NRC Workshop on Control of Solid Materials
December 7-8, 1999
Palmer House Hilton
17 East Monroe Street
Chicago, IL

Meeting Summary

Tuesday, December 7, 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 participants to the Chicago NRC meeting on the Control of Solid Materials. In his opening remarks, he noted that there are currently no national standards articulating appropriate levels of radioactivity in solid materials to assure public health and safety. On the other hand, Dr. Cool observed that people come into contact routinely with other materials in the environment that contain radioactivity from natural sources or other activities. He commented that, in this time of increasing environmental consciousness, providing for public health and the task of determining how much radioactive material is allowable in different kinds of products has become more complex. Dr. Cool stated that the current practice of returning materials with small quantities of radioactivity to the general marketplace on a case-by-case basis has fueled the debate on appropriate levels of radioactivity. As a result, he commented that NRC initiated this national dialogue on the issues associated with controlling solid materials with low levels of radioactivity to answer the questions of whether and under what conditions such material should be disposed of in a licensed facility, safely reused or recycled. In this regard, he stated that the participants shared a common purpose of establishing the appropriate controls to assure that the risks posed preserve public health and safety. Dr. Cool stated NRC would evaluate controls for workers in a licensed facility, individuals at other facilities where radioactive material is recycled, and end users of products made with recycled material under a variety of circumstances.

Dr. Cool commented that, while the topics of discussion at the meeting are similar to those at the previous three workshops, he hoped the group would be able to spend more time on the areas that had not gotten as much attention and build upon information from the previous workshops. He explained that the workshops and other opportunities for interaction are part of an enhanced participatory rulemaking process to define the appropriate regulatory vehicle for establishing a national standard. Dr. Cool requested that participants provide the rationale for their comments to help the NRC understand the issues more fully.

As part of his introductory remarks, Dr. Cool also took the opportunity to state that, while he had hoped to be able to report on questions that had been raised about supporting contracts, contractors and potential conflicts of interest, he was unable to comment on these things at the meeting because the results of the Commission Staff review were being considered by the Office

of General Counsel (OGC) and the Division of Contracts. In addition, Dr. Cool stated that his comments were similarly restricted regarding concerns about the activities of the State of Tennessee and licensing actions with Manufacturing Sciences Corporation (MSC). He explained that Commission Staff were in the process of responding to a list of related questions submitted by Congressman Dingell, Markey and Klink, and the responses will be provided to the Congressmen later in December at the same time that they are made available to the public.

In closing, Dr. Cool commented on NRC plans after the workshops. He stated that the Commission Staff would provide the Commission with a summary of the information and options on how to proceed in March of 2000. Dr. Cool explained that the submission would be a brief paper with a number of attachments that will be developed with the assistance of a working group chaired by Frank Cardile and made up of staff from several NRC offices. He noted that some of the working group meetings would be open to the public for additional comment. In addition, Dr. Cool stated that a management steering group including an Agreement State representative who would have an opportunity to comment on management considerations in the paper before the paper is finalized. He invited participants to propose other options to move this issue forward. Dr. Cool then introduced the facilitators for the meeting, Barbara Stinson and Dr. Michael Lesnick from the Meridian Institute.

Ms. Stinson began by briefly introducing the Meridian staff and describing their role in the process. She then initiated a round of introductions of participants. Following the introductions, Ms. Stinson proposed a few groundrules for the meeting. She explained that the meeting would largely be a roundtable discussion with regular opportunities for public comment. Ms. Stinson commented that, following some background presentations, the agenda was organized material-by-material using a table of alternatives as a guideline. She explained that the discussion of each material would include current and potential alternatives for control, health and environmental impacts, cost impacts, and analyses needed. Following her remarks, Ms. Stinson invited participants to comment on the agenda.

One individual from the nuclear energy industry cautioned against focusing too much on selected materials because materials are usually a complex mixture of things. Ms. Stinson acknowledged the comment and noted that the intention was not to separate materials artificially, but to help focus on a diversity of materials. She noted that it might also be appropriate to consider some combinations of them as well.

Another participant representing the labor community was concerned that the agenda did not include time for discussion on some of the questions posed at the last NRC workshop in Rockville, MD, particularly with regard to the institutional foundation of the NRC. He requested that Dr. Cool comment on some of the historic practices of its predecessor, the Atomic Energy Commission (AEC) with nickel, the aluminum experience with British Nuclear Fuels (BNFL), and the questions on the Science Applications International Corporation (SAIC) contract. Ms. Stinson responded that a number of these issues were addressed in Dr. Cool's opening remarks and suggested that the participant talk with Dr. Cool during a break.

II. Session I - How Does What We Are Discussing Today Fit Into the Overall Picture?

Patricia Holahan, Division of Industrial and Medical Nuclear Safety, NRC, initiated her presentation with an overview of the origin of the workshops. She noted that the purpose of the meeting was to fulfill NRC's congressional mandate and responsibility to protect the public health and safety and the environment.

Questions of Clarification and General Comments

One participant inquired how NRC planned to publicize the Commissioner's briefing and future working group meetings on the Commission Staff paper. He suggested using something other than the late notice provided by the Federal Register. Dr. Holahan responded that NRC could post such notifications on the list server and NRC's public meeting web site to notice public meetings 10 days prior to the meeting. She noted that the date of the Commissioner's briefing would be posted on the Commissioner's web page. Frank Cardile, Office of Nuclear Material Safety and Safeguards, NRC, noted that the address for the improved web site was www.nrc.gov/NMSS/IMNS/controlsolid. Ms. Stinson suggested that NRC consider notifying this group about selected milestones using the list serve. A second participant from the academic and medical community felt that public input could be enhanced through contacts in the network of existing groups in the academic and medical communities via e-mail lists. She was also encouraged that NRC was soliciting public comments prior to initiating a rulemaking rather than starting with a rulemaking and letting the "chips fall as they may." She felt that the NRC workshop process was open and healthy and would help to prevent mixed messages such as what are and are not safe levels of exposure.

Another individual from the labor community commented on what he viewed as several transparency issues. First, he noted that SAIC prepared the Issues Paper and the Regulatory Options Paper, not the NRC. Second, he commented that the renewal of the SAIC contract in August 1999 implied that the June 30, 1999 staff memorandum was "locked in" and he wanted to know if this was confirmed. Third, the individual requested an update on the response to the October 1999 letter from several Congressmen, Paper, Allied-Industrial, Chemical and Energy Workers International Union, AFL-CIO (PACE), and the Natural Resources Defense Council addressed to the Tennessee Authority regarding the lawfulness of the recycling in Oak Ridge. Mr. Cardile clarified that he and others on staff prepared the Issues Paper. He also noted that there might be some confusion about the details of the referenced contract. Dr. Cool responded to the question on the October letter and reiterated his earlier comment that the Staff has prepared a response to the letter and it will be delivered to the Congressmen within the next two weeks. He also suggested that they talk separately during the next break.

A participant from the Portland Cement industry asked Dr. Holahan to restate, in addition to power plants and accelerators, the NRC licensees affected by this effort. She noted that States regulate naturally occurring and accelerator-produced materials and NRC regulates reactor-produced material and material regulated under the Atomic Energy Act (AEA).

One participant from the nuclear power decommissioning industry assumed that the criterion

would ultimately be dose-based and wanted to know where the outcome of a potential rulemaking would fit into the regulations, as part of the 10 CFR 20 or elsewhere. Dr. Holahan responded that NRC was still trying to determine whether or not to proceed with a rulemaking, so it was premature to assume that the criteria would be dose-based and where it would fit into the regulations. She explained that, if a rulemaking were to take place, the applicable regulation would probably be 10 CFR 20.

An individual from the environmental community commented that, in comparison to the earlier draft NUREG - 0518, the background material for this workshop is difficult to understand and poorly written, which makes it difficult for the general public to comment. In response to this comment, an individual representing academic and medical interests agreed that it is important to communicate the information in the documents in plain language. However, she also noted that the documents need to be presented in a technically credible way to be received by technically sophisticated users and critics.

Additions to the Alternatives Table

An individual from the academic and medical community suggested adding activation products, mixed waste and lead to the discussion on alternatives for the control of solid materials. Based on earlier comments, nickel was also added to the table.

Establishing a Standard

An individual from the scrap metal recycling industry noted that this rulemaking was first the responsibility of the U.S. Environmental Protection Agency (EPA) who deferred this effort. He asked for clarification on the responsibility of EPA and Agreement States in this potential rulemaking. Dr. Cool explained that EPA continues to have its authority under the AEA to promulgate generally applicable environmental standards which all federal agencies would be obligated to look at. He stated that Agreement States would work with NRC and look at corresponding State regulations and address issues of adequacy and compatibility, should a rulemaking be done. Craig Conklin, EPA, added that, in going through its technical evaluations regarding this issue several years ago, EPA became aware that there was a larger risk to the public and the environment of recycling of metals in commercial materials from overseas. As a result, he explained that EPA made a risk management decision and decided to focus its limited resources on this concern. Mr. Conklin stated that that is why EPA is working with Gwendolyn Bauer, U.S. Department of State, and the International Atomic Energy Agency (IAEA) and others to look at the risk of what is entering the country from other countries.

Another individual from the environmental community recalled that in a comment from the early 1980s, EPA did not support recycling radioactive metal based on the principal that radiation exposures in the workplace and the community should be "as low as reasonably achievable" (ALARA). He felt that the dissemination of radioactive material, however slight the levels are, violates the principal of ALARA as presented in NUREG CR-1775. The individual asked EPA to clarify its position on a rulemaking and/or whether they are continuing to reject the recycling of radioactive metal based on the ALARA standard. Mr. Conklin responded that EPA has not taken a position on this issue because they are still gathering information.

An individual from the power industry commented that the concept of ALARA was designed to prevent exposure to radiation within reasonable limits. He noted that ALARA implies that economic and social factors are taken into account in a reasonable risk versus benefit analysis. One representative of the academic and medical community explained that applying ALARA is a process and is tied to their professional standard of excellence that is ten percent of any limit. She noted that they apply ALARA even when it is not necessary because they do not want to concern contractors who might be involved with the cleanup of a radioactive release. She was supportive of NRC developing a usable and understandable standard that assures reasonable and acceptable risk. A participant from the steel industry stated that the term "as low as unreasonably achievable" (ALAUA) should be used instead of ALARA as a result of a costly cleanup experience he had which required cleanup to low levels of picocuries per gram for concrete, soil, dust and other materials.

One individual from the metals recycling industry asked how a potential rulemaking might affect material released under the control of Department of Energy (DOE) or the Department of Defense (DOD). In a similar vein, he wanted to know how a rule would affect the decision of a State like Tennessee on recycled material prior to the rule. Dr. Cool explained that, while NRC does not have direct regulatory authority over DOE, he assumed that DOE would take into consideration NRC standards as well as EPA and international standards while determining what is done within DOE. For the DOD, Dr. Cool noted that the NRC licenses some materials, however the DOD works with the DOE to address materials from the weapons and other programs. He stated that each Agreement State would need to adopt adequate and compatible, comparable regulations which would then govern licensing actions in that State. A representative from the DOE, added that they often release materials to NRC licensees or to an Agreement State and the NRC requirements are directly applicable. He also stated that the DOE would consider adopting an NRC standard if one were set.

A participant from the nuclear energy industry asked if Agreement States would allow the recycling of scrap pipe that has Naturally-Occurring and Accelerator-Produced Radioactive Material (NORM) contamination from the oil and gas industry. In response, a representative from an Agreement State commented that States have the jurisdiction to set the standards for NORM materials and accelerator-produced materials and that these standards vary from State to State. She also clarified that States often refer to this process as the "release" rather than the "recycling" of material. Another individual from an Agreement State noted that a listing of NORM criteria for each State is presented in a newsletter put out by a consultant Peter Gray and Associates on a quarterly basis.

One participant from the iron and steel industry asked for clarification on whether standards imposed by the IAEA, the European Union (EU) or other countries, would be legally binding in the same way that NRC standards would be legally binding or whether an organization like IAEA only made recommendations. He noted that, at the last NRC workshop, a representative from IAEA indicated that they decided not to move forward with a standard, but rather to adopt a consensus document with voluntary guidelines. Dr. Holahan responded that EU standards are legally binding to those countries within the EU. Dr. Cool explained that the IAEA sets basic

safety standards and guides that are similar to NRC Regulatory Guides that are available to its 161 member countries. He stated that those member countries that are receiving assistance from the IAEA are required to adopt the IAEA standards. Dr. Cool noted that the IAEA standards are not binding for those countries not directly receiving assistance from the IAEA, such as the U.S., other large, developed nuclear program countries, and some European countries.

