DECOMMISSIONING FUNDING ADEQUACY FOR NUCLEAR POWER PLANTS: SCENARIO ANALYSES (2000) -- INDUSTRY-WIDE, INDIVIDUAL FUND AND PLANT

D. G. Williams
Center for Economics
Office of Applied Research and Methods
U.S. General Accounting Office
Washington, DC

ABSTRACT

**** *The views, opinions, and results expressed in this paper are those of the author and do not necessarily reflect those of the U.S. General Accounting Office* ****

This paper presents some of the major simulation results reported in a recent U.S. General Accounting Office (GAO) Report -- *GAO-04-32*, October 2003 -- to assess the adequacy of U.S. electric utilities, as of December 31, 2000, to eventually decommission the nation's nuclear power plants. This paper describes this adequacy with respect to a *benchmark* for 222 *individual* decommissioning funds; the paper also contains some additional results – by reactor -- not included in our GAO Report. An earlier GAO Report (*GAO/RCED-99-75*, May 1999) assessed this adequacy, as of December 31, 1997, in a more aggregative manner -- by 76 individual utilities. Both GAO reports addressed three alternative assumption scenarios – baseline (most likely), optimistic, and pessimistic – and, for purposes of comparison, held *all* funds/utilities to the same key assumptions pertaining to each scenario, respectively. Our current analysis and results -- because they are more disaggregated -- may be more meaningful and useful to industry/regulatory/utility/plant policymakers concerned with decommissioning funding issues.

Looking backward, in 2000, industry-wide fund balances in our *baseline* scenario were about 47 percent *above* benchmark levels. (In our optimistic scenario, about 83 percent above; in pessimistic, about zero percent above – i.e., "on track.") Looking forward, in 2000, industry-wide recent-year fund contributions in our *baseline* were about 107 percent *above* benchmark levels. (In our optimistic scenario, about 223 percent above; in pessimistic, about 18 percent below.) However, these excellent industry-wide results mask the true picture that, while often very good, is quite varied. 50 of the 222 separate fund balances, and 50 of the recent fund contributions (of 172 funds with contributions data available) are *below* their benchmark levels. Conversely, 51 funds, *given our baseline assumptions*, are "over-funded"; that is, they require no future funding contributions because their trust fund balances exceed the present value of their respective estimated decommissioning costs! For the 122 nuclear power plants in 2000 -- many jointly owned -- 32 have fund balance levels (combined) below benchmark. Of the 18 jointly-owned plants with *at least* one owner below its *individual* benchmark adequacy on balances, 10 plants are above benchmark on the *combined* balances for the plant. This result suggests that some owners are "carrying" the funding burden of others to achieve these above-benchmark plant-wide balances. More generally, some owners' share of plant-wide balances is much below

their corresponding ownership share of the plant, which suggests that these owners are less aggressively funding their reactor portions than are their co-owners.

Scenario analysis was used to show the effects of optimistic and pessimistic assumption "screens," respectively, on our year 2000 baseline results. In the baseline, only 34 (of 222) funds were below benchmark for *both* their balances and recent contributions. Of these 34, 18 funds were still below benchmark on both balances and contributions even under optimistic assumptions. (However, for 9 of these funds, their below benchmark results are understandable in that they correspond to plants that have been permanently closed *before* they had accumulated sufficient decommissioning funds.) On the other hand, under pessimistic assumptions, our results are not as sanguine, 82 (of 222) funds are below both balance and contributions benchmarks.

Our focus in this paper is on those funds with below benchmark results on *both* balances and recent contributions. In general, our funding adequacy results in our baseline (most likely) scenario are reassuring -- 188 of 222 decommissioning funds are above benchmark on at least their balances or contributions. Nonetheless, there may be some concern that under unfavorable conditions, this positive result could weaken substantially. 82 of the funds may require additional policy concern because of their below benchmark results under both measures if conditions are not as favorable as we expect. Also, the Nuclear Regulatory Commission (NRC) requires that multiple owners of plants share "equitably" in their funding (i.e., generally, the ownership share). However, our results show that they often do not. At plant closure, or at any point between the present and that closure, one owner should not be "carrying" the financial funding burden of another.

INTRODUCTION

Two recent U.S. General Accounting Office (GAO) Reports[a] have assessed the adequacy -- for optimistic, baseline and pessimistic scenarios -- of electric utilities' funds to eventually decommission the nation's nuclear power plants. The earlier GAO Report (May 1999) -- for 1997 -- used analysis based on relatively more aggregated data, by utility; the more recent GAO Report (October 2003) -- for 2000 -- used analysis based on more disaggregated data, by individual fund. At the WM'02 Symposium, with slightly improved simulation modeling capability, I extended the analysis of our earlier GAO Report and presented a paper[b] assessing the recent baseline *trends* in funding adequacy over 1997-2000. A shortened version of this paper was published in the *Nuclear Plant Journal*.[c] At WM'03, I presented a paper,[d] using the same data sources, describing further results – namely, trends (1997-2001), and sensitivity (2001) and scenario (2001) analyses.

