NATURAL RESOURCES DEFENSE COUNCIL

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COMMENTS OF THE NATURAL RESOURES DEFENSE COUNCIL ON NRC'S PROPOSAL TO ESTABLISH STANDARDS FOR THE UNRESTRICTED RELEASE OF SOLID MATERIALS FROM LICENSED FACILITIES

The Natural Resources Defense Council, Inc. ("NRDC") opposes the Nuclear Regulatory Commission's ("NRC") proposed rule that would permit the unrestricted release of radioactively contaminated materials for use in such things as consumer products and expose workers processing contaminated materials at scrap mills to potentially significant levels of radiation. NRDC has fundamental concerns about whether such standards can be implemented safely and about the uncertainties in the estimates of the risks of recycling radioactively contaminated materials to workers and the public. For these reasons, NRDC opposes establishing a free release standard and continuance of NRC's case-by-case approach until these uncertainties are resolved and NRC has obtained general public support for recycling radioactively contaminated materials.

NRDC is a national non- profit membership environmental organization with offices in Washington, D.C., New York City, San Francisco and Los Angeles. NRDC has a nationwide membership of over 400,000 individuals. NRDC's activities include maintaining and enhancing environmental quality and monitoring federal agency actions to ensure that federal statutes enacted to protect human health and the environment are fully and properly implemented. Since its inception in 1970, NRDC has sought to improve the environmental, health, and safety conditions at and surrounding nuclear facilities operated by Department of Energy ("DOE") and commercial nuclear facilities licensed by the NRC and their predecessor agencies.

I. NRC and DOE Have Maintained Very Circumscribed Regulatory Restrictions on Unrestricted Releases of Materials Containing Radioactive Elements.

In March 1965, NRC established "Criteria for the approval of products intended for use by the general public." 30 Fed. Reg. 3462-63. The NRC notice sets forth its policy for products intended for the general public when there are no regulatory controls on the consumer-user. Approval depended upon a product being unlikely to expose individuals to more than a few hundredths of the NRC dose limits and the radioactive components having utility. The NRC noted specifically that it "considers that the use of radioactive material in toys, novelties, and adornments may be of marginal benefit . . . . Applications for approval of 'off-the-shelf' items that are subject to mishandling especially by children will be approved only if they are found to combine an unusual degree of utility and safety." 30 Fed. Reg. 3462 (March 16, 1965). For many years, NRC has therefore acknowledged the complexity and risks of permitting consumer products to contain radioactive substances.

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In 1986 and 1990, the NRC adopted policies on radiation levels that would be considered "below regulatory concern" ("BRC"). The 1990 policy would have permitted the deregulation of certain radioactive wastes, materials, and emissions. In the early 1990's the public, states, and Congress rejected NRC's BRC effort to deregulate contaminated scrap metals and other materials for unrestricted recycling. NRC's BRC policy was formally revoked by Congress in the Energy Policy Act of 1992, and NRC rescinded both policies soon after. In part in response to NRC's deregulation efforts, at least sixteen states have passed regulations or laws that are stricter than the federally proposed allowable releases, most with the intent to continue regulatory control if the federal government allows deregulation. Public concern therefore remains high about NRC's recent interest in eliminating regulation of certain radioactively contaminated materials. The present rulemaking represents yet another attempt by NRC to modify its regulation of regulated materials by establishing broad-based deregulation standards for radioactively contaminated materials.

Until recently, DOE has also had a policy that generally precluded the release of radioactively contaminated materials for unrestricted and unregulated sale in U.S. markets. It was not until former Assistant Secretary of Environmental Management Al Alm issued a policy statement in September 1996 promoting, on a provisional basis, recycling of radioactively contaminated scrap steel that DOE formally altered its long-standing policy disfavoring unrestricted release of contaminated materials; although, this policy focused more on restricted end uses of recycled steel at DOE facilities. Further, DOE's policy is being implemented on a conditional basis while DOE evaluates the safety and economics of recycling these materials.

Accordingly, although recycling of radioactively contaminated materials has been considered by both NRC and DOE, and permitted on a small scale by both agencies, the proposed rulemaking represents a major change in policy towards deregulation, which has consistently received substantial public opposition. At the same time, unprecedented quantities of radioactively contaminated materials, such as scrap metals and concrete, are becoming available from the decommissioning of NRC-licensed and DOE facilities. Public concern remains high because of DOE's history of regulatory mismanagement, the technical challenges, and the direct impacts recycling radioactive materials will have on consumer products.

