

## DEPARTMENT OF ENERGY PERSPECTIVES ON RESIDUAL RADIOACTIVITY IN WASTE

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### ABSTRACT

The lack of generally-applicable standards for release of waste with minute amounts of radioactive material may have contributed to the use of inappropriate standards for making release decisions by DOE installations. The result was a large expenditure of resources to determine the amounts and types of waste involved and impacts of releasing these contaminated materials. Now DOE, in coordination with the Environmental Protection Agency, the Nuclear Regulatory Commission, the Department of Defense and the Office of Management and Budget, is working on generally-applicable standards for residual radioactivity at cleanup sites and in waste. DOE is funding standards development by EPA and is pursuing technical data for establishing allowable levels for radioactive materials in waste regulated under the Resource Conservation and Recovery Act. Until standards are developed and promulgated in regulations, DOE will evaluate, on a case-by-case basis, the release of slightly contaminated material as allowed for in currently existing Orders and regulations.

### BACKGROUND

There has been a long-recognized need for standards for residual radioactivity in waste materials. This became painfully apparent to the Department of Energy (DOE) in 1991 when it was learned that wildly varying criteria were being used by DOE installations for making decisions to release hazardous waste as nonradioactive, i.e., not regulated for the radioactive component. The varied criteria being used by the DOE installations reflected the fact that the Department, the Nuclear Regulatory Commission (NRC) and the Environmental Protection Agency (EPA) had failed to develop generally-applicable standards for residual radioactivity.

In the absence of applicable standards, the DOE installations had used standards or regulations applicable to activities other than waste management for establishing waste release criteria. Certain installations were using the Department of Transportation limit of 74 Bq/g (2 nCi/g) for posting a vehicle as transporting radioactive materials (1). Some installations were using the NRC concentration limit of 0.05% uranium for defining unimportant quantities of source material, or some derivative of the concentration limit (2). And other installations were using limits based on instrument capabilities and time for analyses. None of these limits had been supported by a dose assessment or as low as reasonably achievable (ALARA) analysis as required by DOE Order. Nor had any been approved by the proper DOE authorities.

As a result of Headquarters becoming aware that the inappropriate standards were being used by DOE installations, a moratorium on the offsite shipment of hazardous waste with a potential for containing residual radioactivity was imposed in 1991. The moratorium remains in place at each installation until Headquarters approves their criteria and procedures for releasing waste offsite. Department installations reviewed their past shipping records to determine how much radioactively contaminated waste may have been sent to unlicensed treatment, storage or disposal facilities. The results of these reviews were reported to Congress, Governors, state regulators, and the facility operators.

The data on past shipments of potentially radioactive waste also provided the input necessary for estimating radiological doses from the transportation and management of this waste. The dose assessment results showed that the potential

dose to a member of the public residing near one of the facilities that managed the DOE waste ranged from about  $1 \times 10^{-6}$  uSv/y ( $1 \times 10^{-7}$  mrem/y) to 0.1 uSv/y (0.01 mrem/y) for the maximum year of exposure. Worker doses were estimated to range from about  $1 \times 10^{-4}$  uSv/y ( $1 \times 10^{-5}$  mrem/y) to 0.03 mSv/y (3 mrem/y) for the maximum year of exposure. The conclusion reached from these dose assessments was that the risks presented by the transportation, treatment and disposal of slightly contaminated DOE waste were insignificant (3).

As described above, an enormous amount of effort was expended by the Department in responding to the release from radiological control of minuscule amounts of radioactive material. At each of the DOE installations, shipping and analytical records had to be reviewed to determine if past shipments were radioactively contaminated, a data base was established to manage data reported by the sites, many letters were written to elected representatives, regulators and facility operators in cases where suspect waste was shipped and a number of commercial facilities were visited and analyzed in conducting the radiological dose assessments. Although the absence of nationalized standards for residual radioactivity does not justify the use of inappropriate standards, the use of these surrogate standards highlights the issue; the radioactive waste management community needs generally-applicable standards for residual radioactivity in waste.