The present paper presents some of the major simulation/scenario results contained in our latter GAO Report (*GAO-04-32*, October 2003) as well as some additional results – those organized by reactor. In this analysis, we present the adequacy of utility decommissioning funding (as of December 31, 2000) for 222 separate utility/plant funds, but (1) use new data sources to construct revised sets of assumptions and (2) use more disaggregated data for the full universe of 99 utility owners (and their related 222 separate funds). These adequacy results are therefore organized by the separate funds. Industry-wide, and even individual utility, results can be

misleading. Utility A with over-benchmark-level funds will not transfer funds to utility B with under-benchmark funds. Nor, in general, will the Nuclear Regulatory Commission (NRC) permit a utility to transfer its funds from its over-benchmark-funded plant to its under-benchmark-funded plant.

METHODOLOGY

The spreadsheet simulation models used in our decommissioning funding adequacy analyses are essentially large "what if" financial/economic models whose results for each utility/fund depend upon the values chosen for the key assumptions. The *definition* of each benchmark fund balance and benchmark current-year contribution – our looking-backward and looking-forward adequacy analyses, respectively -- can be explained by using a simplified example: If, by December 31, 2000, a utility with 100% ownership of a single reactor has "used up" 40 percent (e.g., 16 years) of the 40-year lifespan of this reactor, its actual balance in this reactor's *separate* fund should equal its benchmark balance of 40 percent of the *present value* of the future decommissioning costs for this reactor. If, say, this utility has accumulated only 30 percent, then its actual balance would be 25 percent *below* its benchmark balance at this time.[e]

However, this above utility could currently be contributing to its fund at a much higher rate than it has been, on average, in the past and, thus, be showing that it likely will "make up" that shortage over its future funding years (e.g., 24 years). (For such funds that are below benchmark on balances but *above* benchmark on contributions, funding adequacy concern may be reduced because these funds appear in recent years to be "making up" their shortfalls in their balances.) If the utility's most recent two-year cost-adjusted average contribution were *above* the annual-average present-value of its future required contributions (i.e., the *present value* of 70% of the future costs, divided by 24 years), then it would currently be contributing *above* its benchmark amount. For example, if this benchmark amount were, say, $2 million, and its recent average yearly contribution were $3 million, it would currently be contributing at a rate 50% *above* its benchmark. Note, however, that: *this assessment of contribution adequacy* ***assumes*** *that a utility will increase yearly its most recent (two-year-average-cost-adjusted) contribution, over the remaining life of its reactor, by the after-tax rate-of-return on its decommissioning fund.*

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 fairly, and transparently, to electricity purchasers over time.

However, this benchmark is not the only possible funding stream for a utility. A below benchmark result(s) for a utility does not mean that the utility cannot, or will not, "catch up" and finance its future decommissioning costs.[f] In fact, there are, mathematically, an infinite number of possible funding streams for a utility that can accumulate funds sufficient for

decommissioning. No utility can be expected to fund precisely at its benchmark rate; rather this rate may represent more of an "ideal" annual average to be achieved over several years. A below benchmark result(s) merely means that such a utility will have to increase its future yearly contributions at a faster rate than the annual rate assumed in the benchmark future contribution stream – the assumed after-tax rate-of-return on the decommissioning fund assets.

KEY INPUT DATA

For the key data used in our analysis, for our base year of 2000, we used the owner's 2001 biennial reports and responses from a mail survey[g] 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 the NRC and other NRC publications.

(2) A decommissioning cost estimate for each owner's plant "portion" (that is, a current dollar amount for the year – generally 2000 -- that the estimate was made). (In general, this decommissioning cost-responsibility portion corresponds to the ownership portion of the plant.) 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) 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 non-radiation 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.

KEY ASSUMPTIONS DATA

The decommissioning funding adequacy analyses of the industry-wide trust funds, and of the trust funds of individual owners, depend on six key assumptions. The values for these six assumptions vary based upon the scenario: baseline (most likely), optimistic, or pessimistic. For example, in the pessimistic scenario, we include: (1) a 40-percent increase in decommissioning costs estimates to reflect the cost underestimation "fears" of many industry observers, and (2) a 5-percent decline in fund asset values to reflect the likely drop in such values over the past several years since 2000. (Because about 50 percent of decommissioning fund assets in 2000 were in bonds, this assumed 5-percent decline may be less than many would have expected!)

For each scenario, we used the same assumption values for each owner and each plant in order to apply an "even-handed" standard. Table I lists these six key assumptions: (1) future after-tax annual-average rate-of-return on decommissioning fund assets (discount rate), (2) future annual-average decommissioning cost escalation rate, (3) alternative initial decommissioning cost estimates, (4) alternative start of "instantaneous" decommissioning – years after permanent shutdown, (5) alternative operating license expiration year, and (6) alternative market values for decommissioning funds.

