To help conserve resources, she recommended using email to distribute Federal Register notices and public notification of meetings. Dr. Meck mentioned that NRC is making the effort to be more transparent with the purpose of getting public input.

A State representative explained that her State of New Jersey has a lot of contaminated soil. She found that using a DOE aerial fly-over is a useful way to locate and recapture contaminated soil that has been transported off-site.

As a method to dispose of contaminated soils, a nuclear medical industry representative suggested using contaminated DOE sites to build LLW disposal facilities.

## III. Session 7 - What are potential health and environmental impacts to be considered for various alternative approaches?

Giorgio Gnugnoli, Division of Waste Management, U.S. NRC, discussed the potential health and environmental impacts that should be considered under the various alternatives. After his presentation, he asked the participants for their input on the presentation or additional impacts NRC should consider.

In a question bridging the previous session with this one, an Agreement State representative asked if NUREG 1640's estimation of 33 percent slag that goes to other uses, such as soil conditioning and ice control, could result in localized contribution to exposure pathways. She also wondered if slag that is used in areas already containing slag would result in an underestimated dose to a critical group. A public interest representative agreed with the above concerns based on the reason that the radionuclides with long half-lives present in slag can raise complex questions from an analytical perspective.

The participant continued to suggest that the development of intervention strategies to ensure

prompt action if a dose-based standard is exceeded should be considered. Mr. Gnugnoli explained that NRC is considering intervention strategies, but they are also looking to the stakeholders for information and assistance to help make decisions.

With respect to the potential radiological impacts, a nuclear energy industry representative noted that the NCRP cautions against risk assessment for collective dose derived from large populations and small doses. He then asked why NRC uses collective dose. Mr. Gnugnoli replied that NRC looks at collective dose to conduct the cost/benefit analysis, and to make sure they do not miss something by focusing on one material and one pathway.

To address the scope of the future generic impact statement, a public interest representative noted that any analysis of environmental and social impacts of the various alternatives must address the behavior of the potential actors who may be affected by the rule. For example, he mentioned that if DOE is an actor, the potential volume of material that could be affected by the rule and the potential associated impacts would affect secondary and tertiary uses of the analysis, such as Agreement States, contractors and disposal sites. A State representative agreed with that statement and added non-agreements States as a secondary or tertiary use.

In addition, the participant stressed the importance of addressing the potential impacts of uncertainty and accidental releases. In regards to uncertainty, Mr. Gnugnoli emphasized that NRC is looking at how to deal with volumetric contamination in terms of calculating and monitoring uncertainties. Regarding accidents, he noted that NRC will use information from analogues from other areas they have worked on and apply that to the analysis for this rulemaking.

To provide another point related to uncertainty, another public interest representative noted that a broad-ranging concern of the public is whether or not NRC can do an analysis that adequately addresses aggregate issues. He added that the public's concern comes from the degree of uncertainty about the volume of material that may or may not be released. He stressed that in the analysis, it is essential to address those uncertainties and how they influence the analysis. To address other public concerns, he suggested including and considering the following in the analysis: an estimate of the frequency of improper releases, the potential volume of material involved, and the potential impacts of those releases; and how the "as low as reasonably achievable" (ALARA) principle will be applied. Regarding improper release, Mr. Gnugnoli mentioned that they will look at reference examples of how to predict and deal with improper releases. He also noted that ALARA will be figured into the cost/benefit analysis.

On a policy level, a State representative noted that this rulemaking is direction-setting for the nation, and may discourage people from using recycled material. She expressed that the impact on natural resources from increased mining should be considered. Mr. Nelson noted that at

previous workshops, steel representatives have indicated that the amount of steel that would be subject to recycle is very small compared to the amount of steel that is produced. As a result, the impact on the mining industry would be minimal.

In addition, the State representative observed that genetically sensitive individuals were not considered in the presentation's discussion about population groups. She emphasized that some people are genetically sensitive and should be considered in the analysis of potential doses to different population groups.

In regards to medical facilities and universities, a nuclear medical industry representative mentioned that sink/sewage disposal should remain an option for universities and medical facilities to avoid worker exposure.

A public interest representative expressed concern that the comments provided during the workshop have indicated that only very large doses of ionizing radiation have any health impact. She added that work is not advanced enough for anyone to say that there are no health impacts from low doses of ionizing radiation worth considering. She mentioned she was distressed that she was not able to participate in the final session on cost/benefits. She emphasized that illness, disease and genetic defects are examples of the real costs to real people that NRC should consider. She requested that NRC adhere to their social contract undertaken years ago to protect the public's health and safety, and protect the environment. She also requested that the NRC should fulfill that contract by retaining control over all the radioactive materials and wastes by not releasing, recycling or reusing them. She suggested that, instead, they should develop a program to reclaim those materials and place them under control, sequestered, and isolated for the duration of the biological hazard.

