

NRC Staff Summary of March 26-27 Meeting of the National Academies' Committee on Alternatives for Controlling the Release of Solid Materials from NRC-Licensed Facilities

Introduction

The National Academies' Committee on Alternatives for Controlling the Release of Solid Materials from NRC-Licensed Facilities (Committee) held a meeting on March 26-28, 2001, to gather information from representatives of a number of different stakeholder groups on their views and ideas regarding various alternatives. The following sections discuss stakeholder groups that made presentations and a summary of their major points.

Generally, the presentations made by the licensees and licensee organizations, steel and cement industries, public citizen groups, and the States, were similar to those made at NRC's Fall 1999 public meetings and at the May 2000 Commission, and as summarized in SECY-00-0070. For example, licensees continued to express concern over the current approach and generally endorsed ANSI/HPS N13.12-1999. The Nuclear Energy Institute (NEI) noted that it does not have an interest in recycling of metals, and it did not have a written policy statement in this area at this time. Rather, NEI is focused on the need for standards on disposal of material in landfills and also on direct reuse of equipment. The steel and cement industries repeated that they were generally opposed to unrestricted release of metals and concrete due to potential for economic disruption of their industries, although they suggested some limited restricted use or unrestricted use of metal from clean areas if it is monitored and tracked. The public citizen groups restated their opposition to release of solid materials and their concerns over radiation risk, implementation problems, and lack of trust. Stakeholders who had not previously presented information to the Nuclear Regulatory Commission (NRC) included a waste broker, a detection instrument manufacturer, a DOE facility with volumetrically distributed radioactivity in scrap parts, and a metallurgist that analyzed DOE's options for recycling steel.

A. Nuclear Energy Institute (NEI)

1) Current situation - NEI described the current situation at nuclear reactors by noting that solid materials must be removed every day (e.g., tools, components, trucks, cranes, welders, compressed gases, computers, etc). The current approach for dealing with these solid materials at nuclear reactors is generally NRC's no-detectable approach.

2) Industry did not ask for this standard - NEI noted that the nuclear industry did not ask for this effort to develop a standard, although it noted that NRC is doing the right thing by closing a gap in its regulations to cover solid material in a manner similar to air and liquid standards.

3) Steel recycling - With regard to the specific question of recycling of steel, NEI stated that it views recycling of steel as a special case that deserves special attention. It indicated that the steel recycling issue should not impede progress of an overall effort to handle the many solid materials (noted in 1 above) that reactors handle on a daily basis. It suggested resolution of the orphan source problem was important.

NEI noted that it does not have an interest in recycling of metals, although NEI does not have a written policy statement stating this at this time.

4) Issues with the current approach - In its remarks to the Committee, as well as in responses to the questions, as to the motivation for a change in the current approach or if the current system works, NEI noted the following:

- a) Levels under the current approach are protective of health - The current approach is protective of public health and safety. In any consideration of this issue, all risks must be balanced, e.g., industrial risks for having levels too low must be balanced against the dose levels being considered.
- b) Issues with 'no-detectable' approach - NEI noted that the 'no detectable' approach is not readily implementable and is material and licensee dependent. NEI stated that the no-detectable approach causes utilities to have a disincentive to use advanced monitoring technology because such instruments can see better than the detection levels associated with the no-detectable approach. Also, the no-detectable approach may result in a release at a level below the utility's detection level, but may register on a recipient's detector set at a lower level. Thus, the no-detectable approach perpetuates liability which is inappropriate for materials that have already been released.
- c) Cost issues - Although the current system does work, it is cumbersome, expensive, and wasteful of public and NRC resources, especially compared to the low impact on public health and safety associated with such releases.
- d) Public confidence issues - The different levels of the current approach undermine public confidence.
- e) Inconsistency issues - The current approach results in inconsistent levels, is not health and safety based, doesn't cover volumetric material, and is inconsistent with the international community.