Table I Six Key Assumptions – Optimistic, Baseline, and Pessimistic Scenarios

Key Assumptions, Year 2000		**SCENARIO**		
Type	Units	Optimistic	**Baseline**	Pessimistic
After-Tax Rate-of-Return on Fund, Annual-Average	(%)	5.58 %*	**5.62 %****	6.40 %***
Decommissioning Cost Escalation Rate, Annual-Average	(%)	4.47 %	**4.60 %**	5.31 %
Initial Decommissioning Cost Estimates, *Increase*	(%)	-5.0 %	**0.0 %**	40.0 %
Start of "Instantaneous" Decommissioning after Shutdown	(# Years)	7.5	**2.5**	2.0
Operating License Expiration Year, Years Extension	(20 Years)	38 plants	**16 plants**	16 plants
Decommissioning Fund Market Value, *Increase*	(%)	0.0%	**0.0%**	-5.0%

* Real rate: 1.11%; ** Real rate: 1.02%; and *** Real rate: 1.09% -- each relative to scenario cost escalation rate.

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.[h] We used these five weights 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. On average, these decommissioning funds contained roughly a 50-50 split between equity-like and bond-like assets.

Using a long-term forecast (as of January 30, 2003) from Global Insight (an economic forecasting company), we developed a forecast for each asset category under a baseline, pessimistic, and optimistic forecast scenario.[i] For the baseline scenario, we calculated a forecast (current-dollar) annual-average 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.[j] 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.)

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.[k] 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.

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.[l] 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.[m] From these real after-tax rates of return, we computed implied cost-escalation rates of 5.31 percent and 4.47 percent for the pessimistic and optimistic scenarios, respectively.[n]

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.

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.

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.[o] 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-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.

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 20-year license renewals for some plants, and it may approve 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.[p] 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.[q] In general, these plant license renewals suggest that the electricity market today is robust and owners expect higher electricity prices in the future. This expectation is in contrast to conditions reported in our earlier 1999 GAO Report (for 1997), 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; in the pessimistic scenario, we assumed that 26 plants (these 6 plus 20 others) would be similarly retired early.

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.

MODEL RESULTS

This section describes some of our decommissioning fund adequacy results -- by industry-wide, and by individual fund and reactor. Through 2000, using our baseline (most likely) economic

assumptions, the owners of 122 operating and retired nuclear power plants in the United States collectively had accumulated about $26.9 billion in their decommissioning funds. This was about $8.6 billion more than the $18.3 billion we estimate they needed *at that point* to ensure that sufficient funds would be available to cover the approximately $33 billion (in present-value) estimated decommissioning costs when the plants are retired.

In the following tables, I present some detailed results of our analyses of the adequacy of the nuclear industry's 222 decommissioning trust funds for 99 owners of all, or parts of, 122 nuclear power plants. Note that the differences in the sizes of these 222 separate funds among utilities, and the number of funds owned by a utility, can be great. For example, one utility, Exelon Generation Co., has 20 separate funds for 20 plants (14 with 100-percent ownership) while another utility, City of Bushnell Utility Co., owns only 0.04 percent of one plant, Crystal River 3. In general, the decommissioning cost share responsiblity of a utility is its ownership share of a plant. For comparison, we also present our industry-wide results, but stress the importance of the results for the individual funds, rather than the "average" results for the industry as a whole. Industry-wide results can be very misleading, masking the below benchmark results for many individual owner/funds. Nonetheless, these aggregated results are the types of results that the nuclear industry often reports.

In Table II, we show -- for 2000 -- the industry-wide, weighted-average results by each of three scenarios – baseline (most likely), optimistic, and pessimistic. In the baseline, average balances for 12/31/00 are 47 percent above their benchmark level and average contributions for years 1999 (cost-adjusted) and 2000 are 107 percent above benchmark – a very positive, albeit misleading picture for the diversity of adequacy results among the 222 individual funds. The effect on the industry-wide results of using, respectively, our optimistic and pessimistic assumptions, is substantial. In the optimistic scenario, the average adequacy of balances rises to 83 percent above benchmark, while the average adequacy of contributions rises even more sharply to 223 percent above benchmark. Conversely, in the pessimistic scenario, the average adequacy of balances falls to 0 percent above benchmark – i.e., "on track" -- while the average adequacy of contributions falls even more sharply to 18 percent *below* benchmark. For mathematical reasons, the adequacy results for balances are relatively less sensitive (i.e., less "leveraged") to changes in assumptions than are the adequacy results for contributions.

Table II Status of Combined Trust Fund Balances and Current Contributions:
Compared to Industry-wide Benchmark Balances and Current Contributions
(Adequacy, by Percentages, Above or below Benchmark Levels)

Analysis Category, Year 2000	**Number of Funds**	**Scenario**		
Industry-wide		**Optimistic**	**Baseline**	**Pessimistic**
		%	**%**	**%**
Adequacy of:				
Balances: 12/31/00	222	83	47	0
Current Contributions (00 & 99)*	172**	223	107	-18

* Two-year annual average -- for 2000 and 1999 (cost-adjusted to 2000, by key assumption).
** For those 172 of 222 decommissioning funds that responded to our GAO survey.