In response to the above comment on genetic defects, a nuclear medical industry representative noted that the large research group that is being studied in Hiroshima has shown no evidence of genetic defects.

## IV. Public Comment

Ms. Stinson initiated the public comment period by notifying the participants and the observers that the comment period for this rulemaking was extended to December 22, 1999, and that the comment period for NUREG 1640 has no deadline at this point.

Eugene Sheely from the U.S. Air Force provided the first comments. He mentioned that the question is not whether we should protect our environment, but rather, what is best way of protecting it. He continued that it is foolish to believe that we can eliminate all the risks associated with our lives, but we need to look at ways to minimize risks and decide what is an

acceptable risk and what is not. Comparing the risks involved with mining steel or recycling it, he mentioned there are risks involved with both and the question then becomes, which of these processes exposes society to the least risk? He stressed that NRC should not be concerned whether a consumer is going to buy a baby-buggy or not, but whether it is safe or not.

Jeff Lux, who spoke as an American citizen, noted that rulemaking procedures ask for public comment on technical issues, but rarely do they ask for input on NRC's roles, programs and responsibilities. He suggested that it would be beneficial to consider public input on how NRC will inspect, enforce compliance, and respond to non-compliance. Regarding SAIC and the potential conflict of interest issue, he suggested that the conflict of interest does not necessarily invalidate the dose assessments, but due to the perceived problem, he thought NRC should have a different contractor to produce the final report. In conclusion, he emphasized that the survey methodologies must consider that very few release surveys are for material that is actually leaving the site for public use.

Pat Dostie with the State of Maine commented that in regards to volumetric contamination of steel, if concrete can be activated, the possibility exists for some rebar to be activated as well. Mr. Dostie also mentioned that he was surprised and also troubled to learn that the Commission is aware of the issues involved with this process because, despite Meridian's and the NRC staff's recommendations, the Commission still decided to stay on course with the proceeding. He mentioned that he is disheartened because these proceedings are strikingly similar to BRC, and if the Commission is not listening, then he suspects history might repeat itself.

Ray Turner, David Joseph Company, stated that the detectors in the recycling and scrap industry are set to detect orphan sources and low level NORM sources. He added that these systems are very sensitive and will not get less sensitive over time. He suggested that in developing the release criteria for material, NRC should poll members of the scrap recycling industry, steel industry, the American Foundry Society, the Ductile Iron Society, and others consumers to ask if they are willing to take the risk associated with accepting the material.

Regarding soil, Henry Morton (no affiliation was given) suggested that the environmental assessment should consider the alternative of transportation and other impacts resulting from hauling contaminated soils long distances to regulated disposal.

Tony LaMastra, American Iron and Steel Institute (AISI), noted that AISI will be making formal comments on the errors of fact and assumptions in NUREG 1640 where they can have a significant impact on the dose projections. He also noted that if he correctly perceived the comments indicating that the NRC is not considering economic factors beyond licensees, then they are violating ALARA. Regarding some earlier questions about what level of contamination is in steel today, Mr. LaMastra noted that his studies of over a thousand samples showed less

than .02 picocuries per gram.

Richard Burklin, Seimens Power Corporation, mentioned that the corporation recommends developing a consistent dose-based method of releasing material from potentially contaminated areas. Whatever dose limit is determined, he added that it must be very protective of the public and should be compatible with international limits. He also suggested that NRC should adopt the ANSI standard.

## V. Session 8 - What are potential economic and cost-benefit considerations for various alternatives?

Giorgio Gnugnoli presented information on the potential economic and cost-benefit considerations associated with the various alternatives for a rulemaking, including the alternative not to make a rulemaking. He emphasized that when making cost-benefit analyses, NRC's first priority is the protection of public health and the environment. Their second priority is to use the analyses as a tool to help NRC make a decision. After his presentation, Dr. Gnugnoli asked the group for questions and comments, and suggestions for other costs that NRC should consider.

A nuclear energy industry representative mentioned that nuclear technology provides numerous benefits to society. He added that stringent and controlled regulations can result in a loss to the public if industries have to cease manufacturing a product that is beneficial to society. Mr. Gnugnoli explained that in a cost/benefit analysis they look at the threshold of burdens, in terms of time and energy, to a medical practitioner, for example, and express that threshold in terms of a monetary sum. He added that the sum is then brought into a calculation that incorporates all the costs and benefits.

