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603-668-0300

March 19, 1987

WILLIAM L. PHINNEY (1909-1977) JOHN J. SHEEHAN PERKINS BASS JOSEPH F. DEVAN COUNSEL

#### EXETER OFFICE

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50-443/444

ADMITTED IN MAINE

Director of Nuclear Reactor Regulation Nuclear Regulatory commission 1717 H Street NW Washington, DC 20555

> Re: Nuclear Decommissioning Financing Committee, NDFC 87-1

Dear Sir:

Here is a copy of the Notice of Hearing. Here also are copies of the required filings with the Committee.

Sincerely,

Edward A. Haffer

EAH:jc Enclosure

> 8703250181 870319 PDR ADOCK 05000443 p

#### NDFC 87-1

### NUCLEAR DECOMMISSIONING FINANCING COMMITTEE

..00..

Notice is hereby given that the Nuclear Decommissioning Financing Committee (NDFC), established pursuant to RSA 162-F:15, shall begin a public hearing process in accordance with RSA 541-A et seq. by holding a procedural hearing on April 20, 1987 at the New Hampshire Public Utilities Commission located at 8 Old Suncook Road, Concord, New Hampshire at 10:00 A.M.

The hearings are pursuant to the authority granted the NDFC by provisions of RSA 162-F:19 et seq. and will be conducted in accordance with the provisions of RSA 541 A:16.

The purpose of this proceeding is to establish a nuclear decommissioning fund in the office of the State Treasurer for the Seabrook Station nuclear plant. RSA 162-F:19 I.

The purpose of the public hearings in this proceeding is for the NDFC to receive information on funding requirements of the nuclear decommissioning fund to be established for the Seabrook Station Unit I at Seabrook, New Hampshire. RSA 162-F:21.

The hearings in this proceeding will be conducted in two phases. The first phase of the hearings will commence with the procedural hearing to be held on April 20, 1987, with additional hearings thereafter to receive information on funding requirements. Thereafter, further public hearings, in the second phase of the proceeding, will be conducted on the Committee's proposed plan after appropriate notice is given. RSA 162-F:21 IV.

The April 20, 1987 procedural he ring shall include, but is not limited to, consideration of the following:

- 1. Intervention of parties;
- 2. Simplification of the issues;
- Stipulations or admissions as to issues of fact or proof by consent of the parties.
- Specification of witnesses. Limitation of number of witnesses.
- Consolidation of witnesses of the parties.
- 6. Discovery schedule, if any.
- 7. Order of proceeding between parties.
- Hearing schedule for evidentiary hearings.

Requests for intervention shall be filed in accordance with the Chairman of the Nuclear Decommissioning

Financing Committee, Vincent J. Iacopino, 8 Old Suncook Road, Concord, New Hampshire 03301 no later than April 17, 1987.

To facilitate the proceedings, New Hampshire Yankee shall file all written testimony with supporting exhibits, attachments or other evidence with the Committee on or before March 20, 1987 and shall furnish a copy of such documents to any person who requests them. In addition, a copy shall be placed on file with the New Hampshire State Library, New Hampshire Public Utilities Commission, the Treasurer's Office and the Town Clerk/Selectmen's Office in Seabrook, New Hampshire.

New Hampshire Yankee shall notify all persons desiring to be heard to appear at said public hearings, commencing with the April 20, 1987 procedural hearing, when and where they may be heard upon the questions of whether the establishment of a nuclear decommissioning fund and the funding requirements for said fund are in the public good, by causing a copy of this notice to be published at least twice in a newspaper having general circulation in that portion of the State in which operations are proposed to be conducted and a newspaper having state-wide circulation, such publication to be no later than March 27, 1987, said publication to be designated in an affidavit to be made on a copy of this notice and filed with this Committee on or before April 17, 1987.

New Hampshire Yankee shall also publish a copy of this notice of the time and place of hearing at two appropriate public places in Seabrook, New Hampshire. New Hampshire Yankee shall further notify the Attorney General's Office, the Consumer Advocate, the New Hampshire Public Utilities Commission and the United States Nuclear Regulatory Commission and all Joint Owners by sending a copy of this notice to each of them.

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HDFC 87-1

Vincent J. Iacopino, Chairman

<u>Acorgie A Thomaskie</u> Georgie A. Thomas Secretary/Treasurer

March 17, 1987

#### SHEEHAN, PHINNEY, BASS & GREEN, PROF. ASS'N

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#### MANCHESTER, NEW HAMPSHIRE 03105-3701

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WH & GREEN RICHARD A. MORSE KIMON S. ZACHOS ROBERT E. DASTIN ALAN & REISCHE JANES E. HIGGINS THOMAS H. RICHARDS JON S. RICHARDSON W MICHAEL DUNN PETER F. KEARNS AMES O. SHIPLEY ROBERT B. FIELD. JR. WILLIAM J. DONOVAN BRADFORD E. COOK JOHN D. COLLIANDER ALAN P CLEVELAND CLAUDIA C. DAMON EDWARD A. HAFFER MICHAEL C. HARVELL HENRY B. STEBBINS STEPHEN E. WEYL WAYNE T. MURRAY NICHOLAS J LAZOS DANIEL W. SHLAN THOMAS J. FLYGARE

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#### HAND-DELIVERED

March 19, 1987

WILLIAM L. PHINNEY (1909-1977)

JOHN J. SHEEMAN PERKINS BASS JOSEPH F. DEVAN COUNSEL -

EXETER OFFICE

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ADMITTED IN MAINE

Vincent J. Iacopino, Chairman Nuclear Decommissioning Financing Committee 8 Cld Suncook Road Concord, NH 03301

Re: NDFC 87-1

Dear Chairman Iacopino:

On behalf of New Hampshire Yankee, we enclose 15 copies of the following: (1) Dec Rule 301.1 Information; (2) New Hampshire Yankee's Opening Statement; and (3) New Hampshire Yankee's prepared testimony and exhibits, consisting of the testimony of Thomas S. LaGuardia (together with a 1987 update of the "Decommissioning Study for the Seabrook Station - Unit 1"), Judith C. Dunn, and William P. Hannon.