In Table III, for 2000, we show that -- looking backward -- while the majority (172) of the 222 funds are above benchmark balance levels, a sizable number of funds (50) are *below* benchmark. Conversely, 51 of 222 funds, *given our baseline assumptions*, are "over-funded"; that is, they require no future funding contributions because their trust fund balances exceed the present value of their respective estimated decommissioning costs! Looking forward, while 122 of 172 funds are above benchmark current contributions, a sizable number of funds (50) are below benchmark. For adequacy of funding, not all of these above 50 below-benchmark-balance funds should be considered of equal concern; namely, 10 of these funds have *above* benchmark recent contributions. Thus, these 10 may be of lesser concern because they appear to be currently making up the shortages in their balances. Conversely, of the 172 funds with above benchmark balances, 17 have *below* benchmark recent contributions. For these 17 funds, this result may, or may not, be of concern depending upon *how much* their balance adequacy percentages are above their respective benchmark balances. For those with balances *far above*, their current contributions can perhaps be lower than benchmark over at least the short-run.

Table III. Status of Individual Owners' Trust Fund Balances through 2000, Compared with Benchmark Trust Fund Balances; and Status of Individual Owners' Current Trust Fund Contributions (2000 and 1999), Compared with Benchmark Trust Fund Contributions (Under Baseline -- Most Likely -- Assumptions)

Analysis Category, Year 2000	**Scenario: Baseline**		
	Number of Funds:		
Adequacy of:	Above Benchmark	Below Benchmark	Total
Balances: 12/31/00	172**	50***	222
Current Contributions (00 & 99)*	122	50	172****

* Two-year annual average -- for 2000 and 1999 (cost-adjusted to 2000, by key assumption).

** For 43 of these 172 funds, no contributions data are available; but for 23 of these 43 funds, no future contributions are required because they are "over-funded."

*** For 7 of these 50 funds, no contributions data are available.

**** For those 172 of 222 decommissioning funds that responded to our GAO survey; thereby, providing us with contributions data. Accordingly, no contributions data are available for 50 funds.

Table IV -- for 2000 -- includes the 82 of 222 decommissioning funds that showed below benchmark balances *and* current contributions under the *pessimistic* scenario.[r] To conserve space, we show the balance and contributions adequacy percentages for these 82 funds for only the baseline scenario. One of the objectives of this paper is to identify, and focus, on those funds with below benchmark results so that the NRC and/or the utility's corresponding Public Utility Commission (PUC) can monitor and assist these owner/funds more closely. More specifically, Table IV includes those funds that, under more adverse conditions, will show *below* benchmark percentages under *both* of our adequacy measures – the looking-backward and looking-forward analyses. These funds, in particular, may be funds that should be monitored, and "prodded" more closely so that future users of the plant's electricity will pay a rate that more closely embodies their benchmark, or "fair share," accrued portion of the plant's future decommissioning costs. For example, a plant that is permanently shut *before* it has been fully funded will require "make up" decommissioning cost fees from "somebody" -- perhaps from utility shareholders, or from ratepayers who are not now receiving their electricity from the closed, under-funded plant. To receive such fees from ratepayers would be a situation that can hardly be considered economically efficient, or equitable!

The 82 funds listed in Table IV -- below benchmark under both adequacy measures for the *pessimistic* scenario -- are separated into three groups by using optimistic, baseline and pessimistic "screens." This exercise shows how the number of these below benchmark funds will contract, or expand, under alternative assumption scenarios. Since the future is uncertain, the sensitivity of the number of funds included in this group to our alternative screens will suggest the degree to which the size and scope of this under-benchmark funding "problem" relates to alternative assumption scenarios. The pessimistic screen, of course, reveals the 82 of 222 funds (37 percent) in Table IV. The first group, in Table IV, 18 of 222 funds (8 percent), includes those funds whose balance *and* contributions adequacies are below their respective benchmarks not only under pessimistic and baseline assumptions, but also under an optimistic assumptions screen! These are perhaps the funds that should be monitored most intensely. (However, for 9 of these 18 funds, our results are very understandable – these funds are for plants that have already been permanently shut down, most prematurely, before being fully funded.)

The second group, in Table IV, consists of 16 funds whose balance *and* contributions adequacies are below their respective benchmarks under pessimistic and baseline screens, but not under an optimistic assumptions screen. Thus, under baseline -- or most likely -- conditions, 34 of 222 funds (15 percent) are below both benchmark measures. The third group, in Table IV, consists of 48 funds whose balance *and* contributions adequacies are below their respective benchmarks under only the pessimistic screen. Depending upon a regulator/policymaker's tolerance toward risk, our results may be either very encouraging, or a cause for some concern. That is, under optimistic assumptions, only 8 percent of funds are below benchmark under both balance and contributions adequacies. But, under baseline – most likely – conditions, 15 percent are below; and under pessimistic conditions, 37 percent are below!