Another nuclear energy industry representative noted that lost opportunity costs are a challenge. He added that for nuclear facilities to operate, materials need to move in and out every day. Without a clearance option, one alternative option is to send the material to a LLW site. However, he mentioned that when society selectively takes away opportunities for LLW disposal, the alternative is to leave the material on site. He concluded that this alternative could possibly be done safely, but whether it is the best alternative and the associated costs need to be considered.

In response to the above comments, a public interest representative noted that there are many subjective values built into this issue and, therefore, the cost/benefit analysis can not be objective. He suggested that one option is to discriminate on how a rule applies to a specific class of licensees by the value society places on it, and economic perception will play a huge role in those values. He emphasized that the wide-ranging economic impacts argue for casting the widest possible net for participants in this process. He concluded that it is important not to rush

the process, otherwise there will not be adequate discussion on the important discussions of societal values.

A nuclear energy representative noted that a key element of these discussions is to determine when material is, or is not contaminated. He added that an established standard will allow plants to use newer instrumentation that will reduce human errors and ensure that radioactive material is not released inappropriately.

In regards to steel, a metals industry representative expressed his concerns with the values assigned to contaminated steel. He explained that 99 percent of steel mills will not accept steel that sets off their alarms and the rejected steel is, therefore, left with a negative value. He stressed that the costs associated with material that is abandoned after it is rejected from a steel mill should be considered. He then suggested that, to simplify the complexity of the cost/benefit analysis for steel, NRC could eliminate the steel that is from nuclear industries from the analysis because the nuclear energy industry representatives have indicated that nuclear facilities do not intend to release steel for recycling.

A union representative asked if the cost/benefit analysis would consider the real-life cases of political distortion in recycling and unlawful departure from public processes. Mr. Gnugnoli explained that, in addition to potential health impacts and the various alternatives, the analysis will look at normal facility operations and will not assume that every facility is conducting their operations improperly or inappropriately. He noted that they will look at disruptions in terms of accidents.

In terms of public perceptions, a metals industry representative noted that the cost impacts involved with the potential for the public to look for an alternative product if recycled steel containing low levels or radioactivity becomes commercially available, should be considered in the analysis.

In response, a public interest representative observed that many questions have revolved around public perception and the metals industry representatives are identifying that public buy-in is critical if NRC proceeds with a rulemaking. He added that ensuring that the process is objective and not perceived as prejudged is also critical for a credible process. To achieve this, he suggested having smaller working groups to discuss the various issues, assigning an NRC point-person to address questions and concerns, obtaining an individual analysis of the current DOE and other reports, and ensuring follow-up to address the questions raised here.

In addition, the public interest representative stressed the importance of establishing a baseline for the alternatives analysis that will be a part of the EIS process. He also emphasized that, given the complexity of the regulatory issues involved with a potential rulemaking, the different

alternatives should be discussed in detail among the various stakeholder groups.

A metals industry representative noted that much of the discussions have related to releasing scrap metal, but perhaps the most dangerous and significant issue for NRC to address is the orphan source problem. In addition, he and a nuclear energy industry representative stressed the importance for the U.S. to take a lead role in setting a standard.

***Materials to Consider in a Rulemaking***

Ms. Stinson asked the participants to provide their input on what materials should be considered in this rulemaking process, other than the four that were examined in NUREG 1640. The participants recommended the following additional materials: industrial waste, such as institutional trash, waste and scrap metals, soil, concrete, asphalt, and roof gravel; and materials that have to come out of nuclear facilities, including vehicles, computers, forklifts and scaffolding. Other materials to consider included fluorine and concrete. Two metals industry representatives suggested treating steel separately from the other materials because the industry will develop their own standard based on what their detectors can or can not read and what their suppliers are willing to certify. In terms of scrap metal, one metals industry representative noted that material that is in an area of a facility presumed to be contaminated should not leave Government control, even if the material is surveyed to the non-detectable level. He added that materials surveyed for a non-detectable standard may still contain contamination that the monitors are not able to detect, and the steel industry will not accept that material. A nuclear medical industry representative added that nuclear medical facilities and hospitals should also be treated separately because they currently have established standards for release of material.

Mr. Lesnick then turned to a public interest representative to provide his input on potential criteria for differentiating between materials. The public interest representative noted that there is an obvious division between whether the material will be disposed of or will be recycled, which could serve as criteria for differentiating materials. Other factors that he suggested for consideration included radionuclides and their differing lifetimes, and where the radionuclides are partitioned (either directly into the material or into the slag).

A State representative noted that in order to go forward with a rulemaking, some of the materials under consideration, such as nickel, soil, titanium, and sewage sludge, require more research and information. She added that there is an adequate base of information for materials such as concrete, steel, copper and aluminum. A federal government representative noted that there is a lot of other information available in addition to NUREG 1640.