5) ANSI/HPS N13.12-1999 - NEI indicated that they endorse a standard based on ANSI/HPS N13.12-1999. NEI indicated that the values in the standard are in agreement with values in IAEA documents. In answer to a Committee question as to whether ANSI/HPS N13.12-1999 is really a consensus standard or if it is an industry consensus standard (i.e., did it undergo public review), NEI noted that the ANSI standard does take into account public comments. It was also noted that NRC would go through the Administrative Procedures Act process to adopt a standard through rulemaking.

6) Controlled/restricted release - In answer to a question from the Committee as to whether NEI would accept a limited or controlled clearance approach (e.g, the material could only go to a landfill but not recycle) NEI indicated that, yes, that would be an improvement but any approach should also cover direct reuse of equipment (e.g., re-use of tools, trucks, scaffolding, computers, etc.) in their current form.

7) Draft NUREG-1640 - Concerns were expressed about the adequacy of Draft NUREG-1640 and it was indicated that comments had been provided to the NRC.

B. Utilities: Four utility representatives provided input. These were Exelon (which manages 17 power plants in the Midwest), Entergy Corporation (which manages Maine Yankee), Consumers Energy (which manages Big Rock Point), and Duke Engineering. Their general comments are summarized below:

1) Current situation - The utility representatives described the current situation at their various plants. It was noted that these facilities will generally send much of their lower activity material to Duratek (See discussion below in Item H.). It was also noted that much of the material has gone to LLW/Envirocare from the "hot side" of the plant. One utility representative noted that they do not sort and clean low activity material-- they send it to Duratek--partly because there are not regulations in this area to determine what is clean.

2) Issues with the current approach -In their opening remarks, and in response to Committee questions, about the motivation for a change in the current approach the utilities noted the following:

- a) Risk-informed regulation - There is risk-informed regulation in other parts of the nuclear industry, but not on control of solid materials.
- b) Material transfer between plants - A better method is needed for clearing material so it can be transferred from one plant to another. It was noted that there is a substantial amount of this type of activity and the current approach is cumbersome.
- c) Issues with 'no-detectable' approach - The no-detectable approach is outdated and discourages use of best available technology. There can also be inconsistencies in detection between the releasing facility and the recipient of the material, if different detection capabilities are used. As a result of these inconsistencies, a utility can receive a violation which can lead to lack of public confidence. It was further noted that utilities face a dilemma in that they could find radioactivity in materials (including concrete) with better instruments, but it is not clear what to do with this information under the no-detectable policy, i.e., the no-detectable approach tells a utility how hard to look, but if the utility uses a more sensitive instrument and finds something, they have to clean it up. A dose standard would allow concentration on a health basis and give an incentive to use better, and more efficient, instruments.
- d) Cost issues - Currently costs can be incurred on items with minimal impact on public health and safety. It is very costly to try to deal with volumetrically contaminated concrete because it must be compared to lower limits of detection for environmental measurements. Estimates are not available for the excess costs associated with operations under the current system.
- e) Inconsistency issues - The dose level being considered for solid materials is lower than other items, including medicine, consumer products, recycling of fly ash, etc.

3) Controlled/restricted release - In answer to a question from the Committee as to whether

utilities would accept a limited or controlled clearance approach (e.g, the material could only go to a landfill but not recycle), Exelon responded that it would.

4) State compatibility issues - There are differences in State regulations which can cause a problem. Compatibility issues should be resolved.

5) Draft NUREG-1640 - One utility representative noted that Draft NUREG-1640 is adequate as a bounding calculation, but not realistic.

C. American Nuclear Society (ANS)

1) Current situation: ANS is working on a draft position paper which may be published in about six months.

2) ANSI/HPS N13.12-1999 - ANS has not endorsed the ANSI standard at this time. ANS considers a value of 1 mrem/yr to be unreasonably low and not justified as a standard because it is a trivial dose. ANS recognizes some limits to the ANSI standard in that it excludes certain items.

3) Steel recycling - ANS noted that steel recycling is not a big issue for NRC licensees. ANS is not advocating recycling and recognizes the concern of the steel industries.