Table IV Individual Owners' Funds (82) with:
Below Benchmark Trust Fund Balances, through 2000, and
Below Benchmark Current Trust Fund Contributions, 2000 and 1999, Under Pessimistic Assumptions
(Adequacy, by Percentages, Above or below Benchmark Levels, of those 82 Funds, Under Baseline Assumptions

Plant name	**Owner[a]**	**Owner-ship share of plant**	**Adequacy of trust fund balances, as of end of 2000, Under:**	**Adequacy of recent trust fund contributions[b] Under:**
82 (of 222 Total Owner/Funds) with below benchmark balances *and* current contributions under *pessimistic assumptions*			**Scenario: Baseline, Year 2000**	
18 Owner/Funds with below benchmark balances *and* current contributions under *all* three scenarios – optimistic, baseline, and pessimistic assumptions				
		%	**%**	**%**
Columbia Gen Sta	Energy Northwest	100	-22	-50
Dresden 1 [c]	Exelon Generation Co., LLC	100	-60	-85
Duane Arnold	Central Iowa Power Cooperative	20	-58	-72
Duane Arnold	Corn Belt Power Cooperative	10	-46	-45
Duane Arnold	IPL	70	-26	-33
Grand Gulf 1	South Mississippi Electric Power	10	-29	-73

Plant name	Owner[a]	Owner-ship share of plant	Adequacy of trust fund balances, as of end of 2000, Under:	Adequacy of recent trust fund contributions[b] Under:
Indian Point 1 [c]	Entergy Nuclear Operations, Inc.	100	-56 [e]	–94 [e]
Limerick 1	Exelon Generation Co., LLC	100	-16	-52
Maine Yankee [c]	Maine Yankee Atomic Power Co	100	-28	-49
Millstone 1 [c]	Dominion Nuclear Connecticut	100	-16	[g]
Peach Bottom 1 [c]	Exelon Generation Co., LLC	100	-73	-96
Rancho Seco [c]	Sacramento Municipal Utility	100	-48	-79
Salem 1	Exelon Generation Co., LLC	42.59	-16	-28
Sequoyah 1	Tennessee Valley Authority	100	-12	-100
Trojan [c]	Portland General Electric Co.	67.50	-51	-57
Wolf Creek 1	Kansas Electric Power Cooperative	6	-38	-53
Zion 1 [c]	Exelon Generation Co., LLC	100	-44	-99
Zion 2 [c]	Exelon Generation Co., LLC	100	-52	-96
16 Owner/Funds with below benchmark balances *and* current contributions under *baseline* and *pessimistic* scenarios only				
Beaver Valley 1	Pennsylvania Power Co.	65	-9	-67
Browns Ferry 1 [d]	Tennessee Valley Authority	100	-40	-100
Browns Ferry 2 [d]	Tennessee Valley Authority	100	-37	-100
Browns Ferry 3 [d]	Tennessee Valley Authority	100	-30	-100
Brunswick 1	Progress Energy Carolinas, Inc.	81.67	-31	-16.2
Fermi 1 [c]	Detroit Edison Co.	100	-6	–100
LaCrosse [c]	Dairyland Power Cooperative	100	-8	-100
Limerick 2	Exelon Generation Co., LLC	100	-17	-2
Palo Verde 2	El Paso Electric Co.	15.80	-2	-2
Robinson 2 [d]	Progress Energy Carolinas, Inc.	100	-41	-39
Salem 2	Exelon Generation Co., LLC	42.59	-9	-19
Sequoyah 2	Tennessee Valley Authority	100	-6	-100
Summer [d]	South Carolina Electric & Gas Co.	66.67	-35	-60
Susquehanna 1	Allegheny Electric Cooperative	10	-45	-13
Susquehanna 2	Allegheny Electric Cooperative	10	-36	-3
Vogtle 2	Oglethorpe Power Co.	30	-0	-61
48 Owner/Funds with below benchmark balances *and* current contributions under *pessimistic* scenario only				
Arkansas Nuclear 2 [d]	Entergy Arkansas, Inc.	100	17	-25
Beaver Valley 1	Ohio Edison Co.	35	7	5
Beaver Valley 2	Cleveland Electric Illuminating Co.	24.47	36	23
Beaver Valley 2	Ohio Edison Co.	41.88	35	-12
Beaver Valley 2	Toledo Edison Co.	19.91	29	38
Big Rock Point [c]	Consumers Energy Co.	100	4	+inf [f]
Brunswick 1	North Carolina Eastern Municipal	18.33	-15	8
Brunswick 2	North Carolina Eastern Municipal	18.33	-14	9
Brunswick 2	Progress Energy Carolinas, Inc.	81.67	-26	2
Callaway	AmerenUE	100	2	-34
Calvert Cliffs 1 [h]	Constellation Energy Group	100	11	[g]
Calvert Cliffs 2 [h]	Constellation Energy Group	100	14	[g]
Catawba 1 [d]	Duke Power Co.	12.50	21	74
Catawba 1 [d]	North Carolina Electric Membership	28.1	6	-100
Catawba 1 [d]	Piedmont Municipal Power Agency	12.5	23	47
Catawba 2 [d]	North Carolina Electric Membership	28.1	19	-100
Crystal River 3	City of Alachua Electric Dept.	0.08	19	[g]

