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NRC's Oversight of Licensees' Decommissioning Practices Can Be Improved

Statement of
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Before the
Environment, Energy, and Natural
Resources Subcommittee
Committee on Government Operations
House of Representatives

Mr. Chairman and Members of the Subcommittee:

We appreciate the opportunity to discuss the Nuclear Regulatory Commission's (NRC) decommissioning requirements and the application of those requirements by fuel cycle facility licensees. My testimony today is primarily based on our report, Nuclear Regulation: NRC's Decommissioning Procedures and Criteria Need to Be Strengthened (GAO/RCED-89-119), which you requested and are releasing today, Mr. Chairman.

In summary, numerous private nuclear facilities, such as commercial power plants, research reactors, and medical treatment facilities, as well as those owned by government agencies, such as the Department of Energy (DOE), will eventually have to be decommissioned. Little actual data exist on decommissioning costs, and estimates range from the tens of millions to $3 billion, depending on the facility. We found that NRC's decommissioning cost estimates averaged 29 percent, or $45 million, lower than those prepared by a private consulting firm for 25 nuclear power plants and were between $6 million and $19 million lower than two fuel cycle owners' estimates for their facilities. We also found that little assurance exists that fuel cycle licensees appropriately decontaminate their facilities. Our review of the activities conducted by eight such licensees showed that NRC

-- allowed the partial or full use of two sites for any purpose (unrestricted use) although contamination at one was up to 4 times higher and, at the other, up to 320 times higher than NRC's guidelines allowed,

-- did not have information, or had incomplete data, for the other six licensees to support the decommissioning activities conducted,

-- does not know the types, amounts, or location of radioactive waste that have been buried by four licensees--the four sites had groundwater contamination ranging from 12 to 730 times higher than federal drinking water standards allow, and

-- does not have regulations specifying the actions that can be taken to require additional decontamination after it terminates a license.

In addition, about 12 years ago we pointed out that no federal standards existed for acceptable levels of radiation that could remain after NRC terminated a license. As of today, Mr. Chairman, there are still no such standards. In 1970 the Congress made the Environmental Protection Agency (EPA) responsible for developing federal residual radiation standards. EPA began this effort in 1984 and expects to complete it by 1992.

Although only one of the eight fuel cycle licensees that we examined had completely decommissioned its facility, the activities that have been conducted by all eight indicate some problems in, and provide some perspective on, improvements that NRC needs to make in carrying out its regulatory responsibilities in this area. These problems, when taken together, demonstrate a need for NRC to play a stronger role in ensuring that all land, buildings, and equipment at nuclear sites released for unrestricted use meet established requirements and will not endanger public health and safety or the environment.

Before I discuss these issues in greater detail, I will briefly describe NRC's decommissioning requirements.

NRC'S DECOMMISSIONING REQUIREMENTS

NRC requires owners and/or operators of nuclear facilities that have reached the end of their useful lives to decontaminate (remove) the radioactive material from the site, including land, groundwater, buildings and contents, and equipment. To terminate their NRC licenses, the owners must decommission the facilities by (1) removing them safely from service and (2) reducing any residual (remaining) radioactivity to a level that allows the property's use to be unrestricted. In addition, NRC can release part of a facility for unrestricted use without terminating the license.

Today, 112 nuclear power plants, 22 fuel cycle facilities that support these plants (app. I shows these facilities), 54 reactors used in research, and more than 20,000 organizations hold licenses to use radioactive material. Although no large commercial nuclear power plant in this country has been decommissioned, about 60 demonstration, military, and research reactors have been or are being decommissioned, including DOE's Shippingport reactor, and 14 fuel cycle facility owners have completed, or are in the process of, decommissioning all or a portion of their sites. Some of these licensees used high- and low-enriched uranium and/or plutonium to fabricate fuel for commercial and naval reactors and to conduct research using these and other materials.

On July 27, 1988, new NRC regulations took effect that set out technical and financial criteria for decommissioning licensed nuclear facilities. The regulations address planning, timing, funding, and environmental review requirements that must be met before a facility, or part of a facility, can be decommissioned and released for unrestricted use. Other NRC policies can be found in regulatory guides, such as Regulatory Guide 1.86 for nuclear power plants and an unnumbered guide for fuel cycle facility operators that set residual contamination limits for surfaces and equipment (both developed in the early 1970s); general guidance; or internal memoranda, such as a 1981 branch technical position that sets residual contamination limits for uranium and thorium in soil.