4) State compatibility issues - ANS noted the need for consensus standards and indicated that States should apply a national standard uniformly.

5) Issues with the current approach - With regard to issues with the current approach, ANS cited inconsistencies, lack of uniform criteria, and public acceptance as problems, and noted that it would like to see convergence between NRC, EPA, and DOE.

D. Steel Industry

1) Consistency with previous comments - The overall views expressed by the steel industry, including the recommended alternatives, were similar to those presented at the May 2000 Commission briefing and summarized in SECY-00-0070. These include that there should be no unrestricted release of metals, but that restricted use may be acceptable if dedicated industries accept the material as long as the steel did not go into general commerce. Also, as before, the steel industry indicated it was open to recycling of material from non-radioactive areas of a licensed facility if the material is surveyed and tracked after release. It was stated that all metals industries have the same viewpoint.

2) Current situation - The steel industry noted that a significant fraction of what they use in making products comes from scrap. Last year, out of about 100 million tons produced, about 67 million tons of steel were recycled.

3) Other steel industry activities - The steel industry noted it had played a role in DOE's moratorium and is currently working with the international community, the U.S. Customs Service, EPA, the States, and others on detection of radioactivity in scrap steel.

4) Issues with alternatives for control of solid materials - The steel industry noted:

- a) Large economic impact on steel industry because consumers do not want this material - Public perception of products containing contaminated metal could be a real and large economic impact based on focus group studies. It was noted that the studies indicated that even if a government agency says levels are acceptable, public confidence is still low. It was also noted that public perception of the risks of products and the de-selection of products is the major concern here, not the science of a dose of 1 mrem/yr. There could be a potential loss to the steel industry of \$100 M annually from unrestricted use of steel from licensed facilities for recycling into general commerce.
- b) Impact on steel industry image - Allowing this material to enter the market would undo much of the recent progress of the steel industry's expansion initiative.
- c) Transfer of responsibility for material - The government doesn't have the right to transfer the materials, and disposal costs, from the nuclear industry to the steel industry.
- d) Steel industry does not need this source of recycled steel and there is not an economic benefit to this recycling - There is plenty of clean scrap (1.5 billion tons available) so the steel industry does not need the DOE metal or licensee material (especially with the negative connotations). In addition, the cost of scrap steel is low, and radioactive steel has no worth. Thus, the negative economic impact on the steel industry cited above could be significant without a big benefit.
- e) Scrap detection systems and cost to steel industry for alarms - The steel industry currently monitors incoming scrap loads for radioactivity. These detection systems can read levels near Draft NUREG-1640 values and would alarm and reject loads at those levels. The steel industry would keep monitoring and rejecting loads if NRC has a standard or not. It was noted that there will be costs incurred for the steel plant for downtime to respond to alarms and that in most cases the steel will be surveyed once it is alarmed because if it is rejected and shipped back, it must meet Department of Transportation regulations. Another concern is the steel employee's perception of a radiation problem which makes for more downtime.

5) Issues with the Committee's study - The steel industry supports the Committee's study, but notes that the study must examine public perception and commercial and economic impacts.

6) Draft NUREG-1640 - Draft NUREG-1640 does not do a good job of understanding the steel technology, including basic oxygen furnace, and did not handle the slag pathway analysis well.

7) Background levels in steel - Steel is not contaminated with natural background based on recent measurements (sampling of 277 batches in 1995 found no Co-60; sampling of 205 batches in 1996 found 2 batches at <1 pCi/gm; sampling of 150 batches in 1997 found one batch at <1 pCi/gm)

8) Other metals - Nickel releases are different but not in the steel industry's scope. A problem noted is that a large amount of nickel "dumped" on the market could impact nickel market prices.

E. Concrete Industry

1) Consistency with previous comments - The overall views expressed by the concrete industry, including unacceptability of unrestricted use and concerns over economic impacts, were similar to those presented at the Fall 1999 public meetings held by the NRC and summarized in SECY-00-0070.