Plant name	Owner[a]	Owner-ship share of plant	Adequacy of trust fund balances, as of end of 2000, Under:	Adequacy of recent trust fund contributions[b] Under:
Crystal River 3	City of Bushnell Utility Dept.	0.04	31	[g]
Crystal River 3	City of Kissimmee Utilities	0.68	9	[g]
Crystal River 3	City of Leesburg Municipal Electric	0.82	9	[g]
Crystal River 3	City of Ocala Utilities Division	1.33	3	[g]
Crystal River 3	Seminole Electric Cooperative, Inc.	1.70	27	79
Dresden 2 [d]	Exelon Generation Co., LLC	100	18	443
Dresden 3 [d]	Exelon Generation Co., LLC	100	14	173
Farley 1 [d]	Alabama Power Co.	100	15	119
Haddam Neck [c]	Connecticut Yankee Atomic Power	100	21	+inf [f]
Harris 1	North Carolina Eastern Municipal	16.17	19	-1
Harris 1	Progress Energy Carolinas, Inc.	83.83	21	21
Humboldt Bay 3 [c]	Pacific Gas & Electric Co.	100	5	+inf [f]
Indian Point 2	Entergy Nuclear Operations, Inc.	100	22	208
Millstone 2	Dominion Nuclear Connecticut	100	45	[g]
Monticello	Xcel Energy	100	-1	36
Palo Verde 1	El Paso Electric Co.	15.8	-3	14
Palo Verde 3	El Paso Electric Co.	15.8	-14	1
Palo Verde 3	Public Service Co. of New Mexico	10.20	39	-52
Peach Bottom 2 [h]	Exelon Generation Co., LLC	50	45 [e]	79 [e]
Pilgrim 1	Entergy Nuclear Operations, Inc.	100	27	-100
Prairie Island 1	Xcel Energy	100	15	134
Quad Cities 1 [d]	Exelon Generation Co., LLC	75	13	48
Quad Cities 2 [d]	Exelon Generation Co., LLC	75	16	141
Quad Cities 2 [d]	MidAmerica Energy Holdings	25	116	9
Susquehanna 1	PPL Susquehanna, LLC	90	3	19
Vermont Yankee	Entergy Nuclear Operations, Inc.	100	3 [e]	78 [e]
Vogtle 1	Oglethorpe Power Co.	30	1	-63
Waterford 3	Entergy Louisiana, Inc.	100	-11	9
Wolf Creek 1	Kansas City Power & Light Co.	47	3	-8
Wolf Creek 1	Kansas Gas & Electric Co.	47	13	15
Yankee Rowe [e]	Yankee Atomic Electric Co.	100	-0	4930

[a] Owners' funds were selected to be screened based on our pessimistic results; namely, that the status of their trust funds were below pessimistic benchmarks (i.e., "-", "-") on both balances and contributions adequacies.

[b] 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.

[c] Plant has been permanently shut down.

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

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

[g] Contributions data are not available.

[h] Plant's operating license has been extended for 20 years.

Of the 122 nuclear power plants (reactors) in 2000 -- many jointly owned -- 32 have fund balance levels (combined) below benchmark. Of these 122, 43 have multiple owners. With joint ownership, an important issue for regulators/policymakers is to insure that not only all of the owners will have shared "equitably" in the decommissioning funding for the plant at plant closure, but also that each owner -- over time -- has steadily funded its "fair share" for the decommissioning of the reactor. In NRC's analysis of the utilities' biennial reports to NRC, NRC does not currently assess the adequacy of the owners' *individual* balances for each respective plant; rather, it merely monitors whether the *combined* balance for the plant – at that time -- appears to be "satisfactory." [$] By contrast, our analysis assesses the individual balance of each owner to a benchmark standard.

Our baseline results, for 2000, show that for 25 of these 43 jointly-owned plants, all of their owners have balance adequacies for their individual funds that are above benchmark. (Obviously, the combined balances for each of these 25 plants would similarly be above benchmark.) For these 25, some owners currently have fund balance shares above their ownership shares, and some below. One could say, therefore, that many of these owners are not necessarily funding their "fair share." However, because each such owner is above its benchmark individual balance, the regulatory importance of this result is probably minimal.

However, of these above 43 plants, 18 have *at least* one part owner with *below* baseline benchmark adequacy in its individual balance for 2000. Table V lists these 18 plants/reactors, along with – for each reactor -- the names of their corresponding owners, their ownership shares, their shares of the combined reactor balances, and the adequacy of their individual balances relative to our baseline benchmark. For 10 of these 18, the combined reactor balance of each is above benchmark. This result suggests that some owners are "carrying" the funding burden of others to achieve these above-benchmark plant-wide balances. For the other 8, however, the combined reactor balance of each is below benchmark; for 3 of these 8, each reactor has a part owner with above benchmark individual balance. In such situations, the above benchmark funding of some owners has been more than offset by the corresponding below benchmark funding of other owners.

