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United States General Accounting Office

GAO

Report to the Honorable Edward J. Markey, House of Representatives

October 2003

NUCLEAR REGULATION

NRC Needs More Effective Analysis to Ensure Accumulation of Funds to Decommission Nuclear Power Plants

GAO-04-32

October 2003

GAO Accountability • Integrity • Reliability

Highlights

Highlights of GAO-04-32, a report to the Honorable Edward J. Markey, House of Representatives

NUCLEAR REGULATION

NRC Needs More Effective Analysis to Ensure Accumulation of Funds to Decommission Nuclear Power Plants

Why GAO Did This Study

Following the shutdown of a nuclear power plant a significant radioactive waste hazard remains until the waste is removed and the plant site decommissioned. In 1999, GAO reported that the combined value of the owners' decommissioning funds was insufficient to ensure enough funds would be available for decommissioning. GAO was asked to update its 1999 report and to evaluate the Nuclear Regulatory Commission's (NRC) analysis of the owners' funds and its process for acting on reports that show insufficient funds.

What GAO Recommends

NRC should (1) develop an effective method for determining whether owners are accumulating decommissioning funds at sufficient rates and (2) establish criteria for taking action when it is determined that an owner is not accumulating sufficient funds. NRC disagreed with these recommendations suggesting that its method is effective and that it is better to deal with unacceptable levels of financial assurance on a case-by–case basis. GAO continues to believe that limitations in NRC's method reduce its effectiveness and without criteria, NRC might not be able to ensure owners are accumulating decommissioning funds at sufficient rates.

www.gao.gov/cgi-bin/getrpt?GAO-04-32.

To view the full product, including the scope and methodology, click on the link above. For more information, contact Jim Wells, at (202) 512-6877 or WellsJ@gao.gov.

What GAO Found

Although the collective status of the owners' decommissioning fund accounts has improved considerably since GAO's last report, some individual owners are not on track to accumulate sufficient funds for decommissioning. Based on our analysis and most likely economic assumptions, the combined value of the nuclear power plant owners' decommissioning fund accounts in 2000—about $26.9 billion—was about 47 percent greater than needed at that point to ensure that sufficient funds will be available to cover the approximately $33 billion in estimated decommissioning costs when the plants are permanently shutdown. This value contrasts with GAO's prior finding that 1997 account balances were collectively 3 percent below what was needed. However, overall industry results can be misleading. Because funds are generally not transferable from funds that have more than sufficient reserves to those with insufficient reserves, each individual owner must ensure that enough funds are available for decommissioning its particular plants. We found that 33 owners with ownership interests in a total of 42 plants had accumulated fewer funds than needed through 2000 to be on track to pay for eventual decommissioning. In addition, 20 owners with ownership interests in a total of 31 plants recently contributed less to their trust funds than we estimate they needed to put them on track to meet their decommissioning obligations.

NRC's analysis of the owners' 2001 biennial reports was not effective in identifying owners that might not be accumulating sufficient funds to cover their eventual decommissioning costs. In reviewing the 2001 reports, NRC reported that all owners appeared to be on track to have sufficient funds for decommissioning. In reaching this conclusion, NRC relied on the owners' future plans for fully funding their decommissioning obligations. However, based on the owners' recent actual contributions, and using a different method, GAO found that several owners could be at risk of not meeting their financial obligations for decommissioning when these plants stop operating. In addition, for plants with more than one owner, NRC did not separately assess the status of each co-owner's trust funds against each co-owner's contractual obligation to fund decommissioning. Instead, NRC assessed whether the combined value of the trust funds for the plant as a whole was reasonable. Such an assessment for determining whether owners are accumulating sufficient funds can produce misleading results because owners with more than sufficient funds can appear to balance out owners with less than sufficient funds even, though funds are generally not transferable among owners. Moreover, NRC has not established criteria for taking action if it determines that an owner is not accumulating sufficient funds.

Contents

Abbreviations

FERC	Federal Energy Regulatory Commission
GDP	Gross Domestic Product
NRC	Nuclear Regulatory Commission
SAFSTOR	Safe Storage

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Accountability * Integrity * Reliability

United States General Accounting Office
Washington, D.C. 20548

October 30, 2003

The Honorable Edward J. Markey
House of Representatives

Dear Mr. Markey:

Following the retirement of a nuclear power plant and removal of the plant's spent or used fuel, a significant radioactive waste hazard remains until the waste is removed and disposed of, and the plant site decommissioned.[1] Decommissioning of existing plants is expected to cost nuclear power plant owners about $33 billion dollars.[2] The Nuclear Regulatory Commission (NRC), which licenses nuclear power plants, requires plant owners to submit biennial reports on decommissioning funding that, among other things, provide financial assurance that enough funding will be available when the power plants are retired.

In 1999, we reported that the combined value of the owners' decommissioning trust fund accounts (as of the end of 1997) was 3 percent less than needed to ensure that enough funds would be available when the plants are retired.[3] In addition, we found that NRC had not established criteria for responding to unacceptable levels of financial assurance. In December 2001, we reported that transfers of plant licenses among companies stemming from economic deregulation and the restructuring of the electricity industry had, in many cases, increased assurances that new plant owners would have sufficient decommissioning funds when their plants are retired.[4] Nevertheless, in some instances, NRC's evaluation of the adequacy of funding arrangements was not rigorous enough to ensure that decommissioning funds would be adequate.

[1]Retirement means the permanent cessation of a plant's operation.

[2]Costs in 2000 present value dollars and are for decommissioning the plant site only and exclude costs for cleaning up nonradiological hazards and storing spent fuel.

[3]U.S. General Accounting Office, *Nuclear Regulation: Better Oversight Needed to Ensure Accumulation of Funds to Decommission Nuclear Power Plants*, GAO/RCED-99-75 (Washington, D.C.: May 3, 1999).

[4]U.S. General Accounting Office, *Nuclear Regulation: NRC's Assurances of Decommissioning Funding during Utility Restructuring Could Be Improved*, GAO-02-48 (Washington, D.C.: Dec. 3, 2001).

In this context, you asked us to update our earlier findings on the adequacy of owners' decommissioning funds. Specifically, this report (1) assesses the extent to which nuclear plant owners are accumulating funds at sufficient rates to pay decommissioning costs when their plants' licenses expire and (2) evaluates NRC's analysis of the owners' 2001 biennial reports and its process for acting on reports that show unacceptable levels of financial assurance.

As part of our review, we collected data from the 2001 biennial reports on estimated decommissioning costs and actual decommissioning trust fund balances, generally as of December 31, 2000, for 122 nuclear power plants licensed by NRC. In addition, we surveyed the owners of the plants to determine how the trust fund balances were invested in 2000 and to identify the annual amounts that the owners had contributed to the trust funds in recent years. Eighty-two percent of the owners responded to our survey.[5] Using an approach similar to that used for our 1999 report,[6] we analyzed both the combined efforts of all owners to accumulate funds to decommission all of the nuclear plants and each individual owner's efforts to accumulate funds for decommissioning each of its plants. For our analysis, we estimated the most likely future values of key assumptions, such as decommissioning costs, earnings on the decommissioning funds' assets, and the operating life of each plant. To address the inherent uncertainty associated with forecasting outcomes many years into the future, we also analyzed the effect of using pessimistic and optimistic values for these key assumptions. To evaluate NRC's analysis of the biennial reports and its process for acting on reports that have not satisfied decommissioning funding assurance requirements, we reviewed NRC's guidelines and policies for analyzing these reports and interviewed NRC's officials about how they conducted their analysis. Appendix I provides more detail on the scope and methodology of our review.

Results in Brief

Although the collective status of the owners' decommissioning fund accounts has improved since our last report, some individual owners are not on track to accumulate sufficient funds for decommissioning. Using

[5]We administered the survey to 110 owners. Since then, the ownership of some plants has changed and as a result, the total number of owners has declined. Our analysis assesses 222 trust funds held by 99 owners.

[6]GAO/RCED-99-75.

our most likely economic assumptions, the combined value of the nuclear plant owners' trust funds in 2000—about $26.9 billion—was about 47 percent greater than needed at that point to ensure that sufficient funds will be available to cover the approximately $33 billion in estimated decommissioning costs when the plants are retired. This value contrasts with account balances that collectively were 3 percent below what was needed by the end of 1997. Overall industry results can be misleading, however. Because NRC does not allow owners to transfer funds from a trust fund with sufficient reserves to one without sufficient reserves, each individual owner must ensure that enough funds are available for decommissioning its particular plants. We found that 33 owners of all or parts of 42 different plants had accumulated less funds than we estimated they needed to have through 2000 to be on track to pay for eventual decommissioning. Under our most likely assumptions, these owners will have to increase the rates at which they accumulate funds to meet their future decommissioning obligations. Of the 33 owners, 26 provided contributions information for our survey. Of these 26 owners, only 8 appeared to be making up their shortfalls with recent increases in contributions to their trust funds.

NRC's analysis of the owners' 2001 biennial reports was not effective in identifying owners that might not be accumulating sufficient funds to cover their eventual decommissioning costs. In reviewing the 2001 reports, NRC reported that all owners appeared to be on track to have sufficient funds for decommissioning. In reaching this conclusion, NRC relied on the owners' future plans for fully funding their decommissioning obligations. However, based on the actual contributions the owners recently made to their trust funds, we found that several owners could risk not meeting their financial obligations for decommissioning when these plants are retired. In addition, for the plants with more than one owner, NRC did not separately assess the status of each co-owner's trust funds against the co-owner's contractual obligation to fund decommissioning. Instead, NRC assessed whether the combined value of the trust funds for each plant as a whole was reasonable. Such an assessment for determining whether owners are accumulating sufficient funds can produce misleading results because owners with more than sufficient funds can appear to balance out owners with less than sufficient funds, even though funds are generally not transferable among owners. Furthermore, NRC has not established criteria for responding to any unacceptable levels of financial assurance. Accordingly, we are recommending that NRC develop and use an effective method for determining whether owners are accumulating funds at

sufficient rates and establish criteria for responding to unacceptable levels of financial assurance.

Background

NRC's primary mission is to protect the public health and safety, and the environment, from the effects of radiation from nuclear plants, materials, and waste facilities. Because decommissioning a nuclear power plant is a safety issue, NRC has authority to ensure that owners are financially qualified to decommission these plants.

Of the 125 nuclear power plants that have been licensed to operate in the United States since 1959, 3 have been completely decommissioned. Of the remaining 122 plants, 104 currently have operating licenses (although 1 has not operated since 1985), 11 plants are in safe storage (SAFSTOR) awaiting active decommissioning,[7] and 7 plants are being decommissioned. At the time of our analysis, 43 plants were co-owned by different owners.

NRC regulations limit commercial nuclear power plant licenses to an initial 40 years of operation but also permit such licenses to be renewed for additional 20 years if NRC determines that the plant can be operated safely over the extended period. NRC has approved license renewals for 16 plants (as of August 20, 2003).

In 1988, NRC began requiring owners to (1) certify that sufficient financial resources would be available when needed to decommission their nuclear power plants and (2) require them to make specific financial provisions for decommissioning.[8] In 1998, NRC revised its rules to require plant owners to report to the NRC by March 31, 1999, and at least once every 2 years thereafter on the status of decommissioning funding for each plant or proportional share of a plant they own.[9] Under NRC requirements, the

[7]SAFSTOR involves placing the stabilized and defueled facility in storage for a time followed by final decontamination and dismantlement, and license termination.

[8]NRC licenses include all co-owners as co-licensees; in general, one owner is authorized to operate the facility while the others are authorized only to have an ownership interest. Co-owners generally divide costs and output from their power plants by using a contractually defined pro rata share standard.

[9]U.S. Nuclear Regulatory Commission, *Financial Assurance Requirements* (Sept. 22, 1998), 63 Fed. Reg. 50465.

owners can choose from one or more methods, including the following, to provide decommissioning financial assurance:

- prepayment of cash or liquid assets into an account segregated from the owner's assets and outside the owner's administrative control;
- establishment of an external sinking fund maintained through periodic deposit of funds into an account segregated from the owner's assets and outside the owner's administrative control;
- use of a surety method (i.e., surety bond, letter of credit, or line of credit payable to a decommissioning trust account), insurance, or other method that guarantees that decommissioning costs will be paid; and
- for federal licensees, a statement of intent that decommissioning funds will be supplied when necessary.

In September 1998, NRC amended its regulations to restrict the use of the external sinking fund method in deregulated electricity markets. Prior to this time, essentially all nuclear plant owners chose this method for accumulating decommissioning funds. However, under the amended regulations, owners may rely on periodic deposits only to the extent that those deposits are guaranteed through regulated rates charged to consumers.

In conjunction with its amended regulations, NRC issued internal guidance, describing the process for reviewing the adequacy of a prospective owner's financial qualifications to safely operate and maintain its plant(s) and the owner's proposed method(s) for ensuring the availability of funds to eventually decommission the plant(s).[10] The guidance outlines a method for evaluating the owner's financial plans for fully funding decommissioning costs. In addition, the guidance states that, except under certain conditions, the NRC reviewer should, when plants have multiple owners, separately evaluate each co-owner's funding schedule for meeting its share of the plant's decommissioning costs.[11]

[10]U.S. Nuclear Regulatory Commission, *Standard Review Plan on Power Reactor Licensee Financial Qualifications and Decommissioning Funding Assurance*, NUREG 1577, Rev. 1, March 1999.

[11]Under NRC's guidance, co-owners trust funds can be collectively evaluated when the lead licensee agrees to coordinate funding documentation and reporting for all the co-owners.