2) Issues with alternatives for control of solid materials - The concrete industry noted:

- a) Unacceptability of unrestricted use - Unrestricted, widespread use of concrete from licensed facilities is unacceptable to the concrete industry. The concept of concrete framed buildings being made with radioactive materials exposing people to potential radioactivity levels greater than background is contrary to the charter of the NRC.
- b) Costs and liability issues - The concrete industry should not have to assume the economic burden or liability of preparation of these materials into a product (e.g., transporting, crushing, screening, handling) or use of these materials.
- c) General use of recycled concrete - Recycled concrete generally does not have a good record in construction, although it can be used in road beds, etc.
- d) Restricted use - The concrete industry is open to consideration of some form of restricted use. However, the restricted use should be confined to a single point where contact for exposure to the general population is minimal, and should entail licensing as a low-level nuclear facility by the NRC.
- e) Comparisons to use of fly ash - The concrete industry stated that comparisons of recycle to fly ash are invalid because radioactivity in fly ash constitutes a small dose compared to background and because it does not require any of the additional processing (noted in item 2b above) that concrete from a nuclear facility would require.

F. Agreement States, Organization of Agreement States (OAS), and Conference of Radiation Control Program Directors (CRCPD) - Suggestions from States and organizations on the approach for recycling and disposal of solid materials included:

1) State suggestions - The Agreement States of South Carolina and Washington were present to provide input to the Committee. Washington suggested that Regulatory Guide 1.86 be updated to provide specific activity limits based on a dose of 1 mrem/yr and emphasized their opposition to a "restricted" category of release. South Carolina currently uses a 1 mrem/yr criterion and emphasized that guidance is needed on what to consider in pathway analysis for recycled materials. Both Washington and the CRCPD noted that consensus among NCRP, ICRP, IAEA, ANSI, and others should help form the basis for decisions on dose-based criteria.

2) OAS suggestions - The OAS stated that they support the development of standards and guidance that address free release and restricted release (for recycling or reuse of material with slight contamination). They noted that whenever the standards are drafted, they must be discussed with regulators, individual States, and other stakeholders. They noted that, although

a consensus would be difficult to achieve, there should not be differing standards for different regulatory agencies or federal entities.

3) CRCPD - The CRCPD E-23 Committee, Resource Recovery and Radioactivity, stated that they recommend the promulgation of nationally applicable regulations and guidance based upon a 1 mrem/yr dose criterion and nuclide specific concentration guidelines. CRCPD emphasized that the NRC and States should work as equal partners in an alliance to improve the control of solid materials and to establish a uniform national regulatory system adequate to protect human health and the environment.

G. Individuals and public citizen groups

1) Consistency with previous comments - The overall views expressed by the individuals and public citizen groups present at the meeting, including unacceptability of release of solid material, concerns over potential health risks, implementation, and lack of trust of the government, and requests for recall of previously released material, were similar to those presented at the May 2000 Commission meeting and summarized in SECY-00-0070.

2) Prevention of unrestricted release of solid material - radioactivity releases should be prevented and existing radioactivity should be kept by generators. Radioactivity releases should not enter commerce.

3) Concerns with the Committee's study and NRC's efforts - Interest groups indicated:

- a) Concern over radiation risk - The issue is real radiological risk and not public perception. Proper questions must be asked about public protection. The Committee should go outside NRC's framework and ask the right questions to get at the risk exposure problem. Under no circumstance should any radioactive metal be released for free use without 100% verification. Also such material, in addition to being 100% verified as safe, should be labeled as having originated from a nuclear activity. Anything less would just confirm the government's lack of concern and attention.
- b) Concern with Committee approach - The Committee should reject the contract framework imposed by NRC, and should consider the empirical record of institutional incompetence, and be a fact finder.
- c) Lack of trust in government, particularly NRC and DOE - A number of cases were cited leading to lack of trust in government or ability of this effort to protect public health and safety:
 - a) Past incidents of exposing soldiers and citizens without informing or educating them to dangerous levels of radiation. There continues to be research and secret exposures ongoing.
 - b) NRC actions in delegating its responsibility to a contractor, SAIC, was a clear conflict of interest. DOE had publicly employed SAIC as a contractor and NRC used them for regulatory compliance assistance in the same area.