NRC must convince an already wary public that it can implement a rule safely, that the underlying science is sound, and that deregulation isn't simply a means of externalizing the decommissioning costs of NRC-licensed and DOE facilities onto the public by recycling radioactive waste into consumer products. Otherwise, NRC risks creating the backlash it experienced in 1992 and causing potentially significant economic harm to the recycling industry, particularly for scrap metals, by burdening it with radioactive wastes that undermine public confidence in its products. Public acceptance and understanding are therefore essential.

II. NRC's Support of the Oak Ridge Radioactive Metals Recycling Project Undermines the Credibility of this Process.

In 1996 a DOE-commissioned study by the National Research Council ("Council") was published on the decommissioning of DOE's three gaseous diffusion plants. The study included

extended analysis of recycling options for the large quantities of scrap metal that would be generated in the decommissioning process. The Council's report included the following recommendations and findings:

- Promulgation of credible national standards for the unrestricted release of radioactively contaminated materials is a necessary prerequisite before recycling of such materials can proceed.
- It is essential that a meaningful stakeholder and public involvement process be implemented before the decommissioning of the gaseous diffusion plants proceeds and recycling of any radioactively contaminated materials occurs.
- Health risks to workers and the public may arise during the recycling process.
- Great care must be taken to ensure that releases of contaminated steel does not increase residual radioactivity present in the nation's steel supply to an unacceptable level. Increases in contaminants have been observed in the past.

Despite the absence of accepted standards and any meaningful public involvement, DOE is proceeding with the first large-scale recycling of contaminated scrap metal at the Oak Ridge K-25 gaseous diffusion plant. In a legal challenge to DOE's failure to complete an environmental impact statement for the project, federal district court judge Gladys Kessler found that:

- the potential for environmental harm from the Oak Ridge project is great, especially given the unprecedented amount of hazardous materials that would be recycled
- DOE should have prepared an environmental impact statement for the Oak Ridge radioactive metals recycling project; and
- it was "startling and worrisome" that from an early point on, there was no opportunity for public scrutiny or input on a project of such grave importance.

In addition to the problems identified by Judge Kessler, it appears that under NRC's regulations the project is proceeding without a valid license, as Tennessee lacks the regulatory authority to grant a licensee where radioactively contaminated materials are recycled for use in consumer products. *See* 10 C.F.R. Parts 30 and 40 and 10 C.F.R. § 150.15(a)(6).

The NRC has explicitly and implicitly supported the Oak Ridge project despite these deficiencies and the present rulemaking it is considering. The Oak Ridge project is qualitatively different from prior, limited releases because of its scale – approximately 100,000 tons of scrap metal will be recycled – and the types of contaminated materials. DOE's decision to proceed with the Oak Ridge project and NRC's support of it seriously undermine the credibility of NRC's public participation process. According to NRC, the issue it is considering is not simply whether NRC should establish general standards or continue with its case-by-case review process; it is whether unrestricted releases should occur at all. With the Oak Ridge project proceeding under NRC's blessing, environmental stakeholders question whether the proposed NRC rulemaking will fully and fairly consider all alternatives. Consistent with the Council's report, NRC should cease licensing unrestricted releases of radioactively contaminated materials until it resolves these issues.

III. NRC's Proposed Rulemaking Raises Numerous Regulatory Uncertainties and Challenges.

1. *The Total Quantity of Radioactively Contaminated Materials to be Released for Use in Commercial Products Remains Highly Uncertain.*

According to Environmental Protection Agency ("EPA") estimates, NRC-licensed facilities contain about 650,000 metric tonnes of scrap metal that could be recycled (~ 80% carbon steel; ~ 20% stainless steel); EPA's upper bound on this estimate is about twice 2 this value. EPA estimates that DOE facilities currently store bout 171,000 metric tonnes of scrap metal; the upper bound on this estimate is about twice 2 this value. Decommissioning of DOE facilities according to EPA will generate approximately another 925,000 tonnes (~ 85% carbon steel; ~ 15% equally divided between copper, aluminum, and stainless steel); the actual quantity could be several times higher than this value. There are no estimates of the total quantities of other radioactive materials (*e.g.*, concrete, soil, industrial wastes) that could be deregulated.

Because of these uncertainties, it is unclear how NRC can reasonably evaluate the human health impacts of its standard. It is essential that NRC clearly explain how it plans to estimate, in a scientifically sound manner, the total quantity of radioactively contaminated materials that the public could be exposed to, particularly because some radioactive contaminants remain hazardous for many thousands of years. For example, several radionuclides have extremely long half-lives, which adds another layer of complexity to NRC's assessment of the aggregate amount of radioactively contaminated materials that will be in commerce at any given time.