Table V 18 Multiple-Owner Plants -- Each Plant with *At Least* One Owner with Individual Decommissioning Fund Balance Below Baseline Benchmark Adequacy: Ownership Share; Owner Share of Balances; Balance Adequacy (Adequacy, by Percentages, Above or below Benchmark Levels)

Plant name	**Owner**	**Owner-ship Share**	**Owner Share of Balance**	**Actual Balance to Benchmark Balance**
		%	**%**	**%**
		Scenario: Baseline, Year 2000		
Beaver Valley 1	**All Owners:**	100	100	-4
	Pennsylvania Power Co.	65	61.19	-9
	Ohio Edison Co.	35	38.81	7

Plant name	Owner	Owner-ship Share	Owner Share of Balance	Actual Balance to Benchmark Balance
Brunswick 1	**All Owners:**	100	100	-28
	Progress Energy Carolinas, Inc.	81.67	78.16	-31
	North Carolina Eastern Municipal	18.33	21.84	-15
Brunswick 2	**All Owners:**	100	100	-24
	Progress Energy Carolinas, Inc.	81.67	79.38	-26
	North Carolina Eastern Municipal	18.33	20.62	-14
Duane Arnold	**All Owners:**	100	100	-34
	IPL	70	78.92	-26
	Central Iowa Power Cooperative	20	12.91	-58
	Corn Belt Power Cooperative	10	8.17	-46
Grand Gulf 1	**All Owners:**	100	100	5
	System Energy Resources, Inc.	90	93.86	9
	South Mississippi Electric Power	10	6.14	-29
Palo Verde 1	**All Owners:**	100	100	158
	Arizona Public Service Co.	29.10	19.31	71
	Salt River Proj Agri Impr & Power Dst	17.49	11.45	69
	El Paso Electric Co.	15.80	5.96	-3
	Southern California Edison Co	15.80	43.11	603
	Public Service Co of New Mexico	10.20	5.20	31
	Southern California Public Power Auth	5.91	7.65	234
	Los Angeles Dept of Water & Power	5.70	7.33	231
Palo Verde 2	**All Owners:**	100	100	159
	Arizona Public Service Co.	29.10	19.10	70
	Salt River Proj Agri Impr & Power Dst	17.49	11.01	63
	El Paso Electric Co.	15.80	6.01	-2
	Southern California Edison Co	15.80	43.21	608
	Public Service Co of New Mexico	10.20	5.39	37
	Southern Calif Public Power Auth	5.91	7.85	244
	Los Angeles Dept of Water & Power	5.70	7.42	237
Palo Verde 3	**All Owners:**	100	100	178
	Arizona Public Service Co.	29.10	16.83	61
	Salt River Proj Agri Impr & Power Dst	17.49	11.39	81
	El Paso Electric Co.	15.80	4.90	-14
	Southern California Edison Co	15.80	46.18	713
	Public Service Co of New Mexico	10.20	5.08	39
	Southern California Public Power Auth	5.91	8.35	293
	Los Angeles Dept of Water & Power	5.70	7.27	255
Quad Cities 2 a	**All Owners:**	100	100	5
	Exelon Generation Co b	75	72.62	16
	MidAmerican Energy Holdings Co b	25	27.38	-16
Salem 1	**All Owners:**	100	100	41
	PSEG Nuclear LLC (Pub Sv Enter Gp)	57.41	74.73	83
	Exelon Generation Co	42.59	25.27	-16
Salem 2	**All Owners:**	100	100	54
	PSEG Nuclear LLC (Pub Sv Enter Gp)	57.41	74.72	100
	Exelon Generation Co	42.59	25.28	-9
Summer a	**All Owners:**	100	100	-24
	S Carolina Elec & Gas (SCANA Corp)	66.67	56.34	-35
	S Carolina Public Service Authority	33.33	43.66	0

Plant name	Owner	Owner-ship Share	Owner Share of Balance	Actual Balance to Benchmark Balance
Susquehanna 1	**All Owners:**	100	100	-2
	PP&L Resources Inc	90	94.38	3
	Allegheny Electric Cooperative Inc	10	5.62	-45
Susquehanna 2	**All Owners:**	100	100	7
	PP&L Resources Inc	90	94.08	11
	Allegheny Electric Cooperative Inc	10	5.92	-36
Three Mile Isl 2 c	**All Owners:**	100	100	-15
	Metropolitan Edison Co	50	50	-15
	Jersey Central P & L Co	25	25	-15
	Pennsylvania Electric Co	25	25	-15
Trojan c	**All Owners:**	100	100	-65
	Portland General Electric Co (Enron)	67.50	93.27	-51
	Eugene Water & Electric Board	30	0.0	-100
	Pacific Power & Light Co	2.50	6.73	-5
Vogtle 2	**All Owners:**	100	100	109
	Southern Co (Georgia Power Co)	45.70	58.36	167
	Oglethorpe Power Co	30	14.33	-0
	Municipal Electric Authority Georgia	22.70	23.38	116
	Dalton Water & Light Com (City of)	1.60	3.94	415
Wolf Creek 1	**All Owners:**	100	100	5
	Westar Energy (Kansas City P&L Co)	47	45.96	3
	Westar Energy (Kansas G & E Co)	47	50.51	13
	Kansas Electric Powr Coop (KEPCO)	6	3.53	-38

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

[b] For Quad Cities 2, the ownership shares of Exelon and MidAmerican Energy do not exactly equal their cost responsibility shares. Namely, Exelon's cost responsibility share is 66%, while its ownership share is 75%; MidAmerican's cost share is 34%, while its ownership share is 25%. This difference may reflect a difference in cost estimation technique used by the two owners (e.g., site specific versus generic formula).