Although NRC is responsible for ensuring that licensees appropriately decommission their facilities, since 1970 EPA has been responsible for developing standards for the levels of residual radiation that can safely remain after NRC terminates a license. EPA does not expect to finalize such standards until 1992. In the interim, NRC uses its regulations and guidance to release sites for unrestricted use. Once EPA finalizes its standards, NRC's criteria could change.

WEAKNESSES THAT NRC SHOULD CORRECT

Only very limited decommissioning activities have occurred at nuclear power plants primarily because no disposal facility exists for the high-level waste generated from their operations. The same is not true for fuel cycle facilities--some operators have fully decommissioned all or a portion of their sites or are now doing so. Our examination of the activities that have been conducted by eight fuel cycle licensees provides some perspective on the manner in which NRC carries out its regulatory responsibilities and highlights actions that NRC should take to ensure that all land, buildings, and equipment released for unrestricted use meet the criteria that NRC has established. We identified four weaknesses--ineffective decontamination by licensees, insufficient monitoring of and data on radioactive waste that has been buried on licensed sites, no regulations to enforce additional cleanup after terminating licenses, and lack of federal residual radiation

standards--that we believe affect NRC's ability to provide reasonable assurance that contamination remaining at nuclear sites will not endanger public health and safety in the future. A discussion of each of these problems follows.

NRC Does Not Ensure the Cleanup of All Radioactive Material

In two of the eight cases we examined, NRC released property for unrestricted use that had radioactive contamination higher than NRC's guidelines allowed. In one case the contamination ranged from 3 to 320 times higher. In 1979 the U.S. Department of the Interior's National Park Service bought the site from a private company to relocate part of the Appalachian National Scenic Trail. The National Park Service has spent about $80,500 to clean up the site and estimates it may cost about $308,000 more before the site meets NRC's guidelines. In the second case, the contamination ranged from 1.5 to 4.4 times higher than NRC's guidelines, but NRC did not require the licensee to clean up the contamination. NRC documents show that a number of factors caused the Commission to release the property in the second case even though the contamination exceeded its guidelines. For example, NRC concluded that its guidelines merely set a "target" rather than an absolute value that must be achieved, the average concentration of the contamination was within NRC's guidelines, and only limited access to the property would occur.

We could not determine whether these two cases demonstrated isolated instances of poor regulatory oversight or systemic problems with NRC's process to ensure that licensees appropriately decontaminate and decommission their sites. For the other six cases, NRC either did not have information, such as licensees' radiological surveys or NRC's confirmatory surveys, or the information that it had was incomplete. Further, this is not the first time that we have raised a concern to NRC over inadequate or incomplete information. In 1976 and 1982, we found that licensees' files frequently did not contain information on the cleanup activities conducted, methods used to dispose of radioactive or other material, or surveys conducted. In part, these problems occurred, and still occur, because NRC's regulations do not specify how long either the agency or the licensees should retain information.

In addition, NRC documents showed instances where licensees did not effectively decontaminate their facilities to meet NRC's guidelines. For example, NRC conducted at least five inspections at one facility prior to releasing two buildings from the license. The licensee had to conduct extensive decontamination activities that included removing interior walls, concrete floors, and part of a roof and building before NRC authorized the release. Further, although NRC asks licensees to reduce contamination below its guidelines, 11 of 19 decommissioning plans did not show that the licensees would do so.

NRC Does Not Require Licensees to Monitor Buried Waste

Until January 1981, NRC allowed all licensees to bury low-level radioactive waste on-site. NRC did not require the licensees to obtain prior NRC approval or provide disposal records to the agency. In addition, NRC did not--and does not now generally--require licensees to monitor groundwater or soil contamination from buried waste. NRC staff do not believe that the buried waste has caused significant environmental contamination. Five licensees that we examined buried waste on their sites; four have found groundwater contamination. At one site, the contamination was 400 times higher and, at another, 12 to 96 times higher than federal drinking water standards allow. Although another site has groundwater contamination 730 times higher than drinking water standards allow, available documentation does not show if the contamination resulted from buried waste or other activities.

Further, neither NRC nor four licensees had complete information on the location or amounts of buried waste. In one case, NRC terminated a license and 10 years later learned that the licensee had buried waste at the site. The company continued to conduct operations at the site under another NRC license and subsequently found three buried waste sites--one was underneath an employees' softball field. In 1981 NRC changed its regulations and now requires licensees to obtain the Commission's approval before

burying waste. NRC also requires information on the quantity and types of material and levels of radioactivity, as well as an environmental analysis of the topography, geology, and hydrology in the area.

