

STATUS OF NRC EFFORTS ON REGULATORY APPROACHES FOR CONTROL OF SOLID MATERIALS

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ABSTRACT

The U.S. Nuclear Regulatory Commission's (NRC's) regulations that set standards for protection of the public against radiation are contained in 10 CFR Part 20, which does not currently contain specific requirements for the release of solid materials with small or no amounts of radioactivity. However, NRC licensees seek to release solid materials when they are obsolete or no longer useful during operations, or when the facility is being shut down during decommissioning. In the absence of a national standard for the release of solid materials, NRC has approached these matters on a case-by-case basis, which is considered adequate to protect public health and safety, but has some limitations. Recently, NRC has been engaged in a process to examine its approach for the control of solid material and to involve the public in that examination. As a part of the process, NRC requested and received public comment in several forums. The extensive and wide-ranging comments from the public are summarized in this paper and the status of NRC's technical basis is explained.

INTRODUCTION

Under the Atomic Energy Act of 1954, as amended, NRC issues regulations that provide for the protection of public health and safety from NRC licensee use of source, byproduct and special nuclear material (1). The NRC regulations for protection of the public against radiation are codified in 10 CFR Part 20 and limit the radiation dose that a member of the public can receive from the operation and decommissioning of a nuclear facility. The regulations also require that doses received are "as low as is reasonably achievable (ALARA)." NRC recently amended its regulations to establish criteria for unrestricted use of facility structures and lands at a decommissioned site (2). However, the criteria focus on protection of persons entering and using decommissioned structures and lands at a site after NRC terminates the license for a nuclear facility, and do not address release of solid materials.

NRC's rationale for examining its approach for controlling releases of solid materials is that there are currently no generally applicable NRC regulations in Part 20 for the control of the majority of solid materials that contain small or no amounts of radioactivity. Nonetheless, licensees seek to release materials when they are obsolete or otherwise unusable during operations, when their facility is being

decommissioned, or when material and equipment needs to be taken out of the restricted area and used elsewhere.

CURRENT CASE-BY-CASE APPROACH

Given the absence of established criteria for controlling the release of solid materials, at this time NRC generally addresses the release of solid material on a case-by-case basis using license conditions, existing regulatory guidance, or other case-specific criteria. Licensing decisions involving the release of solid material are made using a variety of criteria, such as Regulatory Guide 1.86 and its equivalent Policy and Guidance Directive FC 83-23 (3,4). The surface contamination levels contained in these documents were originally developed by the U.S. Atomic Energy Commission in 1974 and were based principally on the capabilities of readily available instrumentation at the time the guide was developed. The guidance does not contain dose criteria and it only applies to solid materials with surface contamination.

For some situations, NRC allows release of volumetrically contaminated solid material if survey instrumentation does not detect radioactivity levels above background. This does not mean that the material is released without any radioactive contamination on or in it; instead, it means that the material may be released with small amounts of radioactivity not detectable with appropriate survey instruments. The release levels are based on measurement capability of survey instruments (5,6).

One regulatory option that is available to licensees is to request approval of alternate disposal procedures in accordance with requirements in 10 CFR 20.2002 (7). Under this regulation, licensees are allowed to seek NRC authorization for disposal of materials with low levels of volumetric contamination. These requests typically involve the burial of solid materials on the licensee's site or disposal at a nearby landfill. Licensees are required to identify and describe the waste, the disposal site, pathways of exposure, and calculate doses to members of the public and workers. The guideline is that annual doses should not exceed a small fraction of the annual public dose limit, which is currently 1millisievert per year (1 mSv/yr, or 100 mrem/yr).

In each application of the current case-by-case approach, material may be released from a licensed operation with the understanding and specific acknowledgment that it may contain small amounts of radioactivity, but that the concentration of radioactivity is so small that control through licensing for the protection of public health and safety is no longer necessary. Although this approach is adequate to protect public health and safety, the lack of established radiological criteria for controlling solid materials could result in inconsistent release levels because not all licensees use the same survey instruments and procedures to monitor solid material releases. Another limitation of existing guidance, such as Regulatory Guide 1.86, is that it does not apply to volumetric contamination.

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On August 7, 2000, the current case-by-case approach was reaffirmed in a memorandum prepared by NRC's Office of Nuclear Material Safety and Safeguards and Office of Nuclear Reactor Regulation. This memorandum was then sent to the Agreement States, on August 22, 2000, for their information (8).

PUBLIC COMMENTS ON NRC'S 1999 ISSUES PAPER

As more facilities near decommissioning, there is a potential for increased licensee requests for release of solid materials. Recently, NRC has been engaged in a process to examine its approach for the control of solid material and to involve the public in that examination. As part of the process, NRC requested and received public comment in several forums, including: (1) publication of an Issues Paper for public comment; (2) holding four facilitated public meetings at locations around the country; (3) receipt of a large number of written and e-mail comments; (4) holding open NRC meetings on these efforts; and (5) maintenance of a website on this topic.