A representative from an Agreement State was supportive of proceeding with a rulemaking and establishing a standard. She observed that when solid materials are released under NRC's jurisdiction they are still solid wastes subject to various State and federal solid industrial and/or hazardous waste regulations. In this regard, she urged NRC to continue to work with EPA and the Association of State and Territorial Solid Waste Management Officials (ASTSWMO) to help ensure that local and State solid waste facilities are adequately prepared for solid materials released from NRC's jurisdiction. She noted that, through their statewide solid waste planning, States must plan for the additional materials with the right number of landfills and appropriate groundwater monitoring programs. She also observed that the landfills that are managed by local governments have insufficient funds to monitor for radioactive material and address incidents of release. The individual commented that a rulemaking would provide for the type of analysis required to help address these concerns.

Another individual from the environmental community added that there were only two reasons for recycling radioactive material: 1) it is economically beneficial to the corporation that has the contract; and 2) it is beneficial to the DOE and the private industry to release the material.

Radiation Dose and Standard

An individual from the labor community commented on some of the information presented on the contribution of radiation doses to the average radiation dose in the U.S. population. He questioned whether it was possible to compare the potential radiation dose from a standard with the dose received from other radiation sources including background radiation. He commented that it was misleading to state that a standard would equate to background radiation when we do not really know whether this is the case. He felt that the slides presenting this information should be removed from future presentations because they provide misleading information.

One participant from the steel industry wanted to know if there was a direct relationship between the concentration and the dose of radiation. Mr. Anthony Huffert, Division of Waste Management, NRC, stated that this relationship would be discussed later in the meeting.

III. Public Comment

Sydney Bainum, National Coalition of Organized Women and Nuclear Energy Information Service - was shocked at the idea of releasing additional radiation into the environment, which is already contaminated, by releases from bombs, nuclear power plants, and other waste and dumping. She observed that we are already recycling radioactive material in the marketplace and there are things like radioactive pots and pans in the marketplace. She stated that it is difficult to measure and detect radiation as it gets distributed in the marketplace so it will be hard to tell the

degree to which the public, including children, will get exposed to radiation. Ms. Bainum referenced the work of Carl Morgan, the father of health physics, and his concern about exposure through household utensils and tooth fillings. She noted that Richard Clapp of Boston University, who has studied low level radiation exposure, shares his concerns. In her closing remarks, she referenced the record of health impacts to children and people in Taiwan as a result of exposure to radiation in apartments constructed from recycled radioactive material.

Rob Leib, First Energy - commented that is was unclear what materials a rulemaking would cover. He felt that, depending on what materials are covered, the technology to screen a broad range of materials might not be available. In particular, he commented that there was no technology available for screening for the release of a bulldozer to the levels proposed. Dr. Cool stated that he hoped to address the state of technology later in the meeting. He added that the scope of the potential rulemaking was open for discussion. Dr. Cool noted that there is hope that however the Commission decides to move forward, they would like to be as encompassing as possible. He commented that part of the issue is to what extent a single approach will work across a range of materials or whether different approaches should be employed. Dr. Cool invited the observer and others to comment on this over the course of the meeting.

IV. Session II - What Studies are being Done, and Will be Done, to Develop Information to Assist in Decision-making?

Anthony Huffert, Division of Waste Management, Office of Nuclear Materials, Safety and Safeguards, U.S. NRC, provided the group with an overview of the technical work that the NRC has done over the past several years on developing a technical basis for estimating radiological doses as presented in NUREG - 1640. He noted that soil was not addressed in NUREG – 1640, but Staff are currently completing additional work on soils. Mr. Huffert then turned to Dr. Robert Meck, Senior Health Physicist, NRC, for a description of the technical approach used in NUREG - 1640. Following his presentation, Dr. Meck introduced Giorgio Gnugnoli, Division of Waste Management, U.S. NRC, for a presentation on health, environment, and economic impacts that should be considered in the decision making. After these presentations, Michael Lesnick, Senior Partner, Meridian Institute asked the participants for comments and questions.

Questions of Clarification and General Comments

A representative from the steel industry asked for clarification on to whom a regulation, if passed, would apply, and whether industries that inadvertently process radioactive material would be subject to the regulation. Dr. Holahan explained that a regulation would apply to NRC licensees, and in Agreement States, to Agreement State facilities. She also noted that the limits established in a potential regulation would apply to the disposal of material produced and contaminated inadvertently.

NUREG - 1640 and Soil

An individual representing the interests of labor commented on the complexity of NUREG - 1640 and the consequent difficulty to evaluate the premise and judgement used in its production. To evaluate NUREG - 1640, he stated that it was important to reference the scope of work for the

document, which he noted was not currently available in the public record. The individual also commented that it was unclear how much of NUREG - 1640 was produced by NRC Staff versus their contractor, SAIC. He asked why the information on the scope of work, the options papers and the regulatory papers for producing NUREG - 1640 are not available to the public. Dr. Cool commented that he had asked for the scope of work to be made available and stated that he did not know why the information was not yet available. Dr. Meck clarified that the purpose of the scope of work was to provide technical assistance to NRC Staff and the Staff are aware that the contractor cannot do their work for them. He explained that the files on the contract have been turned over to the OGC and they have the formal requests for information and the information should be made available.

One participant from the nuclear energy industry commented that the international community is also looking at criteria for the release of materials from nuclear facilities and for determining when materials need to be controlled. He commented that the IAEA and the EU are using an approach similar to that used in NUREG - 1640 and are finding that with extremely low levels the degree of uncertainty increases and the different model assumptions change the modeling results significantly. The individual summarized that, because of this uncertainty, it is less important to arrive at an exact concentration number and more important to, within the range of numbers found among international experts, select a reasonable, implementable number across the board.

Another individual from the scrap metal recycling industry posed four questions on Section 2 - 5 of the summary in NUREG - 1640: 1) When talking about isotopes that have a thousand years or more of decay, is the argument that residual radioactivity in consumer products rarely yields critical groups valid? The individual felt that the issue of consumer products is the driving factor. Further, he stated that NUREG - 1640 does not address consumer products and consumer perception of potential hazards when recycled materials are released. 2) Are there any studies other than computer modeling studies that validate that mixing small quantities of uncontaminated material will dilute what comes out of the mix? 3) Partitioned material is not addressed in NUREG - 1640 nor is the fact that some partitioned material, like slag and flue dust, is continually reused and refined. The individual stated that in today's scientific processing, many of the isotopes go to slag or flue dust and these items might be used in roadbeds or disposed. If there is a significant amount of radiation in the products that are disposed, there is the potential for exposure to the individuals who are involved in handling the materials for disposal. In addition, flue dust can not be landfilled if it is too radioactive and it is considered a mixed waste. 4) What is the validity of the statement, "the relatively small size of consumer products limits the amount of radioactivity to which any individual could be exposed in these scenarios?"

Dr. Meck responded to these questions as follows: NUREG - 1640 does consider consumer products. Consumers are rarely the critical group because of a combination of four reasons: 1) For those radionuclides that have short half lives, radioactive decay from the time of clearance to the time that the consumer gets the product reduces the dose rate to less than that for other scenarios. Thus the critical group, in these cases, is that non-consumer group in the other

scenario. During the manufacturing of the consumer product the cleared material is assumed to be mixed with other materials from the general commerce. The mixing lowers the concentration of radioactivity and thus the dose rate from the consumer product. 2) NRC took the approach of modeling industry as we know it today and when judgements were made about processes, NRC solicited input directly from industry. Dr. Meck stated that it was their understanding that if something goes to a scrap yard, it is likely to get mixed and would tend to dilute the concentration of radioactivity. 3) Physical-chemical processes in the manufacture of materials into consumer products separate, or partition the radionuclides, for example, into metal, slag, and baghouse dust. Many kinds of radioactivity would not make it into a consumer product, thus consumers would not be a critical group for those radionuclides. Dr. Meck began by explaining that partitioning is a physical chemical reaction and NRC followed the form of the radioactivity to determine where it would go in the process. He noted that for byproducts, such as slag and dust, they followed their potential use and the potential for exposure to them. 4) Dr. Meck commented that consumer products are generally not large and if the criterion for release is limiting the concentration, then the amount of radioactivity in one item has a total limit and the total is likely to be less in the smaller consumer objects. The individual noted that this argument does not address the possibility of a consumer purchasing a small product with high concentrations of radioactivity. Dr. Meck acknowledged this concern and clarified that NUREG - 1640 was a tool for a conversion factor. He noted that, while the philosophy of NRC has been to protect the critical group.

One participant from the environmental community observed that, in order to make an evaluation about the validity of NUREG - 1640 it is necessary to know if the basic information or variables that go into producing NUREG - 1640 are valid. He stated that, based on his knowledge, the author of NUREG - 1640 did not take the opportunity to check some of the assumptions about working conditions, power plants, use of classified alloys and chemicals, and synergistic effects. The speaker commented that his October 7, 1999 correspondence with Chip Cameron, NRC, in which he asked for information on the contract and other information on the production of NUREG - 1640 had gone unanswered. He stated that, based on this type of response, it caused him to question whether the NRC workshop process was legitimate or pro forma.

A participant from the nuclear energy cleanup industry posed three concerns: 1) In its development of NUREG - 1640, did the NRC consider the American National Standards Institute (ANSI) consensus standard N13.12? 2) When establishing standards it is important to recognize, acknowledge and communicate the uncertainties in the modeling used and how those uncertainties can change critical parameters in the model. 3) NUREG - 1640 does not propose an actual dose standard like the standard of one millirem proposed by the EU. In addition, it might be appropriate for the U.S. to consider making a distinction between recycling in the nuclear industry and other trades as is done by the EU and other countries. As examples, the individual referenced the different standards used by the German Radiological Commission for unconditional release (0.1 becquerel), 0.4 becquerel for disposal and 0.6 becquerel for recycling. Dr. Lesnick commented that some of these concerns would be addressed later in the agenda, but invited NRC to respond. Dr. Meck responded to the comments on the sensitivity of parameters. He stated that NRC has been working over the past five years with EPA, in addition to conferring

with DOE, to make sure that their characterization of U.S. industry is consistent with others.

One individual from the power industry observed that the pathway analysis used in NUREG - 1640 is reasonable and the results are very conservative. She also noted that, while the approach is reasonable, if it is not easy for industry to implement, industry might end up putting more material in the waste stream because it takes too much time and resources to prove whether the material is licensable. She stated that, if there is a rulemaking, it should be simple and consistently applied.

A representative from the iron and steel industry recommended that, in the final version of NUREG - 1640, NRC used terminology that is consistent with that used in the affected industries. As an example, the individual stated that the term "refiners" does not specify whether the reference is to a single furnace or an entire plant. Dr. Meck commented that it would be helpful if future comments on NUREG - 1640 included specific examples like this.

With regard to finalizing NUREG - 1640, an Agreement State representative suggested the following: 1) Look at demolition debris that is not suitable for recycling. 2) Model low concentration and high volume in landfills to simulate large commercial landfills that receive high volumes of released material. 3) Model long-term implications of hazardous and non-hazardous landfills separately because they have different liner requirements. 4) Look at the formation and collection of leachate and the effect it has on workers at non-radiological facilities. 5) Look at the implications of land spreading. 6) Consider the possibility of leaving low level contaminated material in place as an alternative. 7) Consider defining and prohibiting dilution.

A representative from the environmental community asked if NUREG - 1640 NRC took into consideration the other classified alloys that are mixed with nickel powder from K-25 besides the ones that were listed in the Paducah lawsuit. Dr. Meck responded that NUREG - 1640 analyzed steel, copper, aluminum, and concrete. He added that various ferrous alloys were also taken into account, but noted that nickel was not analyzed. Dr. Meck referred the individual to the list of radionuclides analyzed for additional details. The individual noted that it would be hard to evaluate classified materials without information on them. An individual from the labor community observed that this is an issue about DOE waste, particularly classified nickel, that might be introduced to the consumer marketplace as recycled material.