Despite Industry-wide Improvement, Some Owners of Nuclear Power Plants Are Not Accumulating Sufficient Decommissioning Funds

Using our most likely economic assumptions, the combined value of the nuclear power plant owners' decommissioning trust funds was about 47 percent higher at the end of 2000 than necessary to ensure accumulation of sufficient funds by the time the plants' licenses expire. This situation contrasts favorably with the findings in our 1999 report, which indicated that the industry was about 3 percent below where it needed to be at the end of 1997 to ensure that enough funds would be available. However, because owners are not allowed to transfer funds from a trust fund with sufficient reserves to one without sufficient reserves, overall industry sufficiency can be misleading. When we individually analyzed the owners' trust funds, we found that 33 owners for several different plants had not accumulated funds at a rate that would be sufficient for eventual decommissioning.

Collectively the Nuclear Power Industry Is on Pace to Accumulate More Than Sufficient Funds for Decommissioning

Through 2000, the owners of 122 operating and retired nuclear power plants collectively had accumulated about 47 percent more funds than would have been sufficient for eventually decommissioning, using our most likely economic assumptions. Specifically, the owners had accumulated about $26.9 billion—about $8.6 billion more than we estimate they needed at that point to ensure sufficient funds. This situation contrasts with the findings in our 1999 report, which indicated that the industry had accumulated about 3 percent less than the amount we estimated it should have accumulated by the end of 1997.

Using alternative economic assumptions changes these results. For example, under higher decommissioning costs and other more pessimistic assumptions, the analysis shows that the combined value of the owners' accounts would be only about 0.2 percent above the amount we estimate the industry should have collected by the end of 2000. (See app. II for our results using more optimistic assumptions.)

The collective improvement in the status of the owners' trust funds (under most likely assumptions) since our last report is due to three main factors. First, all or parts of the estimated decommissioning costs were prepaid for 15 plants when they were sold to new owners. For example, the seller prepaid $396 million when the Pilgrim 1 nuclear plant was sold in 1998 for the plant's scheduled decommissioning in 2012. Second, for 16 other plants, NRC approved 20-year license renewals, which will provide additional time for the owners to make contributions and for the earnings to accumulate on the decommissioning fund balances. Third, owners earned a higher rate of return on their trust fund accounts than we projected in our 1999 report. For example, the average return on the trust funds of owners who responded to our survey was about 8.5 percent[12] (after-tax nominal return) per year, from 1998 through 2000, instead of the approximately 6.25 percent per year we had assumed. The higher return was a result of the stronger than expected performance of financial markets in the late 1990s.[13] Since that time, however, the economy has slowed and financial markets—equities in particular—have generally performed poorly.

Several Owners Are Not Accumulating Sufficient Funds for Decommissioning Their Plants

In contrast to the encouraging industry-wide results, when we analyzed the owners' trust fund accounts individually, we found that several owners were not accumulating funds at rates that would be sufficient to pay for decommissioning if continued until their plants are retired. Each owner has a trust fund for each plant that it owns in whole or in part. For example, the Exelon Generation Company owns all or part of 20 different plants. For this analysis, we assessed the status of 222 trust funds for 122 plants owned in whole or part by 99 owners. As shown in table 1, using our most likely assumptions, 33 owners of all or parts of 42 different plants (50 trust funds) had accumulated less funds than needed through 2000 to be on track to pay for eventual decommissioning (see app. II for details).[14] Thirteen of these

[12]Based on 72 owners who provided after-tax rates of return for 1998, 1999, and 2000. These owners' trust funds accounted for about 71 percent of the total trust funds in 2000.

[13]For 2000 (the only year for which we have data on fund allocations), on average, owners allocated their funds rather evenly between equities and fixed income assets (see app. I for details). Investment plans such as pension funds that invested more heavily in equities may have earned a greater overall return during this period.

[14]Some owners whom we estimate are below the benchmark have a parent company guarantee or other method to support financial assurance obligations. However, we did not evaluate the adequacy of these provisions. See app. II, table 4.

plants were shut down before sufficient funds had been accumulated for decommissioning. Although the remaining 78 owners of all or parts of 93 plants (172 trust funds) had accumulated more funds than we estimate they needed to have at the end of 2000, funds are generally not transferable from owners who have more than sufficient reserves to other owners who have insufficient reserves. Under our most likely assumptions, the owners whom we estimate to be behind will have to increase the rates at which they accumulate funds to meet their eventual decommissioning financial obligations.

For our analysis, we compared the trust fund balance that individual owners had accumulated for each plant by the end of 2000 with a "benchmark" amount of funds that we estimate they should have accumulated by that date. In setting the benchmark, we assumed that the owners would contribute increasing (but constant present-value) amounts annually to cover eventual decommissioning costs.[15] For example, at the end of 2000, an owner's decommissioning fund for a plant that had operated one-half of a 40-year license period (begun in 1980) should contain one-half of the present value of the estimated cost to decommission the owner's share of that plant in 2020. Although this benchmark is not the only way an owner could accrue enough funds to pay future decommissioning costs, it provides both a common standard for comparisons among owners and, from an equity perspective among ratepayers in different years, a financially reasonable growing current-dollar funding stream over time. Appendix I describes our methodology in more detail.

[15]Our analysis simulates that the owners will increase their yearly future funding at the assumed after-tax rate of return on the investments of the funds, and that once in the fund, these yearly contributions will grow at this same rate. See appendix I for a discussion of our methodology.

Table 1: Status of Individual Owners' Trust Fund Balances through 2000, Compared with Benchmark Trust Fund Balances, under Most Likely Assumptions[a]

Status	Trust funds	Owners	Plants currently operating	Plants shut down
Above benchmark balance	172	78	88	5
Below benchmark balance	50	33	29	13
Total	**222**	[b]	[b]	[b]

Source: GAO analysis.

[a]Most likely assumptions include 20-year license renewals that have been approved by NRC for 16 plants as of August 20, 2003.

[b]Not applicable.

The status of each owner's fund balance at the end of 2000 is not, by itself, the only indicator of whether an owner will have enough funds for decommissioning. Whether the owner will accumulate the necessary funds also depends on the rate at which the owner contributes funds over the remaining operating life of the plant; by increasing their contribution rates, owners whose trust fund balances were below the benchmark level could still accumulate the needed funds. Consequently, for the owners who provided contributions information to us, we also analyzed whether their recent contribution rates would put them on track to meet their decommissioning obligations. For this second analysis, we compared the average of the amounts contributed in 1999 and 2000 (cost-adjusted to 2000) with a benchmark amount equivalent to the average yearly present value of the amounts the owners would have to accumulate each year over the remaining life of their share of the plants to have enough decommissioning funds.

As table 2 shows, 28 owners with ownership shares in 44 different plants (50 trust funds) contributed less than the amounts we estimate they will need to meet their decommissioning obligations, under our most likely assumptions.

Table 2: Status of Individual Owners' Recent Trust Fund Contributions, Compared with Benchmark Trust Fund Contributions, under Most Likely Assumptions[a]

Status	Trust funds	Owners	Plants currently operating	Plants shut down
Above benchmark contributions	122	58	76	5
Below benchmark contributions	50	28	34	10
Total	**172[b]**	[c]	[c]	[c]

Source: GAO analysis.

[a]Most likely assumptions include 20-year license renewals that have been approved by NRC for 16 plants as of August 20, 2003.

[b]Contributions not available for 50 other trust funds.

[c]Not applicable.

We compared the owners in table 1 with those in table 2 to see whether owners who are behind in balances were making up their shortfalls with recent increases in contributions. Of the 33 owners who we estimate had less than the benchmark balances through 2000, 26 owners of all or parts of 38 plants provided contributions information. Of these owners, only 8 owners of all or parts of 9 plants appeared to be making up their shortfalls with recent increases in contributions. By contrast, 20 owners with ownership interests in 31 plants recently contributed less to their trust funds than we estimate they needed to put them on track to meet their decommissioning obligations.[16]

These results would change under alternative economic assumptions. For example, if economic conditions improve to those assumed in our optimistic scenario, of the 20 owners who were below the benchmark under most likely assumptions on both balances and contributions, 12 owners would still be below the benchmark in both categories, even under optimistic assumptions.

However, if economic conditions worsen to those in our pessimistic scenario, 34 owners who were above the benchmark under most likely assumptions on either balances or contributions would be below either of

[16]Some of these owners were also making up their shortfalls on other plants.

these benchmarks under pessimistic assumptions. (See app. II for detailed results.)

NRC's Analysis Did Not Effectively Determine Whether Each Owner Was Accumulating Sufficient Decommissioning Funds

NRC's analysis of the 2001 biennial decommissioning status reports was not effective in identifying owners that might not be accumulating funds at sufficient rates to pay for decommissioning costs when their plants are permanently shut down. Although the NRC reported in 2001 that all owners appeared to be on track to have sufficient funds for decommissioning,[17] our analysis indicated that several owners might not be able to meet financial obligations for decommissioning. NRC's analysis was not effective for two reasons. First, NRC overly relied on the owners' future funding plans, or on rate-setting authority decisions, in concluding that the owners were on track to fully fund decommissioning. However, as discussed earlier, based on actual contributions the owners had recently made to their trust funds, several owners are at risk of not accumulating enough funds to pay for decommissioning. Second, for the plants with more than one owner, NRC did not separately assess the status of each co-owner's trust funds relative to the co-owner's contractual obligation to fund a certain portion of decommissioning. Instead, NRC combined funds on a plant-wide basis and assessed whether the combined trust funds would be sufficient for decommissioning. Such an assessment method can produce misleading results because the owners with more than sufficient trust funds can appear to balance out those with insufficient trust funds. Furthermore, if NRC had identified an owner with unacceptable levels of financial assurance, it would not have had an explicit basis for acting to remedy potential funding deficiencies because it has not established criteria for responding to unacceptable levels of financial assurances.

NRC officials said that their oversight of the owners' decommissioning funds is an evolving process and that they intend to learn from their review of prior biennial reports and make changes to improve their evaluation of the 2003 biennial reports. However, they also said that any specific changes they are considering are predecisional, and final decisions have not yet been made.

[17] *Summary of Decommissioning Trust Funding Status Reports For Power Reactors*, SECY-01-0197, Nuclear Regulatory Commission, November 5, 2001.

NRC's Review Relied on Owners' Future Plans for Making Contributions

According to NRC officials, in reviewing the 2001 biennial reports, they used a "straight-line" method to establish a screening criterion for assessing whether owners were accumulating decommissioning funds at sufficient rates. Specifically, NRC compared the amount of funds accumulated through 2000 (expressed as a percentage of the total estimated cost as of 2000 to decommission the plant) to the expended plant life (expressed as a percentage of the total number of years the plant will operate). Under this method, the owner of a plant that has operated for one-half of its operating life would be expected to have accumulated at least one-half of the plant's estimated decommissioning costs (that is, it would be collecting at or above the straight-line rate). NRC found that the owners of 64 out of 104 plants currently licensed to operate were collecting at the above a straight-line rate, and that the owners of the remaining 40 plants were collecting at the less than a straight-line rate.[18]

On a plant-wide basis, NRC then reviewed the owners' "amortization" schedules for making future payments to fully fund decommissioning. The schedules, required as part of the biennial reports, consist of the remaining funds that the owners expect to collect each year over the remaining operating life of the plants. In estimating the funds to be collected, the owners may factor in the earnings expected from their trust fund investments. To account for such earnings, NRC regulations allow an owner to increase its trust fund balance by up to 2 percent per year (net of estimated cost escalation), or higher, if approved by its regulatory rate-setting authority, such as a state public utility commission. Because these owners' amortization schedules identified sufficient future funds to enable them to reach the target funding levels, NRC concluded that all licensees appear to be on track to fund decommissioning when their plants are retired.

However, relying on amortization schedules is problematic, in part because the actual amounts the owners contribute to their funds in the future could differ (that is, worsen) from their planned amounts if economic conditions or other factors change. NRC officials said that owners are not required by regulation to report their recent actual contributions to the trust funds, and NRC does not directly monitor whether the owners' actual contributions match their planned contributions. Consequently, NRC relies on the owners' amortization schedules as reported in the biennial reports.

[18]One plant—Browns Ferry 1—has a license but is currently not operating.

Such reliance is also problematic because in developing their amortization schedules, the owners could use widely varying rates of return to project the earnings on their trust fund investments. For example, each of the three co-owners of the Duane Arnold Energy Center nuclear plant assumed a different rate, ranging from 2 to 7 percent (net of estimated cost escalation). Other factors being equal, the owners using the higher rates would need to collect fewer funds than the owner using the lower rate of return. While the return that each owner actually earns on its investments may be higher or lower than these rates, by relying on the owners' amortization schedules, NRC effectively used a different set of assumptions to evaluate the reasonableness of the trust funds accumulated by each owner. Consequently, NRC did not use a consistent "benchmark" in assessing the owners' trust funds. By contrast, we used historical trends and economic forecasts to develop assumptions about rates of earnings and other economic variables, applied the same assumptions in evaluating the adequacy of each owner's trust fund, and based expected future contributions on actual amounts contributed in recent years.

NRC's Analysis Focused on the Adequacy of Trust Funds on a Plant-by-Plant Basis

NRC's internal guidance for evaluating the biennial reports states that for plants having more than one owner, except in certain circumstances, each owner's amortization schedule should be separately assessed for its share of the plant's decommissioning costs.[19] For those plants that have co-owners, NRC used the total amount of funds accumulated for the plant as a whole in its analysis. However, as we demonstrated with our industry-wide analysis, such an assessment for determining whether owners are accumulating sufficient funds can produce misleading results because owners with more than sufficient funds can appear to balance out owners with less than sufficient funds, even though funds are generally not transferable among owners.

[19]Requirement is waived if lead owner has agreed to coordinate funding documentation and reporting for all co-owners. In such cases, the guidance does not require a separate evaluation of each co-owner's amortization schedule.