### CURRENT ACTIVITIES

There currently exist in regulations permissible releases of radioactive materials in certain media discharged to the environment. The EPA has established a public dose limit from releases to the atmosphere for NRC-regulated and DOE installations (4). The EPA has also established a dose limit from manmade radionuclides in drinking water systems (5). The NRC has established limits for the release of radioactive materials in liquid effluents to either surface waters or a sewerage system (6). The DOE has also established limits for releases from its installations in liquid discharges and air emissions (7, 8). However, for material that is being treated or disposed of as solid waste, no standards for release from radiological controls have been established.

Thirty-years of cleanup and waste management activities lie ahead of the Department. In remarks to the National

Research Council, the Assistant Secretary for Environmental Restoration and Waste Management stated that "Good risk management . . . is critical to program success" (9). This means that DOE should not be committing resources to over-regulating sites or waste that represent minimal risk, but need to focus on those sites and wastes which actually present a threat to human health or the environment. Therefore, the Department recognizes the need for the development of standards for residual radioactivity.

At the Department's prompting, in 1992 the Office of Management and Budget formed an interagency steering committee to aid in revitalizing dormant federal efforts to address the issue of residual radioactivity. This steering committee is composed of representatives from the NRC, the EPA, the Department of Defense (DoD) and DOE. Departmental representation comes from the Deputy Assistant Secretaries for Environment, Waste Management, and Environmental Restoration. The mission of the steering committee is to coordinate efforts among the four agencies and to ensure that the appropriate resources are applied to each agency's efforts.

There are two principal ways that the Department is contributing to this interagency effort. One is funding activities for the development, by EPA, of generally applicable standards and the other is through the development of "control criteria" for the management of hazardous waste.

In the first activity, DOE is providing support to the EPA in the development of cleanup standards and standards for waste management. Similar to NRC's current effort, the EPA is initially working on the development of standards for residual radioactivity from cleanup of sites and facilities contaminated with radioactive material. An issues paper that discusses various technical and regulatory approaches was issued in 1993 (10). Work is underway this year to develop a companion issue paper for waste management activities.

The second principal activity being undertaken by the Department is the technical evaluation by the Office of Environment, Health and Safety in developing "control criteria" for the management of hazardous waste with minute amounts of radioactivity. The concept behind this activity is that the level of protection provided by controls and work practices mandated by the Resource Conservation and Recovery Act (RCRA) for chemical and physical hazards of waste would also be adequately protective of any radiological hazards presented. Consequently, below some "control" level, regulations beyond those provided under the auspices of RCRA are not necessary.

In performing the analysis necessary for establishing the "control criteria," personnel have visited various types of treatment, storage and disposal facilities. At these facilities, they have taken air and residue samples and gathered time and motion data for the handling of waste received at the facility. These data are being analyzed to develop proposed levels of radioactive material that could be included in hazardous waste without creating unacceptable risk to the public or the workers. Additionally, DOE installations have been requested to provide data on the amounts of waste they project would be below various "control" levels. The DOE installations are to estimate the savings from the reduced regulatory structure and costs necessary to prove the waste is below the "control" levels. With these data, a case can be developed consistent with the draft Federal Radiation Protection Guidance for Exposure of the General Public that, "There should be no exposure of the general public to ionizing radiation

unless it is justified by the expectation of an overall benefit from the activity causing the exposure" (11).

### FUTURE ACTIVITIES

In addition to the statutory authority granted DOE in the Atomic Energy Act, DOE acknowledges the value and necessity of complying with the radioactive materials management regulations of the NRC, or EPA, when interfacing with the commercial sector. Therefore, the results of the work to establish "control criteria" will not be implemented unilaterally by DOE. Instead, DOE will rely on the NRC and/or EPA to take the technical data through the next steps. A rule will have to be proposed to establish the "control criteria" as regulatory limits that apply to commercial or DOE radioactive materials. All steps of the rulemaking process will provide the opportunity for public involvement.