NRC claims that the risks from contaminated metals are limited because contaminated scrap metals will make up less than a percent of the scrap metal being processed in any given year, which necessarily reduces their potential risks. However, this estimate does not take into account scrap mills, particularly mini-mills, that may receive a disproportionate amount of radioactively contaminated metal. At these facilities, recycled metal could be released without being mixed with any clean metal. Under these circumstances, NRC's claims of significant dilution are merely hypothetical. As in the prior EPA study, the risks from contaminated materials must be evaluated assuming no dilution.

Finally, NRC limits its analysis to the average member of each critical group. In EPA's earlier study, its risk analyses were based on the "reasonably maximally exposed individual" ("RMEI"). NRC should use the more conservative RMEI in its risk assessments; although, a comparison of the normalized dose factors calculated using average critical group member with those derived using the RMEI would also be informative. In addition, because of public concern about aggregate effects of radiation from contaminated materials, it is essential that NRC provide information on and estimates of exposures from multiple pathways. Only with this information will the public be able to assess the relative contributions from different sources and pathways, *e.g.*, the impact of technetium-99 contamination in consumer products relative to that of cobalt-60 or what pathways are most important for each radionuclide. This information should be tabulated and presented in several examples illustrating the affect of different radionuclides in specific circumstances.

2. *Surveying for Radioactive Contamination is Costly, Challenging, Limited by Current Instruments, and Difficult to Monitor and Enforce Effectively.*

Survey measurements for radioactive contamination are difficult and challenging where large, complicated pieces of equipment, such as that found at DOE and NRC facilities, are involved. Problems that can undermine effective surveying include the following:

- Complex geometries with difficult to reach surfaces are challenging to measure accurately, and workers will tend to avoid these measurement areas.
- Large errors can be introduced into measurements of volumetric contamination if the contaminant concentration is not uniform or if the geometry of the contaminated piece is complicated.
- Even where measurements are straightforward, the accuracy of the measurements is limited by the presence of unavoidable background radiation.

Typical measurement uncertainties are likely to be several percent even for the most favorable geometries; more complex geometries will result in greater measurement uncertainty. In its study, EPA acknowledges that current detection instruments may not be sensitive enough to detect contamination reliably under a 1 mrem/y standard. For example Co-60, a major contaminant in materials at NRC-licensed facilities and an important radionuclide in risk assessments, could be difficult to detect under a 1 mrem/y standard. If a standard is set, NRC must be able to demonstrate that the available detection equipment can reliably survey materials to satisfy its standard. Conversely, if NRC identifies an acceptable standard but adequate detection equipment is not available for certain radionuclides, unrestricted release of materials contaminated with those radionuclides should be prohibited.

ability to detect

These technical constraints lead to several basic questions:

- It is unclear whether the detection equipment available can protect the public against improper releases of radioactively contaminated materials if a stringent standard were set.
- No data have been provided estimating the rate of potential false negatives (measurements that incorrectly find that a piece of equipment is not contaminated).
- NRC has not conducted any assessments of the potential impacts of improper releases on workers or the public.
- NRC has not demonstrated that surveying can be conducted adequately for the large quantities of scrap metal available for recycling at NRC-licensed and DOE facilities.

3. *The Many Risks Posed by the Different Radiological Contaminants Could Impede Reliable Implementation of a General Standard.*

Several factors influence the threat posed by a given radioactive element:

(1) whether the radionuclide remains in the recycled material or partitions into a byproduct of the recycling process (e.g., for metals it can partition into the metal product, slag, or baghouse dust);

(2) the type of radiation the radionuclide emits (*i.e.*, alpha, beta, gamma);

(3) the residence time of the radionuclide in an individual once it is ingested; and

(4) the length of the radionuclide's half-life.

For example, some radionuclides like uranium-238, plutonium-239, neptunium-237, and technetium-99 are extremely long lived, some have long residence times like plutonium and neptunium, and some partition almost exclusively into the recycled metal, such as technetium and cobalt.

These different characteristics mean that radionuclides present substantially different risks to workers and the public and present different challenges from a regulatory perspective. For example, radionuclides that partition exclusively into the slag that is generated during recycling are less likely to pose a significant threat to the public through commercial products, but pose potentially significant risks to workers. Establishing an across-the-board rule under these circumstances raises the potential for substantial regulatory problems and could undermine safe implementation of a standard. Factors that differentiate radionuclides from a standard-setting perspective include uncertainties in estimates underlying risk assessments, types of risks, likelihood of improper releases (violations), and level of public concern. For example, more uncertain risks should lead to more conservative standards or rejection of a standard altogether. Similarly, the degree to which future uses are foreseeable should factor into this analysis.