[c] Plant has been permanently shut down.

CONCLUSION

For nuclear regulators and policymakers, it is important for them to specify a *benchmark* funding adequacy standard(s) for each of the 222 *separate* decommissioning owner/funds for our nation's nuclear power plants. In this paper, we have specified, utilized, and listed some results from, one such standard that we believe can be useful from regulatory, economic efficiency, fairness, and transparency perspectives. Our adequacy results are organized by these 222 separate decommissioning funds. Industry-wide results, and even individual utility results, can be misleading and can mask below benchmark results for many individual funds. One utility will not transfer its over-benchmark-level funds to another utility with under-benchmark-level funds. Nor, in general, will the NRC permit a utility to transfer its funds from one of its plants to another.

It is particularly important for regulators to monitor more closely, and apply remedial action to, those funds that fall below one, or more, of our benchmark standards even though an owner may be able to, in the future, "catch up" in its funding shortage. The future is uncertain. Not all

owners will necessarily remain fiscally solvent, particularly as the nuclear industry evolves toward more retail competition beyond its previous, mostly regulated, state. PUCs may not always be able to assess "catch up" fees on ratepayers. Therefore, it would not be prudent for the nuclear industry to risk facing large un-funded liabilities for the already accrued portions of future decommissioning costs.

Scenario analysis ("screening") may provide nuclear policymakers with a wide variety of funding adequacy outcomes -- that evolve from alternative circumstances -- so that they can better assess the adequacy of utility decommissioning funding. Depending upon their tolerance toward risk, regulators and other interested parties can decide how important, and likely, such outcomes will be to them and, thereby, make appropriate policy decisions to address such possible outcomes.

FOOTNOTES

a/ U.S. General Accounting Office, Nuclear Regulation: Better Oversight Needed to Ensure Accumulation of Funds to Decommission Nuclear Power Plants, GAO/RCED-99-75, May 1999.

U.S. General Accounting Office, Nuclear Regulation: NRC Needs More Effective Analysis to Ensure Accumulation of Funds to Decommission Nuclear Power Plants, GAO-04-32, October 2003.

b/ Williams, Daniel G., "Recent Trends In The Adequacy Of Nuclear Plant Decommissioning Funding" (Reference/Abstract # 7), WM'02 Proceedings, Tucson, AZ, Feb. 24-28, 2002.

c/ Williams, Daniel G., "Adequacy of Funds for Nuclear Plant Decommissioning," Nuclear Plant Journal, Volume 20, No. 4, July-August 2002, pp. 29-31.

d/ Williams, Daniel G., "Substantial Variability Exists in Utilities' Nuclear Decommissioning Funding Adequacy: Baseline Trends (1997-2001) and Scenario & Sensitivity Analyses (Year 2001)" (Reference/Abstract # 225), WM'03 Proceedings, Tucson, AZ, Feb. 23-27, 2003.

e/ We assume that decommissioning will most likely (i.e., baseline) 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 of the plant's operation should equal $1/40^{th}$ of the present value of the costs, discounted over 41.5 years. At the end of the second year, the second contribution to the fund should equal $1/40^{th}$ of the present value of the costs, discounted over 40.5 years; thus the total trust fund (including earnings) -- at second year end -- 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 in that year.

f/ Note, however, that in "catching up," later-year purchasers of electricity from such a utility will pay more than their "fair share" of accrued decommissioning costs than those who bought electricity in earlier years.

g/ 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. 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. Nonetheless, the new owner might accumulate trust funds at a different rate than did the former owner.

h/ 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.

i/ 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).

j/ 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.

k/ Using rate of return data provided by 84 owners, we calculated a weighted-average difference between their pre-tax 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.

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

m/ 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%.

n/ For pessimistic, 6.40% - x% = 1.09%; therefore, x = 5.31%. For optimistic, 5.58% - y% = 1.11%; therefore, y = 4.47%.

o/ 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.

p/ 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.

q/ 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.

r/ These 82 funds in Table IV include 9 funds with no contributions data available. However, the balance adequacies for 8 of these 9 funds are below benchmark under only the pessimistic scenario; and for 1 of these 9 funds, under benchmark for also the baseline and optimistic scenarios.

s/ Nor, does NRC require that utilities (in their biennial reports to NRC) submit their recent-year contributions for each individual fund. Such data are required by our looking-forward funding adequacy measure that assesses such adequacy based on *actual* recent-year contributions behavior. What NRC requires is that each utility submit an adequate future contribution "plan" for each separate fund. Accordingly, it would be useful for NRC to regularly assess whether, or not, recent annual contributions have matched the sizes of those proposed contributions that were submitted in these past plans.