Following these comments, Ms. Stinson took the opportunity to note that these comments and suggestions were helpful for NRC to factor into their future analysis. She also observed that the concern about the relationship between DOE material and NRC licensees has been raised at this and previous workshops. Ms. Stinson commented that the group heard that DOE plans to adopt what NRC proposes for the handling of solid waste. Also, she stated that there is a dynamic tension. The labor and environmental communities are looking to NRC to increase protection for workers and the environment. At the same time, she noted that NRC does not regulate DOE facilities, and is therefore reluctant to take on the responsibility for DOE's past actions. Ms. Stinson asked participants to consider this tension and try and focus on comments and questions that provide the protection sought within the jurisdiction of the NRC. A representative from the

environmental community expressed concern because he felt this drew into question the lawfulness of the Tennessee license. Ms. Stinson asked the participant to bring his concern forward during the next discussion on environment and health.

An individual from the scrap metal recycling industry stated that it would be helpful if NUREG - 1640 would provide information on how to correlate a dose of released material with what that material would read if scanned with a detector. Mr. Huffert explained that NUREG - 1640 does not provide that information. However, he noted that NRC is currently working on the issue of measurability and whether materials released at the NUREG - 1640 levels would set off alarms at scrap yards. Mr. Huffert stated that this information would be included in a possible rulemaking.

Environmental and Health

An individual from the academic and medical community observed that there is technology for in situ measurements of radioactivity in soil, water or large equipment and the ability to convert these measurements to doses for each isotope. In addition, she noted that the science of risk assessment is well developed and can be applied to this circumstance to determine risk to humans and the environment. The individual also stated that there are lots of data available on releases to air and water, some of which can be used to start evaluating risk from solids.

A representative from the nuclear power industry commented on the extent of the potential rulemaking. He suggested that it would be important to include as part of the rulemaking the consideration of established practices with accepted risks when determining what to recycle and distribute as radioactive material. As examples, he noted that NRC already sanctions the distribution of self-luminous devices and the addition of uranium to dentures to prevent discoloration.

In its evaluation of environmental impacts, one representative from the DOE proposed that the NRC consider the impact of mining for replacement metals versus obtaining the metals from recycled material. In addition, he suggested that part of the analysis should include an evaluation of the energy required to convert native ores into valuable metals.

As a point of clarification on the earlier discussion on the classification of nickel, an individual from the DOE commented that, from his knowledge, this classification does not prevent the application of limits for nuclides in nickel for the purpose of free release. The participant representing the environmental community observed that the adverse health effects that are being experienced by individuals who worked with that nickel indicate that there is still great concern about nickel and its classification. He offered to make a more detailed presentation later in the meeting on this for clarification of his concerns. A representative from the labor community was also perplexed by the DOE response and requested additional explanation. Dr. Lesnick suggested that the representative of the DOE and the two individuals expressing concern get together for additional discussion during a break.

Economy and Cost

Several participants from the iron and steel industry were concerned about the economic impact

of negative emotion or public perception on the metals industry. They stated the importance of including this factor as part of an economic analysis and asked if NRC planned to include it as part of the potential economic impact on the recycling and metals industries. Mr. Gnugnoli explained that NRC had not begun the cost benefit analysis, but was beginning to gather information for the analysis. He noted that the analysis would include impact on the directly affected industries as well as industries that are once removed, like the film industry. Mr. Gnugnoli commented that, at this point, he was uncertain whether NRC could evaluate the impact of public perception quantitatively. A representative from the nuclear energy industry commented that the impact of a perceived problem associated with a product and a real measurable impact, such as setting off a false positive at a landfill, might be handled differently. He noted that managing public perception is challenging, but he felt that NRC could positively influence public perception in the way that it conducts a potential rulemaking, the safety of the standard they may ultimately establish, and the assurance that NRC is firmly committed to applying the standard. Another individual from the Portland Cement industry agreed that negative perception is a very real economic factor, particularly for those individuals who are the potential recipients of the recycled waste material. For this reason, he stated that it would be a challenge for the NRC to gain public trust on the safety of the standards they might establish through a rulemaking. He also stated that industry commonly measures public perception and quantifies these results.

Another individual from the iron and steel industry wanted to know if the economic analysis would only address the impact on the regulated industry. Mr. Gnugnoli clarified that the economic analysis would include the costs and benefits to industry and the community and whether there will be a net positive value to society. In this regard, the individual wanted to know if the public perception of risk and the potential for product deselection would be factored into the equation. Mr. Gnugnoli responded that they will try to quantify this type of factor, but where tangible figures are not available, that might be part of a qualitative analysis. He stated that NRC is going to try to include the impact of perception in their economic analysis. Another individual from the iron and steel industry stressed the need for NRC to obtain quantitative information on this impact in their analysis. A participant from the steel industry summarized with the comment that dilution is not the solution to the problem, the solution is source prevention.

A participant from the scrap recycling industry added, "perception is reality." He explained that because of the negative consumer perception of recycling materials, industry has been saying that they are not comfortable with the release of recycled materials to the marketplace. He suggested that to have an effective rulemaking, NRC must first allow the stakeholders to buy-in to the premise of the rulemaking. As part of this, he commented that the stakeholders must have the opportunity to agree on the facts, the parameters for dealing with the material, the volume of material, what it looks like, how to measure it, what industries accept what material, and what consumers will tolerate. Once this is accomplished, he stated that the rulemaking should proceed. As an approach to a rulemaking process, he suggested that the NRC convene an interest group to study the problem.

For some perspective on public perception, a participant from the iron and steel industry shared the results of a poll of four focus groups regarding the free release of metals. He explained that 80 percent of the responders felt that free release was a bad idea. Additionally, he noted that underlying these responses were uncertainty, risk aversion, skepticism of government oversight, and the perception that all steel would be negatively impacted.

Also on quantifying public perception, a representative from the labor community commented on the fact that there was no one at this or the previous workshop that was supportive of volumetric recycling for unrestricted use without any recall mechanism. A representative of DOE observed that if surface contaminated material is recycled, it is melted and becomes volumetrically contaminated. He stated that the surface release process is DOE's current policy. The process is regulated and they feel it is sensible and safe.

Another individual from the steel industry requested clarification on whom in the open marketplace is likely to benefit from a potential value of $100 per ton of steel scrap. He asked whether it would be nuclear facilities that sell recyclable material to recyclers, or the recycling industry and the public. Mr. Gnugnoli responded that there were a number of potential benefits. As examples, he explained that there was an economic benefit to the cheaper disposal option of a solid waste disposal site instead of a low-level nuclear waste disposal site. In addition, he stated that there was an economic benefit to recycling valuable components of the material.

V. Public Comment

Michael B., IL EPA - observed that there were no representatives from solid waste landfills at the meeting and recommended that their perspective be added to the mix. For some insight, he noted that the general public is going to react when they are told that they cannot put grass clippings into the local landfill but radioactive waste is allowable. He stated that allowing radioactive waste in solid waste landfills would cause a reaction from the public when new landfills are sited. Dr. Lesnick reminded the observer that the Solid Waste Association of North America as well as the Environmental Industries Association have been tracking the NRC workshop process and they may submit written comments.

Jack Barnette, U.S. EPA, Region 5 - commented on the "reality" of public perception. He noted that radioactive waste generates a lot of public concern. He stated that if the NRC is considering the release of material, it is essential to have the right stakeholders at the workshops. As he viewed the audience and the participants, he commented that there was not too much diversity. He noted that in Region 5 there are 29 recognized federal Tribal groups, many of whom would be impacted by the issues under discussion. He also agreed with the previous speaker that there were no municipalities represented in the room.

VI. Session III - What are Alternatives for Control of Solid Materials?

Frank Cardile, NRC, began the presentation on the alternatives for the control of solid materials by introducing the other contributors to the presentation, Tony Huffert, NRC, and Stephen

Klementowicz, Office of Nuclear Reactor Regulation, NRC. Mr. Cardile explained that they hoped to focus the discussion on alternatives for the control of various materials and the costs, impacts and benefits associated with each of the alternatives. He turned to Mr. Huffert for the presentation on the first alternative, i.e., continuation of the current case-by-case approach. Following his presentation, Mr. Cardile provided the group with an overview of alternatives to the current approach. Mr. Huffert closed the presentation with a discussion on survey methods for different alternatives. He then invited participants to comment on other types of controls.

Ms. Stinson asked participants to begin with questions of clarification and comments on the presentation. She also reminded participants that lead and nickel were added to the list of materials on the table of alternatives, which was to be used as a tool to help structure the discussion. Ms. Stinson explained that, after a presentation by Cliff Honnicker, American Environmental Health Studies Project (AEHSP), the group would begin their discussion on alternatives with aluminum by looking at current methods of control, potential alternatives, and health and environmental impacts as well as economic impacts.

Questions of Clarification and General Comments

An individual from the iron and steel industry asked what was meant by "current methods of control." Ms. Stinson referred him to the footnotes for the table and explained that this phrase referred to how the material is handled today.

One participant from the scrap recycling industry asked how to convert the levels in Regulatory Guide (RG) 1.86 to the standard used in the U.S. to measure material.

Another individual from an Agreement State asked whether the restricted use scenario was modeled in NUREG - 1640 with dose and economic assessments. Mr. Cardile responded that restricted use was not modeled in the NUREG and that no economic assessments were performed. The participant commented that any restricted use scenario would require a significant regulatory role at the federal and State levels and the required resources to implement the alternative should be carefully evaluated.

Discussion of Alternatives

A participant from the scrap recycling industry reminded the group that before considering a rulemaking it is necessary to address the fact that industry and the public will only tolerate a value of zero for the release of material from nuclear facilities. Before proceeding with a rulemaking, he stated that it will be necessary to work with industry and the public to establish what they are willing to accept and deal with. Without that buy-in, he felt the rulemaking would be challenging. Mr. Cardile asked the participant for suggestions on how to address this issue with the public. The participant responded that it is important to provide information on the alternative benefits to the risk of exposure, other than additional radiation exposure to the public. In a similar vein, an individual from the academic and medical community commented that it is possible to deal with the "outrage factor" regarding radiation through a well-done educational campaign with effective communication, well-done assessments, and well-disseminated information.

Mr. Cardile commented that it would be helpful for representatives of the nuclear industry to elaborate on what they saw and potential benefits of the release of material, such as reduced cost of medical procedures because it is cheaper to recycle waste material. One individual from the power industry saw a benefit to power industries because they do not have to pay to survey to the same extent and they would not have to pay to dispose of materials with low amounts of radioactive material. In addition, she felt that unrestricted release would reduce the volume of low level radioactive waste going to disposal facilities while at the same time reducing the environmental impact creating more steel, plastic, and chemicals to take the place of that material. Another participant from the power industry commented that there is no societal risk in material that has such a low level of radiation. As such, he felt that the benefit to recycling this material was similar to the benefit of recycling any other material.

In regard to the cost of the disposal of waste material, an individual from the Portland Cement industry asked for clarification on whether the license for a facility included a closure plan and financial assurance to cover disposal costs of the material generated on the site. Mr. Huffert responded that this question relates to decommissioning and the potential rulemaking would address not only decommissioning but normal operations. He clarified that the license does not cover financial assurance.

A member of the academic and medical community observed that the benefits from research and development in the university environment are threatened by over-regulation and the cost of regulation and disposal. Some of the areas of research that she viewed as vulnerable included pharmacology, toxicology, biochemistry, and student research. She felt it was difficult to estimate the cost of jeopardizing these kinds of research.

Other benefits recognized by a representative from the nuclear power industry included economic benefits from nuclear technology, which were summarized in a study performed in 1995 by Management Information Services, Incorporated. He noted that, in addition to providing 20 percent of our electricity without the environmental impacts produced by other forms of power, the benefits included employment, sales, and tax revenues for local, State and the federal government. In addition, he noted that medical diagnosis using radioactive materials helps 10 million Americans each year. While he recognized the need for appropriate regulatory response, he also cautioned against developing a regulatory regime that is too restrictive. In a similar vein, a participant from the scrap recycling industry commented that there are many benefits from the production of steel. However he commented that every industry that produces a valuable product is also responsible for its waste and must deal with the public perception of how they handle that waste. He reminded participants that the public does not want to see that recycled waste in their consumer goods. He stated that the public needs to be able to tell industry what they will tolerate and accept.

A representative from the steel industry commented that, before discussing alternatives such as restricted release it is necessary to first perform a market-based survey to evaluate the demand for the material. After determining the demand and before establishing a release level, it is critical to know the protocol and release methodology used by the licensee and to determine whether its

application is consistent across different organizations. As an example, the individual described an experience where his organization received three loads of material from a nuclear facility and all three truckloads set off an alarm. He explained that his organization rejected the loads and cut off the supplier. In summary, he commented that it is premature to look for a level that can be released until finding out how the material is going to be released and to whom.