In explaining their approach, NRC officials said that the section of the guidance that calls for a separate evaluation of each owner's amortization schedule for its share of the plant is not compulsory. In addition, they said that they consider each owner's schedule to determine the total funds for the plant as a whole, but they believe that the same level of effort is not required for each individual trust fund balance unless there is a manifest reason to do so. They also stated that NRC's regulations do not prohibit each co-owner from being held responsible for decommissioning costs, even if these costs are more than the co-owner's individual ownership share. However, assessing the adequacy of decommissioning costs on a plant-wide basis is not consistent with the industry view, held by most plant owners, that each co-owner's responsibility should be limited to its pro rata share of decommissioning expenses and that NRC should not look to one owner to "bail out" another owner by imposing joint and several liability on all co-owners.[20] NRC has implicitly accepted this view and has incorporated it into policy to continue it. In a policy statement on deregulation,[21] NRC stated that it will not impose decommissioning costs on co-owners in a manner inconsistent with their agreed-upon shares,[22] except in highly unusual circumstances when required by public health and safety considerations and that it would not seek more than the pro rata shares from co-owners with *de minimis* ownership. Nevertheless, unless NRC separately evaluates each co-owner's trust fund, NRC might eventually need to look to require some owners to pay more than their share.

NRC Has Not Established Criteria for Responding to Unacceptable Levels of Financial Assurance

While the NRC has conducted two reviews of the owners' biennial reports to date, it has not established specific criteria for responding to any unacceptable levels of financial assurances that it finds in its reviews of the owners' biennial reports. As we noted in our 1999 report, without such criteria, NRC will not have a logical, coherent, and predictable plan of action if and when it encounters owners whose plants have inadequate financial assurance. NRC officials said that their oversight of the owners'

[20]Joint and several liability refers to the legal doctrine, which would allow holding all or any one of the co-owners financially responsible for the default of any co-owner.

[21]*Final Policy Statement on the Restructuring and Economic Deregulation of the Electric Utility Industry*, 62 Fed. Reg. 44071 (Aug. 19, 1997).

[22]Co-owners generally divide costs from their facilities using a contractually defined pro rata share.

decommissioning funds is an evolving process, and they are learning from their prior reviews. However, they also said that any specific changes they are considering are predecisional and final decisions have not yet been made.

The absence of any specific criteria for acting on owners' decommissioning financial reports contrasts with the agency's practices for overseeing safety activities at nuclear power plants. According to NRC, its safety assessment process allows it to integrate information relevant to licensee safety performance, make objective conclusions regarding the information, take actions based on these conclusions in a predictable manner, and effectively communicate these actions to the licensees and to the public. Its oversight approach uses criteria for identifying and responding to levels of concern for nuclear plant performance. In determining its regulatory response, NRC uses an "Action Matrix" that provides for a range of actions commensurate with the significance of inspection findings and performance indicators. If the findings indicate that a plant is operating in a way that has little or no impact on safety, then NRC implements only its baseline inspection program. However, if the findings indicate that a plant is operating in a way that implies a greater degree of safety significance, NRC performs additional inspections and initiates other actions commensurate with the significance of the safety issues. A similar approach in the area of financial assurance for decommissioning would appear to offer the same benefits of objectivity and predictability that NRC has established in its safety oversight.

Conclusions

Ensuring that nuclear power plant owners will have sufficient funds to clean up the radioactive waste hazard left behind when these plants are retired is essential for public health and safety. As our analysis identified, some owners may be at risk of not accumulating sufficient trust funds to pay for their share of decommissioning. NRC's analysis was not effective in identifying such owners because it relied too heavily on the owners' future funding plans without confirming that the plans were consistent with recent contributions. Moreover, it aggregated the owners' trust funds plant-wide instead of assessing whether each individual owner was on track to accumulate sufficient funds to pay for its share of decommissioning costs. In addition, NRC has not explained to the owners and the public what it intends to do if and when it determines an owner is not accumulating sufficient trust funds. Without a more effective method for evaluating owners' decommissioning trust funds, and without criteria for responding

to any unacceptable levels of financial assurance, NRC will not be able to effectively ensure that sufficient funds will be available when needed.

Recommendations for Executive Action

To ensure that owners are accumulating sufficient funds to decommission their nuclear power plants, we recommend that the Chairman, NRC, develop an effective method for determining whether owners are accumulating funds at sufficient rates to pay for decommissioning. For plants having more than one owner, this method should include separately evaluating whether each owner is accumulating funds at sufficient rates to pay for its share of decommissioning. We further recommend that the Chairman, NRC, establish criteria for taking action when NRC determines that an owner or co-owner is not accumulating decommissioning funds at a sufficient rate to pay for its share of the cost of decommissioning.

Agency Comments and Our Evaluation

We provided a draft of this report to NRC for its review and comment. NRC's written comments, which are reproduced in appendix III, expressed three main concerns regarding our report. First, NRC disagreed with our observation that its analyses of funding levels of the co-owners of a nuclear plant are inconsistent with its internal guidance. We revised the report to remove any inferences that NRC was not complying with its own guidance. While clarifying this point, we remained convinced that NRC needs to do more to develop an effective method for assessing the adequacy of nuclear power plant owner's trust funds for decommissioning. NRC's current practice is to combine the trust funds for all co-owners of a nuclear plant, then assess whether the combined value of the trust funds is sufficient. However, as our analysis indicates, NRC's practice of combining the trust funds of several owners for its assessment can produce misleading results because co-owners with more than sufficient funds can appear to balance out those with less than sufficient funds. As a practical matter, owners have a contractual agreement to pay their share of decommissioning costs, and owners generally cannot transfer funds from a trust fund with sufficient reserves to one without sufficient reserves. While NRC recognizes that private contractual arrangements among co-owners exist, the agency stated that it reserves the right, in highly unusual situations where adequate protection of public health and safety would be compromised if such action were not taken, to consider imposing joint and several liability on co-owners for decommissioning funding when one or more co-owners have defaulted. Nonetheless, we believe that NRC should take a proactive approach, rather than simply wait until one or more co-

owners default on their decommissioning payment expenses, to ensure that sufficient funds will be available for decommissioning and that the adequate protection of public health and safety is not compromised. Such an approach, we believe, would involve developing an effective method that, among other things, separately evaluates the adequacy of each co-owner's trust fund.

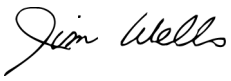
Second, NRC disagreed with our view that some owners are not on track to accumulate sufficient funds for decommissioning. NRC's position is that it has a method for assessing the reasonableness of the owners' trust funds and that our method has not been reviewed and accepted by NRC. While we recognize that NRC has neither reviewed nor accepted our method, our report identifies several limitations in NRC's method that raise doubts about whether the agency's method can effectively identify owners who might be at risk of not having sufficient funds for decommissioning. A particularly problematic aspect of this method is NRC's reliance on the owners' future funding plans to make up any shortfalls without verifying whether those plans are consistent with the owners' recent contributions. We found some owners' actual contributions in 2001 were much less than what they stated in their 2001 biennial reports to NRC that they planned to contribute. For example, one owner contributed about $1.5 million (or 39 percent) less than the amount they told NRC that they planned to contribute. In addition, based on our analysis using actual contributions the owners had recently made to their trust funds, we found that 28 owners with ownership shares in 44 different plants contributed less than the amounts we estimate they will need to make over the remaining operating life of their plants to meet their decommissioning obligations. Therefore, we continue to believe that some owners are not on track to accumulate sufficient funds to pay for decommissioning.

Finally, NRC disagreed with our view that it should establish criteria for responding to owners with unacceptable levels of financial assurance. NRC stated that its practice is to review the owners' plans on a case-by-case basis, engage in discussions with state regulators, and issue orders as necessary and appropriate. Since NRC has never identified an owner with unacceptable levels of financial assurance, it has never implemented this practice. We believe that NRC should take a more proactive approach to providing owners and the public with a more complete understanding of NRC's expectations of how it will hold owners who are not accumulating sufficient funds accountable. As stated in our draft report, this lack of criteria is in contrast to NRC's practices in overseeing safety issues at nuclear plants, where the NRC uses an "Action Matrix" that provides for a

range of actions commensurate with the significance of safety inspection findings and performance indicators. In the area of financial assurance, a similar approach could involve monitoring the trust fund deposits of those owners who NRC determines are accumulating insufficient funds to verify that the deposits are consistent with the owners' funding plans.

We conducted our review from June 2001 to September 2003 in accordance with generally accepted government auditing standards. Unless you publicly announce the contents of this report earlier, we plan no further distribution until 30 days from the report date. At that time, we will send copies of this report to the appropriate congressional committees; the Chairman, NRC; Director, Office of Management and Budget; and other interested parties. We will also make copies available to others upon request. In addition, this report will be available at no charge on the GAO Web site at http://www.gao.gov. If you or your staff have any questions, please call me at (202) 512-6877. Key contributors to this report are listed in appendix IV.

Sincerely yours,



Jim Wells
Director, Natural Resources
and Environment

Scope and Methodology of Our Analysis of the Decommissioning Trust Funds

This appendix describes the scope and methodology of our review for our first objective: the extent to which nuclear power plant owners are accumulating funds at sufficient rates to pay decommissioning costs when their plants' licenses expire.

In addressing this objective, we analyzed the status of the decommissioning trust funds from two perspectives. First, we analyzed whether the industry as a whole is accumulating funds at rates that would be sufficient for decommissioning. For this analysis, we combined the trust funds of the owners of 122 nuclear plants. We then compared our results with those of our 1999 report to see whether the industry's status had changed.

Second, because owners generally cannot transfer funds from a trust fund with sufficient reserves to one without sufficient reserves, we also analyzed the status of each owner's trust fund for each plant in which the owner had an ownership share. For this analysis, we analyzed the status of 222 individual trust funds, representing 99 owners of all or parts of 122 plants.

For both the combined industry-wide trust funds and the individual owners' trust funds, we conducted two separate analyses (hereafter described in terms of our analysis of the individual owners' trust funds). This method is the same as that used in our earlier report on the adequacy of decommissioning funding.[1] First, we looked backward from a base year—2000—and assessed whether, when taking into account key economic factors such as decommissioning cost-escalation rates and after-tax rates of return on the funds (the discount rate), each owner's decommissioning fund balance for its ownership share of each of its plants was consistent with the expended portion of the licensed operating life of that plant. In other words, we assessed whether the monies the owner had contributed to its fund as of the end of 2000, together with the past earnings on these monies, equaled a benchmark or expected balance the owner should have accumulated by that time.

[1] GAO/RCED-99-75.

To determine the benchmark balance for 2000 for each plant (owner's share), we multiplied the present value of the plant's estimated future decommissioning costs (owner's share) by the fraction of the plant's operating life used up by 2000. For example, a plant that began operating in 1980 would have used up one-half of its 40-year operating life by the end of 2000. Therefore, by the end of 2000, the owner for this plant should be expected to have accumulated in its trust fund one-half of the present value (in constant 2000 dollars) of the estimated decommissioning costs. Over the life of a plant, our benchmark measure presumes that an owner would contribute an annual amount that increases (but constant in present-value terms) at the trust fund's after-tax rate of return. The sum of these annual amounts plus the income earned on the investment of the funds would equal the total estimated (present value of) the decommissioning costs when the plant's operating license expires.[2]

Although recent deregulation and restructuring of the electricity industry have led some owners to prepay decommissioning costs, many owners continue to fund the trust funds by collecting fees from electricity users. Thus, under our benchmark measure, by paying decommissioning "fees" that are deposited into the trust funds, electricity users pay for the present value of each year's accrued decommissioning costs. As a result, the benchmark embodies the principle of economic efficiency in that the price of a product (i.e., electricity) should, if possible, equal all of its costs—current and accrued. In addition, by assuming that current and future users pay the same decommissioning fees, in constant present-value terms, our benchmark ensures that decommissioning costs are accrued transparently over time.

In addition to the looking-backward analysis, we conducted a second analysis, a "looking forward" from a base year—end of 2000—and assessed

[2]We assume that decommissioning will most likely occur within 5 years of a plant being retired. For simplicity, our model therefore decommissions a plant "instantaneously" at 2.5 years after the 40-year lifespan. Thus, the present value of decommissioning costs after the first year of operation is computed by discounting the estimated future costs by 41.5 years (39+2.5). Under our benchmark, the first contribution to the fund at the end of the first year should equal $1/40^{th}$ of the present value of the costs, discounted over 41.5 years. At the end of the second year of the plant's operation, the trust fund (including earnings) would equal $2/40^{th}$ of the present value of the future costs, discounted back by 40.5 years. Finally, at the end of the 40^{th} and final year of operation, the fund would contain $40/40^{th}$ of the present value of the future costs, discounted back by 2.5 years. At "instantaneous" decommissioning, 2.5 years hence, the trust fund balance would equal the entire current-dollar decommissioning costs.

whether each owner's recent contributions to its decommissioning funds for respective shares of each of its nuclear power plants were at a level consistent with the remaining portions of the licensed operating lives of each plant. In other words, we assessed whether the owner recently added monies to its decommissioning trust fund for each plant at the benchmark contribution necessary to have enough funds to decommission the plant when its operating license expires. For example, an owner who is behind in terms of trust fund balance through the end of 2000 could have recently contributed to its fund at much higher rates than it had in the past to make up for its shortfall over the remaining operating life of the plant.