Copies of these materials have also been sent to the following: the State Library; the State Public Utilities Commission; the State Treasurer's Office; Town of Seabrook's Clerk/Selectmen Office; all joint owners of Seabrook Station; Edward A. Brown; Assistant Attorney General Smukler; Consumer Advocate Holmes; the United States Nuclear Regulatory Commission; Hon. Robert Cushing; Mary K. Metcalf; Robert A. Backus, Esq.; Michael King, Esq.; and David J. Braiterman, Esq.

Sincerely, Edward A. Haffer

EAH: jc

cc: w/enc.: Persons listed in ¶2, above

### NDFC 87-1

# STATE OF NEW HAMPSHIRE NUCLEAR DECOMMISSIONING FINANCING COMMITTEE RULE DEC 301.01 INFORMATION

#### (a) UTILITY INFORMATION

(1) Name of lead company: New Hampshire YankeeDivision of Public Service Company of New Hampshire(NHY).

Mailing address of lead company: Seabrook Station,Route 1, Seabrook, New Hampshire 03874.

(3) Telephone Number of lead company: 603-474-9574;

(4) Utility franchise area: Not applicable to NHY, since it is not authorized to sell electricity.

(5) Names and addresses of principal officers of the lead company: Edward Brown, President; William B. Derrickson, Senior Vice President; George S. Thomas, Vice President Nuclear Production; and Ted C. Feigenbaum, Vice President.

(6) Whether the lead company is the owner, lessee or other: Other, specifically the managing agent for the joint owners in the operation of the facility.

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- (7) Names and addresses of owners of the facility:
  - 7.1 Public Service Company of New Hampshire 1000 Elm Street - P.O. Box 330 Manchester, NH 03105
  - 7.2 The United Illuminating Company 80 Temple Street - P.O. Box 1564 New Haven, CT 06506
  - 7.3 EUA Power Corporation c/o Eastern Utilities Associates P.O. Box 2333 Boston, MA 02107
  - 7.4 Montaup Electric company c/o Eastern Utilities Associates P.O. Box 2333 Boston, MA 02107
  - 7.5 Connecticut Light & Power Company c/o Northeast Utilities P.O. Box 270 Hartford, CT 06106
  - 7.6 Canal Electric Company c/o Commonwealth Energy System P.O. Box 190 - 1 Main Street Cambridge, MA 02139
  - 7.7 New England Power Company c/o New England Electric System 25 Research Drive Westborough, MA 01581
  - 7.8 Mass. Municipal Wholesale Electric Co. P.O. Box 426 Ludlow, MA 01056
  - 7.9 Hudson Light and Power Department Town House, 49 Forest Avenue Hudson, MA 01749
  - 7.10 Taunton Municipal Lighting Plant 55 Weir Street P.O. Box 870 Taunton, MA 02780
  - 7.11 Vermont Electric Generation and Transmission Cooperative, Inc. School Street Johnson, VT 05656

7.12 N.H. Electric Cooperative, Inc. R.F.D. #2, Tenney Mountain Highway Plymouth, NH 03264

(8) Copies of permits and licenses by other regulatory agencies required to decommission, if any: None as of now; but see 10 C.F.R. §50.82, providing for a licensee to apply to the Federal Nuclear Regulatory Commission for authority to surrender a license voluntarily and to dismantle the facility.

(b) LOCATION INFORMATION

 Location of site: Route 1, Seabrook, New Hampshire.

(2) Travel directions to site: Interstate 95 to Route107 easterly to intersection with Route 1.

- (C) GENERATING UNIT INFORMATION
  - (1) Name of unit: Seabrook Station Unit 1.
  - (2) Size of unit--megawatt electric: 1150.
  - (3) Type of unit

 Type: Pressurized water reactor nuclear steam supply system.

b. Method of cooling condenser discharge: Oncethrough cooling, utilizing sea water.

c. Whether the unit is proposed to serve base, intermediate or peaking loads: Base load.

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(4) Methods of Decommissioning Nuclear Facility

a. A detailed description, cost and timetable of
known and acceptable decommissioning methods
currently available: See attached testimony.
b. Method proposed by lead company: See attached
testimony.

c. Cost of each method: See attached testimony.(5) Payment Schedule

a. Proposed Schedule of payments: See attached testimony.

 All methods and inputs utilized in the development of the proposed schedule: See attached testimony.

> Respectfully submitted, NEW HAMPSHIRE YANKEE By Its Attorneys: Sheehan, Phinney, Bass & Green,

Prof. Ass'n.

By: Edward A. haffer 1000 Elm Street Manchester, NH 03101 668-0300

March 19, 1987

#### STATE OF NEW HAMPSHIRE NUCLEAR DECOMMISSIONING FINANCING COMMITTEE

In Re Seabrook Station - Unit 1 Docket NDFC 87-1

#### OPENING STATEMENT OF NEW HAMPSHIRE YANKEE

#### Statutory Background.

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The purpose and scope of the present hearings are determined by statute. RSA 162-F:1, II provides:

The legislature recognizes that to ensure the safety and well-being of the public and of future generations, a costly and comprehensive decommissioning procedure is necessary at the end of the useful or serviceable life of nuclear electric generating facilities. Because the costs are substantial and because these costs are the direct and predictable result of operating such a facility and should not have to be borne by the state, it is found to be in the public interest to require that adequate fiscal responsibility be established to ensure proper and safe decommissioning and subsequent surveillance of nuclear reactor sites to the extent necessary to prevent such sites to the extent necessary to prevent such sites to the extent necessary to prevent such sites from constituting a hazard to future generations. The legislature, therefore, hereby establishes a procedure which will provide assurance of adequate funding by utilities for the decommissioning of those nuclear electric generating facilities which complete their anticipated energy-producing lives.

Sections 14 through 26 of RSA 162-F set out the substantive provisions on decommissioning funding.

The issue before this Committee is not whether a decommissioning financing fund should be or should not be established. That issue is already resolved: RSA 162-F unequivocally requires a fund. "A separate nuclear decommissioning financing fund shall be established in the office of the state treasurer for each nuclear electric generating facility in the state." Section 19, I. The issues before this Committee are, instead, as follows: (1) what amount is needed for decommissioning; and (2) what schedule of payments should be implemented to reach that amount. "The committee shall establish a regular monthly schedule for payment of monies into the fund by the owner or owners of the facility. The monthly payment shall not be less than necessary to reach the specified amount needed for decommissioning as determined by the committee." Section 19, II.