NRC Lacks Regulations to Enforce Additional Cleanup

Although NRC has found radioactive contamination in excess of its guidelines after terminating a license, NRC staff believe it would be difficult to enforce additional decontamination activities because NRC lacks specific regulations to do so. This difficulty occurs, according to NRC's Office of General Counsel, even though section 161 of the Atomic Energy Act authorizes NRC to take actions that it considers necessary to protect the public from the hazards of radioactive materials. Under the broad discretion granted by section 161, NRC staff believe that they can require former licensees to conduct additional cleanup after terminating a license. However, the staff recognize that their taking such actions against former licensees would be difficult without regulations specifying the actions that can be taken.

As a result, NRC staff told us that they plan to draft regulations to implement the Commission's general authority. The staff could not estimate when they would do so or when a final rule could be expected. We should point out, Mr. Chairman, that in the past NRC has taken a long time to issue regulatory changes. For

example, NRC took over 10 years to issue new decommissioning regulations.

Federal Residual Radiation Criteria Needed

Although standards for residual radiation would provide a sound decision-making basis for the types and extent of decommissioning activities required, no federal regulations exist concerning acceptable levels of contamination that can remain after NRC terminates a license. As a result, NRC uses residual radiation limits developed in the early 1970s to determine whether it can terminate a license and/or release a site for unrestricted use. Recently, the Health Physics Society Standards Committee of the American National Standards Institute recommended changes to NRC's criteria. For some radioactive material, the society proposed levels from 3 to 50 times higher and for other substances, 3 to 5 times lower than NRC's criteria. The society expects to complete its proposed standards by March 1991.

In 1977, we pointed out that a decommissioning strategy could not be developed until NRC established acceptable residual radiation limits.[1] As a result, we recommended that NRC determine acceptable levels for residual radiation and surface contamination consistent with standards being developed by EPA. In 1982 we

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[1]Cleaning Up the Remains of Nuclear Facilities--A Multibillion Dollar Problem (GAO/EMD-77-46, June 16, 1977).

again pointed out that radiation standards were needed to guide decommissioning programs.[2] At that time, we noted that licensees were concerned that they may have to conduct additional cleanup activities if final EPA regulations were more stringent than those used by NRC. Conversely, if EPA's final standards were less stringent, the licensees may have conducted unnecessary cleanup and incurred unneeded costs. As a result, we recommended that EPA reevaluate the low priority it had assigned to developing radiation standards.

EPA began to develop the standards in 1984 but does not expect to finalize them until 1992. In the interim, NRC has developed residual radiation limits for about 250 substances; the staff plan to present their proposal to the Commission by December 1989.

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In conclusion, Mr. Chairman, NRC must play a stronger role in ensuring that all land, buildings, and equipment that it releases for unrestricted use meet the guidelines established. Until NRC corrects these weaknesses, we do not believe that NRC can provide the public reasonable assurance that nuclear sites--fuel cycle facilities, commercial nuclear power plants, or other licensees--are safe for unrestricted use.

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[2]Cleaning Up Nuclear Facilities--An Aggressive and Unified Federal Program Is Needed (GAO/EMD-82-40, May 25, 1982).

First, little assurance exists that licensees appropriately decontaminate their facilities and accurately reflect the results of these activities in their radiological surveys. NRC information shows many instances in which excess radiation remained after the licensees had completed initial decontamination activities. Second, neither NRC nor the licensees appropriately retain all information that is vital to NRC's termination decision. Third, many fuel cycle facility licensees had buried waste on-site, but neither NRC nor the licensees have information on the locations, types, or amounts of waste buried. Fourth, licensees' monitoring programs are generally not sufficient to define the radiological conditions within buried waste sites or to provide an adequate basis to predict the stability of the waste in the future.

An increasing number of nuclear facilities will have to be decommissioned in the immediate and not-too-distant future. To guide this activity, we made a number of recommendations to the Chairman, NRC, to (1) update information on the land, buildings, and equipment involved with licensed operations; (2) ensure that licensees monitor buried waste to determine the extent of environmental contamination; (3) ensure that NRC obtains and keeps decommissioning information for more than 10 years, and (4) expeditiously issue regulations specifying the enforcement actions that can be taken against former licensees if additional cleanup is needed after licenses have been terminated.