To determine an owner's benchmark annual contribution, for each of its plants, we computed the annual-average present value of the required future contributions that are summed over the remaining life of the plant. The total present value contribution must equal the present value of the total future decommissioning costs minus the value of the current trust fund balance. We then compared this annual amount with the average contribution to the trust fund that the owner made in 1999 and 2000 (cost adjusted to 2000). We assume that an owner will annually increase its most recent contribution (2-year average, cost adjusted to 2000) over the remaining life of its plant by the assumed after-tax rate of return on its decommissioning fund. Owners whose recent average contributions exceeded the benchmark amount would be adding funds at a rate that would be more than sufficient, while owners whose recent average contributions were below the benchmark rate would be adding funds at an insufficient rate to pay for future decommissioning costs (under our specific economic assumptions).

For our assessment of the status of the industry as a whole (and for both the looking-backward and looking-forward analyses), we developed three different scenarios: baseline (i.e., most likely), pessimistic, and optimistic. For the baseline analysis, we used our most likely economic assumptions. For the pessimistic and optimistic scenarios, we used different values for several key assumptions, as described later in this appendix.

For our assessment of the status of each individual owner's trust funds, we looked at the status of each owner's trust funds under baseline (most likely) assumptions (for both the looking-backward and looking-forward analyses). In addition, for owners who were below the benchmark on both balances and contributions under the baseline assumptions, we reviewed the 2003 and 2001 biennial reports to ascertain whether the owner has and/or had an additional method (e.g., parent company guarantee) to

support financial assurance obligations. We indicate in our detailed results when an owner reported having an additional method (see app. II, table 4). However, we did not evaluate the adequacy of these methods.

In addition, for selected owners depending upon our baseline results, we analyzed how these results might change under alternative conditions—optimistic or pessimistic assumptions. For example, for owners who were below the benchmark on both balances and contributions under the baseline (see app. II, table 5), we assessed the status of their trust funds under optimistic conditions to determine which of these owner's funds would still remain below benchmark on both our looking-backward and looking-forward measures. In addition, for owners who were from zero to 100 percent above the benchmark, under baseline assumptions for either balances or contributions, we assessed the status of their funds under pessimistic assumptions to determine whether their funds would fall below benchmarks for both balances and contributions (see app. II, table 6).[3]

Key Data Used in Analysis

To conduct our analysis we used a spreadsheet simulation model that uses a base year of 2000. In addition, for the key data in our analysis, we used the owner's 2001 biennial reports and responses from a mail survey that we administered to nuclear power plant owners.

More specifically, the key data used in the model are the following:

(1) Owner's name, percentage of each plant in which the owner has a share, year the plant was licensed to operate (or commenced operation, if earlier), and year the plant's license will expire. We obtained these data using the owners' 2001 biennial reports to Nuclear Regulatory Commission (NRC) and other NRC publications.

(2) A decommissioning cost estimate for each plant (that is, a current dollar amount for the year that the estimate was made). When available, we used a site-specific estimate of NRC-related costs (that is, radiation-related costs). If a site-specific estimate was not available, we used cost estimates derived from NRC's generic formula for these NRC-related costs. We obtained these data using the owners' 2001 biennial reports to NRC.

[3]Table 6 includes some trust funds for which we did not have contributions data but whose balance adequacy percentage for the baseline fell below zero under the pessimistic assumptions.

(3) Decommissioning fund balances as of December 31, 2000 for each owner and its plant share. When indicated, we used that portion of the fund balance that the owner designated for NRC-type costs (that is, excluding the costs relating to nonradiation or spent-fuel activities). Otherwise we used the entire fund balance. We obtained these data from the owners' responses to our survey or from their 2001 biennial reports.

(4) Decommissioning fund contributions for 1999 and 2000 for each owner and its plant share. We assumed these contributions were for NRC-related costs only. We obtained these data from the responses to our survey, and for owners who did not respond to our survey, we do not report on the adequacy of their contributions.

In some cases, the ownership shares of plants have changed hands since our survey and the 2001 biennial reports. In these cases, to make our analysis as current as possible, we assess the adequacy of the funds that were accumulated by the previous owner but report the results under the name of the new owner of the trust fund (see app. II, table 4). Nonetheless, the new owner might accumulate trust funds at a different rate than the former owner.

Key Assumptions Used in the Analysis

The analysis of the industry-wide trust funds and the individual owners' trust funds depends on the following six key assumptions. The values for these six assumptions vary based upon the scenario: baseline (most likely), pessimistic, or optimistic. For each scenario, we used the same assumption values for each owner and each plant in order to apply an "even-handed" standard.

(1) Future after-tax rate of return on decommissioning fund assets (discount rate): An after-tax rate of return was used to discount future trust fund contributions and plant decommissioning costs. In our survey, we asked owners for information on the financial assets contained in their respective decommissioning funds. We grouped these assets into five basic financial categories and calculated estimated, industry-wide, average weights for each type, these asset weights themselves reflecting the weights of the varying fund sizes. These categories, and calculated weighted-averages were: equities (e.g., common stocks), 47.1 percent; U.S. securities (e.g., federal government bonds), 26.7 percent; corporate bonds, 9.8 percent; municipal bonds, 10.4 percent; and cash and short-term instruments, 6.0 percent. Therefore, on average, these decommissioning funds contained roughly a 50-50 split between equities and bonds. We used

these results for all of the decommissioning funds, for all three scenarios, but recognize three qualifications: (1) the variation in these asset weights among individual funds for 2000 was quite large, (2) our asset composition data represent only a time "snapshot" of such allocation—for year 2000 only, and (3) these same (baseline) asset weights are also assumed for our other two scenarios, because appropriate data were lacking to do otherwise.

Using a long-term forecast from Global Insight (an economic forecasting company),[4] we developed a forecast for each asset category under a baseline, pessimistic, and optimistic forecast scenario. For the baseline scenario, we used Global Insight's trend forecast; for the pessimistic scenario, we used their pessimistic forecast (representing slower real gross domestic product (GDP) growth); and for the optimistic scenario, we used their optimistic forecast (representing faster real GDP growth).

For the baseline scenario, we calculated a forecast (current-dollar) growth rate of 6.26 percent for equities, 6.83 percent for U.S. securities, 7.83 percent for corporate bonds, 6.27 percent for municipal bonds, and 5.02 percent for cash and short-term instruments.[5] Multiplying these forecast rates with their respective asset weights in the owners' portfolios yielded a baseline "portfolio average" forecast pretax annual-average rate of return of 6.49 percent. Similarly, we calculated pretax rates of return for the pessimistic and optimistic forecasts of 7.27 percent and 6.45 percent, respectively. The rate under the pessimistic forecast is higher than the rate under the baseline or optimistic forecasts because of higher inflation in the Global Insight pessimistic forecast and because of the owners' relatively high average allocation of trust fund investments in bonds. (In Global Insight's pessimistic forecast, the nominal-rate return on bonds is greater than on equities.)

[4]Forecast as of January 30, 2003.

[5]To forecast the growth in equities, we used Global Insight's forecast for the S&P 500. We assumed that dividends would be reinvested. For example, for our baseline scenario, we combined the compound annual-average growth rate for the S&P 500 Index with its corresponding annual-average dividend yield rate to obtain a total growth rate. For U.S. securities, we used the forecast for 30-year federal government bonds. For corporate bonds and municipal bonds, we used the forecast for Aaa-rated corporate and municipal bonds, respectively. For cash, we used the forecast for 6-month U.S. Treasury Bills.

To convert the "portfolio average" forecast pretax rate of return to an after-tax rate of return, we used the pre- and post-tax rates of return data that owners provided in our survey. Based on these data we determined that the pretax rate should be reduced by 0.87 percentage points to derive a baseline after-tax rate of return of 5.62 (6.49 – 0.87) percent.[6] Similarly, we calculated an after-tax rate of return of 6.40 (7.27 – 0.87) percent for the pessimistic scenario and an after-tax rate of return of 5.58 (6.45 – 0.87) percent for the optimistic scenario.

(2) Future decommissioning cost escalation rate: For our baseline scenario, we assumed that decommissioning costs would increase annually at a nominal rate of 4.60 percent.[7] Combining the after-tax rate of return and the cost escalation rate gave us an implied real (cost-adjusted) after-tax rate of return of 1.02 (5.62 - 4.60) percent for the baseline scenario.

To calculate real after-tax rates of return for the pessimistic and optimistic scenarios, we first adjusted the nominal after-tax rates of return using Global Insight's inflation forecasts. Its annual-average inflation forecast was about 2.47 percent for trend, or baseline, 3.04 percent for pessimistic, and 2.15 percent for optimistic. Using these forecasts, the real forecast rates of return are 3.15 (5.62 - 2.47) percent for baseline, 3.36 (6.40 – 3.04) percent for pessimistic, and 3.43 (5.58 – 2.15) percent for optimistic. We then used proportionality ratios to obtain real cost adjusted after-tax rates of return of 1.09 percent for the pessimistic scenario and 1.11 percent for the optimistic scenario.[8] From these real after-tax rates of return, we

[6]Using rate of return data provided by 84 owners, we calculated a weighted-average difference between their pretax and after-tax rates of return for each fund and year over 1997-2001, weighted by the relative size of their funds. We then calculated the simple mean of the weighted average differences for each year to obtain an overall weighted average difference of about 0.87 of a percentage point.

[7]The 4.60 percent cost-escalation rate is fund-weighted average based on the owners' assumptions about future nominal-dollar cost-escalation, as reported in their 2001 biennial reports.

[8]To calculate a cost-adjusted real rate-of-return for the pessimistic and optimistic scenarios, we formed proportionality ratios. For pessimistic, 3.36% / 3.15% = x% / 1.02%; therefore, x = 1.09%. For optimistic, 3.43% / 3.15% = y% /1.02%; therefore, y = 1.11%.

computed implied cost-escalation rates of 5.31 percent and 4.47 percent for the pessimistic and optimistic scenarios, respectively.[9]

Note that the real (cost-adjusted) after-tax rates of return are quite similar in value among our scenarios; therefore, any differing effect on model results caused by the combination of the fund rate of return and decommissioning cost-escalation assumptions will be fairly minimal. Nonetheless, all other things being equal, for these two assumptions only, the balance and contribution adequacy results for the pessimistic scenario will be slightly above those of the baseline scenario, and only slightly below those of the optimistic scenario.

(3) Alternative initial decommissioning cost estimates: In our baseline scenario, for the "initial" decommissioning (NRC-related) costs, we used the site-specific estimates when available. Otherwise, we used the cost estimates derived from NRC's generic formula. For the pessimistic and optimistic scenarios, we used professional judgment to adjust the estimate used in the baseline. For example, to reflect a general concern among industry observers that future decommissioning costs could be much higher than expected, we increased the initial cost estimate by 40 percent for the pessimistic scenario, and reduced the initial decommissioning cost estimate by only 5 percent for the optimistic scenario.

(4) Alternative start of decommissioning--years after shutdown: For the baseline scenario, we assumed that decommissioning would occur within the immediate 5 years after license termination; for simplification, we assumed "instantaneous" decommissioning at 2.5 years after shutdown.[10] For the pessimistic assumption, decommissioning is assumed to occur within the first 4 years—at 2 years after shutdown. For the optimistic assumption, we assumed a 5-year delayed start of decommissioning—within 5-10 years after license termination—at 7.5 years after shutdown. Under certain circumstances (e.g., co-located plants), NRC may permit a decommissioning delay. As long as the assumed after-tax rate of return exceeds the assumed cost-escalation rate (i.e., a positive, real, cost-

[9]For pessimistic, 6.40% - x% = 1.09%; therefore, x = 5.31%. For optimistic, 5.58% - y% = 1.11%; therefore, y = 4.47%.

[10]To test this simplifying assumption in the looking-backward analysis, we assessed the impact of assuming that one-fifth of decommissioning occurred over each of the 5 years. The result was virtually identical to that obtained when we assumed that all decommissioning occurred at 2.5 years after shutdown.

adjusted rate of return), a delay in decommissioning will improve the outlook for an owner's trust fund in both the looking-backward (trust fund balance) and looking-forward (trust fund contributions) analysis, all else the same.

(5) Alternative operating license expiration year: The year of plant operating-license expiration is assumed to vary among our three scenarios to reflect that NRC has approved license renewals for some plants, and it may approve 20-year license renewals for other plants in the future. For the baseline and pessimistic scenarios, we include the renewals that have been approved for 16 plants, as of August 20, 2003.[11] In addition, because NRC has received renewal applications from owners of 14 plants, and it anticipates applications from owners of another 8 plants by the end of 2003 (as of August 20, 2003), we assume in the optimistic scenario that license renewals will be approved for an additional 22 plants.[12] In general, these plant license renewals suggest that the electricity market today is robust and owners expect higher electricity prices in the future.[13]

(6) Alternative market values for decommissioning funds: For the baseline and optimistic scenarios, we use the actual market value of the trust fund balances as of the end of 2000. In contrast, for the pessimistic scenario, we reduced the actual market value of the funds by 5 percent for 2000 to simulate the effect of a slowing economy on investment returns from 2000 through 2002. The simulated decline is modest, and over the period, the overall increase in bond prices would have offset to some degree the overall decline in the value of common stocks.

[11]The 16 plants are: Arkansas Nuclear Unit 1; Calvert Cliffs Units 1 and 2; Hatch Units 1 and 2; North Anna Units 1 and 2; Oconee Units 1, 2, and 3; Peach Bottom Units 2 and 3; Surry Units 1 and 2; and Turkey Point Units 3 and 4.

[12]The 14 plants are: Catawba Units 1 and 2; Dresden Units 2 and 3; Fort Calhoun; Ginna; McGuire Units 1 and 2; Quad Cities Units 1 and 2; Robinson 2; St. Lucie Units 1 and 2; and Summer. The other 8 plants are: Arkansas Nuclear Unit 2; Browns Ferry Units 1, 2, and 3; Cook, D.C. Units 1 and 2; and Farley Units 1 and 2.