- c) The Tennessee nickel release situation was an underhanded approach to go around the system to release contaminated nickel and a deliberate attempt to avoid federal protective provisions for release.
- d) There was no basis to justify issuing a license to MSC. There were misrepresentations about only partial disclosure of uranium as a contaminant, but plutonium was not identified.
- d) Need for recall of previous releases - There should be a system for 100% recall of released material.
- e) Concern that large quantity of material will be released - A regulation allowing release would open the door to a flood of materials being released on the public.
- f) Concern over NRC's lack of control over Agreement States - NRC, in the Tennessee case, did not exercise appropriate review and control thus allowing Tennessee to proceed without proper control. There is no assurance that this situation would not recur.
- g) Concern with Draft NUREG-1640 - This document is flawed because it was developed by a contractor found to have a conflict of interest. Also, this document is supposed to be based on calculating realistic dose estimates, but doesn't include DOE complex workers.
- h) Problems with implementation - any dose criteria for release would have problems with implementation, including disclosure of the information. It is not clear, as was a problem at BNFL, that adequate surveys would be done before contaminated metals were released from the site. In the real world, we can't trust that this will be done. Results could not be trusted without 100% verification. There was speculation in Committee' questions whether this 100% verification criterion could be achieved.

H. Waste broker - Duratek

1) Current processing situation - Duratek noted that:

- a) Number of facilities - They operate 4 material handling facilities in Tennessee and in South Carolina.
- b) Waste type handled - Their emphasis is lower activity waste. They do not handle mixed waste or high activity waste.
- c) Quantities/sources of material handled - They handle 65% of waste materials generated in the nation (approximately 62 million lbs). They receive waste from 25 nuclear power customers and from 100s of smaller customers (hospitals, labs, manufacturers).
- d) Methodology - They have hi-tech capital intensive equipment for processing wastes that

typical licensees do not have. They volume reduce and stabilize material (trash, metal, etc). Thus, they can offer competitive prices for handling waste.

2) Current approach for evaluating material - Duratek noted that in evaluating whether material is clean, they use the following method and approach:

- a) Decision tool for evaluating disposition of the material - Duratek indicated that they use a combined (a) dose-based and (b) detection-based system for evaluating what is 'clean,' i.e., Duratek checks against the 1 mrem/yr Tennessee criterion and also checks against the detection system criteria used at the local landfill. Thus, Duratek tries to satisfy both the State regulator and the landfill operator who receives the material.

Duratek indicated that the advantage of their approach is that it allows them to have both a dose-based answer and also to satisfy the potential recipient who might reject the material if radioactivity is detected even though it meets the dose-based criterion.

- b) Recycling into the commercial market - Duratek stated specifically that they are not interested in releasing metal into the commercial marketplace.
- c) Concrete rubble - Duratek receives concrete from licensees and uses its combined approach for concrete disposition, i.e., it measures it as clean below 1 mrem/yr and also checks to ensure that it would not alarm a landfill detector. Duratek noted that it has calibrated with local landfill detection systems and has not tripped alarms at the landfill in the last 7 years.
- d) Metal - Duratek noted that it takes too long and is too costly to decontaminate and survey metal, so they just compact it and send it to a LLW site or Envirocare. However, they do send some metal to their metal melt facility for eventual controlled use such as in shield blocks for DOE facilities. They do not send metals to commercial recycling, except in certain cases. Duratek indicated their definition of recycling is not to release it into commerce but to turn it into a piece of equipment that can be used by the DOE.

Duratek indicated that some other non-DOE first use of metal (e.g., a tunnel) might be possible using their licensed metal melt process but they do not know if economics warrant it.

I. Detection system manufacturer - Exploranium

1) Current situation - Exploranium is a Canadian company that manufactures portal truck alarm systems for various users, including the steel industry. They noted that vehicle monitors were first developed in 1986 and described how their system works. They noted that a typical steel plant could have up to 6 or 7 monitors including one for truck, rail, charge bucket, lab systems, etc. They also noted that all Canadian nuclear power plants have portal exit monitors.

