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PSEG
Nuclear LLC

10 CFR 72.30(b)

DEC 17 2012

LR-N12-0406

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Director, Division of Spent Fuel Storage and Transportation
Office of Nuclear Material Safety and Safeguards
Washington, DC 20555-0001

Salem Generating Station, Units 1 and 2
Renewed Facility Operating License Nos. DPR-70 and DPR-75
NRC Docket Nos. 50-272 and 50-311

Peach Bottom Atomic Power Station, Units 2 and 3
Renewed Facility Operating License Nos. DPR-44 and DPR-56
NRC Docket Nos. 50-277 and 50-278

Hope Creek Generating Station
Renewed Facility Operating License No. NPF-57
NRC Docket No. 50-354

Subject: DECOMMISSIONING FUNDING PLAN FOR THE INDEPENDENT SPENT FUEL STORAGE INSTALLATIONS

PSEG Nuclear LLC (PSEG) is submitting the enclosed Decommissioning Funding Plan for the PSEG Independent Spent Fuel Storage Installation (ISFSI) in accordance with 10 CFR 72.30(b). Enclosure 1 addresses each of the six criteria contained in 10 CFR 72.30(b) and references Enclosure 2, which provides details concerning the PSEG ISFSI decommissioning cost estimates that were derived from TLG Services, Inc. estimates.

There are no commitments contained in this letter. If you have any questions or require additional information, please do not hesitate to contact Brian Thomas at (856) 339-2022.

Sincerely,

Paul R. Duke, Jr.
Licensing Manager

Enclosure 1: Decommissioning Funding Plan
Enclosure 2: Decommissioning Cost Estimate

cc: Mr. W. Dean, Administrator, Region I, NRC
Mr. J. Hughey, Project Manager, NRC
NRC Senior Resident Inspector, Salem
NRC Senior Resident Inspector, Hope Creek
Mr. P. Mulligan, Manager IV, NJBNE
Mr. L. Marabella, Corporate Commitment Tracking Coordinator

Enclosure 1 to LR-N12-0406

Decommissioning Funding Plan

PSEG Nuclear Decomissioning Funding Plan for the Salem, Hope Creek, and Peach Bottom Independent Spent Fuel Storage Installations (ISFSIs)

The U.S. Nuclear Regulatory Commission (NRC) published the Decommissioning Planning final rule in the Federal Register on June 17, 2011 (76 FR 35512) which adds reporting requirements for a Decommissioning Funding Plan (DFP) for holders and applicants of both general and specific licenses under 10 CFR Part 72. This rule is effective December 17, 2012. PSEG Nuclear LLC (PSEG) provides the following information required by 10 CFR 72.30(b) to be included in the DFP:

Requirement 1:

"(1) Information on how reasonable assurance will be provided that funds will be available to decommission the ISFSI or MRS."

Information for Requirement 1:

Pursuant to 10 CFR 72.30(e)(5), since Salem, Hope Creek and Peach Bottom Atomic Power Station (PBAPS) are power reactor licensees under 10 CFR 50, PSEG utilizes the methods of 10 CFR 50.75(b), (e), and (h) to provide financial assurance associated with its ownership shares of the PSEG ISFSI and the PBAPS ISFSI (operated by the Exelon Generation company).

Requirement 2:

"(2) A detailed cost estimate for decommissioning, in an amount reflecting:
(i) The cost of an independent contractor to perform all decommissioning activities;
(ii) An adequate contingency factor; and
(iii) The cost of meeting the § 20.1402 of this chapter criteria for unrestricted use, provided that, if the applicant or licensee can demonstrate its ability to meet the provisions of § 20.1403 of this chapter, the cost estimate may be based on meeting the § 20.1403 criteria."

Information for Requirement 2:

The information extracted from the TLG Services, Inc decommissioning estimates for Salem, Hope Creek, and Peach Bottom is included in Enclosure 2.