Though the determination of these two issues will have an impact on rates, the present proceeding is not a rate proceeding. Under RSA 162-F, the Committee does not determine rates to be charged customers; rather, the Public Utilities Commission does. Section 19, III provides, "The public utilities commission shall permit the utility to charge its customers on a per kilowatt hour basis the amount it pays directly into the fund created under this section. The charge, as determined by the public utilities commission, shall be designated a nuclear decommissioning charge and shall be separately stated on the customer's billing statement."

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It should also be noted that the Committee does not administer the decommissioning financing fund; rather, the State Treasurer does. Section 20, I provides, "The state treasurer shall administer each fund established under this subdivision." However, under the same statutory paragraph, both "[t]he treasurer and the committee shall take every reasonable precaution to preserve the integrity of each nontaxable fund."

The present hearings are under Section 21, and relate to the funding requirements for decommissioning upon the plant's completion of its anticipated energy-producing life. In other words, these hearings constitute the "procedure which will provide assurance of adequate funding by utilities for the decommissioning of those nuclear electric generating facilities which complete their anticipated energy-producing lives." Section 1, II (emphasis added). The present hearings are not under Section 22, which requires hearings by the Committee to deal with changes in circumstances during the life of the facility, such as changes resulting from an emergency. "At any time during the energy-producing life of the facility the committee may determine whether the amount of the funds shall be increased or decreased for reasons including, but not limited to, changes in circumstances, need, or technological advances. . . . " Section 22, I (emphasis added). See also, Section 17, III, which requires that, after the funding

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requirements have been established, the Committee "shall meet at least once a year and, for good cause, . . . may increase or decrease the amount of funds pursuant to RSA 162-F:22, I, or may alter the funding schedules because of changed circumstances delineated in RSA 162-F:22, II."

The New Hampshire Yankee Division of Public Service Company of New Hampshire has been designated the lead company for the joint owners of the Seabrook Nuclear Power Station. See Section 14, IV.

#### Summary of Testimony

The three basic alternatives for decommissioning are (1) prompt removal/dismantling, (2) safe storage entombment with delayed dismantling, and (3) safe storage mothballing with delayed dismantling. For Seabrook Station, New Hampshire Yankee recommends prompt removal/dismantling as the most prudent alternative, both technically and financially. In 1987 dollars, prompt removal/dismantling is estimated to cost \$242,429,000, whereas the entombment alternative is estimated to cost \$328,454,000, and the mothballing alternative is estimated to cost \$362,189,000. See LaGuardia testimony.

New Hampshire Yankee recommends that monies collected for decommissioning be treated and invested prudently and with the objective of maximizing savings to ratepayers. One means to that objective is Section 468A of the Internal Revenue Code. Section 468A provides that, if certain

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requirements are met, monies collected for decommissioning are tax deductible. This tax saving to the utility is in effect passed back to the ratepayers through lesser charges for decommissioning costs. See Dunn testimony.

New Hampshire Yankee recommends a schedule of regular monthly payments into the fund that take into account historically justified assumptions on inflation and investment return. Assuming that such payments begin in 1988 and continue for 40 years (the anticipated energyproducing life of the facility) the amount collected for decommissioning at the end of the 40th year will be \$1,210,461,896. See Hannon testimony.

> Respectfully submitted, NEW HAMPSHIRE YANKEE By Its Attorneys: Sheehan, Phinney, Bass & Green, Prof. Ass'n.

By: Twend &. Halle

Edward A. Haffer 1000 Elm Street Manchester, NH 03101 688-0300

March 19, 1987

# NEW HAMPSHIRE YANKEE

: :

DIRECT TESTIMONY OF THOMAS S. LAGUARDIA, P.E.

SEABROOK STATION RATE PROCEEDING

MARCH, 1987

#### NEW HAMPSHIRE YANKEE

#### PREPARED TESTIMONY OF THOMAS S. LAGUARDIA

- Q. Please state your name and business address.
- A. Thomas S. LaGuardia, 640 Federal Road, Brookfield, CT 06804
- Q. What is your occupation?
- A. President, TLG Engineering, Inc.
- Q. What are your responsibilities with that organization?
- A. I am responsible for the technical and business management of engineering consulting services in the areas of decontamination, decommissioning, waste management and general engineering for nuclear generating stations.
- Q. What is your educational and professional background?
- A. I completed my BSME at Polytechnic Institute of Brooklyn in 1962 and my MSME at the University of Connecticut in 1968. I am a registered professional engineer in Connecticut (Reg. No. 10393) and New York (Reg. No. 059389). I founded TLG Engineering in April, 1982. I was employed by Nuclear Energy Services in Danbury, Connecticut from 1973 until I founded TLG Engineering. Prior employment was with Gulf Nuclear Fuels Corporation (formerly United Nuclear Corporation) and Combustion Engineering.

My decommissioning experience began as site representative for UNC during the BONUS reactor decommissioning in 1969-70. Following that program, I was lead engineer for UNC during

the Elk River Reactor decommissioning. While at Nuclear Energy Services, I was principal investigator for the Atomic Industrial Forum decommissioning study entitled, "An Engineering Evaluation of Nuclear Power Reactor Decommissioning Alternatives" (AIF NESP-009). I co-authored the "Decommissioning Handbook" for the U.S. Department of Energy, and prepared numerous site-specific decommissioning cost estimates for utility companies. I prepared a conceptual study for decommissioning the Shippingport reactor for the U.S. Department of Energy, and was Project Engineer for the detailed engineering and planning of the Shippingport decommissioning program.

At TLG Engineering, I have assisted utility clients in the selection of tools for removal of equipment and components as part of facility modificatons. I also assisted Atomic Energy of Canada, Ltd. in the detailed engineering and planning for the decommissioning of the 238 MWe Gentilly Unit 1 reactor. TLG Engineering has prepared site specific decommissioning studies for 44 nuclear and fossil fueled power plants.

TLG together wih its joint venture partner, Cleveland Wrecking Company was recently awarded a two-year, \$7 million contract to remove all contaminated and noncontaminated piping and components from the Shippingport Reactor. Shippingport, a 70 MWe Light Water Breeder Reactor, is the largest reactor to be completely dismantled in the US.