2) Issues with alternatives for control of solid materials - Exploranium noted that their system will be able to detect many of the radionuclides in Draft NUREG-1640 at levels corresponding to 1 mrem/yr.

J. Health Physics Consultant

1) Current field experience with radiological control failures - The types of materials that are found in the uncontrolled environment are usually nuclear medicine related with short half-lives. Incidents can arise from residue from a released nuclear medicine patient or a piece of radium military ordnance or equipment. Users of the service are facilities, e.g., landfills, who have an alarm monitor.

The consultant indicated that they have never found anything from a nuclear power plant, and generally they can't detect alpha contamination. Many times an incident is just natural radioactivity that may have gotten concentrated. Also, they often can't figure out why the alarm tripped. Other incidents are mistakes at medical waste generators, for example, a mistake at hospital, patient room waste not properly "red bagged", etc.

2) Landfill monitors - Municipal waste sites' portal monitors are just a single point measurement, i.e., static not dynamic. Measurement could be done more dynamically to get overall readings. Installation and operator training greatly affects sensitivity, e.g., distance, geometry, etc, and could be done better.

3) Cost considerations - A lot of monitoring is done because of deleterious effects (such as cost and liability) associated with downstream rejections. Experience at transfer stations and incinerators indicate that radioactive anomalies are disruptive of operations. False alarms, not so frequent anymore, generally result in going to hand-held survey techniques, where they might find a bag or find that it is a false alarm. Experience with such alarm levels has improved operational effectiveness.

K. Licensed waste handler - Envirocare

1) Current situation - Envirocare noted that it is licensed to handle very low Class A wastes (soil and concrete (60-80% of its input), asphalt, clothing, debris, trash (20-40%)). It also noted that its current input from facilities is declining because business is going elsewhere. It also noted that it has the capacity to be able to take a large volume of low activity waste in the future.

2) Issues with alternatives for control of solid materials - Envirocare noted:

- a) A clearance standard could effect their business in that, depending on the level set, it would affect how much material Envirocare receives.
- b) Envirocare feels that they have applied for and received proper licenses and others who might take the material should do the same. There is a need to make sure waste is monitored and checked. Envirocare noted that they can't compete in cost with landfills who have lower regulatory requirements. They also noted that long term costs of disposal at landfills could be a problem if there were not proper surveys/disposal.

L. Government agency on solid waste - EPA Office of Solid Waste

1) Scope of EPA Office of Solid Waste review - It was noted that this office focuses on how waste is generated, rather than how it is disposed, and bases its evaluations on the Resource Conservation and Recovery Act (RCRA). RCRA applies to both municipal solid waste landfills and hazardous waste disposal facilities. However, RCRA specifically excludes regulation of source, special nuclear, and byproduct material.

2) Regulation of landfills - Currently, EPA doesn't directly regulate landfills; EPA authorizes the States to regulate materials not regulated under federal authority. Because RCRA precludes source, special, or byproduct material from AEA as solid waste, EPA doesn't regulate it. In the nonhazardous waste program, EPA has little interaction with waste generators or disposers, and then only if a State or citizen raises a legal or regulatory action. EPA HQ has had no request for radioactive waste to be disposed at municipal landfill. EPA noted that it does not have jurisdiction over actual disposals, but it does have a role in generating guidance for use and application. The radioactive dimension doesn't appear to be an issue that the solid waste community has raised to EPA.

3) Questions regarding radioactivity at landfills - Questions were raised by the Committee regarding the acceptability of an item (e.g., a chair) having a detectable level of radioactivity being sent, under an NRC regulation, to a landfill. Questions were also raised about whether there is a radioactivity level below which municipal landfill disposal of radioactive material would be acceptable and whether anything that had a radioactive constituent would raise concerns for municipal landfills. The EPA noted that their scope does not cover this area and suggested the States were more appropriate for a response.