In addition, we had previously reported that NRC's decommissioning cost estimates averaged 29 percent lower than those prepared by a private consulting firm for 25 nuclear power plants and were between $6 million and $19 million lower than two fuel cycle owners' estimates for their facilities.[3] We concluded that realistic estimates help to ensure that adequate funds will be available for site decommissioning, and NRC's estimates should reflect the most current information while recognizing that changes can occur as NRC and the industry gain experience and obtain better data on decommissioning activities and their associated costs. Therefore, we recommended that NRC reassess its estimates to determine whether they appropriately reflect all the costs that utilities and fuel cycle operators believe are needed to decommission their facilities.

We hope, Mr. Chairman, that you and the Subcommittee will encourage NRC to implement the recommendations contained in the report that we discussed today as well as our earlier report on decommissioning cost estimates. If these recommendations are implemented, NRC will take a significant step toward minimizing the potential for future problems at nuclear sites.

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[3]Nuclear Regulation: NRC's Decommissioning Cost Estimates Appear Low (GAO/RCED-88-184, July 29, 1988).

This concludes our testimony. We would be pleased to respond to any questions you or the Subcommittee members may have.

Fuel Cycle Facilities and the Status of Their Decommissioning Efforts as of October 31, 1988

Type/licensee/location	Type of material primarily processed	Status
Uranium conversion plants		
Allied-Signal, Metropolis, Ill.	Conversion of uranium oxides to uranium hexafluoride	Operating.
Sequoyah Fuels, Gore, Okla.	Conversion of uranium oxides to uranium hexafluoride	Operating.
Uranium fuel fabrication plants		
Babcock and Wilcox, Lynchburg, Va.	High- and low-enriched uranium	Both a high- and a low-enriched plant are operating.
Babcock and Wilcox, Apollo, Pa.	High- and low-enriched uranium	Some high- and low-enriched areas have been decontaminated. Decontamination of site ongoing.
Combustion Engineering, Windsor, Conn.	Low-enriched uranium	Operating.
Combustion Engineering, Hematite, Mo.	High- and low-enriched uranium	High-enriched uranium facility decontaminated. Low-enriched fuel operation ongoing.
Advanced Nuclear Fuels Corp., Richland, Wash.	Low-enriched uranium/plutonium	Plutonium building essentially decommissioned. Low-enriched fuel operations ongoing.
GA Technologies, San Diego, Calif.	High- and low-enriched uranium	Facility in standby status.
General Electric, Wilmington, N.C.	Low-enriched uranium	Operating.
Cimarron Corp. (Kerr-McGee), Crescent, Okla.	Low-enriched uranium	Facility partially decommissioned. Company plans to decommission entire site within a few years.

Nuclear Fuel Services, Erwin, Tenn.	High- and low-enriched uranium/plutonium	Plutonium facility and some uranium buildings being decommissioned. Other processes ongoing.
Texas Instruments, Attleboro, Mass.	High-enriched uranium	Facility being decommissioned. Company plans to decommission entire site.
United Nuclear, Montville, Conn.	High-enriched uranium	Operating.
United Nuclear, Wood River Junction, R.I.	High-enriched uranium	Facilities being decommissioned. Company plans to decommission entire site.
Westinghouse, Columbia, S.C.	Low-enriched uranium	Operating.
Plutonium fabrication plants		
Babcock and Wilcox, Lynchburg, Va.	Plutonium	Plutonium facilities decontaminated. Facility being used for reactor service instrumentation.
Babcock and Wilcox, Parks Township, Pa.	Plutonium	Plutonium facility being decontaminated. Other processes ongoing.
Battelle Columbus Division, Columbus, Ohio	Plutonium	Plutonium facility decommissioned. Company plans to decommission entire site.
Energy Systems Group (Rockwell), Canoga Park, Calif.	Plutonium	Plutonium facility being decontaminated. Other activities ongoing.
General Electric, Vallecitos, Calif.	Plutonium	Plutonium facility decommissioned. Other processes ongoing.
Cimarron Corp. (Kerr-McGee), Crescent, Okla.	Plutonium	Plutonium facility being decommissioned. Company plans to decommission entire site.
Westinghouse, Cheswick, Pa.	Plutonium	Plutonium facility decontaminated. Other activities ongoing.

Source: NRC, Fuel Cycle Safety Branch, Office of Nuclear Material Safety and Safeguards.