## VI. Next steps

Ms. Stinson explained that this workshop accomplished a back-and-forth dialogue of the issues

between parties, brought new information to the table, and also brought some new understanding. She noted that such discussions are typical of a first meeting of this type and the next step is to bring the discussions to the next level for the Chicago workshop. She suggested the following potential options: 1) Use the list server for back-and-forth discussions and to prepare for work group discussions. 2) Conduct smaller group discussions before the Chicago workshop to further develop, refine and discuss the alternatives that are presented in the Issues Paper and recommended by participants. 3) Provide requested information and answers to questions that were not available at the Chicago workshop. 4) Learn the schedule of NRC activities if they pursue a rulemaking process.

The participants provided the following additional suggestions for next steps:

- Before a schedule of activities is generated, there first needs to be a discussion regarding whether there should be a rule or not, and what materials it would include. If there is a portion of a rule that could gain general agreement, NRC could focus on developing that portion, rather than taking a more universal approach.
- Other issues to discuss before moving forward with a rulemaking include: NRC's legal authority to undertake this rulemaking; the credibility of and conflict of interest involved in the studies conducted; and the legality of recent releases.
- Use the web to facilitate information exchange of the discussions of the alternatives, and answers to the stakeholders' questions raised at the workshop. This will take care of the basic issues to allow more detailed discussions in Chicago.
- Representatives from the steel industry could meet with those involved with making the cost and risk assumptions. This would promote a better understanding of what the steel industry is faced with in a potential rulemaking.
- Assign better numbers and values to the options suggested by the participants (such as removing steel from the materials to include in a rulemaking).
- Several participants noted that this workshop was a good first step to bring people together to share ideas, but the size of the group was cumbersome. They supported the idea of smaller working groups consisting of 4-8 people. The workgroups could address individual issues and then report the results of the discussions back to the plenary group. For some stakeholders, such as States, this may be difficult because they might be interested in participating in all of the work group discussions.
- Meetings should include a broader representation of stakeholders, namely from all aspects of the medical industry (not just nuclear).
- Have separate meetings to discuss materials from metal and medical facilities.
- NRC should provide answers to the questions surrounding the SAIC issue.
- NRC should open any meetings with their contractors to the public.
- Continue involving and including Tribal representatives. Their participation allows them to become informed about the issues, provide their input and perspective, and pass the information to other Tribes.

## VII. Public comment

Hans Honerlah with the Army Corps of Engineers began by noting that a rulemaking may impact the new decommissioning rule that was recently passed at 25mrem/year, and it is important to understand what those potential impacts may be. Mr. Honerlah also observed that the discussions focused on a 1mrem/year standard. He suggested focusing future discussions on the specific pathway analyses done for each specific waste stream. For example, he suggested that there would be three or four different release numbers for steel, including recycling, reuse, disposal in a RCRA facility, and disposal in a LLW facility. He concluded that a dose-based standard should include concentration values that are calculated based on the specific scenario for a specific type of material.

Earnest Fuller, a Pennsylvania citizen, described the difficulties that the past BRC process caused in his experience with siting a municipal landfill. He noted that he had to go through a lengthy process to convince the surrounding communities that the landfill would not accept any contaminated waste, including that from a nearby power plant. He emphasized that NRC should broaden their cost/benefit analysis to include such examples.

Peter Hernandez, AISI, read a statement from AISI that recommended the following: 1) Radioactively contaminated metal originating from NRC-licensed and DOE-operated facilities should not be released for unrestricted recycling or reuse as products in commerce. 2) NRC should adopt a restricted release policy of metals from nuclear facilities that limits recycling or recovery at dedicated licensed facilities for use only at NRC-licensed fuel cycle facilities, DOE-operated nuclear facilities, or disposal in licensed radioactive waste or other appropriate landfills. 3) NRC should emphasize to other agencies, namely DOE, that these restrictions should also apply to other facilities not under NRC's jurisdiction. He also noted that to preserve public confidence in the safety of products made from recycled metal, metal companies will not accept scrap that is known or perceived to be radioactively contaminated. In conclusion, he mentioned that AISI intends to submit additional comments for the record.

Upon the conclusion of the public comments, Dr. Cool thanked everyone for participating in the workshop. In addition, he thanked everyone for their ideas, the information they brought to NRC's attention, and for discussing some of the practical issues and the associated pros and cons of those issues. He encouraged everyone to think about what was discussed during the workshop and to put their ideas on paper to send to the NRC as additional comments to be included on the record. He hoped that they could continue to build on the information that was circulated during the workshop so that he could put together a comprehensive analysis of the different aspects involved with this process and provide that in a report to the Commission in March of next year.

After Dr. Cool concluded his comments, the meeting was adjourned.