Requirement 3:

"(3) Identification of and justification for using the key assumptions contained in the DCE."

Information for Requirement 3:

The information extracted from the TLG Services, Inc. decommissioning estimates for Salem, Hope Creek, and Peach Bottom is included in Enclosure 2.

Requirement 4:

"(4) A description of the method of assuring funds for decommissioning from paragraph (e) of this section, including means for adjusting cost estimates and associated funding levels periodically over the life of the facility."

Information for Requirement 4:

The decommissioning cost estimate will be adjusted as necessary every three years, as required by 10 CFR 72.30(c). As indicated in the information for Requirement 1, PSEG utilizes the methods of 10 CFR 50.75(b), (e), and (h) to provide financial assurance associated with its ownership share of the ISFSIs. PSEG adjusts its share of the amount of financial assurance required by 10 CFR 50.75(b) annually in accordance with paragraph (2) of that section, and further adjustment is required by 10 CFR 50.75(f)(3) and (5) at or about five years prior to the projected end of reactor operations.

Requirement 5:

"(5) The volume of onsite subsurface material containing residual radioactivity that will require remediation to meet the criteria for license termination."

Information for Requirement 5:

There is no known subsurface material containing residual radioactivity in the proximity of the ISFSI that will require remediation to meet the criteria for license termination.

Requirement 6:

"(6) A certification that financial assurance for decommissioning has been provided in the amount of the cost estimate for decommissioning."

Information for Requirement 6:

PSEG has provided financial assurance for decommissioning the ISFSI sites in an amount that meets or exceeds its ownership share of the amount required by 10 CFR 50.75(b), which pursuant to 10 CFR 72.30(e)(5) provides the requisite financial assurance for PSEG's share of the ISFSI decommissioning cost.

Enclosure 2 to LR-N12-0406

Decommissioning Cost Estimate

ISFSI Information Extracted From TLG Services, Inc Reports for Salem, Hope Creek and Peach Bottom

Information for Requirement 2 extracted from TLG Services, Inc. decommissioning estimates for Salem, Hope Creek, and Peach Bottom

Hope Creek (thousands of 2012 dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu.Feet	Burial Volume Class A Cu. Feet	Burial Volume Class B Cu. Feet	Burial Volume Class C Cu. Feet	Burial Volume GTCC Cu. Feet	Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
4b.2.2	ISFSI License Termination	-	78	12	26	-	399	1,334	325	2,174	-	2,174	-	-	2,925	-	-	-	244,501	5,132	1,049
5b.2.4	ISFSI Demolition and Site Restoration	-	1,265	- -		-	-	20	193	1,478	-	1,478	-	-	-	-	-	-	-	14,329	27

Salem Unit 1 (thousands of 2012 dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu.Feet	Burial Volume Class A Cu. Feet	Burial Volume Class B Cu. Feet	Burial Volume Class C Cu. Feet	Burial Volume GTCC Cu. Feet	Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
4b.2.2	ISFSI License Termination	- 46		7	15	-	234	748	185	1,236	-	1,236	-	-	1,709	-	-	-	142,673	3,195	755
5b.2.4	ISFSI Demolition and Site Restoration	-	1,729	- -		-	-	22	263	2,013	-	2,013	-	-	-	-	-	-	-	19,488	47

Salem Unit 2 (thousands of 2012 dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu.Feet	Burial Volume Class A Cu. Feet	Burial Volume Class B Cu. Feet	Burial Volume Class C Cu. Feet	Burial Volume GTCC Cu. Feet	Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
4b.2.2	ISFSI License Termination	- 46		7	15	-	234	748	185	1,236	-	1,236	-	-	1,709	-	-	-	142,673	3,195	755
5b.2.4	ISFSI Demolition and Site Restoration	-	1,729	- -		-	-	22	263	2,013	-	2,013	-	-	-	-	-	-	-	19,488	47