[13]This expectation is in contrast to conditions reported in our 1999 report, when the market for electricity appeared much weaker. In that report, we assumed in the baseline scenario that 6 plants would be prematurely retired during 1998 to 2002.

Detailed Results of Our Analysis of the Decommissioning Trust Funds

This appendix presents the detailed results of our analysis of the decommissioning trust funds. Specifically, table 3 shows industry-wide, weighted-average results under three scenarios—baseline (most likely) assumptions, pessimistic assumptions, and optimistic assumptions. Table 4 presents the results for individual owners under baseline, or most likely assumptions. Table 5 shows the results of our analysis under optimistic assumptions for individual owners whose trust funds were below the benchmarks for both balances and recent contributions under the baseline scenario. Table 6 presents the results under pessimistic assumptions for individual owners whose trust funds were zero to 100 percent above the benchmark balances and/or contributions under the baseline scenario. See appendix I for a description of our methodology.

Table 3: Status of Combined Trust Funds Compared with Benchmarks for Balances and Contributions (by Percentage above or below Benchmarks)

			Scenario		
Analysis category	Number of owners	Number of plants	Baseline[a] (percent)	Pessimistic[a] (percent)	Optimistic[b] (percent)
Balances through 2000	99	122	46.9	0.2	82.5
Recent Contributions[c]	75	109	106.5	-18.0	224.4

Source: GAO analysis.

Note: Percentages are weighted averages, measured relative to the benchmark balances or benchmark contributions.

[a]The baseline and pessimistic scenarios include the 20-year license renewals already granted for 16 plants, as of August 20, 2003.

[b]The optimistic scenario includes 20-year license renewals for 38 plants, including renewals: (1) already granted for 16 plants, (2) for another 14 plants whose owners have applied for but not yet received renewals, and (3) for another 8 plants whose owners are expected to apply by December 2003 (all as of August 20, 2003).

[c]Adequacy of recent contributions is based on responses to our survey. The percentages are more, or less, than the benchmark contribution, meaning the owner has contributed more, or less, on average for 1999 and 2000 (cost adjusted to 2000) than the annual average of the present value of the amounts required in each subsequent year until the plant's license expires.

Table 4: Owners with More, or Less, Than Benchmark Trust Fund Balances and Contributions, under Most Likely Assumptions (by Percentage above or below Benchmarks)

			Baseline (most likely) scenario	
Plant name	Owner	Ownership share of plant (percent)	Adequacy of trust fund balances as of end of 2000	Adequacy of recent trust fund contributions[a]
Arkansas Nuclear 1[b]	Entergy Arkansas, Inc.	100	+ + + +	+ + + +
Arkansas Nuclear 2[c]	Entergy Arkansas, Inc.	100	+	_
Beaver Valley 1	Ohio Edison Co.	35	+	+
Beaver Valley 1	Pennsylvania Power Co.	65	_	_ _ _
Beaver Valley 2	Cleveland Electric Illuminating Co.	24.47	+ +	+
Beaver Valley 2	Ohio Edison Co.	41.88	+ +	_
Beaver Valley 2	Pennsylvania Power Co.	13.74	+ + + +	_ _ _
Beaver Valley 2	Toledo Edison Co.	19.91	+ +	+ +
Big Rock Point[d]	Consumers Energy Co.	100	+	+ + + +[e]
Braidwood 1	Exelon Generation Co., LLC	100	+ + +	_ _ _
Braidwood 2	Exelon Generation Co., LLC	100	+ + + +	+ + + +
Browns Ferry 1[c]	Tennessee Valley Authority	100	_ _	_ _ _
Browns Ferry 2[c]	Tennessee Valley Authority	100	_ _	_ _ _
Browns Ferry 3[c]	Tennessee Valley Authority	100	_ _	_ _ _
Brunswick 1	North Carolina Eastern Municipal	18.33	_	+
Brunswick 1[f]	Progress Energy Carolinas, Inc.	81.67	_ _	_
Brunswick 2	North Carolina Eastern Municipal	18.33	_	+
Brunswick 2[f]	Progress Energy Carolinas, Inc.	81.67	_ _	+
Byron 1	Exelon Generation Co., LLC	100	+ + +	_ _ _
Byron 2	Exelon Generation Co., LLC	100	+ + +	+ + +
Callaway	AmerenUE	100	+	_ _
Calvert Cliffs 1[b]	Constellation Energy Group	100	+	[g]
Calvert Cliffs 2[b]	Constellation Energy Group	100	+	[g]
Catawba 1[h]	Duke Power Co.	12.50	+	+ + +
Catawba 1[h]	North Carolina Electric Membership	28.1	+	_ _ _
Catawba 1[h]	North Carolina Municipal Power	37.50	+ +	+
Catawba 1[h]	Piedmont Municipal Power Agency	12.50	+	+ +
Catawba 1[h]	Saluda River Electric Cooperative	9.38	+ + + +	_ _ _
Catawba 2[h]	Duke Power Co.	12.5	+ +	+ + + +

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			Baseline (most likely) scenario	
Plant name	Owner	Ownership share of plant (percent)	Adequacy of trust fund balances as of end of 2000	Adequacy of recent trust fund contributions[a]
Catawba 2[h]	North Carolina Electric Membership	28.1	+	_ _ _
Catawba 2[h]	North Carolina Municipal Power	37.5	+ + +	+
Catawba 2[h]	Piedmont Municipal Power Agency	12.5	+ +	+ + +
Catawba 2[h]	Saluda River Electric Cooperative	9.38	+ + + +	_ _ _
Clinton	AmerGen Energy Co., Inc.	100	+ + + +	+ + +
Columbia Generating Station	Energy Northwest	100	_	_ _
Comanche Peak 1	Texas Utility Electric Co.	100	+ + + +	+ + + +
Comanche Peak 2	Texas Utility Electric Co.	100	+ + + +	+ + + +
Cook, D.C. 1[c]	Indiana Michigan Power Co.	100	+ + +	+ + + +[e]
Cook, D.C. 2[c]	Indiana Michigan Power Co.	100	+ + +	+ + + +
Cooper	Nebraska Public Power District	100	+	+ + + +
Crystal River 3	City of Alachua Electric Dept.	0.08	+	[g]
Crystal River 3	City of Bushnell Utility Dept.	0.04	+ +	[g]
Crystal River 3	City of Gainesville Regional Utilities	1.41	+	+ + + +
Crystal River 3	City of Kissimmee Utilities	0.68	+	[g]
Crystal River 3	City of Leesburg Municipal Electric	0.82	+	[g]
Crystal River 3	City of Ocala Utilities Division	1.33	+	[g]
Crystal River 3	New Smyrna Beach Utilities Comm.	0.56	+ + +	+ + + +[e]
Crystal River 3	Orlando Utilities Comm.	1.60	+ + +	[g]
Crystal River 3	Progress Energy Florida	91.8	+ + +	+ + + +[e]
Crystal River 3	Seminole Electric Cooperative, Inc.	1.7	+ +	+ + +
Davis-Besse	Cleveland Electric Illuminating Co.	51.38	+	+ + + +
Davis-Besse	Toledo Edison Co.	48.62	+	+ + + +
Diablo Canyon 1	Pacific Gas & Electric Co.	100	+ + + +	+ + + +[e]
Diablo Canyon 2	Pacific Gas & Electric Co.	100	+ + + +	+ + + +[e]
Dresden 1[d]	Exelon Generation Co., LLC	100	_ _ _	_ _ _
Dresden 2[h]	Exelon Generation Co., LLC	100	+	+ + + +
Dresden 3[h]	Exelon Generation Co., LLC	100	+	+ + + +
Duane Arnold	Central Iowa Power Cooperative	20	_ _ _	_ _ _
Duane Arnold	Corn Belt Power Cooperative	10	_ _	_ _
Duane Arnold	IPL	70	_ _	_ _
Farley 1[c]	Alabama Power Co.	100	+	+ + + +

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			Baseline (most likely) scenario	
Plant name	**Owner**	**Ownership share of plant (percent)**	**Adequacy of trust fund balances as of end of 2000**	**Adequacy of recent trust fund contributions[a]**
Farley 2[c]	Alabama Power Co.	100	+ +	+ + + +
Fermi 1[d]	Detroit Edison Co.	100	_	_ _ _
Fermi 2	Detroit Edison Co.	100	+ + +	+ + + +
FitzPatrick	Entergy Nuclear Operations, Inc.	100	+ + +	+ + + +[e]
Fort Calhoun[h]	Omaha Public Power District	100	+	+ + + +
Ginna[h]	Rochester Gas & Electric Corp.	100	_	[g]
Grand Gulf 1	South Mississippi Electric Power	10	_ _	_ _ _
Grand Gulf 1	System Energy Resources, Inc.	90	+	+ + + +
Haddam Neck[d]	Connecticut Yankee Atomic Power Co.	100	+	+ + + +[e]
Harris 1	North Carolina Eastern Municipal	16.17	+	_
Harris 1	Progress Energy Carolinas, Inc.	83.83	+	+
Hatch 1[b]	City of Dalton (Georgia)	2.2	+ + + +	[e, g]
Hatch 1[b]	Georgia Power Co.	50.1	+ + +	+ + + +
Hatch 1[b]	Municipal Electric Authority of Georgia	17.7	+ + +	+ + + +
Hatch 1[b]	Oglethorpe Power Co.	30	+ + +	+ + + +
Hatch 2[b]	City of Dalton (Georgia)	2.2	+ + + +	[e, g]
Hatch 2[b]	Georgia Power Co.	50.1	+ + + +	+ + + +
Hatch 2[b]	Municipal Electric Authority of Georgia	17.7	+ + + +	+ + + +
Hatch 2[b]	Oglethorpe Power Co.	30	+ + +	+ +
Hope Creek 1	PSEG Nuclear, LLC	100	+ + + +[i]	[g]
Humboldt Bay 3[d]	Pacific Gas & Electric Co.	100	+	+ + + +[e]
Indian Point 1[d, f]	Entergy Nuclear Operations, Inc.	100	_ _ _[i]	_ _ _[i]
Indian Point 2	Entergy Nuclear Operations, Inc.	100	+	+ + + +
Indian Point 3	Entergy Nuclear Operations, Inc.	100	+ + +	+ + + +[e]
Kewaunee	Wisconsin Power & Light	41	+ + + +	+ + + +[e]
Kewaunee	Wisconsin Public Service Corporation	59	+ + + +[i]	+ + + +[e, i]
LaCrosse[d, f]	Dairyland Power Cooperative	100	_	_ _ _
LaSalle County 1	Exelon Generation Co., LLC	100	+ + +	_
LaSalle County 2	Exelon Generation Co., LLC	100	+ + +	+ + +
Limerick 1[j]	Exelon Generation Co., LLC	100	_	_ _ _
Limerick 2[j]	Exelon Generation Co., LLC	100	_	_
Maine Yankee[d]	Maine Yankee Atomic Power Co.	100	_ _	_ _

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			Baseline (most likely) scenario	
Plant name	**Owner**	**Ownership share of plant (percent)**	**Adequacy of trust fund balances as of end of 2000**	**Adequacy of recent trust fund contributions[a]**
McGuire 1[h]	Duke Power Co.	100	+	+ + +
McGuire 2[h]	Duke Power Co.	100	+	+ + + +
Millstone 1[d, f, j]	Dominion Nuclear Connecticut	100	_	[g]
Millstone 2	Dominion Nuclear Connecticut	100	+ +	[g]
Millstone 3	Central Vermont Public Service Corp.	1.73	+ + + +	[g]
Millstone 3	Dominion Nuclear Connecticut	93.47	+ + + +	[e, g]
Millstone 3	Massachusetts Municipal Wholesale Electric Co.	4.80	+ + + +	[g]
Monticello	Xcel Energy	100	_	+ +
Nine Mile Point 1[f]	Constellation Energy Group	100	_[i]	[g]
Nine Mile Point 2	Constellation Energy Group	82	+ + +[i]	[g]
Nine Mile Point 2	Long Island Power Authority	18	+ + +	+ + + +
North Anna 1[b, k]	Old Dominion Cooperative	10.4	+ + + +	[e, g]
North Anna 1[b, k]	Virginia Electric & Power Co.	89.6	+ + + +	+ + + +
North Anna 2[b, k]	Old Dominion Cooperative	10.4	+ + + +	[e, g]
North Anna 2[b, k]	Virginia Electric & Power Co.	89.6	+ + + +	+ + + +
Oconee 1[b]	Duke Power Co.	100	+ +	+ + + +
Oconee 2[b]	Duke Power Co.	100	+ +	+ + + +
Oconee 3[b]	Duke Power Co.	100	+ + +	+ + + +
Oyster Creek	AmerGen Energy Co., Inc.	100	+ + +	+ + + +[e]
Palisades	Consumers Energy Co.	100	+ + + +	+ + + +[e]
Palo Verde 1	Arizona Public Service Co.	29.1	+ + +	+ + + +
Palo Verde 1	El Paso Electric Co.	15.8	_	+
Palo Verde 1	Los Angeles Dept. of Water & Power	5.7	+ + + +	+ + + +[e]
Palo Verde 1	Public Service Company of New Mexico	10.2	+ +	+ + + +
Palo Verde 1	Salt River Project Agricultural Improvement & Power District	17.49	+ + +	[g]
Palo Verde 1	Southern California Edison Co.	15.8	+ + + +	[e, g]
Palo Verde 1	Southern California Public Power	5.91	+ + + +	+ + + +[e]
Palo Verde 2	Arizona Public Service Co.	29.1	+ + +	+ + + +
Palo Verde 2	El Paso Electric Co.	15.8	_	_