A representative from the environmental community followed up on the idea that recycled material will ultimately be introduced to the consumer marketplace and that the unknown is how the marketplace will adjust to its presence. He observed that this circumstance differs from other marketplace adjustments in that most of the consumers are not aware of what they are buying. In this regard, he raised three points of concern regarding a potential rulemaking: 1) What will the feedback mechanism for the rule be? 2) Who will be the legally responsible party if members of the public experience harm from the release of material? and 3) Where is the public feedback addressed in the risk assessment process?

One individual from the nuclear power decommissioning industry questioned the need to go through the exercise of discussing alternatives. He commented that, as a licensee under 10 CFR, Subpart K, he is required to show the absence of licensed material. He explained that as a licensee, he processes large quantities of material using a bulk assay system and is unable to show the absence of licensed material. However, he stated that creating a restricted use scenario will require many more licenses.

A participant from the nuclear energy industry suggested that the NRC pursue unrestricted release at this time. He stated that it is premature to address restricted release criteria because it is necessary first to have decision criteria in place to determine whether the material is safe and acceptable for release. He suggested setting a health and safety-based limit that is acceptable for unrestricted release of material and establishing whether there is a marketplace for released material. At that point, he felt it might be possible to have a dedicated facility that would receive material and produce certain products for use. He commented that it would be difficult to both establish the release level and address the use of a facility in one rulemaking.

Alternatively, another individual from the iron and steel industry stated that they encouraged NRC to limit the alternatives for contaminated material to restricted use applications. He explained that restricted use applications would be those in which the material would never be released. In addition, he noted that with this limitation, recycled objects could be made into anything without restriction. Mr. Cardile clarified that this would then be a licensed restricted use, a combination of two alternatives shown in the simplified diagram of alternatives. An individual from the nuclear power industry observed that the alternative of reuse in a licensed environment is already allowed, consequently there is no need for a rulemaking for this alternative.

An individual from the academic and medical community felt that the concept of restricted use confused the issue because the point was to establish a limit below which the material is safe and does not need to be regulated and a license is not necessary. Several representatives from

Agreement States expressed reservations about restricted use because they were not confident about the effectiveness of institutional controls that might be employed to oversee the restricted use. However, one of them saw a possible use for restricted material in the construction of a high level nuclear waste facility and the containers for the licensed material. He saw this as a licensed restricted use or, in the case of containers for licensed material, a use by licensed individuals. The other individual did not see the benefit to restricted use and saw the alternatives as either unrestricted use or licensed used.

Release Level

A representative from an Agreement State recognized that regulators have been approving the release of solid waste on a case-by-case basis for years and that small amounts of radiation are occasionally released. In addition, he noted that there is some level of radioactivity in almost everything in the environment. In this regard, the individual reiterated the need for the NRC along with EPA to establish a scientifically based level of radioactivity below which regulation is not necessary. He noted that, regardless of the value selected, most States will want to maintain the authority to apply more restrictive values if they choose to address the health and safety aspects of radiation protection. He was supportive of a formal rulemaking and the Administrative Procedures Act process to develop the standard.

Another individual from the iron and steel industry stressed the need for any clearance limit to be safe. In this context, he asked NRC to clarify what the role of ALARA would be in setting a standard. He stated that setting a standard of one millirem as safe while also adhering to the concept of ALARA sends a mixed signal.

V. Presentation by Cliff Honnicker, American Environmental Health Studies Project

Mr. Honnicker began his presentation with an overview of his history with nuclear issues. As part of that history he referenced a letter written by his mother in 1980 to the NRC regarding a rulemaking for the release of material to the open marketplace and the environmental and human impact of the release. He observed that, while his mother received copies of 5,000 public comments through a Freedom of Information Act (FOIA) request, the NRC did not provide her with information on their responses to those comments. Mr. Honnicker noted that in the past 18 years there have been five attempts to recycle these materials in the open marketplace and that each time the attempts have been deterred. He suggested that the NRC consider composing an historical record of the scientific studies done for each of these efforts for institutional memory. Also as part of the history, Mr. Honnicker referenced a letter from U.S. EPA in 1980 on why they did not support recycling of these materials in the open marketplace. He then described his personal history on the issue since 1980, including his involvement with affected nuclear workers at the K-25 site.

In his presentation, Mr. Honnicker observed that the NRC has not always been effective in regulating licensed material as evidenced by the appearance of contaminated material in the open marketplace. Mr. Honnicker also expressed concern about the practices of DOE and referenced several DOE sites with which he had involvement including the Paducah lawsuit and the Keytam

suit. In addition, Mr. Honnicker referenced his October 7, 1999 letter to Chip Cameron, NRC, in which he requested information on the activities of a contractor recycling radioactive materials on a DOE site to be sent off site for commercial uses and background on NUREG - 1640. He noted that he had not yet received a response from Mr. Cameron and wanted to know why. Mr. Honnicker expressed concern that with this kind of NRC and DOE history, he was not certain it was wise to add another layer of uncertainty with a rulemaking.

Mr. Honnicker also commented that there is information that suggests that the DOE and others might have been involved in the recycling of radioactive metals as part of their operations. He stated that he and others have been bringing this practice to the attention of the NRC through various correspondences with no response. Mr. Honnicker indicated that this lack of response suggests that these practices could be viewed as classified national security issues. In this environment, he questioned how government protects the average citizen.

As a final point, Mr. Honnicker stated that, instead of basing rules on perception, the NRC could base its rules on the proof offered by the history and current record of people affected by exposure to radiation.

VI. Session III (Continued) - What are the Alternatives for Control of Solid Materials?

Ms. Stinson introduced the second part of the discussion on alternatives for the control of solid materials. She referenced the alternatives table and recalled that, based on the discussions at the meeting, the materials that should be added to the table include lead, nickel, and medical devices. Ms. Stinson suggested that the group begin by discussing alternatives for aluminum. Before delving into the specifics on aluminum, Ms. Stinson provided participants with an opportunity for general comments.

General Comments on Alternatives

An individual from the metals industry provided additional comments on restricted and unrestricted use. He observed that the current practice of unrestricted use has been unacceptable to the metals industry. In response to this practice, he explained that his industry installed expensive, sophisticated radiation detectors to screen and reject loads for production. As another example, he noted that the NRC failed to control enclosed sources to which the industry responded with additional radiation detectors to protect their workers. In summary, the individual commented that the metals industry has responded internally to address waste and pollution concerns over a period of years. He commented that it is time to deal with nuclear waste and recycling material is not going to be acceptable to the consumer.

Another participant from the iron and steel industry asked for clarification on the concerns about institutional controls and whether the concerns were specific to the restricted use option. Mr. Cardile explained that some people doubted whether institutional controls would assure that materials would be directed to controlled uses. For additional clarification, a representative from an Agreement State explained that his concern was regarding institutional controls which are unchecked, uninspected, and unmonitored over time. As an example, he noted that current

general license devices for certain categories of materials were not tracked to insure that the institutional controls were maintained. In response to this, he commented that some Agreement States have gone back to try and reconstruct this information and are developing accountability systems to regain control of the situation.

One individual from the nuclear energy industry made a distinction between institutional controls and compliance with existing regulations. He explained that institutional controls assume that an extra-regulatory activity will continue and impose restriction on some activity. Whereas he noted that compliance with existing regulation requires that a licensee survey and evaluate material prior to its release, and their performance is enforced by the regulating agency. He felt that it was possible to set up a regulatory system that adequately protects public health and safety. The individual stated that it was premature to consider long-term institutional controls before setting a free-release or unrestricted release criteria.

A representative from the academic and medical community stated that it is time to set a uniform standard that is well known and easily measured, as has been done for air and water. She observed that there was a potential to confuse release standards with health and safety standards and that it was necessary also to address this kind of misinformation. In addition, she stated there is the possibility for human error and the use of instrumentation that is calibrated to the wrong isotope. However, she commented that with the right instrumentation, education, and a standard, the program would be easy to administer.

Aluminum

Ms. Stinson began the discussion on aluminum with a description of how to use the alternatives table. She then turned to some industry representatives for background on the current case-by-case release of aluminum.

Current Methods of Control

An individual from the nuclear energy industry explained that they use the best technology available to prove whether or not there is licensed material registering above background radiation. He stated that very little aluminum is released from his industry. He explained that the aluminum in his facility is often part of other equipment such as the carriages of certain types of equipment, angle irons, soft drink containers, electrical wiring or part of electrical components. To determine the fate of aluminum in any of these forms, he explained that they would first assess through process knowledge whether the material was exposed to radiation. If the assessment suggests exposure, he noted that the material is surveyed as it is via hand, after disassembling, or if there is a significant chance of contamination it will not be released. He explained that they use RG 1.86 as their guide to screen for surface contamination, and if the contamination is volumetric they use gamma spectroscopy and other technologies to test for lower levels of radiation. He observed that the guidance does not address techniques for all materials including aluminum.

A representative from the labor community presented information on the DOE facility at Oak Ridge. He stated that among the materials at Oak Ridge there are contaminated aluminum

compressor blades. The individual also referenced some of the contractors performing work on the contract and discussed concerns his organization had with unsafe working conditions among the contractors at the site. As an example, he commented that there were some Occupational Safety and Health Administration (OSHA) violations in the handling of recycled materials. He also referenced the confusion between the DOE and the subcontractors about volumetrically contaminated material and its recycling potential. The participant pointed out that, once the material leaves the site, the Agreement State of Tennessee becomes responsible for its disposition under NRC jurisdiction. He asked for clarification on where the volumetrically contaminated material was, and who is responsible for recycling and paying for it. In response to these questions, a representative from DOE stated that there is still some question about whether the aluminum is volumetrically contaminated. He explained that the contractor responsible for recycling, BNFL, has the option of recycling the material and is currently trying to determine the most economical option for handling the materials.

One participant from the iron and steel industry commented that, based on his work with the ENCRP, the option of recycling aluminum should be looked at carefully because of the potential for dissolving the contamination into the melt and creating volumetric contamination through the cryolate-based process. He suggested that NRC look into the metallurgy of aluminum and what the partitioning of radionuclides present would be.

Mr. Cardile asked participants if they had any information on how much of the aluminum in the total recycling marketplace is from nuclear facilities. An individual from the nuclear energy industry commented that, in his experience at a power plant, there was so little aluminum that they did not segregate it as they did copper and stainless steel. A representative from the academic and medical community stated that there was only a small volume of aluminum in academic and medical institutions including incidentals like caps and vials.

An individual from the scrap recycling industry suggested that the DOE respond to this question because they are recycling aluminum. In response, a representative from DOE stated that he was not aware of the DOE recycling aluminum at this time. He explained that, if it is being recycled, it met the screening requirements of RG 1.86 and was surface clean. He also explained that the material would have to meet the RG 1.86 requirements to be title-transferred to an NRC licensed facility. To be released under any other circumstances, he stated that it would have to meet DOE Order 5400.5. He noted that there are currently no provisions for the release of volumetrically contaminated aluminum. A representative from the labor community asked if that meant that the material could be released from Oak Ridge and sent to another DOE facility. The DOE participant responded affirmatively and stated that the material could also be sent to a licensed NRC facility under NRC jurisdiction.

A representative from the scrap recycling industry asked the DOE for additional clarification on the circumstances under which material released from DOE might be released into commerce. The individual from DOE explained that, based on screening results under RG 1.86, materials have been title-transferred to an NRC facility for surface decontamination followed by release into commerce. An individual from the labor community stated that, based on his understanding

of 5400.5, the DOE could not release materials into commerce without specific approvals. He also reiterated that there is no release standard for volumetric contamination. For clarification, the DOE representative explained that, within DOE, on a case-by-case basis, volumetrically contaminated material is evaluated under DOE Order 5400.5 and that the primary criteria are related to surface release criteria. Additionally, he explained that there was a provision within that that allows for an evaluation of any proposed release materials that would be released under DOE ownership and auspices. For this circumstance, he stated that the screening criteria would be a dose-based analysis of one millirem or less per year based on the maximally exposed, and ALARA must also be satisfied. He added that there are selected circumstances where the criteria could be higher but ALARA must be satisfied and the Office of Environmental Safety and Health headquarters would have to approve it.