- Q. What is the purpose of your testimony?
- A. I am presenting the results of the decommissioning study, prepared by TLG Engineering, Inc. for the 1150 MWe Seabrook Station Unit 1, Exhibit 1. This study was commissioned by New Hampshire Yankee (hereinafter "the Company"). The testimony includes the decommissioning alternatives evaluated, cost and schedule estimates, and a discussion of decommissioning feasibility.
- Q. What is the purpose of this study?
- A. To estimate the cost of decommissioning the Seabrook Station power plant so that the revenue requirements may be determined to establish a decommissioning fund. The study is not a decommissioning plan, and therefore does not commit the Company to a specific course of action following ultimate plant shutdown.
- Q. Would you summarize the estimated Seabrook Station decommissioning costs and schedule?
- A. Yes. The costs, period length and plant years for each decommissioning alternative are shown in Exhibit 2. These costs are in constant 1987 dollars and include 25% contingency. The cost estimate does not include future inflation.
- Q. Did TLG prepare a previous study of Seabrook decommissioning costs?
- A. Yes. A study was prepared by TLG in 1985 for the same decommissioning scenarios.

Q. Why was the study redone?

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- A. To update the cost estimate to include the cost increases in labor, materials, shipping and burial that occured between 1985 and 1987
- Q. What is the basis for the Seabrook Station decommissioning study?
- A. The Seabrook Station study is a site specific study and was developed using the detailed engineering drawings, together with plant description and inventory documents provided by the Company. These drawings and documents were used to identify the general arrangement of the facility and to determine estimates of building concrete volumes, steel quantities, numbers and size of components and degree of site restoration required.

I have made a personal site inspection of the plant, including access to the facility to determine movement of heavy equipment (cranes, fork-lifts, front-end loaders, etc.) close to the structures for demolition and removal work.

Decommissioning is a labor-intensive program. Representative labor rates for each geographical region and each craft or salaried work group are essential for development of a meaningful site-specific decommissioning cost estimate. The Company provided typical craft labor rates and salary data for administrative personnel from recent payroll records. Rates for shipping radioactive wastes for burial were obtained from tariffs published by Tri-State Motor Transit. Tri-State Motor Transit is a reputable carrier with many years of experience in handling radioactive fuel and low level radioactive wastes. Transportation costs have escalated rapidly in the past few years and recent rates must be used for accurate site-specific cost estimates. For this study, we assumed all radioactive waste would be shipped to a hypothetical regional burial ground within 250 miles of the site. For cost estimating purposes, the study assumed burial rates for Barnwell, South Carolina.

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- Q. What federal and state regulations apply to decommissioning and how does this study comply with them?
- A. The US Nuclear Regulatory Commission (US NRC) and the State of New Hampshire have regulations dealing with the issue of decommissioning. The US NRC regulations for decommissioning are identified in the US Code of Federal Regulations (CFR) Parts 10, 20, 30, 40, 50, 51, 70 and 72, and specific guidance for their implementation is provided in US NRC Regulatory Guide 1.86 (June, 1974). More recently the US NRC published Proposed Rules in the Federal Register of February 11, 1985 to establish technical and financial criteria for decommissioning licensed facilities. It is my understanding the Proposed Rules favor a site specific cost estimate for decommissioning funding, and that

decommissioning be accomplished in the shortest possible time following cessation of operations.

The State of New Hampshire established a law on "Decommissioning of Nuclear Generating Facilities" (RSA 162-F: 14). It is my understanding that the law requires a fund be established to decommission Seabrook Station and restore and rehabilitate the site.

The decommissioning cost estimate prepared for Seabrook fully satisfies each of these regulations.

Q. What methodology was used to prepare the cost estimate?

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The methodology used to develop the cost estimate followed Α. the basic approach presented in the AIF/NESP-009 study report, "An Engineering Evaluation of Nuclear Power Reactor Decommissioning Alternatives," and the US Department of Energy "Decommissioning Handbook." These references use a unit cost factor method for estimating decommissioning activity costs to standardize the estimating calculations. Unit cost factors for activities such as concrete removal (\$/cu yd), steel removal (\$/ton), and cutting costs (\$/in.) were developed from the labor and material information provided by the Company. With the item quantity (cu yds, tons, inches, etc.) developed from plant drawings and inventory documents, the activity-dependent costs for decontamination, removal, packaging, shipping and burial were estimated. The activity duration critical path was

used to determine the total decommissioning program schedule.

The program schedule is used to determine the <u>period-dependent</u> costs such as program management, administration, field engineering, equipment rental, quality assurance and security. The salary and hourly rates are typical for personnel associated with period-dependent costs. The costs for conventional demolition of non-radioactive structures, materials, backfill, landscaping and equipment rental were obtained from conventional demolition references such as k. S. Means, "Building Construction Cost Data 1987."

The activity- and period-dependent costs were summed to develop the total decommissioning costs. A 25% contingency was added to allow for unpredictable program problems. Such a contingency is appropriate for a project of this size and type, as will be discussed later in this testimony.

One of the primary objectives of every decommissioning program is to protect public health and safety. The cost estimate for the Seabrook Station decommissioning activities includes the necessary planning, engineering and implementation to provide this protection to the public.

- Q. Does this estimate include the costs for removal of high level waste?
- A. It is important to note that although decommissioning of a site cannot be complete without the removal of all spent fuel and source material, the disposition of high level waste is outside

the scope of decommissioning. In accordance with the Nuclear Waste Policy Act of 1982 (Public Law 94-425), the U.S. Department of Energy (DOE) is required by law to enter into contracts with owners and/or generators of spent fuel with the DOE responsible for final disposal of spent nuclear fuel as high-level nuclear waste. To cover the cost of spent fuel disposition, the DOE assesses the facility operator 1 mill/kWh on net electrical generation. Therefore, the cost and disposal of spent fuel is accounted for separately and is specifically excluded in the decommissioning estimates.

All radioactive wastes generated luring the decommissioning process are low-level radioactive wastes and will be transported to a federal or state licensed commercial low-level waste facility for ultimate disposal as required by the appropriate regulations in effect at the time of decommissioning.