The first step in soliciting public input on this matter was publication, for public comment, of an Issues Paper on the release of solid materials on June 30, 1999 (9). It presented a variety of issues and alternatives related to the control of solid material and served as a discussion tool for public meetings the staff held from September through December 1999 in San Francisco, California; Atlanta, Georgia; NRC Headquarters in Rockville, Maryland; and Chicago, Illinois.

The Issues Paper presented several alternatives for control of solid material for public comment. The two broad process alternatives were to either not conduct a rulemaking or to develop a regulation. If a rulemaking was not pursued, NRC would continue the current case-by-case approach or possibly update existing guidance. Alternatively, NRC could conduct a rulemaking to establish criteria for control of solid material with analysis of health and environmental impacts and cost impacts, and opportunity for public comment. Possible alternatives included in the Issues Paper are: (1) setting acceptable dose levels that must be met before materials could be cleared for unrestricted use; (2) not permitting release of materials from radioactive areas, which is referred to as "prohibition;" and (3) establishing restrictions that limit the release of solid materials to certain authorized uses. The Issues Paper also outlined considerations that would need to be evaluated for each alternative, including an evaluation of health and environmental impacts and economic tradeoffs.

In response to NRC's request for public input on this topic, there were over 800 diverse and wide-ranging comments received on the possible alternatives. These comments were discussed in a March 23, 2000, paper from the NRC staff to the Commission (SECY-00-0070) and were subsequently summarized and characterized in report NUREG-/CR-6682 (10,11). On May 3, 2000, the NRC staff briefed the Commission on the contents and recommendations in SECY-00-0070 and on May 9, 2000, the Commission held a meeting with representatives of stakeholder groups to hear their comments and concerns. At the latter meeting, representatives from the following stakeholder groups presented their

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views to the Commission: (1) the U.S. Environmental Protection Agency; (2) the U.S. Department of Energy; (3) the Health Physics Society and American National Standards Institute; (4) the Nuclear Information and Resource Service; (5) the Natural Resources Defense Council; (6) the Conference of Radiation Control Program Directors/Organization of Agreement States; (7) the Nuclear Energy Institute; (8) the Association of State and Territorial Solid Waste Management Officials; (9) the Association of Radioactive Metal Recyclers; (10) the Metal Industry Recycling Coalition; (11) the Institute of Scrap Recycling Industries; and (12) the Paper, Allied-Industrial, Chemical and Energy Workers International Union. Public comments received to date on this issue are broadly summarized below.

Metals and cement industry representatives indicated that they were opposed to unrestricted release of solid materials that could come to their facilities for potential recycle. The rationale for this view was that there could be a large economic impact on these industries if consumers do not want to buy products because of concerns over the presence of radioactivity in the products. Also, the metals industry stated that the total amount of steel available for recycle from the nuclear industry is relatively small compared with the amount recycled in the United States annually and, therefore, any benefit of recycle would be comparatively small and likely offset by potentially major economic costs to the metals industry. In addition, the metals and cement industry commenters considered the shifting of costs from licensed facilities that generate the solid material to their industries as economically unfair and inequitable. Another consideration noted by the metals industry was that sensitive radiation detectors have been installed at steel mills, which may alarm at levels near an NRC standard that might be promulgated. This, in turn, could result in rejected shipments of released solid material, which would cause further economic problems for the metals industry.

However, comment letters from the metals industry suggested that it could support an approach that included either restricted release or a modified unrestricted release. For example, metal could be released if it were restricted to its original purpose within the nuclear industry. Restricted applications could also include disposal in unlicensed landfills or processing at a dedicated metal melting facility for the nuclear industry. Modified unrestricted release was considered acceptable if the following conditions were met: (1) demonstration and certification that the metal had been located in a site area where radioactive contamination was not possible; (2) verification by monitoring that the metal did not contain levels of radiation above a standard or above background; and (3) establishment of labeling and tracking requirements.

Citizens groups and individuals generally indicated that radioactive wastes should be isolated from the public, and that they were opposed to releasing materials that could end up in consumer products. Comments received ranged from categorical opposition to any release of solid materials to broad opposition unless fundamental concerns about uncertainties in technical and policy issues are resolved. Potential health concerns cited by these commenters included: (1) the associated risks are too high, avoidable, and involuntary; (2) no dose above natural background is acceptable; (3) any dose increases

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cancer risk; and (4) natural background doses do not justify adding dose from solid material with small amounts of radioactivity. Additional technical and policy issues were identified by this group of commenters, including: (1) mistrust of licensees; (2) uncertainty in demonstrating conclusively that releases could be made safely; (3) no liability or responsibility for released materials; (4) difficulties in accurately tracking released material; (5) multiple exposures of a single individual from several products; and (6) uncertainty in accurately predicting health impacts from released material. Furthermore, many commenters indicated there should be full reporting on, and recapture of, solid material released to date.