Based on this description of the DOE process, an individual from the labor community questioned the validity of the process when there was not yet a federal standard for volumetric contamination. He was perplexed about how the DOE title transferred classified nickel with out declassifying the nickel, and was not comfortable with DOE passing on the responsibility of contaminated material. The DOE representative clarified that they required BNFL to obtain a license for handling materials shipped to their site. He stated that BNFL met the requirement by getting a license for the nickel with the State of Tennessee.

One participant from the nuclear power industry clarified, based on the DOE discussion, that NRC licensees in the power industry do not use RG 1.86. She explained that they based their decisions on "no detectable activity" which has a bearing on what they are able to release. In terms of disintegrations per minute (dpm) per 100 square centimeters, she explained that with a box monitor this translates to less than 5,000 dpm with an alarm set at 4,000 dpm to be conservative. She explained that when they have small volumes of material they might place it on a germanium detector and look for a cobalt-60 peak. The participant commented that they would like to have a numerical value to work with.

Following these comments, an individual from the nuclear energy industry offered to comment on the remainder of the alternatives table. His comments are presented below, column by column as presented in the alternatives table.

- **Potential Alternatives for Control -** The individual stated that possible alternatives include requiring that contaminated aluminum must be saved on site. He suggested other alternatives including: releasing aluminum only for disposal, either in a Part 61 Facility or in a landfill; releasing for disposal and/or reuse or recycling.
- **Health and Environmental Impacts -** The participant noted that the health and environmental impacts would be directly linked to the allowable contamination associated with the material. He stated that assuming a dose range of between 0.1 and 10 millirem, the health and environmental impacts should be minimal.
- **Cost Impacts -** Again, the individual commented that the cost impacts are directly related to the controls imposed on the licensee to monitor the material. He observed that if the controls imposed are labor and equipment intensive, the cost will increase. For context,

the individual explained that they currently use direct risking, box monitors, and automated tools.

- **Analysis Needed -** The participant observed that the analysis needed includes determining how much aluminum is out there, establishing the dose pathways, determining the potential risk to the public, and evaluating the potential radiological and non-radiological impacts on society and other industries.
- **Controls -** The individual commented that the level of control should be what is necessary to ensure that the criteria are met. He stated that the level of control depends on the criteria and how hard one has to look.

At the close of these remarks, Dr. Lesnick asked participants to describe their preferred alternatives for the control of aluminum. The individual from the nuclear energy industry explained that his preferred alternative would be to establish a realistic pathway analysis that would identify a critical group. He noted that he would establish a dose-base standard for the material that would be recognized by the international community as being safe. The individual commented that he would then pass regulations that put into place the dose limit and develop guidance documents on meeting the requirements of the regulations. He noted that the guidance would be consistent for all environments.

A representative from the labor community expressed concern that, if a standard is set, it be applied consistently. As an example of his concern, he referenced again his frustration with the way solid materials were controlled at the DOE Oak Ridge site and the OSHA infractions.

V. Public Comment

Christina Bechalk, Collier, Shannon, Rill and Scott - representing the Metals Industry Recycling Coalition. She suggested as an alternative for aluminum and potentially all metals, monitoring at the point of release for source control to prevent shifting the cost of monitoring to the metals industry. She explained her understanding that the nuclear power industry intended to shift the cost of monitoring to the metals industry to keep radioactive materials out of their mills.

Rob Leib, First Energy - requested that he be allowed to sit at the table to take part in the discussions.

Wednesday, December 8, 1999

Ms. Stinson initiated the discussion for the second day of the meeting by welcoming participants. She suggested that the discussions for the day continue with a focus on control alternatives material-by-material. Ms. Stinson also noted that a few environmental organizations might attend the meeting later in the day to share some of their comments. An individual from the scrap recycling industry noted for the record that environmental organizations participated in previous workshops and chose not to voice their opinions by boycotting the process contributed greatly to the discussions.

"Non-Detectable"

Before continuing with focused discussion on alternatives, the group elected to spend some time reflecting on some of the comments made the previous day. One individual from the iron and steel industry expressed concern about the use of the term "non-detectable" when referring to a detectable value of less than 5,000 dpm per 100 square centimeters. He felt it was misleading to call a detectable value "non-detectable" because some of these materials will have detectable values below 5,000 dpm per 100 square centimeters. In addition, he explained that, if something with gamma emissions is released under RG 1.86 or NUREG - 1640, many of those levels will be detectable using today's scrap detectors and will result in rejected loads. Another participant from the nuclear technology industry pointed out that gamma emitters represent only some of the radioisotopes, consequently the technology used by the steel industry will not protect them from orphan sources that emit carbon-14, tritium, or iron-55. The individual from the iron and steel industry clarified that the metals industry is aware that it is difficult to detect beta-alpha emitters. An individual from the academic and medical community differed with these opinions and stated that it is possible to detect a broad spectrum of radioisotopes, including some of the lower energy isotopes like carbon-14 and plutonium-33, with an instrument that is properly calibrated. As an example, she stated that a Ludium Geiger counter could be calibrated to detect carbon-14. In addition, she noted that gamma spectroscopy could be used to detect extremely low emissions. An Agreement State representative added that they are also concerned about the term "non-detectable." He explained that when they use this term they make sure to define the instrumentation used along with the confidence limits. A representative from the power industry commented that, in their industry, if something is detected, it is not released. He stated that there are very few borderline cases in their industry so there is generally a clear difference between clean materials and contaminated materials.

In response to these comments, Ms. Stinson asked for suggestions on solutions to the problem or for ideas on alternative terminology. The individual from the iron and steel industry proposed stating that the material emits something less than some dpm per 100 square centimeters and admit that it is detectable. Mr. Klementowicz, NRC, commented that the term "no detectable" has been used since 1981 in the power industry because there are no release limits. He explained that the NRC provides guidance in Circular 81-07 and follow-up Information Notice 85-92 where they advise the industry how hard they have to look and it equates to 5,000 dpm per 100 square centimeters which is equivalent to what is in RG 1.86. For power plants, he noted that if they release material below the non-detectable level and lower levels of radioactivity are later measured, the power plant is liable and it is a violation against 10 CFR 20.2002. Mr. Klementowicz observed that this circumstance is driving the detection limit down and causing the power industry to use more sophisticated equipment to insure that they are releasing material that has a lower detection limit. He commented that the industry now has a technology-based standard with no lower threshold. Mr. Klementowicz stated that a standard would help to alleviate this circumstance.

An individual from the scrap recycling industry asked an individual from the academic and medical community whether there were materials with residual radioactivity released from health care or research facilities that were reusable or recyclable. The academic and medical community

representative explained that the following material fit in this category: lead shielding including other lead containers and shielding inside a scintillation counter; lead waste; accelerator activated material such as a Geiger counter, tools, beam lines, screws, nuts, bolts; biomedical waste such as paper, plastic gloves, glass stock, and lead containers; soil; and copper that was part of a cyclotron.

As a point of clarification on his comment about the limitations of the portal monitoring system at a steelyard, the participant from the nuclear industry commented that he is aware that the technology exists to detect very small amounts of radioactive material. However, he observed that it takes more resources and time to check for lower values and commented that this might not be practical in the industry. He commented that a national standard would help define the conditions for screening materials. A representative from the iron and steel industry offered a different perspective and commented that, if the steel industry is able to deal with the time it takes to screen materials, then other industries should be able to do the same. He felt that it was inappropriate to pass the responsibility of detection further downstream. In response, the participant from the nuclear industry clarified that the nuclear power industry believes it needs to monitor the source and because their detection equipment is sophisticated they are unlikely to pass on the responsibility of detection. He suggested that the metals industry might be detecting materials from non-licensed sources.

One participant from the iron and steel industry was concerned about what he viewed as a double standard where the NRC requires the nuclear power industry to make a certain effort to detect radioactivity. If, after screening, a power plant releases a material that is below the limit but still detectable, the material may be returned to them. In contrast, he noted that, if a research lab releases some absorbent towels that set off an alarm, they are fined.

A representative of the DOD also commented on some of the challenges with monitoring for the presence of contamination. For background, he noted that it is generally too costly to decontaminate materials with surface contamination so they often opt to dispose of the material. In a similar vein, he questioned how feasible and costly it would be to measure down to one millirem per year in terms of concentrations and whether it would still be more economical to dispose of the material.

Mr. Cardile provided some clarification on the concern that, through its guidance, the NRC might be passing the responsibility of detecting radioactive material on to the steel industry. He explained that that is not their intention. Mr. Cardile described a possible scenario where the NRC passed a rule with a standard of one millirem, such that no material would leave a licensed facility without a survey to verify that the material met the standard. He asked if, with this rule, the steel industry still felt it would be able to detect and reject the material with residual levels on these released materials. In response to this question, a representative from the iron and steel industry stated that this would be the case. They would both be able to detect materials at this level and would reject them. He explained that with today's sophisticated equipment they were able to detect the presence of a diversity of elements at the NUREG - 1640 concentrations levels of 5,000 or 4,000 dpm per 100 square centimeters or one millirem per year for many elements. A

representative from an Agreement State added that they also would be able to detect these levels and would reject the materials and respond in some way. She observed that this process uses State resources. In addition, the individual noted that most States are not only looking for orphaned sources but they are also looking for the NORM so their equipment is set at background. Another representative from an Agreement State commented that they would reject the material also.

One individual from the nuclear energy industry asked for clarification from Agreement States on whether the alarm limits set in scrap yards are set at reasonable levels and whether the State provides the scrap yards with guidance on the detection levels. An Agreement State representative commented that in her State the company from which they purchase their monitoring equipment calibrates the equipment and the State does not give the scrap yard any guidance on the levels of detection. Another Agreement State representative commented that in his State many of the scrap yards have set their detection limit at a small percent of the local background readings. A third individual from an Agreement State explained that several of their commercial hazardous waste disposal facilities have incorporated in their permits that detection monitors must be set at twice the background level.

An individual from the iron and steel industry offered additional clarification on why the detectors are set so low and what they detect. He explained that the detector alarm is set low because an undetected, sealed source can shut a mill down. The individual commented that a detector is typically set at six to eight percent of the suppressed background level, consequently the incidents of false alarms are few. For additional perspective on why the detectors are set so low, an individual from the steel industry explained that it is also to protect workers who might come into contact with the material. He also reiterated that one of the reasons the detector is set this way is because industry does not want contaminated material.

For some perspective on the benefit of use of radioactive material at nuclear facilities, an individual from the nuclear energy industry responded to this comment stated that radiation has been very beneficial in the medical field. In addition, he commented that nuclear energy provides up to 20 percent of the electricity in this country. He stated that, if the cost of disposing of their waste goes up, so will the cost of energy and the reliance on other sources of energy. For this reason, the individual felt there was a direct benefit to supporting ways of disposing nuclear waste without causing harm to employees or the public.

In response to the comments on the value of recycled material, Dr. Holahan asked participants to think, as they work through the alternatives table, about whether there are materials that would be worth recycling, like copper.

An individual from the scrap recycling industry commented that the concept of background levels will soon be outdated. Because of pressure from the industry, he noted that many scrap yards are starting to isolate the area around the scale where the scrap is screened for radioactivity and are able to detect readings coming from the truck of material. He observed that some companies are also moving the detector closer to the material and to the conveyor belts to help

minimize the potential for background interference.

Dr. Meck took the opportunity to clarify the roles of the NRC and industry to provide some perspective on setting a standard that might also result in detectable levels of radiation from released materials. He stated that the role of the NRC is to protect public health and the environment, which is separate from marketplace considerations. However, Dr. Meck saw as a potential overlap between these two areas, the need for the NRC to consider economics in its cost/benefit analysis when evaluating regulatory alternatives. He stated that it was not the place of NRC to drive economics.

Perception
One individual from the nuclear energy industry commented on real risk and perceived risk. He noted that in the nuclear power industry they monitor materials to the detection limit of 5,000 dpm per 100 square centimeters, and they also monitor personnel. He observed that no deaths have resulted from exposure to radiation in the commercial nuclear power industry, while there are 800 deaths per week from traffic accidents in this country. He was supportive of efforts to educate the public on some of these comparative risks. The individual also agreed that it is necessary to work on coordinating the calibration of monitoring equipment to avoid some of the issued discussed previously.