- Q. What decommissioning alternatives did you investigate for the Company?
- A. I prepared cost and schedule estimates for these three basic decommissioning alternatives: (1) prompt removal/dismantling, (2) safe storage entombment with delayed dismantling, and (3) safe storage mothballing with delayed dismantling. These alternatives may be briefly summarized as follows:
  - (1) The <u>prompt removal/dismantling</u> alternative consists of removing from the site the spent fuel assemblies discharged from the reactor and stored on site. All

radioactive wastes from plant operation would be packaged and shipped for controlled burial. The operating license would be converted to a possessiononly license for the decommissioning operations. A possession-only license permits the owner to possess the radioactive material under reduced Technical Specification requirements, but prohibits operation of the reactor.

The radioactive fission and corrosion products and all other radioactive materials having activities above accepted unrestricted levels would be removed, packaged and shipped for disposal. The reactor vessel and internals would have to be removed with remote tooling. The site may then be released for unrestricted use with no requirement for a license. The US Nuclear Regulatory Commission (NRC) has recently termed this method of decommissioning DECON. The remainder of the reactor facility may then be dismantled to make the site available for re-use.

(2) The <u>safe storage entombment</u> alternative consists of removing from the site all fuel and radioactive wastes from operations. A possession-only license would be obtained and all radioactive components and structures would be sealed within an entombment barrier. The security intrusion monitoring system would be maintained operable, and adequate surveillance, inspections and

- continuing facility repairs and maintenance would be provided to ensure entombment integrity. The NRC has termed this method of decommissioning ENTOMB.
- (3) Safe storage mothballing consists of the same basic site deactivation activities as carried out in the entombment method except that radioactive components are neither shipped off-site nor centrally stored within an entombment barrier. Piping and components would be drained and dried, and left on site. An adequate security force would be maintained on the site, thereby increasing the annual maintenance costs when compared with entombment. As with the entombment, the dismantling activities are delayed to a later date. The NRC has named this alternative SAFSTOR.
- Q. Which of the foregoing decommissioning alternatives do you recommend and what is the basis for your recommendation?
- A. I recommend the immediate dismantling (DECON) decommissioning alternative as the most technically and financially prudent. This alternative provides the best means for terminating *e* possession-only license in the shortest possible time, and consequently relieves the Company of its regulatory and liability obligations at the site. DECON avoids the longterm costs and commitments associated with the maintenance, surveillance and security requirements of the delayed dismantling alternatives, SAFSTOR and ENTOMB.

DECON also allows use of the plant's knowledgeable current operating staff, a valuable asset to a well managed, efficient decommissioning program. All equipment needed to support decommissioning operations such as cranes, ventilation systems and radwaste processing equipment would be fully operational. In addition, the site would be available for alternative uses at the earliest possible time.

- Q. What is the basis for the 25% contingency in Seabrook Station's cost study and what confidence do you have in this estimate?
- A. The purpose of the contingency is to allow for the costs of high probability program problems where the occurrence, duration, and severity cannot be accurately predicted. For example, during periods of heavy rainfall, burial facilities prohibit the movement of heavy trucks (80,000 lbs) or the handling of heavy cask loads (50,000 lbs) hear the burial trenches because of the muddy road conditions and concern for trench wall collapse. Delay of vital (critical path) cask shipments could seriously decrease productivity and increase costs.

It is impossible to predict weather conditions existing at the time of the year when these shipments will be made and the impact such delays will have on total costs. Yet, to ignore the high probability of occurrence would be

imprudent. Similar examples of high probability problems include specialty tool breakdown, material delivery delays, manpower scheduling problems, unanticipated overtime to make up schedule slippages, demolished/dismantled material removal delays, changing regulatory (Federal, state, local) requirements, work stoppages and strikes. Most of these events have a high probability of occurrence and may have a cumulative impact.

In the AIF/NESP study referred to earlier, we examined the major activity-related problems (tool failure, material delays, shipping problems, etc.) for each reactor type and each primary decommissioning alternative. The variability of the cost estimates ranged up to 24%. Therefore, in the AIF/NESP study, we recommended a 25% contingency be added to the total estimated costs for prudent financial planning purposes. Subsequent to our preparation of the AIF/NESP report, Battelle Pacific Northwest Labs prepared independent decommissioning cost estimates for the NRC for an 1175 MWe PWR (NUREG CR-0130), and an 1155 MWe BWR (NUREG CR-0672). Battelle concurred with the 25% contingency allowance.

- Q. What assurance is there that the estimated cost for decommissioning will reflect future developments in improved technology and increased or decreased costs?
- A. The cost estimate prepared for the Company is based on current state-of-the-art technology and on current federal

and state regulations. It is my recommendation that the Company thoroughly review this estimate periodically and revise it if necessary to account for cost increases or decreases as influenced by future technology and regulations. I understand that the Company intends to do this.

- Q. What indication is there that Seabrook Station can be completely dismantled?
- A. Between 1960 and 1979, 68 licensed nuclear reactors had been or were in the process of being decommissioned in the United States. Of these, five were nuclear power plants, four were demonstration nuclear power plants, six were licensed test reactors, 28 were research reactors and 25 were critical facilities. Most of the 53 licensed research reactors and/or critical facilities decommissioned or scheduled to be decommissioned had been or will be totally dismantled with the licenses terminated. Many other reactor facilities in the U.S., Canada and Europe have been successfully decommissioned using demonstrated techniques.

The feasibility of decommissioning is well documented in the reports of successful completion of programs such as dismantling the Elk River Reactor, Walter Reed Army Research Reactor, Ames Laboratory Reactor and Sodium Reactor Experiment (SRE) Facilities. The basic activities of cutting pipe, segmenting vessels, demolishing reinforced concrete and decontaminating contaminated systems and structures are independent of the size of the structure or megawatt rating of the plant on a unit cost factor basis (\$/cut, \$/cu. yd., etc.). A contaminated 12-inch diameter pipe in a 3000 Mwt plant takes just as long to cut as it does in a 58 Mwt plant, although the number of cuts will be greater in the larger plant. The technology of cutting is well established.

The major activities include removal and burial of contaminated piping and components using conventional power hack saws or oxyacetylene torches within a contamination control tent. Removal of the reactor vessel and internals can be accomplished using an arc-gouging fuel gas torch or an arc saw which is currently capable of cutting through carbon and stainless steel up to 12 inches thick (current vessels are less than 10 inches thick). The remote manipulator technology required to cut the reactor vessel and internals was developed by Oak Ridge National Laboratory for the Elk River Reactor dismantling. This technology uses the plasma arc torch for cutting. This same tool was used in the SRE vessel cutting activity.