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			Baseline (most likely) scenario	
Plant name	**Owner**	**Ownership share of plant (percent)**	**Adequacy of trust fund balances as of end of 2000**	**Adequacy of recent trust fund contributions[a]**
Palo Verde 2	Los Angeles Dept. of Water & Power	5.70	+ + + +	+ + + +[e]
Palo Verde 2	Public Service Company of New Mexico	10.2	+ +	+ + +
Palo Verde 2	Salt River Project Agricultural Improvement & Power District	17.49	+ + +	[g]
Palo Verde 2	Southern California Edison Co.	15.8	+ + + +	[e, g]
Palo Verde 2	Southern California Public Power	5.91	+ + + +	+ + + +[e]
Palo Verde 3	Arizona Public Service Co.	29.1	+ + +	+ + +
Palo Verde 3	El Paso Electric Co.	15.80	_	+
Palo Verde 3	Los Angeles Dept. of Water & Power	5.7	+ + + +	+ + + +[e]
Palo Verde 3	Public Service Company of New Mexico	10.2	+ +	_ _ _
Palo Verde 3	Salt River Project Agricultural Improvement & Power District	17.49	+ + +	[g]
Palo Verde 3	Southern California Edison Co.	15.8	+ + + +	[e, g]
Palo Verde 3	Southern California Public Power	5.91	+ + + +	+ + + +[e]
Peach Bottom 1[d, j]	Exelon Generation Co., LLC	100	_ _ _	_ _ _
Peach Bottom 2[b, j]	Exelon Generation Co., LLC	50	+ +[i]	+ + +
Peach Bottom 2[b]	PSEG Nuclear, LLC	50	+ + +[i]	[g]
Peach Bottom 3[b, j]	Exelon Generation Co., LLC	50	+ + +[i]	+ + + +
Peach Bottom 3[b]	PSEG Nuclear, LLC	50	+ + + +[i]	[g]
Perry 1	Cleveland Electric Illuminating Co.	44.85	+ + +	+ + + +
Perry 1	Ohio Edison Co.	30	+ +	+ + +
Perry 1	Pennsylvania Power Co.	5.24	+	+ + +
Perry 1	Toledo Edison Co.	19.91	+ +	+ + + +
Pilgrim 1	Entergy Nuclear Operations, Inc.	100	+ +	_ _ _
Point Beach 1	Wisconsin Electric Power Co.	100	+ + +	+ + + +[e]
Point Beach 2	Wisconsin Electric Power Co.	100	+ + +	+ + + +[e]
Prairie Island 1	Xcel Energy	100	+	+ + + +
Prairie Island 2	Xcel Energy	100	+	+ + + +
Quad Cities 1[h]	Exelon Generation Co., LLC	75	+	+ +
Quad Cities 1[h]	MidAmerican Energy Holdings Co.	25	+ +	+ + + +
Quad Cities 2[h]	Exelon Generation Co., LLC	75	+	+ + + +
Quad Cities 2[h]	MidAmerican Energy Holdings Co.	25	_	+

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			Baseline (most likely) scenario	
Plant name	**Owner**	**Ownership share of plant (percent)**	**Adequacy of trust fund balances as of end of 2000**	**Adequacy of recent trust fund contributions[a]**
Rancho Seco[d]	Sacramento Municipal Utility District	100	_ _	_ _ _
River Bend 1	Entergy Gulf States, Inc.	100	+ + + +	+ + + +
Robinson 2[f, h]	Progress Energy Carolinas, Inc.	100	_ _	_ _
Salem 1	Exelon Generation Co., LLC	42.59	_	_ _
Salem 1	PSEG Nuclear, LLC	57.41	+ + +[i]	[e, g]
Salem 2	Exelon Generation Co., LLC	42.59	_	_
Salem 2	PSEG Nuclear, LLC	57.41	+ + +[i]	[g]
San Onofre 1[d]	San Diego Gas & Electric Co.	20	+ + + +	[e, g]
San Onofre 1[d]	Southern California Edison Co.	80	+ + +	[e, g]
San Onofre 2	Anaheim Public Utilities Dept.	3.16	+ + + +	[e, g]
San Onofre 2	Riverside Utilities Dept.	1.79	+ + + +	[e, g]
San Onofre 2	San Diego Gas & Electric Co.	20	+ + + +	[e, g]
San Onofre 2	Southern California Edison Co.	75.05	+ + + +	[e, g]
San Onofre 3	Anaheim Public Utilities Dept.	3.16	+ + + +	[e, g]
San Onofre 3	Riverside Utilities Dept.	1.79	+ + + +	[e, g]
San Onofre 3	San Diego Gas & Electric Co.	20	+ + + +	[e, g]
San Onofre 3	Southern California Edison Co.	75.05	+ + + +	[e, g]
Saxton[d]	GPU Nuclear	100	+ + + +	[e, g]
Seabrook 1	FPL Energy	88.2	+ + +[i]	+ + + +[i]
Seabrook 1	Hudson Light & Power Dept.	0.08	+ +	+ + + +
Seabrook 1	Massachusetts Municipal Wholesale Electric Co.	11.6	+ +	+ + +
Seabrook 1	Taunton Municipal Lighting Plant	0.1	+ +	+ + + +
Sequoyah 1	Tennessee Valley Authority	100	_	_ _ _
Sequoyah 2	Tennessee Valley Authority	100	_	_ _ _
South Texas Project 1	AEP (Texas Central Co.)	25.20	+ + + +[i]	+ + + +[i]
South Texas Project 1	City of Austin—Austin Energy	16	+ + + +	+ + + +
South Texas Project 1	City Public Service Board of San Antonio	28	+ + +	+ + + +
South Texas Project 1	Texas Genco	30.80	+ + + +[i]	+ + + +[i]
South Texas Project 2	AEP (Texas Central Co.)	25.20	+ + + +[i]	+ + + +[i]
South Texas Project 2	City of Austin—Austin Energy	16	+ + + +	+ + + +
South Texas Project 2	City Public Service Board of San Antonio	28	+ + + +	+ + + +

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			Baseline (most likely) scenario	
Plant name	Owner	Ownership share of plant (percent)	Adequacy of trust fund balances as of end of 2000	Adequacy of recent trust fund contributions[a]
South Texas Project 2	Texas Genco	30.80	+ + + +[i]	+ + + +[e, i]
St Lucie 1[h]	Florida Power & Light Co.	100	+ + + +	+ + + +[e]
St Lucie 2[h]	Florida Municipal Power Agency	8.7	+ + +	[g]
St Lucie 2[h]	Florida Power & Light Co.	85.2	+ + + +	+ + + +[e]
St Lucie 2[h]	Orlando Utilities Comm.	6.05	+ + + +	[e, g]
Summer[h]	South Carolina Electric & Gas Co.	66.67	_ _	_ _ _
Summer[h]	South Carolina Public Service Authority	33.33	+	+ + + +
Surry 1[b]	Virginia Electric & Power Co.	100	+ + +	+ + + +
Surry 2[b]	Virginia Electric & Power Co.	100	+ + +	+ + + +
Susquehanna 1	Allegheny Electric Cooperative	10	_ _	_
Susquehanna 1	PPL Susquehanna, LLC	90	+	+
Susquehanna 2	Allegheny Electric Cooperative	10	_ _	_
Susquehanna 2	PPL Susquehanna, LLC	90	+	+ + + +
Three Mile Island 1	AmerGen Energy Co., Inc.	100	+ + +	+ + + +[e]
Three Mile Island 2[d]	Jersey Central Power & Light	25	_[i]	[g]
Three Mile Island 2[d]	Metropolitan Edison Co.	50	_[i]	[g]
Three Mile Island 2[d]	Pennsylvania Electric Co.	25	_[i]	[g]
Trojan[d, f, j]	Eugene Water & Electric Board	30	_ _ _	[g]
Trojan[d, f, j]	Pacific Power & Light Co.	2.50	_	+ + + +
Trojan[d, f, j]	Portland General Electric Co.	67.50	_ _ _	_ _ _
Turkey Point 3[b]	Florida Power & Light Co.	100	+ + + +	+ + + +[e]
Turkey Point 4[b]	Florida Power & Light Co.	100	+ + + +	+ + + +[e]
Vermont Yankee	Entergy Nuclear Operations, Inc.	100	+[i]	+ + +[i]
Vogtle 1	City of Dalton (Georgia)	1.60	+ + + +	[e, g]
Vogtle 1	Georgia Power Co.	45.70	+ + + +	+ + + +
Vogtle 1	Municipal Electric Authority of Georgia	22.70	+ + + +	+ + + +
Vogtle 1	Oglethorpe Power Co.	30	+	_ _ _
Vogtle 2	City of Dalton (Georgia)	1.60	+ + + +	[e, g]
Vogtle 2	Georgia Power Co.	45.70	+ + + +	+ + + +
Vogtle 2	Municipal Electric Authority of Georgia	22.70	+ + + +	+ + + +

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			Baseline (most likely) scenario	
Plant name	**Owner**	**Ownership share of plant (percent)**	**Adequacy of trust fund balances as of end of 2000**	**Adequacy of recent trust fund contributions[a]**
Vogtle 2	Oglethorpe Power Co.	30	_	_ _ _
Waterford 3	Entergy Louisiana, Inc.	100	_	+
Watts Bar 1	Tennessee Valley Authority	100	+ + + +	_ _ _
Wolf Creek 1	Kansas City Power & Light Co.	47	+	_
Wolf Creek 1	Kansas Electric Power Cooperative	6	_ _	_ _ _
Wolf Creek 1	Kansas Gas & Electric Co.	47	+	+
Yankee Rowe[d]	Yankee Atomic Electric Co.	100	_	+ + + +
Zion 1[d]	Exelon Generation Co., LLC	100	_ _	_ _ _
Zion 2[d]	Exelon Generation Co., LLC	100	_ _ _	_ _ _

Legend

+ means that fund balance/recent contributions were 0 to 25 percent more than benchmark.

++ means that fund balance/recent contributions were 26 to 50 percent more than benchmark.

+++ means that fund balance/recent contributions were 51 to 100 percent more than benchmark.

++++ means that fund balance/recent contributions were 101 percent or more than benchmark.

_ means that fund balance/recent contributions were 0.1 to 25 percent less than benchmark.

_ _ means that fund balance/recent contributions were 26 to 50 percent less than benchmark.

_ _ _ means that fund balance/recent contributions were 51 to 100 percent less than benchmark.

Source: GAO analysis.

[a]Adequacy of recent contributions is based on responses to our survey. The percentages are more, or less, than the benchmark, meaning the owner has contributed more, or less, on average for 1999 and 2000 (cost adjusted to 2000) than the annual average of the present value amounts required in each subsequent year until its plant is retired.

[b]Plant's operating license extended for 20 years.

[c]Plants whose owners are expected to apply for 20-year license renewals by December 2003.

[d]Plant has permanently shut down.

[e]Trust fund balance exceeds present value of estimated decommissioning costs.

[f]Owner has, as of March 31, 2003, an additional method to support financial assurance obligations (e.g., parent company guarantee, statement of intent).

[g]Contributions data are not available.

[h]Plants whose owners have applied for 20-year license renewals, as of August 20, 2003.

[i]Includes balances and/or contributions from a previous owner's biennial report and/or responses to our survey.

[j]Owner had, as of March 31, 2001, an additional method to support financial assurance obligations (e.g., parent company guarantee, statement of intent).

[k]Liability is for decommissioning share and not ownership share.

Table 5: Selected Owners with More, or Less, Than Benchmark Trust Fund Balances and Contributions, under Optimistic Assumptions (by Percentage above or below Benchmarks)

			Optimistic scenario[b]	
Plant name	Owner[a]	Ownership share of plant (percent)	Adequacy of trust fund balances as of end of 2000	Adequacy of recent trust fund contributions[c]
Beaver Valley 1	Pennsylvania Power Co.	65	+	_ _ _
Browns Ferry 1[d]	Tennessee Valley Authority	100	+ +	_ _ _
Browns Ferry 2[d]	Tennessee Valley Authority	100	+ +	_ _ _
Browns Ferry 3[d]	Tennessee Valley Authority	100	+ +	_ _ _
Brunswick 1	Progress Energy Carolinas, Inc.	81.67	_	+
Columbia Generating Station	Energy Northwest	100	_	_ _
Dresden 1[e]	Exelon Generation Co., LLC	100	_ _ _	_ _ _[g]
Duane Arnold	Central Iowa Power Cooperative	20	_ _ _	_ _ _
Duane Arnold	Corn Belt Power Cooperative	10	_ _	_ _
Duane Arnold	IPL	70	_	_
Fermi 1[e]	Detroit Edison Co.	100	+	+ + + +[f]
Grand Gulf 1	South Mississippi Electric Power	10	_	_ _ _
Indian Point 1[e]	Entergy Nuclear Operations, Inc.	100	_ _ _[g]	_ _ _[g]
LaCrosse[e]	Dairyland Power Cooperative	100	+	+ + + +[f]
Limerick 1	Exelon Generation Co., LLC	100	_	_ _
Limerick 2	Exelon Generation Co., LLC	100	_	+
Maine Yankee[e]	Maine Yankee Atomic Power Co.	100	_	_
Palo Verde 2	El Paso Electric Co.	15.80	+	+
Peach Bottom 1[e]	Exelon Generation Co., LLC	100	_ _ _	_ _ _
Rancho Seco[e]	Sacramento Municipal Utility District	100	_ _	_ _ _
Robinson 2[d]	Progress Energy Carolinas, Inc.	100	+	+ + + +
Salem 1	Exelon Generation Co., LLC	42.59	_	_
Salem 2	Exelon Generation Co., LLC	42.59	+	+
Sequoyah 1	Tennessee Valley Authority	100	_	_ _ _
Sequoyah 2	Tennessee Valley Authority	100	+	_ _ _
Summer[d]	South Carolina Electric & Gas Co.	66.67	+ +	+ +

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			Optimistic scenario[b]	
Plant name	**Owner[a]**	**Ownership share of plant (percent)**	**Adequacy of trust fund balances as of end of 2000**	**Adequacy of recent trust fund contributions[c]**
Susquehanna 1	Allegheny Electric Cooperative	10	_ _	+
Susquehanna 2	Allegheny Electric Cooperative	10	_ _	+
Trojan[e]	Portland General Electric Co.	67.50	_ _	_ _
Vogtle 2	Oglethorpe Power Co.	30	+	_ _ _
Wolf Creek 1	Kansas Electric Power Cooperative	6	_ _	_ _
Zion 1[e]	Exelon Generation Co., LLC	100	_ _	_ _ _
Zion 2[e]	Exelon Generation Co., LLC	100	_ _	_ _ _

Legend

+ means that fund balance/recent contributions were 0 to 25 percent more than benchmark.