Process
A participant from the Portland Cement industry asked for clarification on whether the transcript for the meeting becomes part of the administrative record and whether questions and comments raised at the meeting would be addressed in a potential rulemaking and become part of the Federal Register. Dr. Cool responded affirmatively. He explained that the discussion is being transcribed and will become part of the administrative record. Further, Dr. Cool noted that these materials will be provided to the Commissioners along with a characterization of the comments to help them decide what the next steps should be. He stated that the NRC would not respond to each question separately, however, if the Commission directed them to proceed with a rulemaking, they would address categories of comments as part of the Federal Register.

I. Session III (Continued) - What Are Alternatives for Control of Solid Materials?

Copper
To begin the discussion on alternatives for control of copper, Ms. Stinson invited a representative from the academic and medical community to provide more information on sources of copper in research. The individual stated that copper is not a typical waste in academia or medical institutions. However, she noted that her institution currently has the largest cyclotron of its type in the world. To reach that point, she noted that the institution combined the resources of smaller cyclotrons and also produced some waste of copper coils and copper in electronic parts. She explained that copper, as an activated product, is not a problem because it is comprised of activated material with short half-lives and will become suitable for free release soon after activation.

Current Methods of Control

The individual from the academic and medical community also took the opportunity to speak about surveying activated material in general. Based on her experience, she observed that people are hesitant to survey when products are comprised of different mixed materials and it is unclear which isotopes to measure for and how to calibrate the machine. To address this hesitance she and her staff exposed many different materials in a building to gamma spectroscopy and then surveyed them with beta and gamma analysis and alpha analysis to determine what the materials were and what radioisotopes were present. She stated that they determined deficiencies for these materials with the NIST-certified standards and produced guidelines for all of the operators and users in the building. The individual commented that she would like to see this kind of process as part of a rule.

An individual from the DOD asked the presenter from the academic and medical community for details on how she released the activated copper. She stated that they decided to handle the copper under NRC guidelines. She explained that they categorized the copper in an electronic part and analyzed it with gamma spectroscopy to determine what isotopes were present in what percentages. In addition, she noted that they applied their standards to determine the efficiencies of the different isotopes, or their relative half-lives. Based on this information, it is then possible to analyze them using gamma spectroscopy or a Geiger counter to determine the amount of radioactivity. In the case of the copper, she explained that they surveyed each slab of copper by hand. She stated that they found one small hot spot that emitted values greater than their release limit of less than twice the background and they labeled the whole slab and put it in storage as waste. She noted that in this case, with a properly calibrated instrument, the detection limit was 200 dpm per 100 square centimeters. In the case of other materials, depending on what the material is and the process used, they look at the maximum permissible concentration (MPC) for unrestricted release of air and water. She stated that she uses the MPC for water as a measure to release ash.

An individual from the DOE relayed a similar experience with accelerator activated copper which, because of its value, has warranted extra attention. He stated that the DOE has a facility in California where, in coordination with the State of California and under DOE Order 5400.5 volumetric procedure, they release activated copper at very low levels. In addition, he noted that there are other accelerator facilities in California and elsewhere that will be releasing similar material in the future.

One participant from the nuclear energy industry provided information on their surveying techniques and on sources of copper in their industry. He began by explaining a control element that they use for the evaluation of the survey results of all materials. He noted that this procedure was used because they deal with a broad spectrum of isotopes from the reactor and the fuel. Also because of the diversity of isotopes, the individual commented that they survey with gamma spectroscopy in addition to looking closely for the harder to detect isotopes. He stated that the only way they know the potential isotopes is through process knowledge and sampling and analysis. Based on this information, he explained that they develop scaling factors or ratios between hard to detect isotopes and the routine isotopes. They then make scaled assumptions

about the presence of the harder to measure isotopes based on the presence of the other isotopes. In addition, the individual commented that this is how they characterize material for waste shipments. As an example, he described sending materials to a Tennessee facility within their Green Clean Program that is dedicated to survey and release of material. The facility takes the fingerprint analysis and builds it into their computer algorithm to determine their detection sensitivity and counting criteria.

Following his description of the control element, the individual from the nuclear power industry described potential sources of copper in a plant. He stated that there might be copper in the pressurized water reactors, the boiling water reactors, and the turbine generator system. In addition, he noted there is electrical cabling, reactor coolant pumps, small motors and pumps, and electronics of all types throughout the facility, all of which may contain copper and may or may not be contaminated. To summarize, he stated that there may be a large amount of copper available when the plan is decommissioned.

A participant from the nuclear power industry commented that there is no way to confirm that there is no contamination. However, he noted that it is possible to say that it is within the statistical ability of the specific instrumentation that the values measured on the material are not different from background within the set parameters. Another individual from the scrap recycling industry agreed that the concept of zero was a difficult issue, and because of the perception that anything about zero is unacceptable, scientists should come to an understanding that zero is not ultimate and that people can live with something above zero.

An individual from the scrap recycling industry asked the participant from the academic and medical community for a description of how they present the cyclotron when they sell it. The participant explained that they recycle a lot of material and have developed a process, working with the salvage yard or others, that involves a complete survey for everything that could have been on the item based on its use history. She stated that that information is compiled on an "Equipment Release Form" which includes information on what the material is, its origin, its use, what it was screened for, what was found and with whom to speak for additional details. She clarified that they do not use RG 1.86, however; they use the more aggressive approach she described earlier in the meeting.

Potential Alternatives for Control

An observer from the U.S. EPA commented that because it is hard to understand the potential risk associated with radioactivity, it is hard for people to put it into perspective with risks associated with traffic accidents and other more tangible risks. He suggested that, no matter who relays the information about relative risk, the public will probably not accept the risk. In this regard, he proposed that the NRC consider taking the economic and environmental benefits of recycling the copper and other metals, but restrict the marketplace to the industry itself.

One representative from the nuclear power industry commented that, in considering alternatives for control, it is important to factor in the practical implementation of the potential rulemaking. She remarked that it would be very difficult for them to implement different standards for

different materials from a power plant because the materials they release are complex with a mix of different materials. In addition, she was concerned about requiring a health physics technician to judge what materials were in an item in order to determine how to survey the item for release.

Health and Environmental Impacts
An individual from the steel industry commented that anything about the copper that could have an environmental impact, such as chemical makeup or radioactivity, should be considered, particularly the impact on the consumer. In addition, he stated that the perception of a possible environmental impact, like lead on copper pipes, should also be factored into the determination of impact.

Cost Impacts
A participant from the scrap recycling industry provided the group with some information on the relative value of copper versus other metals in the recycling industry. He noted that iron and steel comprise the greatest volume of scrap for the least value per pound, a fraction of a penny per pound or dollars per ton. In addition, he explained that it takes a lot of manpower and equipment to reduce this scrap to usable form. In contrast, the individual commented that non-ferrous metals have a higher value ranging in dollars per pound because there is less of it and it costs less to produce new ore. He stated that the Cadillac of scrap is nickel, followed by stainless steel. The individual observed that the value of all of these metals is reduced if they are contaminated. A representative from the steel industry agreed with this statement and added that for them to be interested in any of these metals they must be clean because of the potential risks to their consumers.

Another individual from the scrap recycling industry observed that, if recycled copper is worth two dollars a pound and it will cost five dollars per pound to clean and prepare it for the marketplace, there is no economic motivation for industry to use or process recycled copper. He felt that it was necessary to work through some of the logistics and costs of making copper marketable before proceeding with a rulemaking.

An individual from the nuclear power industry commented that it is more profitable in many cases to let market-based solutions resolve some of the waste handling problems. As an example, he explained that his business subcontracted the job of recycling electric generators because it was more cost effective to have a specialist do the work than to do the work internally. He commented that, if a reasonable practice and safe standard are adopted, industries will evolve to address the solutions.

Cement
Ms. Stinson initiated the discussion on cement by turning to the representative from the Portland Cement industry for an overview of his experience in the industry.

The individual began with a distinction between the terms "cement" and "concrete" because the terms are often confused. He explained that cement is a manufactured material that makes up 12 percent of concrete. Concrete is comprised of 12 percent Portland Cement, aggregate sand and

water. He described some of the uses for concrete including paving and in buildings and other structures. In particular, the participant noted that there was an increase in use for residential housing in foundations and walls, which he felt represented potential increased risk if recycled concrete is introduced into the open marketplace. He also stated that concrete is used for drinking water reservoirs and in aqueducts. The individual commented that concrete is not used for the manufacture of cement. Cement is manufactured from quarried and mined shales, clays and limestones that are heated to 1400 and 1800 degrees centigrade. However, he stated that used concrete might become part of the aggregate in concrete as a paving base; used as fill for any purpose or as rip-rap lining reservoirs.

Current Methods of Control

In terms of screening for the presence of radioactivity, the individual noted that the cement industry is not as well equipped to do this as the scrap metal industry. In comparison, he was not aware of Readymix companies that screened demolition debris on arrival to the facility.

A participant from the iron and steel industry asked for details on the process for removing reinforcing steel from within the concrete. The individual from the Portland Cement industry did not know these details, however he presumed that the reinforcing steel was removed and recycled elsewhere.

Potential Alternatives for Control

A representative from the nuclear energy industry commented that there is likely to be a large volume of cement to address when power plants are decommissioned because a lot of concrete is used in the plant's construction. He observed that, because concrete is porous, contamination could soak into it some distance, where the concrete is not covered by steel or epoxy coatings. However, he noted that they have generally observed only discrete spots of surface contamination to thicknesses of one or two millimeters. He explained that this type of contamination is scrabbled off with aggressive grinding tools and hydrolashing. In addition, he stated that there is a potential that the concrete which served as a bioshield near the reactor could have been activated and would not ever be suitable for recycling. He suggested that the rest of the structure should remain standing or be "rubblized" or demolished and buried on the site. Other uses for low level contaminated material include base for roads, stabilizer for asphalt, and aggregate for nonstructural materials in proximity to the site. He added that reinforcing bars would be recycled through scrap metal dealers. An individual representing the DOD added that the disposal cost for concrete is large and would be driving part of the total equation on alternatives.

Health and Environmental Impacts

As described in the introductory remarks, the individual from the Portland Cement industry expressed concern about the health and environmental impact of using recycled cement in the construction of residential homes, office buildings, reservoirs, and aqueducts, among other structures with which people come into contact.

One participant from an Agreement State requested information on the amount of ash used in concrete. The representative from the Portland Cement industry responded that the amount of

ash used in concrete has increased. He explained that fly ash is used to form blended cements at the cement facility and it is also mixed with concrete at the Readymix plant. The individual also noted that the federal government requires that a certain amount of fly ash be used in all federally funded projects. The Agreement State representative observed that, in addition to fly ash, some of the naturally occurring materials that are currently mixed to form concrete might already contain some level of radioactivity. Based on this information, he asked if the cement and concrete industry would be willing to add more recycled radioactive material into their product. The participant from the Portland Cement industry expressed that he needed more information on how the market would respond to increased exposure to radioactivity to provide an answer to the question. He suggested that the industry would, similar to the steel industry, be unreceptive about accepting additional recycled metals.

An individual from the scrap metal industry asked for input on the following questions: 1) Where do participants see recycled material being used? 2) Do participants see the potential for the recycled cement being demolished and reused? 3) What is the potential for contamination and decontamination?

A representative from the academic and medical community commented that they have dealt with demolition building materials. She noted that, in their demolition process, they found only a small spot of surficial contamination that they could either decontaminate or remove and dispose of economically. She felt there was very little potential for contamination of concrete in her industry. With regard to mining to produce cement, she stated that it was important to consider the potential environmental trade-off of mining versus recycling the same materials. In addition, she noted that fly ash was probably more radioactive than any recycled material he might use in his product. The individual from the Portland Cement industry responded to her comments by stating that he thought his industry would rather produce more cement than introduce more fly ash into their product. Similarly, while he could not speak for his industry on the possibility of introducing more radioactivity, he did not think most cement and concrete producers would support this idea.

Cost Impacts

The individual from the Portland Cement industry explained that he did not have a dollar value for used concrete. For comparison, he stated that virgin aggregate is worth approximately eight dollars per ton. He observed that used concrete would be worth far less than that. In addition, he noted that, if the concrete or Readymix industries learn that they might receive radioactive material, they will invest in the significant capital expenditure of purchasing monitoring equipment and personnel training to meet the demand. He also commented that, with the release of radioactive material, the NRC is transferring the economic burden of disposal from the power industry to other industries that are receiving these materials at higher costs.