In contrast, licensees and the Health Physics Society generally consider a rule containing criteria for unrestricted use at low dose levels both necessary and appropriate. Specifically, these groups stated that the doses being considered are very low and that scientific bodies such as the National Council on Radiation Protection and Measurements and the International Commission on Radiological Protection indicate that levels around 10 $\mu\text{Sv}/\text{yr}$ (1mrem/yr) are negligible in risk considerations. This group of commenters also noted that such dose levels would be well below those received in the public's routine activities and insignificant compared to variations in natural background that people are exposed to each day without discernible health effects. In addition, licensee commenters considered disposition of solid materials a part of the cost-benefit balancing of the use of radioactivity in medicine, research, industry, and power production.

This group of commenters generally endorsed use of the American National Standards Institute Inc./Health Physics Society standard N13.12-1999 (12). They considered it an industry standard that sets an acceptable level for release of material for unrestricted use. Also, this group of commenters stated that ANSI/HPS N13.12-1999 is a consensus standard that current Federal law requires NRC to consider in its rulemaking process.

State regulatory agencies generally expressed support for the need for a rule and cited the need to correct inconsistencies and reduce burdens associated with the current guidance process. They noted that updating an existing regulatory guide might not fully address all the issues that would be addressed in a rulemaking. Also, there was general support for establishing a dose criterion in the range of 10 $\mu\text{Sv}/\text{yr}$ (1mrem/yr) and it was recommended that NRC should work with other Federal agencies, the States, affected businesses, and the public to identify major concerns. However, it was recommended that there should be provisions in any rulemaking to allow for case-by-case review of specific situations.

Regarding restricted use, many commenters indicated that this alternative had merit as a means of keeping solid materials out of consumer use, but there were concerns about whether a large-scale restriction on recycled solid material in the public sector would be practicable. Some commenters suggested restricting recycle to within the nuclear industry, whereas others suggested restricting material to a landfill. An additional alternative identified was segregation requirements for solid materials, which would entail release for unrestricted use of specific material types and release under restricted conditions for other material types.

CURRENT NRC STAFF ACTIVITIES

Based on input from the public, it is evident that there are diverse views on the acceptability of establishing a national standard for the release of solid materials and that there are several potential alternatives. To continue the process of moving discussions forward on this issue, on August 18, 2000, the Commission directed the staff to proceed with a National Academy of Sciences (NAS) study on possible alternatives for control of solid material (13). The Commission also decided that a final decision on whether to proceed with rulemaking should be deferred at this time to allow the NAS study process to fully explore all alternatives. In addition, the staff was directed to stay informed of international initiatives in this area, related EPA and U.S. Department of State activities, and potential import and trade issues.

The August 18, 2000, Commission directive indicated that the staff should to continue to develop a technical information base necessary to support a Commission policy decision in this area. The staff has been developing technical information on the control of solid materials for the past several years. The major areas that are under development at this time include: (1) evaluation of dose-conversion factors for individual doses; (2) estimates of inventories of materials at nuclear facilities; (3) estimation of collective doses and potential for exposures to multiple sources of recycled material; (4) evaluation of associated costs, including, for example, material disposal costs and economic impacts on different stakeholders; and (5) assessment of survey methods appropriate for surveying solid materials at dose levels being considered.

As part of this development, the NRC staff published two draft technical reports for comment. The first report, NUREG-1640, provides a method for determining potential doses to individuals from a wide range of scenarios by which members of the public could come in contact with material that had been released for unrestricted use (14). The materials evaluated in the report are steel, copper, aluminum, and concrete; however, soil was not included in the evaluation.

Currently, there is a need to develop a technical information basis for establishing the radionuclide concentrations in soil that may be candidate for release. In June 2000, the staff issued a draft report NUREG-1725 for comment, which summarized the results of a literature search for information on human interaction with reused soil (15). NRC staff is continuing to obtain data on the use of recycled soils in the United States so that exposure pathway modeling will accurately reflect real-life exposure scenarios to radiologically contaminated soils. Some of this work is being performed with technical support from the U.S. Department of Agriculture's National Agricultural Library, which possesses extensive information on soils, as well as staff with expertise to obtain specific information about soil usage, if soils were released from a licensed facility and used in commerce or by the general public.

CONCLUSION

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The technical information being developed, along with the NAS study and the public comments, will be used by NRC in its continuing evaluation of this issue. It is anticipated that conduct of these actions will place NRC in a better position to proceed with decisions on potential policy and technical approaches. Information on continuing development on this subject is available on the NRC website location for the control of solid material (16).

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