++ means that fund balance/recent contributions were 26 to 50 percent more than benchmark.

+++ means that fund balance/recent contributions were 51 to 100 percent more than benchmark.

++++ means that fund balance/recent contributions were 101 percent or more than benchmark.

_ means that fund balance/recent contributions were 0.1 to 25 percent less than benchmark.

_ _ means that fund balance/recent contributions were 26 to 50 percent less than benchmark.

_ _ _ means that fund balance/recent contributions were 51 to 100 percent less than benchmark.

Source: GAO analysis.

[a]Owners' funds were selected to be screened under optimistic assumptions based on our baseline results; namely, that the status of their trust funds was below baseline benchmarks on both balances and contributions.

[b]See appendix I for description of optimistic assumptions.

[c]Adequacy of recent contributions is based on responses to our survey. The percentages are more, or less, than the benchmark, meaning the owner has contributed more, or less, on average for 1999 and 2000 (cost adjusted to 2000) than the annual average of the present value amounts required in each subsequent year until its plant is retired.

[d]Plant whose owners have applied for 20-year license renewals or are expected to apply by December 2003, as of August 20, 2003.

[e]Plant has permanently shut down.

[f]Trust fund balance exceeds present value of estimated decommissioning cost.

[g]Includes balances and/or contributions from a previous owner's biennial report and/or responses to our survey.

Table 6: Selected Owners with More, or Less, Than Benchmark Trust Fund Balances and Contributions, under Pessimistic Assumptions (by Percentage above or below Benchmarks)

			Pessimistic assumptions scenario[b]	
Plant name	Owner[a]	Ownership share of plant (percent)	Adequacy of trust fund balances as of end of 2000	Adequacy of recent trust fund contributions[c]
Arkansas Nuclear 2[d]	Entergy Arkansas, Inc.	100	_	_ _ _
Beaver Valley 1	Ohio Edison Co.	35	_ _	_ _ _
Beaver Valley 2	Cleveland Electric Illuminating Co.	24.47	_	_ _
Beaver Valley 2	Ohio Edison Co.	41.88	_	_ _
Beaver Valley 2	Toledo Edison Co.	19.91	_	_
Big Rock Point[e]	Consumers Energy Co.	100	_ _	_ _ _
Brunswick 1	North Carolina Eastern Municipal	18.33	_ _	_ _
Brunswick 2	North Carolina Eastern Municipal	18.33	_ _	_ _
Brunswick 2	Progress Energy Carolinas, Inc.	81.67	_ _	_ _
Callaway	AmerenUE	100	_ _	_ _ _
Calvert Cliffs 1[f]	Constellation Energy Group	100	_	[g]
Calvert Cliffs 2[f]	Constellation Energy Group	100	_	[g]
Catawba 1[d]	Duke Power Co.	12.50	_	_
Catawba 1[d]	North Carolina Electric Membership	28.1	_ _	_ _ _
Catawba 1[d]	Piedmont Municipal Power Agency	12.5	_	_
Catawba 2[d]	North Carolina Electric Membership	28.1	_	_ _ _
Crystal River 3	City of Alachua Electric Dept.	0.08	_	[g]
Crystal River 3	City of Bushnell Utility Dept.	0.04	_	[g]
Crystal River 3	City of Kissimmee Utilities	0.68	_ _	[g]
Crystal River 3	City of Leesburg Municipal Electric	0.82	_ _	[g]
Crystal River 3	City of Ocala Utilities Division	1.33	_ _	[g]
Crystal River 3	Seminole Electric Cooperative, Inc.	1.70	_	_ _
Dresden 2[d]	Exelon Generation Co., LLC	100	_	_
Dresden 3[d]	Exelon Generation Co., LLC	100	_	_
Farley 1[d]	Alabama Power Co.	100	_	_

(Continued From Previous Page)

			Pessimistic assumptions scenario[b]	
Plant name	Owner[a]	Ownership share of plant (percent)	Adequacy of trust fund balances as of end of 2000	Adequacy of recent trust fund contributions[c]
Haddam Neck[e]	Connecticut Yankee Atomic Power Co.	100	_	_ _ _
Harris 1	North Carolina Eastern Municipal	16.17	_	_ _
Harris 1	Progress Energy Carolinas, Inc.	83.83	_	_ _
Humboldt Bay 3[e]	Pacific Gas & Electric Co.	100	_ _	_ _ _
Indian Point 2	Entergy Nuclear Operations, Inc.	100	_	_
Millstone 2	Dominion Nuclear Connecticut	100	_	[g]
Monticello	Xcel Energy	100	_ _	_ _
Palo Verde 1	El Paso Electric Co.	15.8	_ _	_ _
Palo Verde 3	El Paso Electric Co.	15.8	_ _	_ _
Palo Verde 3	Public Service Co. of New Mexico	10.20	_	_ _ _
Peach Bottom 2[f]	Exelon Generation Co., LLC	50	_[h]	_
Pilgrim 1	Entergy Nuclear Operations, Inc.	100	_	_ _ _
Prairie Island 1	Xcel Energy	100	_	_
Quad Cities 1[d]	Exelon Generation Co., LLC	75	_	_ _ _
Quad Cities 2[d]	Exelon Generation Co., LLC	75	_	_ _
Quad Cities 2[d]	MidAmerica Energy Holdings	25	_ _	_ _
Susquehanna 1	PPL Susquehanna, LLC	90	_ _	_ _
Vermont Yankee	Entergy Nuclear Operations, Inc.	100	_ _[h]	_ _[h]
Vogtle 1	Oglethorpe Power Co.	30	_ _	_ _ _
Waterford 3	Entergy Louisiana, Inc.	100	_ _	_ _
Wolf Creek 1	Kansas City Power & Light Co.	47	_ _	_ _
Wolf Creek 1	Kansas Gas & Electric Co.	47	_	_ _
Yankee Rowe[e]	Yankee Atomic Electric Co.	100	_ _	_ _ _

Legend

+ means that fund balance/recent contributions were 0 to 25 percent more than benchmark.

++ means that fund balance/recent contributions were 26 to 50 percent more than benchmark.

+++ means that fund balance/recent contributions were 51 to 100 percent more than benchmark.

++++ means that fund balance/recent contributions were 101 percent or more than benchmark.

_ means that fund balance/recent contributions were 0.1 to 25 percent less than benchmark.

_ _ means that fund balance/recent contributions were 26 to 50 percent less than benchmark.

_ _ _ means that fund balance/recent contributions were 51 to 100 percent less than benchmark.

Source: GAO analysis.

[a]Owners' funds were selected to be screened under pessimistic assumptions based on our baseline results; namely, that the status of their trust funds was 0 to 100 percent above baseline benchmark on balances and/or contributions.

[b]See app. I for description of pessimistic assumptions.

[c]Adequacy of recent contributions is based on responses to our survey. The percentages are more, or less, than the benchmark, meaning the owner has contributed more, or less, on average for 1999 and 2000 (cost adjusted to 2000) than the annual average of the present value amounts required in each subsequent year until its plant is retired.

[d]Plant whose owners have applied for 20-year license renewals or are expected to apply by December 2003, as of August 20, 2003.

[e]Plant has permanently shut down.

[f]Plant's operating license extended for 20 years.

[g]Contributions data are not available.

[h]Includes balances and/or contributions from a previous owner's biennial report and/or responses to our survey.

Comments from the Nuclear Regulatory Commission

Note: GAO comments supplementing those in the report text appear at the end of this appendix.

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

October 3, 2003

Mr. James E. Wells
Director, Natural Resources and Environment
United States General Accounting Office
441 G Street, NW
Washington, D.C. 20548

Dear Mr. Wells:

I would like to thank you for the opportunity to review and submit comments on the draft of the General Accounting Office's (GAO's) report entitled "Nuclear Regulation - NRC Needs More Effective Analysis to Ensure Accumulation of Funds to Decommission Nuclear Power Plants." The United States Nuclear Regulatory Commission (NRC) appreciates the time and effort that you and your staff have taken to review this topic.

See comment 1.

GAO concludes that the NRC's analyses of funding levels of co-owners of a nuclear power plant are inconsistent with its internal guidance, the NRC does not have a method of determining whether licensees are accumulating funds at sufficient rates to pay for decommissioning, and the NRC needs to establish criteria for taking action when licensees are at unacceptable levels of funding assurance.

See comment 2.

The NRC disagrees with GAO's first two conclusions and believes that to establish criteria for taking action when licensees are at unacceptable funding levels is secondary to its primary concern which is to assure that licensees are accumulating funds at appropriate rates. Further, in NRC's view, it is questionable whether the development of criteria to address insufficient funding levels is warranted, given the unique set of circumstances and considerations that would apply to each licensee.

See comment 3.

Therefore, the NRC recommends that GAO state, in its report, that: (1) NRC's practice with respect to analyzing decommissioning funds where nuclear power plants have co-owners is consistent with its internal guidance; (2) the NRC has a methodology that is different from GAO's for assessing whether funds are being accumulated appropriately, and GAO's conclusions regarding sufficient accumulation of funds is based on GAO's methodology that has not been reviewed and accepted by the NRC; and (3) the NRC's practice is to review licensees who have not accumulated sufficient funds on a case-by-case basis due, in part, to the complexity and range of circumstances that may arise with any given licensee, particularly those that are subject to the jurisdiction of State regulators. Specific comments are provided on the three main GAO conclusions, as described below, and are elaborated on in greater detail in the enclosure.

See comment 4.

- First, the GAO report states that NRC's internal guidance requires NRC to separately assess the status of each co-owner's trust funds against each co-owner's contractual obligations with other co-owners to fund decommissioning. We do not agree that the guidance requires assessment against co-owners' contractual obligations. The NRC

reviews the accumulated balances and planned future contributions of each co-owner in order to evaluate the total trust fund balance expected for each reactor. Where a nuclear power plant has multiple owners, it is the owners' collective responsibility to meet the funding requirements for the plant.

See comment 5.

- Second, while the GAO report suggests that the NRC use a "benchmark" amount of funds that owners should have accumulated by the end of year 2000 to determine if owners are "on track" to pay for eventual decommissioning, NRC regulations do not establish intermediate benchmarking levels, but rather establish the minimum balance that must be obtained at the permanent termination of operations. The NRC has always deferred to the State public utility commission, or other regulatory authority with rate making powers, to set rates to fund decommissioning trusts. The NRC determines whether there is reasonable assurance that adequate funds will be available for decommissioning by reviewing a licensee's current fund balance, its plan for future deposits, and its projected earnings, to the extent provided by NRC regulations, consistent with and in recognition of the significant role State regulatory authorities and FERC have in setting the rates at which licensees collect decommissioning funds.

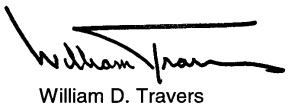
See comment 6.

- Third, the NRC's practice is to deal with licensees who have not accumulated sufficient funds on a case-by-case basis due in part, to the complexity and range of circumstances that may arise with any given licensee, particularly those that are subject to the jurisdiction of State regulators.

The NRC will continue to evaluate its processes and policies associated with the decommissioning of power reactor facilities. The enclosed NRC comments are intended to provide a more comprehensive perspective related to the conclusions and recommendations contained in the draft GAO report.

Should you have any questions about these comments, please contact either Mr. William Dean at 301-415-1703 or Ms. Melinda Malloy at 301-415-1785, of my staff.

Sincerely,



William D. Travers
Executive Director for Operations

Enclosure: As stated

**NRC Comments on the Draft General Accounting Office Report
"Nuclear Regulation - NRC Needs More Effective Analysis to
Ensure Accumulation of Funds to Decommission Nuclear Power Plants" (GAO-04-32)**

1. **The GAO report states on page 4: "Although the collective status of the owners' decommissioning fund accounts has improved since our last report, some individual owners are not on track to accumulate sufficient funds for decommissioning."**

See comment 7.

The NRC disagrees with GAO's conclusion that some individual owners are not on track to accumulate sufficient funds for decommissioning because GAO's conclusion is based on GAO's methodology which is different from the NRC's and has not been reviewed and accepted by NRC.

See comment 8.

The NRC recommends that GAO state, in its report, that NRC has a different methodology than GAO for assessing whether an owner is "on track." The NRC's methodology with respect to licensees who are authorized to accumulate funds over time assesses the reasonableness of the collection schedules proffered by licensees by weighing several factors such as the current fund balance, the licensee's plan for future deposits, and the projected earnings to the extent provided by NRC regulations, consistent with and in recognition of the significant role State regulatory authorities and FERC have in setting the rates at which licensees collect decommissioning funds.

Now on p. 3.