For radionuclides that partition into the recycled material, NRC must be particularly vigilant in ascertaining the potential uses and risks posed by the residual radioactive contaminants. Where these risks cannot be reliably calculated, the scrap materials should not be recycled. NRC bears the burden of demonstrating the safety of its rule under real-world conditions.

In addition, where radionuclides partition into recycling byproduct materials, such as metal slag produced during smelting, NRC must evaluate requiring proper disposal of such materials at regulated facilities under ALARA. This applies particularly to metal slag, which is sold for, among other things, soil conditioning and ice control, because it is of low economic value and certain long-lived radionuclides concentrate in it during the melting process.

4. *The Economics of Radioactive Materials Recycling Will Impede Safe Implementation of a Standard.*

Except in the case of nickel, and to a lesser extent copper, the primary economic gain from recycling scrap metal and other radioactively contaminated materials derives from avoiding disposal costs. This means that from an economic perspective there is little difference between

limiting standards to restricted releases, including disposal, versus permitting unrestricted recycling of such materials.

However, the savings from avoiding disposal are often more than offset by the costs of cleaning the materials to meet unrestricted release standards and, to a lesser extent, costs from surveying the materials for radioactive contaminants. Unless there are effective regulatory oversight and significant penalties for regulatory violations, companies engaged in recycling will (1) maximize the amount of material they release without cleaning it; and (2) seek to limit survey costs. The economics of the radioactive recycling therefore strongly favor lax implementation of surveying requirements and compliance with release standards. Given the amount of material potentially available, the economic incentives and the limits of survey equipment, issuing an NRC standard could result in substantial quantities of material being released in violation of whatever standard is set. Rigorous monitoring and regulatory enforcement will be essential.

As discussed above, NRC must evaluate the potential impacts from such improper releases and ensure that there are regulatory mechanisms to protect the public against them. Further, where the risks – particularly to workers – from improper releases are particularly great, NRC should limit the scope of the permissible types of releases to foreclose the possibility of serious or chronic risks to the public.

NRC is required to ensure that all recycling is in compliance with ALARA and to conduct an analysis in conformance with the ALARA principle as part of any rulemaking. NRC's ALARA analysis will be particularly important in circumstances where the economics either make disposal marginally more expensive (or in some cases cheaper) than unrestricted release or where restricted release is an option. It is therefore essential that NRC include analyses of a variety of circumstances under which recycling could occur to assess fully how ALARA applies. NRC's ALARA analysis should not be limited to a global assessment, but include focused analyses of particular releases under specific conditions.

IV. Public Concern and the Legacy of DOE's Management of Radioactive Materials

In addition to the problems raised by the lack of public notice and comment in the Oak Ridge project, the present rulemaking is being developed in the context of decades of mismanagement of radioactive wastes at DOE facilities. DOE mismanagement has caused incalculable environmental harm, threatened the health, and in some cases lives, of many DOE workers and public citizens, and created an environmental debacle that will cost more than $200 billion dollars to remedy. Unfortunately, these problems are not merely historical artifacts:

- In 1994, the Conference of Radiation Control Program Directors ("CRCPD") found that "[r]adioactive materials has been tracked offsite, into homes, businesses, and elsewhere . . . . States have surveyed people, homes, businesses, rental cars, and trucks. Significant contamination events continue to occur at the DOE facilities due to lack of adequate health physics for all its operations."

- In 1999, the regulatory deficiencies identified by CRCPD were found at DOE's Paducah, Kentucky, plant, as well as evidence that DOE contractors had illegally disposed of radioactive materials in local sanitary landfills, at random sites in a local state wildlife preserve, and through largely un-monitored on-site recycling operations.

- Over the past year the Los Alamos, Livermore, and Savannah River sites have been cited by DOE or the Defense Nuclear Safety Board for regulatory compliance violations.

These problems are a testament to the challenges of managing radioactively contaminated materials, as well as DOE's continuing failure to develop mechanisms to improve its control of them. In the wake of the revelations at Paducah, it is disturbing to consider that the Oak Ridge field office, which also has authority over the Paducah plant, is responsible for overseeing the Oak Ridge radioactive metals recycling project.

NRC's proposed rulemaking will directly and indirectly affect the ability of DOE and its contractors to release radioactively contaminated materials, which DOE has time and again failed to manage safely in a regulated environment. In the absence of demonstrable changes within DOE or, at the very least, independent regulatory mechanisms to ensure that radioactive materials are properly managed, the public has little reason to believe that free releases from DOE facilities, which contain the bulk of the inventory, will occur without serious incidents. It is therefore essential that NRC consider the practical, technical, and administrative limitations of the entities that will be responsible for releasing contaminated materials into United States markets, and that it factor these constraints into its decision on how to proceed.

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