In 1979, Virginia Electric and Power Company removed and replaced the contaminated 823 Mwe steam generators in its Surry plants. The contaminated steam generators, measuring 65 feet high by 170 inches outside diameter with 3.5 inch thick walls, weighed 340 tons each. The reactor coolant system stainless steel piping (34 inch inside diameter), steam piping (30 inch diameter) and feedwater piping (14 inch diameter) were cut with a plasma arc torch to isolate the steam generator from the primary and secondary systems. The steam generator shell was circumferentially cut at the transition cone with the plasma arc torch. The two shell sections were removed through the existing equipment hatch for disposal.

Controlled blasting concrete demolition methods are well developed. They have been used in the mining industry, and were successfully demonstrated in the demolition of the Elk River Reactor. Heavily reinforced eight feet thick concrete sections of the biological shield were safely removed with explosives without damaging or interfering with the operation of adjacent operating power generating units.

The successful application of these decommissioning techniques in both small and large nuclear power plants demonstrates assurance of decommissioning feasibility. Both the technology and the methodology for efficient decommissioning are available and fully tested.

- Q. Does this conclude your testimony?
- A. Yes.

# EXHIBIT 2

## COST AND SCHEDULE ESTIMATE SUMMARY (Thousands of Dollars)

	Schedule Months	Cost,\$ (Thousands)
PROMPT REMOVAL/DISMANTLING		
Unit 1, including common & supporting facilities	72	242,429
ENTOMBMENT WITH 30 YR DORMANCY &	DELAYED DISMAN	TLING
Unit 1, including common & supporting facilities		
Entombment 30 year maintenance cost Delayed dismantlement Total	36 36Ø <u>6Ø</u> 456	118,249 48,670 <u>161,534</u> <b>328,454</b>
MOTHBALLING/DELAYED DISMANTLING		
Unit 1, including common & supporting facilities		
Mothball 30 year maintenance cost Delayed dismantlement Total	12 360 <u>66</u> 438	28,004 114,401 219,783 362,189

\* Columns may not total due to rounding

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# NEW HAMPSHIRE YANKEE

# PREPARED TESTIMONY OF WILLIAM P. HANNON

March, 1987

William M. Mercer-Meidinger-Hansen Asset Planning, Inc. 200 Clarendon St., Boston, MA 02116 (617) 421-5300

# NEW HAMPSHIRE YANKEE PREPARED TESTIMONY OF WILLIAM P. HANNON

1. Please state your name and address.

William P. Hannon, 200 Clarendon Street, Boston, Massachusetts, 02116.

What is your occupation?

Principal and Senior Asset Planning Consultant, William M. Mercer-Meidinger, Inc.

3. What are your responsibilities with that organization?

I am responsible for providing consulting advice relating to the investment of qualified trusts. Our services include establishing investment objectives, selecting investment managers, structuring investment programs and monitoring investment performance. In addition, I work closely with Mercer-Meidinger actuaries who are experts in designing and funding qualified trusts.

4. What is your educational and professional background?

I received a Bachelor of Arts degree from Rutgers University in 1966. I was employed by the John Hancock Companies from 1966 to 1983, where I held positions of increasing responsibility in Group Pension Operations. In 1983, I joined William M. Mercer-Meidinger, Inc., where I have worked with qualified plan sponsors in determining appropriate investment objectives, selecting investment managers, and analyzing investment performance.

In addition, at Mercer-Meidinger, I have applied our proprietary computer models in forecasting the liabilities and asset growth associated with various investment strategies for qualified trusts. These modeling studies assist our clients in developing funding and investment policies.

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5. What is the purpose of your testimony?

I am presenting the results of the funding study prepared by William M. Mercer-Meidinger, Inc. for the Seabrook Station Unit 1. This study was commissioned by New Hampshire Yankee, and it includes a funding schedule which will enable the Decommissioning Fund to accumulate sufficient assets to meet the targeted cost at the time of decommissioning.

6. What is your recommended funding schedule to meet the decommissioning cost requirements?

We recommend that monthly contributions be made to the Decommissioning Fund at the rate described in Exhibit I of this report.

7. What methodology was used to prepare this funding schedule?

The funding schedule was developed to achieve the following objectives:

- a. The funding cost should be equitably spread over the life of the facility.
- b. The funding level should comply with IRS guidelines, thus enabling the Fund to maintain its qualified status.

The funding schedule was developed using assumptions for decommissioning cost, inflation and investment return which are detailed in Exhibit II. The decommissioning cost estimate of \$242,428,800 in 1987 dollars was adjusted to \$252,125,952 to reflect the 1987 inflation estimate of 4% since funding will begin in 1988. In future years, the cost is assumed to increase at an annual inflation rate of 4.0%, and the assets are assumed to earn an annualized investment return of 6.2%. To distribute costs equitably over the entire period of contribution, the scheduled monthly contribution is increased each year by 4% to compensate for inflation. The contribution schedule funds the Decommissioning Fund at a rate projected to cause the asset value to equal the targeted cost forty years from inception.

8. What is the basis for the assumptions used in this study?

The decommissioning cost assumption is based on the testimony of Thomas S. Laguardia.

9. What is the basis for the inflation assumption?

We examined inflation, as measured by the Consumer Price Index (CPI) from 1933 through 1985. The average inflation rate for rolling periods of 40, 30 and 20 years is as follows:

Period	Ending	Number of Observations	Average Inflation	
40 Years	1972-1985	14	4.0%	
30 Years	1962-1985	24	3.6%	
20 Years	1952-1985	34	3.8%	

These results led to the inflation assumption of 4.0% used in the funding schedule.

10. What is the basis for the investment return assumptions?

We developed separate expected returns for both a taxable fixed income portfolio and a tax-exempt fixed income portfolio. The investment return assumptions for taxable portfolios is based on the empirical evidence of returns from fixed income portfolios managed for pension funds as monitored in the William M. Mercer-Meidinger Investment Manager Universe, and the returns of the Shearson Lehman Government/Corporate Bond Index. The tax-exempt portfolio return assumption is based on a modification of the taxable return to compensate for the favorable tax treatment.