2. **On page 5, the GAO report states: ". . . contrary to NRC's internal guidance, for the plants with more than one owner, NRC did not separately assess the status of each co-owner's trust funds against the co-owner's contractual obligation to fund decommissioning."**

See comment 9.

The NRC does not agree that its assessment of plants is contrary to NRC's internal guidance. The NRC review process for decommissioning trust fund assurance does, in fact, incorporate the information regarding each licensee's amortization schedule, where multiple owners per license exist, and where such information for each licensee has been submitted individually (in some cases, a lead licensee will report information for all co-owners). The phrase "for its share of the facility" as taken from page 11 of NUREG-1577, Rev. 1, "Standard Review Plan on Power Reactor Licensee Financial Qualifications and Decommissioning Funding Assurance," only reflects that an individual co-owner should report its own information (absent other arrangements for a lead licensee to report on behalf of the other co-owners), and is not obligated to provide information for other co-owners. The phrase does not indicate that the NRC must analyze each co-owner's decommissioning funds with regard to its private contractual obligations. The NRC does not separately assess the status of each co-owner's decommissioning funding against the co-owner's private contractual obligation to fund decommissioning.

Enclosure

While the NRC recognizes that private contractual arrangements among co-owners exist, the NRC's primary concern is that on a plant basis, there are adequate funds available from the licensees of the plant on a collective or aggregate basis. The NRC reserves the right, in highly unusual situations where adequate protection of public health and safety would be compromised if such action were not taken, to consider imposing joint and several liability on co-owners for decommissioning funding when one or more co-owners have defaulted. The NRC's practice is consistent with this policy.

The NRC recommends that GAO revise its report to state that the staff's practice in analyzing decommissioning funding for plants with multiple owners is consistent with its internal guidance.

Now on p. 3.

3. **On page 6, the GAO report states: ". . . NRC has not established criteria for responding to any unacceptable levels of financial assurance. Accordingly, we are recommending that NRC develop and use an effective method for determining whether owners are accumulating funds at sufficient rates and establish criteria for responding to unacceptable levels of financial assurance."**

See comment 10.

The NRC disagrees with GAO's finding that the NRC has not developed and used a method of determining whether owner utilizing sinking funds are accumulating funds at sufficient rates. The NRC has a method which assesses the reasonableness of the collection schedule by weighing several factors. Therefore, the NRC recommends that GAO revise its report to state that the NRC has a method for determining whether owners are reasonably accumulating sufficient funds. If it is determined that unacceptable levels of financial assurance exist, the NRC will immediately seek licensees' plans to provide acceptable funding mechanisms, review those plans on a case-by-case basis in light of the specific circumstances involved, engage in discussions with relevant State regulators, and issue orders as necessary and appropriate. Beyond the general activities, the NRC has not established criteria for responding to unacceptable levels of financial assurance nor do we believe that such a criteria is worthwhile given the complexity and range of circumstances that may arise with any given licensee, particularly those who are subject to jurisdiction of State regulators.

Now on p. 7.

4. **On page 10, the GAO report includes a section entitled "Several Owners Are Not Accumulating Sufficient Funds for Decommissioning Their Plants."**

See comment 11.

The NRC analyzed a sample of licensees in 2001 to determine whether they were accumulating sufficient funds for decommissioning their plants. Based on the sample, the NRC did not find any owners who were not accumulating sufficient funds. The NRC recognizes that GAO's conclusions are based on GAO's own method of analysis, however, that method of analysis has not been accepted by the NRC.

See comment 12.

Therefore, the NRC recommends that GAO clarify its report to state that its conclusion that several owners are not accumulating sufficient funds is based on a GAO methodology or criteria that has not been accepted by the NRC. The NRC further recommends that GAO acknowledge in its report that there may be other acceptable methodologies or criteria to determine whether adequate funds are being collected that could yield different conclusions, particularly since there are many variables that reasonably can be incorporated into a given methodology.

Now on p. 14.

See comment 13.

-3-

5. **On page 16, the GAO report states: "They [NRC official] also stated that NRC's regulations do not prohibit each co-owner from being held responsible for decommissioning costs even if these costs are more than the co-owner's individual ownership share. However, assessing the adequacy of decommissioning costs on plant-wide basis is not consistent with the industry view, held by most plant owners, that each co-owner should be limited to its pro rata share of decommissioning expenses. . . . "**

   The NRC recognizes the existence of licensee arrangements via private contracts where licensees are responsible for decommissioning costs in proportion to their ownership interests, and does not object to these private contractual arrangements. However, the NRC reserves the right, in highly unusual situations where adequate protection of public health and safety would be compromised if such action were not taken, to consider imposing joint and several liability on co-owners for decommissioning funding when one or more co-owners have defaulted. Therefore, the GAO should revise its report to clarify that while there are a variety of industry practices and views, the NRC's primary intent is assuring the collective accumulation of decommissioning funds.

The following are GAO's comments on NRC's letter dated October 3, 2003.

GAO Comments

1. Rather than concluding that NRC does not have a method, we stated that the agency's analysis was not effective in identifying owners who might be at risk of accumulating insufficient funds to pay for decommissioning. For example, NRC relied on the owners' future funding plans to make up any shortfalls without verifying whether the plans are consistent with the owners' recent contributions. See also our response in the Agency Comments and Our Evaluation section on page 16.

2. We agree that NRC should be primarily concerned with ensuring that owners of nuclear power plants will have sufficient funds for decommissioning. However, we believe that NRC should take a proactive, rather than reactive, approach to providing owners and the public with a more complete understanding of NRC's expectations as to how they will hold owners who are not accumulating sufficient funds accountable. As discussed in the report, the lack of any specific criteria for acting on owners' decommissioning financial reports contrasts with NRC's practices in overseeing safety issues at nuclear plants, where the agency uses an "Action Matrix" that provides for a range of actions commensurate with the significance of safety inspection findings and performance indicators. Without similar criteria in its oversight of decommissioning funding assurance, NRC will not have a logical, coherent, consistent, and predictable plan of action if and when it encounters owners whose plants have inadequate financial assurance. See also our response in the Agency Comments and Our Evaluation section on page 16.

3. See our responses to comments 5, 6, and 9 in this appendix.

4. See our responses to comment 9.

5. We agree that current NRC regulations do not establish intermediate benchmarking levels, but rather establish the minimum balance that must be obtained when plants are retired. We also agree that the state regulatory authorities and Federal Energy Regulatory Commission play a role. However, we believe that NRC should take a more proactive approach in developing an effective method for ensuring that sufficient funds will be available for decommissioning. For example, a common expected rate of return could be used to project the earnings of each

owner's trust fund. NRC's current method allows the owners to use up to 2 percent (real) or another rate if approved by its state regulator. As we stated in our report, one state regulator approved owners of the same plant to use widely varying rates of return to project earnings on their trust fund investments. Other factors being equal, the owner using the higher rate would need to collect fewer funds than the owner using a lower rate of return. While the actual rate the owners will earn on their funds could be higher or lower, NRC accepted the state regulator-approved rates without assessing whether they were consistent with market expectations.

In another example, in its 2001 biennial report, one owner using NRC's 2 percent rate of return estimated that the amount of funds needed for decommissioning under NRC's regulations would be insufficient at five of its nuclear power plants. Therefore, the owner provided additional assurance in the form of a parent guarantee. However, the owner sought and subsequently received approval from its state regulator to use a higher real rate of return. After receiving the approval, the owner withdrew its parent guarantee since under the higher rate, the projected trust funds were sufficient to cover estimated decommissioning costs. We believe that by being more proactive, and not simply deferring to others, the NRC can develop a more effective and consistent method and better achieve its primary concern of ensuring that owners are accumulating funds at sufficient rates.

6. We found no evidence during our review that NRC has ever determined that an owner is not accumulating sufficient funds. Therefore, without any experience that its "practice" has been applied, we believe that without clear criteria, NRC will not have a logical, coherent, consistent, and predictable plan of action if and when it encounters owners whose plants have inadequate financial assurance. Accordingly, we are recommending that NRC establish criteria for responding to unacceptable levels of financial assurance.

7. We agree that our method is different from that used by NRC. Our draft discussed and reviewed NRC's analysis. Based on our review, we concluded that NRC's analysis was not effective in identifying owners who might be at risk of accumulating insufficient funds to pay for eventual decommissioning. For example, NRC relied on the owners' future funding plans, or on rate-setting authority decisions, in concluding that the owners were on track to fully fund decommissioning. However, we found some owners' actual

contributions in 2001 were much less than what they stated in their 2001 biennial reports to NRC that they planned to contribute. For example, one owner contributed about $1.5 million (or 39 percent) less than the amount it told NRC that it planned to contribute. Moreover, using actual contributions the owners had recently made to their trust funds, we identified several owners that are at risk of accumulating insufficient funds to pay for eventual decommissioning.

8. We do not believe any changes are needed.

9. We agree, and the our draft report stated, that NRC does not separately assess the status of each co-owner's decommissioning funding against the co-owner's private contractual obligation to fund decommissioning. The NRC guidance states: "Some licensees are part owners of power reactors. In such cases, the [NRC] reviewer should evaluate separately each licensee's [co-owner's] *amortization* schedule [i.e., decommissioning funding] for its share of the facility, unless the lead licensee has agreed to coordinate funding documentation and reporting for all co-owners." Nonetheless, we revised the report to remove any inferences that NRC's practice is inconsistent with its internal guidance. Notwithstanding NRC's characterization of its practice, we believe that both the guidance and NRC's actions do not go far enough. For example, the guidance allows for an exception when the lead licensee agrees to coordinate documentation and reporting. More importantly, the critical issue is that NRC should do more to develop an effective method for assessing the adequacy of nuclear power plant owner's trust funds for decommissioning. Under NRC's current method, it combines the trust funds for all co-owners of a nuclear plant and then assesses the adequacy of decommissioning funds on a plant-wide basis. However, as our analysis indicates, combining the trust funds of several owners can produce misleading results because those co-owners with more than sufficient funds can appear to balance out those with less than sufficient funds. In addition, as a practical matter, owners have contractual agreements to pay for their share of decommissioning, and the trust funds are generally not transferable among owners. Unless NRC separately evaluates the adequacy of each co-owners' decommissioning trust fund, the agency's existing process would appear to require some co-owners to pay more than their fair share of decommissioning costs. We believe this would be inconsistent with NRC's stated policy of generally not looking to one co-owner to bail out another.

10. Rather than state that NRC has not developed and used a method, we found that the agency's method was not effective in identifying owners who might be at risk of accumulating insufficient funds to pay for decommissioning. For example, we identified several limitations in NRC's method, including the agency's practice of combining the trust funds for all the co-owners of a nuclear plant and then assessing whether the combined value of the trust funds is sufficient. We believe that this practice can produce misleading results because those co-owners with more than sufficient funds can appear to balance out those with less than sufficient funds.

    In addition, we agree that NRC has not established criteria for taking action when it finds cases of unacceptable levels of financial assurance. According to NRC officials we spoke to, NRC has never identified an owner with unacceptable levels of financial assurance. Moreover, the general activities that NRC stated above are not included in its internal guidance for reviewing the owners' biennial reports. We believe that NRC should take a more proactive approach to providing owners and the public with a more complete understanding of NRC's expectations as to how they will hold owners who are not accumulating sufficient funds accountable. We believe having established criteria for taking action when it is determined that unacceptable levels of financial assurance exist will better prepare NRC to make this determination. Furthermore, having such criteria would not only increase public confidence that NRC has a plan to take action to ensure sufficient funds will be available for decommissioning but also would make its determination of inadequacy more transparent to owners.

11. As indicated in our draft report, we reviewed NRC's analysis of the owners' 2001 biennial reports. Our review clearly points out that the agency's method has limitations that reduce its effectiveness. For example, NRC relied on the owners' future funding plans to make up any shortfalls without verifying whether those plans are consistent with the owners' recent contributions. We found that some owners' actual contributions in 2001 were much less than what they stated in their 2001 biennial reports to NRC that they planned to contribute. For example, one owner contributed about $1.5 million (or 39 percent) less than the amount they told NRC that they planned to contribute. In addition, based on our analysis using the actual contributions the owners recently made to their trust funds, we found that 28 owners with ownership shares in 44 plants contributed less than the amounts we estimate they will need to contribute over the remaining life of their

plants to meet their decommissioning obligations. Accordingly, we believe that our recommendation to NRC to develop an effective method is clearly warranted to ensure that all owners are accumulating funds at sufficient rates. See also our response to comment 12.

12. As stated in our draft, our conclusions are based on a method that uses a benchmark to assess the adequacy of each nuclear plant owner's decommissioning trust fund. In addition, our draft stated that this benchmark is not the only way an owner could accrue enough funds to pay future decommissioning costs. Still, we believe that our benchmark is useful for assessing the status of the owners' decommissioning trust funds because it (1) provides a common standard for comparisons among owners, (2) embodies the principle of economic efficiency in that the price of a product (i.e., electricity) should, if possible, equal all of its costs—current and accrued, and (3) provides for transparency in that it assumes that current and future users pay the same decommissioning fees, in constant present-value terms.

13. As we stated in our draft, NRC stated that it will not impose decommissioning costs on co-owners in a manner inconsistent with their agreed-upon shares, except in highly unusual circumstances when required by public health and safety considerations and that it would not seek more than the *pro rata* shares from co-owners with *de minimis* ownership. Nevertheless, unless NRC separately evaluates the adequacy of each co-owners' decommissioning trust fund, the agency's existing process would appear to require some co-owners to pay more than their fair share of decommissioning costs. We believe this would be inconsistent with NRC's stated policy of generally not looking to one co-owner to bail out another one.

GAO Contact and Staff Acknowledgments

GAO Contact

Tim Guinane (202) 512-4939

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