A participant from the iron and steel industry asked for details on the current recycling rate of concrete and its use as a recycled material. The individual from the Portland Cement industry commented that the current rate is zero. He explained that the cost of transporting volumes of used concrete great distances is not outweighed by the low value of the material. He stated that it

might be more economical to use the concrete in place as the base of a highway. The individual also commented that the potential cost of negative public opinion to a Readymix plant is high compared to the benefits to the industry.

An individual from the nuclear energy decommissioning industry asked the participant from the Portland Cement industry to comment on the comparative resource values of recycling concrete in structure with minimal exposure to humans, such as highway base, versus disposing of concrete in landfills and using the resource of landfill space. The participant from the Portland Cement industry explained that he did not have enough information to comment on the economic tradeoffs of each of these alternatives, however, he noted that people are unlikely to want to purchase concrete with high radioactivity and those costs would outweigh the additional disposal costs.

Another individual from the nuclear energy industry stated that the federal government originally required the addition of fly ash on concrete as a resource conservation measure. He also observed that the levels of radiation in the fly ash, which were ten times the levels being talked about internationally (one millirem), did not impact the cost of the concrete. For comparative information, another individual from the nuclear energy industry commented that fly ash has been used in other consumer products and that the process of creating fly ash has increased the levels of natural radiation. He asked if there was information on where there had been an economic impact on those other industries as a result of the fly ash, whether there had been a public outcry, and/or a loss of jobs or other resources? The individual from the Portland Cement industry did not have those statistics. However, in relation to its use in concrete, the individual raised the question about whether, with today's environmental awareness, whether the public would accept the same practice on federal projects. He also took the opportunity to explain that it would be structurally unsound to use recycled concrete in any structure, let alone the foundation of a radioactive waste facility.

II. Public Comment

Jeff Balch - commented that the term "below regulatory concern" (BRC) is at the heart of this issue. He stated that he disagreed with the Commission because they are looking for ways to introduce radioactive waste into the public waste stream instead of eliminating the waste. To characterize his concern, the individual composed a parody that is in the public record.

Mike Nechvatal, IL EPA - stated that they dealt with concrete demolition from many sources in Illinois and the demolition has no to negative value, particularly for recyclers. He commented that most of the recyclers are able to maintain a business because of State grants for the equipment to crush debris. In addition, he noted that there is a large volume of illegally disposed construction debris, particularly in northern Illinois. He explained that public funds are used to remove that debris and dispose of it as clean construction debris in quarries. In summary, he stated that because there is no marketplace for demolition concrete, one control alternative is to leave it on the site of origin.

Kathy Quasey, Member of Interfaith Groups, Peace and Social Justice Groups, some Environmental Groups - commented that she was a writer with a Master's degree in business. She explained that she understood the marketing opportunity of this industry and has researched the radioactivity issue for years. With this as background, she described meeting a Russian woman who lived in the vicinity of the Chernobyl accident and had since had great difficulty starting a family. In addition, her living child is challenged by major health problems as a result of the accident. Ms. Quasey commented that she met other children from Chernobyl who also had severe health defects resulting from their exposure to the accident. She stated that it is no longer possible for us to claim innocence about the potential impacts of exposure to radioactivity, regardless of the good intentions of those who thought they were solving the world's energy crisis. Ms. Quasey also described the health problems of indigenous Americans who have lived radioactive houses. She closed her comments by recognizing the sense of urgency to act on this issue, but she suggested that the participants acknowledge that they do not know the answers and consider not doing anything.

III. Session III (Continued) - What Are Alternatives for Control of Solid Materials?

Soil

Ms. Stinson initiated the discussion on control measures for soil. She noted that the NRC had begun a study to study soil in a similar manner to the materials examined under NUREG - 1640. She invited participants to comment on soil uses and disposal practices.

Current Methods of Control

A representative from the academic and medical community stated that they receive a small volume of soil from researchers who are studying soil for research on remediation using radioactive tracers. She explained that they analyze the soil to verify and identify the isotopes and the concentrations that are present using general screening methods and some dry and wet chemistry. Based upon their current practices, she commented that the volume of soil is small, however the volume may be substantially larger when they decommission something like the cyclotron. The individual added that the presence of a cyclotron is not usual in most research institutions, consequently the issues around decommissioning are not common. On the other hand, she explained that if they have a large power reactor, there might be some decommissioning issues.

An individual from a nuclear power plant described a scenario as a licensee in NRC Region I with the disposition of soil during demolition or replacing asphalt. In this scenario, she explained that there was measurable contamination at very low levels across the site from boiling water reactors. Because of the low-level contamination, the alternatives for controlling the small quantity of soil displaced for demolition or replacing asphalt were limited. She commented that they could not redistribute the soil to low-lying areas, without a license to bury waste or applying for a 10 CFR 20.2002 exemption, on the site so the only alternative was to release the soil as radioactive waste.

Another individual from the nuclear energy industry provided some additional information on the

types of soil that might be of concern at a nuclear utility site. He explained that the air and water effluents from a plant distribute small amounts of material all over the site. As a result, he stated that it is necessary to obtain a 10 CFR 20.2002 Alternate Disposal Request to move any material on the site because there would be activity wherever you worked on the site. As examples, he described the process of concentrating activity in the cooling towers required to cool water released from the reactors over time, equipment with trace amounts of activity, radioactivity in sludge from the septic tank, and in the storm water runoff systems. While all of these sources are addressed in decommissioning, he noted that there are occasions where some of these soils need to be controlled during the operation of the plant and a better system would be desirable. He observed that, like concrete, there is not a significant economic value to soil but there is a high transportation and disposal cost to deal with soils that are often the same as those in your back yard. In addition, he observed that there are remediation technologies for cleaning soils, but there is a need for standards to assess whether the cleaning was effective. In summary, he stated that the current tool of applying for a 10 CFR 20.2002 Alternate Disposal Request that enables State approval to dispose of soil in a local landfill or on site, is expensive and cumbersome but they are the only alternatives at this time.

In response to the reference to sludge as a source of radioactivity, Mr. Huffert asked for comments on whether the NRC should add sludge to their list of materials to consider in a potential rulemaking. The individual from the nuclear energy industry responded affirmatively because the analysis is similar to that required for soils and the sludge is also a repository for activity. Another representative from the nuclear energy industry added that there were three components to sludge that might need to be considered: semisolid sludge, liquid, and dried solid bricks. She observed that NRC would need to consider whether it will require testing the pre-dried sludge and/or the dried sludge.

A representative from the DOD commented that they deal with a lot of soils, particularly during decommissioning of a license or part of a license. In this regard, he asked the NRC to clarify how their 25 millirem decommissioning requirements would fit into the context of a potential rulemaking. The individual also stated that, because they have installations in every State, they have to coordinate between the regulating State, the NRC and EPA for every cleanup action. He observed that this coordination process takes months to years and challenges every budget and schedule. Of concern to him was whether a rulemaking would help to streamline the process of taking action on some of their sites, in view of States reserving the right to determine their own standards. He asked what kind of buy-in the NRC was observing from States on the idea of a standard and whether States are planning to adhere to a potential standard.

Dr. Holahan responded that a license termination addresses decommissioning of a facility and what is left on site. She clarified that the current potential rulemaking would address activity during normal operations of a site, either in the form of restricted or unrestricted release. As an example regarding soil, Mr. Huffert described the circumstance where soils were contaminated near a downspout and the desire was to clean it up during the normal operation of the plant. He explained that part of what NRC was grappling with for this rulemaking was whether to allow for small volumes of soil like this to be cleaned up under this rulemaking rather than delaying action

until decommissioning of the site when larger volumes of soil would also need to be addressed. The DOD representative commented that for them the issue of restricted or unrestricted use was pertinent because they have an enclosed facility with security. As an example, he commented that they have outdoor firing ranges that they would have to cleanup twice, once before decommissioning and again during decommissioning.

Several individuals saw a potential challenge with meshing the 25 millirem value and ALARA requirement for unrestricted release of soil from a DOD facility with a likely lower value that might be established in a rulemaking.

Potential Alternatives for Control

Mr. Cardile asked the individual from the academic and medical community for input on a dose-based standard as part of the alternatives for control. The individual responded that she would like a rulemaking to include the development of a standard and education and guidance for radioactive materials that people, institutions, and facilities will encounter. In addition, she stated the guidance should include guidance on the measurement equipment with calibration instructions for each isotope. The individual suggested using a concentration standard like those used in air and water, instead of a dose-based standard that relates to the dose and considers the pathways and the radiotoxicity of the isotopes, etc. A dose-based standard could be used as secondary guidance.

Based on his experience, an individual from the nuclear energy industry suggested allowing for the alternatives of disposal on site, disposal off site, landfarming, and for beneficial fill in low lying areas on the site.

A representative from the Portland Cement industry proposed using the EPA experiences with the Corrective Action Management Unit (CAMU) as a potential model to essentially exempt a Superfund or cleanup action such as removing soil from a site in the context of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) and the Resource Conservation and Recovery Act (RCRA). In other words, he explained that, whereas in the past it was necessary to obtain a RCRA permit to perform such actions, CAMU replaced that process.

An individual from the nuclear energy industry referenced as a potential model for control the restricted release of soil. The example was the restricted release of soils from a DOE facility which were used to help the local community upgrade their airport. The soils were used to enhance the land for the airport, and were covered by buildings, runways and other structures at the airport.

Another representative from the nuclear power industry cautioned against developing regulations that were in conflict with other soil concentration guidelines derived and codified through DOE Orders, such as 5 picocuries per gram for radium-226. He commented that these levels were developed based on credible pathways analyses and he felt it would not be valuable to revisit these soils issues again.

IV. Public Comment

Lea Foushee, Cherokee and Occaneechi Band of Saponi - stressed that this process does not protect Mother Earth and puts people in a threatened situation for geological time. She mentioned that cancer is the number two cause of cancer among Native Americans. Ms. Foushee commended the steel industry as the backbone of civilization and added that the NRC is threatening the steel industry with things they do not want. She noted that burning, burying, or diluting materials does not solve the problem. She also stressed that if Mother Earth is destroyed, our ancestors and the foundation of the corporate Reich are consequently ignored, and civilization will fall and anarchy will prevail. She emphasized that they want to work for a future for their children.

Carrie Benchelow, Board of Directors, Nuclear Energy Information Service - read a statement prepared by several environmental organizations. The statement called for the NRC to fully regulate and isolate radioactive wastes and materials, and to immediately cease the current methods of releasing radioactive waste from commercial licensees and weapons facilities. Ms. Benchelow noted that they oppose the release of radioactive materials into commerce, and that they support the complete opposition and zero tolerance policies of the metal and recycling industries management and the unions. She also mentioned that the U.S. should take the lead in preventing contamination of the international marketplace. Additional details on her presentation are in the transcript for the meeting.

Sue Woldenberg - noted that she lives in the Chicago area, but that the issues being discussed affect everyone. She encouraged NRC to use their conscience and intellect when controlling others' actions that are wrong.

Sydney Baiman - told a story about a personal experience of the results of a steel mill in Syracuse, NY, that accidentally recycled orphan waste containing cesium. She explained that because of this incident, the radioactive dust that resulted from the recycling blew over onto gardens and into the reservoir, which resulted in drinking water that her dog refused to drink. She noted that when radioactive material gets recycled, not only are the products affected, but the land, sea, air and people are affected as well.

Chris Williams, Executive Director, Citizens Action Coalition of Indiana - mentioned that the Coalition has worked on some significant nuclear issues, mainly construction issues surrounding commercial power plants. He suggested that NRC should consider what they label as "below regulatory concern," because once the public becomes informed about what that means, it will not be beneath public concern.

Lionel Trepanier, Blue Island Greens - stated that the Greens are opposed to nuclear power and nuclear contamination of the environment. Based on that statement, he also noted that the Greens would oppose unrestricted and restricted release of nuclear contaminated materials.

V. Session III (Continued) - What Are Alternatives for Control of Solid Materials?

A scrap recycling industry representative thanked the public for their comments, specifically the comment pertaining to how recycling radioactive material "does not sound right" and also the comment regarding below public concern. He then reemphasized an earlier point that there is tremendous fear and concern about radioactivity, the materials in question, and the fate of those materials. He also mentioned that to have a rulemaking, those concerns should be addressed and the stakeholders should be able to weigh in on what options are acceptable or not. He urged the Commission to allow the stakeholders themselves, with NRC's backing and assistance, to study the issue and to obtain acceptance for alternatives. He added that once that happens and the public does not fear what will happen with the materials, then there could be a rulemaking.