In addition, consideration was given to the impact of the investment guidelines which limit investments to fixed income securities and also restrict investments by quality and by maturity. An estimate of administrative expenses, including taxes, if any, has been netted from the return assumption.

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We assumed the taxable investment portfolio will earn 7.0%, an annualized premium, or real return, of 3% above the inflation assumption (4%). The Shearson Lehman Government/Corporate Bond Index average real return was 3.5% for the decade 1976-1985. In addition, during the same decade the average real return was 4.0% for the median fund in the Mercer-Meidinger Universe of Investment Managers. These real returns are high compared to returns earned from fixed income investments over the past 50 years. The assumed return for the Decommissioning Fund has been set lower than the experience of the past decade, but higher than the real return for the past 50 years.

Traditionally, tax-exempt fixed income securities have a lower yield than comparable government securities. The size of the yield differential is affected by tax laws and economic factors. The assumed return for tax-exempt investments is 6.0%.

The schedule assumes that the Trustee will structure an average portfolio mix of 80% tax-exempt fixed income securities and 20% taxable fixed income securities, which at the earnings assumption of 6.0% and 7.0%, respectively, results in the 6.2% return assumption. The potential impact on investment alternatives of the 1986 Tax Reform Act may make these return assumptions conservatively low. There is nothing to prohibit investments in taxable securities as long as the overall, net yield is to the advantage of the fund.

11. What assurance is there that the funding schedule for the Decommissioning Fund will be adequate if the assumptions prove to be inaccurate?

We anticipate reviewing the actual performance annually to evaluate the differences between actual and expected experience. In addition, we tested the impact if earnings over the first five years were as low as 4.15% and as high as 8.25%. If the funding schedule described in Exhibit I is maintained over the first five years and the return is between 4.15% and 8.25%, the fund balance should be within 5.0% above or below the

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expected projection. A regular review of investment experience and revision of the funding schedule as required by the RSA 162-F will ensure that the fund makes satisfactory progress towards meeting the targeted cost.

12. Does this conclude your testimony?

Yes.

March 5, 1987

William P. Hannon

William P. Hannon Principal

# EXHIBIT I

# DECOMMISSIONING FUND FOR SEABROOK STATION UNIT I FUNDING SCHEDULE

Year	Monthly Contribution	Cumulative Earnings	Fund Balance at Year End	Target Cost at Year End
1	\$341,437	\$ 136,334	\$ 4,233,573	\$262,210,990
2	355,094	540,604	8,898,970	272,699,430
3	369,298	1,239,799	14,029,738	283,607,407
4	384,070	2,263,001	19,661,775	294,951,703
5	399,432	3,641,523	25,833,486	306,749,771
6	415,410	5,409,071	32,585,951	319,019,762
7	432,026	7,601,906	39,963,100	331,780,553
8	449,307	10,259,025	48,011,905	345,051,775
9	467,279	13,422,346	56,782,579	358,853,846
10	485,971	17,136,912	66,328,793	373,208,000
11	505,409	21,451,106	76,707,900	388,136,320
12	525,626	26,416,876	87,981,180	403,661,772
13	546,651	32,089,985	100,214,099	419,808,243
14	568,517	38,530,266	113,476,583	436,600,573
15	591,258	45,801,902	127,843,309	454,064,596
16	614,908	53,973,717	143,394,020	472,227,180
17	639,504	63,119,498	160,213,851	491,116,267
18	665,084	73,318,323	178,393,688	510,760,918
19	691,688	84,654,920	198,030,538	531,191,354
20	719,355	97,220,050	219,227,930	552,439,008

Assumptions

Year 1		1988
Inflation		4.0%
Investment	Return	6.2%

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# EXHIBIT I

# DECOMMISSIONING FUND FOR SEABROOK STATION UNIT I FUNDING SCHEDULE

Year	Monthly Contribution	Cumulative Earnings	Fund Balance at Year End	Target Cost at Year End
21	748,129	111,110,907	242,096,341	574,536,569
22	778,055	126,431,555	266,753,644	597,518,031
23	809,177	143,293,382	293,325,593	621,418,753
24	841,544	161,815,594	321,946,332	646,275,503
25	875,206	182,125,734	352,758,939	672,126,523
26	910,214	204,360,233	385,916,005	699,011,584
27	946,622	228,665,008	421,580,249	726,972,047
28	984,487	255,196,086	459,925,175	756,050,929
29	1,023,867	284,120,274	501,135,764	786,292,906
30	1,054,821	315,615,871	545,409,219	817,744,685
31	1,107,414	349,873,429	592,955,749	850,454,472
32	1,151,711	387,096,560	643,999,411	884,472,651
33	1,197,779	427,502,792	698,778,996	919,851,557
34	1,245,691	471,324,490	757,548,980	956,645,620
35	1,295,518	518,809,823	820,580,530	994,911,444
36	1,347,339	570,223,803	888,162,577	1,034,707,902
37	1,401,232	625,849,390	960,602,953	1,076,096,218
38	1,457,282	685,988,661	1,038,229,605	1,119,140,067
39	1,515,573	750,964,060	1,121,391,879	1,163,905,670
40	1,576,196	821,119,726	1,210,461,896	1,210,461,896

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### EXHIBIT II

#### ASSUMPTIONS

Decommissioning Costs (1987 \$):

\$242,428,800\*

(Assume funding will commence in 1988 and inflation from 1987 to 1988 will be 4%)

\* Source: The Decommissioning Study for the Seabrook Station -Unit One, February 1987, Thomas S. Laguardia, P.E.

2.	Inflation	(40-year	average)	Expected	4%
				High	5%
				Low	3%

#### 3. Investment Return

The investment return is defined as the total return which measures the income earned plus market gains or losses, both realized and unrealized. The return forecast is net of administrative expense. An investment forecast may be expressed as a nominal return or a real return. The real return is the return in excess of inflation, whereas the nominal return includes inflation and corresponds to the rate actually earned.

#### Expected Fixed Income Returns

	Taxable	Tax-Exempt	Total Fund
Nominal Return	7.0%	6.0%	6.2%
Inflation	4.0%	4.0%	4.0%
Real Return	3.0%	2.0%	2.2%

It is assumed that taxable corporation owners will allocate their portion of the Fund to tax-exempt investments, and that the Fund's assets will be allocated 80% to tax-exempt investments and 20% to taxable investments. Expected return for the Total Decommissioning Fund is 6.2% compounded annually. There is a 70% level of confidence that the return will remain within a range of 4.15% and 8.25% over a 20-year period.