The other focus for the future is the use of case-by-case approvals for releasing materials from radiological controls. The Headquarters organization responsible for waste management is proceeding carefully to implement the use of case-by-case exemptions for release of slightly contaminated materials. This slow and judicious course is a result of the past use of inappropriate criteria for making release decisions and the DOE moratorium on offsite shipments of hazardous waste originating in radioactive materials management areas. However, in its Order 5400.5, DOE does have provisions for making individual decisions regarding the release of material from radiological controls (6). Similarly, in the commercial sector, the NRC and Agreement States have in their regulations mechanisms for exempting materials from radioactive regulation. Since it will take a number of years for the activities discussed above to proceed through rulemakings, the Department may avail itself to the existing mechanisms for releasing material on a case-by-case basis.

Order 5400.5 acknowledges that there are no standards for release of materials that may be radioactively contaminated in depth or volume (i.e., activity/mass). However, it allows for case-by-case approvals to be granted by the Assistant Secretary for Environment, Safety and Health. The criteria that are now used for judging whether to forward a request for approval, and for determining whether to grant an approval are both technical and administrative.

Technically, an assessment must be made of the potential radiation dose that would result from the proposed treatment and disposal of the material. Projected doses must be a small fraction of the allowable 1 mSv/y (100 mrem/y) dose limit used by both DOE and the NRC for protection of the public. From an administrative standpoint, approval or acceptance of the proposed action must be received from the facility operator that is to receive the material and the radiation regulatory authority of the state hosting the facility.

### SUMMARY

The Department is currently involved in efforts to develop acceptable limits for residual radioactivity at cleanup sites and in waste. Through its involvement in an interagency steering committee, DOE is coordinating efforts with the NRC, the DoD and the EPA to develop these standards that would apply to commercial sector or DOE activities.

Specific activities being conducted by DOE's Office of Environment, Health and Safety will address the issue of over-regulation of hazardous waste with small amounts of radioactive material. The desired result will be "control criteria" which will relegate hazardous waste with minute

amounts of radioactivity to regulation under RCRA requirements. The technical work being conducted by DOE will demonstrate the net benefit of this approach, and that any risks associated with it are negligible.

Since any of the activities underway may require some time to complete, currently existing methods of managing slightly radioactive waste in accordance with its risk will be considered by DOE. The Department proposes to evaluate the release from radiological control of small amounts of radioactive materials in waste. This would be done on a case-by-case basis in accordance with DOE Orders and NRC/Agreement State regulations.

#### REFERENCES

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3. Proceedings of the Symposium on Waste Management, Tucson, Arizona, February 28-March 4, 1993, "Radiological Dose Assessment for the Commercial Treatment, Storage and Disposal Facilities that Handle Department of Energy Hazardous Waste," WM Symposia, Inc. (1993).

4. EPA, "National Emission Standards for Hazardous Air Pollutants," Title 40, Code of Federal Regulations, Part 61, U.S. Environmental Protection Agency (1993).

5. EPA, "National Primary Drinking Water Regulations," Title 40, Code of Federal Regulations, Part 141, U.S. Environmental Protection Agency (1993).

6. NRC, "Standards for Protection Against Radiation," Title 10, Code of Federal Regulations, Part 20, U.S. Nuclear Regulatory Commission (1993).

7. DOE, "Radiation Protection of the Public and the Environment," DOE Order 5400.5, U.S. Department of Energy (1989).

8. DOE, "Radiation Protection of the Public and the Environment," draft 10 CFR 834, Federal Register, U.S. Department of Energy (March 25, 1993).

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11. EPA, "Federal Radiation Protection Guidance for Exposure of the General Public," (draft), U.S. Environmental Protection Agency (October 10, 1993).