A nuclear industry representative agreed with the above statements and noted that the packing of this issue has not been the best and it is understandable that people have concerns and would not accept a rulemaking under any conditions. He then suggested and offered to participate in further debate and opportunities, such as facility tours, to offer first-hand experience with the kind of materials being discussed and the kind of controls already being opposed.

A steel industry representative noted that the steel industry has worked with the environmental community for over 10 years to promote recycling as a societal good. He mentioned that he appreciated the comments and support received from the environmental community during the workshop and urged the NRC to seriously consider the comments provided by the public and environmental groups.

A Portland Cement industry representative began the discussion by describing a case where a home building supply store chain would not purchase cement that was produced from burning hazardous waste in a cement kiln. He added that the chain store's motivation behind not purchasing the cement was based on public perception of the material and what their customers wanted and, consequently, caused an economic hardship on certain cement distributors. He added there could be similar situations and public reactions to reuse of materials, such as using contaminated slag from a superfund site as a road base for Interstate 15 that is currently being built near the site. In conclusion, he added that the asphalt concrete paving industry uses aggregate and might be interested in recycling the radioactive waste in their materials.

As a general comment, a representative from the steel industry recommended that NRC contact Kristin Erickson, Michigan State University (MSU), to encourage her to submit for the record and NRC's consideration the information on the rigorous sampling and measurement protocols developed by MSU.

Ms. Stinson turned the discussion to a nuclear energy industry representative to provide some introductory remarks regarding the issues of trash and items for reuse.

Items for Reuse

In regards to items for reuse, the nuclear energy industry representative listed several items from a nuclear power plant that would be subject to reuse, including: clothing; tools, ranging from small hand tools to cranes and forklifts; consumable materials, such as paints and oils;

compressed gas cylinders; scaffolding; computers; notebooks; and anything present in an industrial facility. He noted that all the above listed materials have the potential to become contaminated. He also mentioned that those same materials that are believed not to have the potential to become contaminated, such as food or office furniture, are not evaluated. He added that only small parts of nuclear facilities involve loose radioactive material in any fashion.

The nuclear energy industry representative explained that the materials that do enter areas where there is known contamination, different levels of control are practiced to avoid contamination, such as: 1) do not let a material get contaminated; 2) evaluate whether or not it can be cleaned; 3) if it can not be cleaned, isolate it from the environment; 4) if it can be cleaned, send it to a facility that can clean it, or clean it in-house; and 5) take appropriate measures to ensure that there is no residual activity above the standard.

Mr. Cardile asked the participant what he would encourage NRC to think about when considering how to group the materials that need analysis. The nuclear energy industry representative recommended looking at a distribution of values and picking a rational value that everyone would implement uniformly. He explained that such a value for a standard would aid in their evaluation of diverse materials from one facility, as well as verifying the public's satisfaction of the release of materials from many facilities.

To provide perspective from a university research facility, an academic and medical representative noted that surveying, releasing, and reusing material is a common day-to-day occurrence. She described their waste management program as an inexpensive, extremely safe and compliant. To manage their waste, she explained that they categorize their waste and deal with it accordingly. The primary categories are solids and liquids, which are further categorized as "radioactive" or "other." Other categories include scintillation vials, deregulating, and animals or tissue. She also mentioned that a rulemaking could impact the following aspects of a nuclear medicine industry: mixed waste; routine surveillance; security; medical and veterinary uses; public perception; permits and licenses; and environmental programs and operations. She concluded that she and others in an academic and medical and medical radiation safety officer group have struggled with whether a standard limit should be dose-based or a concentration.

Trash

A nuclear energy industry representative described that there is a program for power plants called Green is Clean where materials that are believed to be clean are collected by trained individuals and sent to a facility that is designated to review and survey the material for release. He noted that the vast majority of the material then goes to an industrial landfill. The small amount of material that triggers an alarm is disposed of as radioactive waste. He mentioned that the Green is Clean material does have the remote potential of being contaminated because it is within the radiation controlled area, but it is later surveyed to prove that it is clean. The material generated within power plants that is known to be radioactive is processed and disposed of at a low-level waste site.

To provide figures on the amount Green is Clean waste, a representative from the nuclear energy

industry clarified that on average there is between 100,000 and 200,00 pounds per year per reactor of dry active waste. She noted that some percentage of that waste is clean, but some is contaminated because it was mixed with something or it was not economical to prove that it is clean.

Lead

A nuclear energy industry representative noted that because of its shielding properties, lead is routinely used in the nuclear industry. In fixed facilities, he explained that lead is used within the design of a facility as permanent shielding, in sheets, bricks, or stocks, or in lead wool. He noted that a fabricated shield is protected from contamination because it is poured into a stainless steel container. He added that temporary shielding, such plastic covers, is used to protect workers from lead sources, such as lead wool. The nuclear energy industry representative also noted that nuclear facilities contain large amounts of lead that will come out when a facility is decommissioned or a room is reconfigured. He mentioned that because lead is a hazardous material under RCRA, it can lead to problems, but it is easily cleaned. He described one approach to cleaning lead as electropolishing, which strips everything out until it is clean.

Another nuclear energy industry representative mentioned that his facility generally avoids using lead in the form where it can become contaminated. He suggested that preventing contaminated waste generation in the first place is probably the best approach for lead.

In terms of the recycling industry, a scrap metal industry representative noted that, because there are fewer smelters for lead than for steel or copper, and because lead is not as commonly found in a scrap yard, it must be stored for longer periods of time before they can justifiably ship it out. He added that this becomes an issue because lead, as well as other nonferrous materials, is stored inside a warehouse where people constantly work. Mr. Cardile responded that NUREG - 1640 currently does not address lead, and if the analysis were extended to lead, the workers would become a critical group and would be protected by a dose limit.

A representative from the academic and medical community explained that lead is an everyday business because they receive about 3,000 shipments a year, each of which is packaged in a lead container. She emphasized that some of the lead is contaminated, but since lead is a hazardous material itself, the non-contaminated lead present in facilities is a bigger problem that poses chemical risks to those exposed to it. An individual from the nuclear energy industry noted that handling lead and ingesting oxidized lead is an overriding concern at his facility, rather than contamination.

In conclusion, a nuclear energy industry representative suggested that disposal of lead is a real difficulty. He mentioned that the recycling industry could potentially dispose of lead that is no longer useful by making it available for packaging.

Nickel

A scrap metal industry representative explained that scrap nickel is a precious commodity because there are few nickel mines and refineries, and it is in high demand for specialty metals

and applications for expensive equipment. He also mentioned that nickel is stockpiled inside a warehouse until there is a sufficient quantity or market force to deliver it. An individual from the steel industry affirmed that nickel is a valuable material, particularly to the steel industry because it is a key alloying element and makes their products applicable in many consumer uses. Mr. Cardile asked the scrap metal industry representative if the scrap and steel industries are just as concerned about contaminated nickel coming into their facilities as they are about steel. The scrap metal industry representative replied that they are more concerned about contaminated nickel because the workers handle it more and are exposed to it longer than steel.
A representative from DOE described the notable aspects of a large decommissioning project in Tennessee where 6,000 tons of contaminated nickel is being removed from gaseous diffusion plants. He explained the process of decontaminating the nickel. He noted that the DOE required the contractor to receive a license to proceed with the project and to have an authorized maximum dose limit, which was calculated at 0.0017millirem/year. He noted that the State of Tennessee, an Agreement State, licensed the process, after which DOE was willing to go ahead with the project. He mentioned that DOE oversees the radiological control program and serves as a technical resource, but Tennessee regulates the process. He concluded that brokers are dealing with the metals that are coming out of the project, and the quality of those metals is well known. He mentioned that, consequently, individual firms have not been reluctant to purchase it.

A scrap metal industry representative asked how much of the refining and decontamination process would be observable, considering security issues. The DOE representative replied that once the nickel is melted, there are no security restrictions. He added that the only restrictions apply to radiation and operation aspects.

Steel
Dr. Lesnick opened the discussion by noting that over the course of the four workshops, there has been good conversation and an evolving understanding about steel. He, therefore, suggested focusing the conversation on items that need clarification or are particularly unique regarding steel.

For those participants who were not involved with each workshop, a nuclear energy industry representative provided a brief description of the current practices for steel and its various applications from the nuclear energy industry perspective. He explained that carbon steel is the bulk of a nuclear power plant's material. He mentioned that plants routinely release materials in the form of scrap metal. He added that there is high compliance, and large amounts of care and resources expended to ensure that materials are clean, safe, and monitored, etc. He suggested that a carefully constructed standard that was implemented by the nuclear power industry would not likely result in false alarms at steel recycling facilities because, currently, they are nowhere near a fraction of the standard limit.

From a university research facility perspective, an individual from the academic and medical community mentioned that there are currently few problems with contaminated steel, but they will grow as accelerators are decommissioned and new ones are built. She explained that her university research facility faces a problem with decommissioning ventilation systems. She

explained that the problem mainly pertains to the large amount of equipment they will have to survey to assure there is no contamination.

An individual from the iron and steel industry emphasized that the frailty of the current licensing and regulatory system has put the public at risk with respect to loss of control of orphaned sources. As a result of several meltings of contaminated material, he noted that steel companies have learned that they cannot let their guard down and have, consequently, pushed for the improvement of detection limits in radiation detection equipment and have demanded that their suppliers pre-screen scrap before selling it to steel companies. He also mentioned that steel companies have learned that they must be customer-focused to remain globally competitive. He stressed that a free-release limit for steel products would create a new scrap product, some of which could trip alarms and be rejected by steel companies. He encouraged NRC to consider the role of the orphaned source problem if they establish a free release limit.

One participant from the Portland Cement industry explained an incident where the public opinion of EPA's decision to solidify and store contaminated material on-site of the Shattuck Chemical Superfund site in Denver, CO, caused the EPA to later remove the material from Denver's city limits.

A nuclear energy industry representative observed that the discussion on steel has focused primarily on recycling, when in fact, the economic advantage of recycling is not significant. He suggested that time should also be spent discussing disposal in non-10 CFR Part 61 facilities.

One individual from the scrap recycling industry commented on the recycling industry in the U.S. He stated that the recycling industry has been an integral part of our society in every region of the country for ten to 20 years. The individual observed that some of the metal recycling facilities date back to the Revolutionary War. In this regard, he stated that the recycling industry has been at the forefront of what is good and essential in this country. He felt it was essential that they were also at the fore for this issue as we proceed with a discussion on the approach that will be acceptable to all of us. Based on the results of this discussion, he proposed that the regulators create a rule for implementation.

VI. Closing Comments

Before turning to Dr. Cool for closing remarks, Dr. Lesnick took the opportunity to thank participants and observers for their comments. He encouraged participants to stay involved and to stay in touch with the ongoing process. Dr. Lesnick thanked the NRC Staff for making the workshop process very transparent.

Dr. Cool also thanked each participant and observers for their participation and contributions to what he felt were two extremely useful days of discussion. From the discussions, he observed that they were able to put a finer point on a number of issues in a way that will be useful to the Staff as they embark on the next steps of the process. He reminded participants that the Commission requested that the Staff provide them with a summary of all public interactions

along with some recommendations for how to proceed by March 2000. Dr. Cool stated that they will do this using all of the information they have gathered including the transcripts and the written comments. He reminded participants that the comment period was open until December 22, 1999. Dr. Cool also stated that the transcripts should be available the week following the workshop in addition to a formal meeting summary that will be provided by the Meridian Institute.

Dr. Cool reminded participants to access the web site for additional information about the process and to subscribe to and take advantage of the list server as another means to stay involved with the process. He also explained that, as the Staff prepares the Commission paper, some of the working group meetings will be open to the public and these open meetings will be announced on the NRC web site. In addition, Dr. Cool commented that the draft materials that are being evaluated by the NRC Staff in this process will be available for comment through the web site.

Dr. Cool advised participants that the actual Commission briefing will be open to the public and will take place late in March 2000. He noted that the Commission may or may not invite stakeholders to join them at the table. Following the briefing, Dr. Cool explained that the Commission will make some decisions and provide the NRC Staff with direction on how to proceed with next steps, including a possible rulemaking. He stressed that, if the Commission advises the Staff to proceed with a rulemaking, the rulemaking process would also be open to the public with many additional opportunities for interaction.

The meeting was then adjourned.