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The area between the lines represents the unfunded liability.

#### Testimony of Judith C. Dunn

- Q. What is your name and background?
- A. My name is Judith C. Dunn, and I am a tax lawyer in the Washington, D.C. office of Ropes & Gray.
- Q. What is your purpose here today?
- A. I am here to explain certain federal income tax provisions affecting decommissioning funds and their effect on the "nuclear decommissioning financing fund" which will be established with respect to Seabrook Unit 1 under New Hampshire law.
- Q. As a preliminary to that explanation, would you outline briefly the structure of the trust proposed to be established in compliance with New Hampshire law?
- A. The Seabrook joint owners (through their managing agent), the state treasurer, and a bank, as trustee, will enter into a "Master Trust Agreement." The joint owners will make monthly payments to the trustee as provided for in the schedule of monthly payments established by the Nuclear Decommissioning Financing Committee, so that the monies accumulated in the fund will be available to meet the costs of decommissioning when that time comes. With the exception of periodic withdrawals to cover the expenses of maintaining the trust, the trustee will hold all monies until they are withdrawn to cover decommissioning expenses. The state treasurer will be responsible for calculating each joint owner's share of the monthly payment due under the schedule set by the Nuclear Decommissioning Financing Committee.
- Q. How do the federal tax laws affect decommissioning funds and monies collected from ratepayers to cover contributions to the decommissioning fund?
- A. My explanation covers those joint owners subject to taxation, that is participants owning approximately 86 percent of the Unit. First, section 88 of the Internal Revenue Code (the "Code") provides that monies charged to ratepayers and received by a Seabrook owner to cover the cost of decommissioning must be included in the owner's gross income. Thus, to the extent the

owners of Seabrook currently collect money from ratepayers for future decommissioning, the money is included in the owners' gross income and is currently subject to federal income tax. For a corporation paying tax in 1988 at the maximum federal rate of 34%, the practical effect of this rule is that for every dollar collected for decommissioning 34¢ goes to the federal government in taxes and only 66¢ remains to be accumulated.

- Q. Can the Seabrook owners take a federal tax deduction for contributions they make to a nuclear decommissioning financing fund if such contributions are required by New Hampshire law?
- A. Regardless of the requirements of New Hampshire law, the Seabrook owners can get a tax deduction when they make payments to the decommissioning fund only if the fund qualifies as a Nuclear Decommissioning Reserve Fund under section 468A of the Code. Section 468A of the Code provides that, if an owner so elects, payments made to what the Code calls a "Nuclear Decommissioning Reserve Fund" are deductible if certain requirements are met. Such a deduction offsets the inclusion in income provided by section 88 of the Code, with the result that a dollar collected for decommissioning and contributed to such a Reserve Fund is not depleted by federal income tax. This result can lead to a substantial savings to the ratepayers. As stated above, without section 468A, for every dollar collected for decommissioning in 1988, 34¢ goes to the federal government in taxes and only 66¢ remains in the fund. As a result, unless the regulatory agencies would be prepared to recognize the potential tax refund that would be available when decommissioning occurs as an asset, the ratepayers would have to pay approximately \$1.515 million to produce a trust balance of \$1 million (\$1.515 - 34% of \$1.515 = \$1.000); by using section 468A they need contribute only \$1 million to produce a fund of like amount.
- Q. What restrictions does the Code place on Nuclear Decommissioning Reserve Funds and deductible contributions to such funds?
- A. There are three significant limitations on the ability to qualify a contribution as a deduction under section 468A: (1) the contribution to the fund cannot be greater than the amount of decommissioning costs included in the owner's cost of service for ratemaking purposes for the year; (2) monies in the fund can be invested only in permissible investments; and (3) the

- 2 -

contribution cannot be greater than the "ruling amount" approved by the IRS.

Let me expand a little on each of those requirements. First, the Nuclear Decommissioning Financing Committee will approve a schedule of payments. Each of the joint owners will then go to its ratemaking agency or agencies to request the inclusion of decommissioning costs in its cost of service. The IRS will not permit a deduction for any contribution by a joint owner to a nuclear decommissioning reserve fund in excess of the amount of decommissioning costs included in the joint owner's cost of service for ratemaking purposes.

Secondly, a Nuclear Decommissioning Reserve Fund can only invest in:

- Public debt securities of the United States;
- (2) Tax-exempt obligations of a state or local government that are not in default as to principal or interest; and
- (3) Time or demand deposits in a United States bank or insured credit union.

Finally, each joint owner must request a schedule of ruling amounts from the IRS. That is, a schedule of annual amounts that the IRS determines to be necessary to fund the portion of the total estimated cost of decommissioning that is attributable to the remaining estimated useful life of the Unit at the time the fund is established. The IRS will approve funding at a rate no more rapid than level funding. For example, if \$1 million were to be contributed to a decommissioning fund over a four-year period, the IRS would not permit \$400,000 to be contributed to the fund in the first year, \$300,000 in the second year, \$200,000 in the third year, and \$100,000 in the fourth year. The IRS would require that \$250,000 be contributed in each of the four years, or that smaller amounts be contributed in the early years and larger amounts in the later years.

Since the amount that can be contributed to a Nuclear Decommissioning Reserve Fund is limited to the decommissioning costs included in the cost of service for ratemaking purposes, a requirement that decommissioning costs be accumulated more rapidly than level funding will limit the availability of section 468A with the potential adverse effects on ratepayers described above. For example, if the schedule of payments over a four year period were \$400,000, \$300,000, \$200,000 and \$100,000 not only would the tax deduction in years one and two be limited to \$250,000 each, but the tax deduction in years three and four would be limited to the amounts included in cost of service or \$200,000 and \$100,000 respectively, thus reducing the total deductions to \$800,000 despite the contribution of \$1 million.

- Q. Would the method of funding being proposed by the witness from Mercer-Meidinger satisfy the Code's level funding limitation?
- A. Yes, in my opinion the method of funding being proposed by the witness from Mercer-Meidinger would satisfy the Code's requirement that the funding be not more rapid than level funding.
- Q. Does this conclude your testimony?

A. Yes.

. . . .

February 9, 1987