Peach Bottom Unit 2 (thousands of 2012 dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu.Feet	Burial Volume Class A Cu. Feet	Burial Volume Class B Cu. Feet	Burial Volume Class C Cu. Feet	Burial Volume GTCC Cu. Feet	Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
4b.2.2	ISFSI License Termination	- 54		9	81	-	177	987	219	1,526	-	1,526	-	-	2,908	-	-	-	244,158	4,263	2,240
5b.2.2	ISFSI Demolition and Site Restoration	-	1,493	- -		-	-	43	230	1,766	-	1,766	-	-	-	-	-	-	-	22,611	160

Peach Bottom Unit 3 (thousands of 2012 dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packing Costs	Transport Costs	Off-site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu.Feet	Burial Volume Class A Cu. Feet	Burial Volume Class B Cu. Feet	Burial Volume Class C Cu. Feet	Burial Volume GTCC Cu. Feet	Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
4b.2.2	ISFSI License Termination	- 54		9	81	-	177	987	219	1,526	-	1,526	-	-	2,908	-	-	-	244,158	4,263	2,240
5b.2.2	ISFSI Demolition and Site Restoration	-	1,493	- -		-	-	43	230	1,766	-	1,766	-	-	-	-	-	-	-	22,611	160
5b.2.4	ISFSI Ancillary Structures	-	49	-	-	-	-	-	7	56	-	56	-	-	-	-	-	-	-	-	-

Information for Requirement 3:

The following information is extracted from TLG Services, Inc. decommissioning estimates for Salem Units 1 and 2. This information is typical for Hope Creek and Peach Bottom Units 2 and 3 with the exception of section 3.5.1. The Salem and Hope Creek Section 3.5.1 (common ISFSI) and Peach Bottom Section 3.5.1 information is provided.

3. COST ESTIMATES

The cost estimates prepared for decommissioning Salem consider the unique features of the site, including the NSSS, power generation systems, support services, site buildings, and ancillary facilities. The basis of the estimates, including the sources of information relied upon, the estimating methodology employed, site specific considerations, and other pertinent assumptions, is described in this section.

3.1 BASIS OF ESTIMATES

The estimates were developed using the site-specific, technical information from the 2002 analysis (TLG reports P07-1425-003 for Salem, P07-1425-002 for Hope Creek, P07-1425-004 for Peach Bottom). This information was reviewed for the current analysis and updated as deemed appropriate. The site-specific considerations and assumptions used in the previous evaluation were also revisited. Modifications were incorporated where new information was available or experience from ongoing decommissioning programs provided viable alternatives or improved processes.

3.2 METHODOLOGY

The methodology used to develop the estimates follows the basic approach originally presented in the AIF/NESP-036 study report, "Guidelines for Producing Commercial Nuclear Power Plant Decommissioning Cost Estimates," and the DOE "Decommissioning Handbook." These documents present a unit factor method for estimating decommissioning activity costs, which simplifies the estimating calculations. Unit factors for concrete removal ($/cubic yard), steel removal ($/ton), and cutting costs ($/inch) were developed using local labor rates. The activity-dependent costs were estimated with the item quantities (cubic yards and tons), developed from plant drawings and inventory documents. Removal rates and material costs for the conventional disposition of components and structures relied upon information available in the industry publication, "Building Construction Cost Data," published by R.S. Means.

The unit factor method provides a demonstrable basis for establishing reliable cost estimates. The detail provided in the unit factors, including activity duration, labor costs (by craft), and equipment and consumable costs, ensures that essential elements have not been omitted.

This analysis reflects lessons learned from TLG's involvement in the Shippingport Station Decommissioning Project, completed in 1989, as well as the decommissioning of the Cintichem reactor, hot cells, and associated facilities, completed in 1997. In addition, the planning and engineering for the Pathfinder, Shoreham, Rancho Seco, Trojan, Yankee Rowe, Big Rock Point, Maine Yankee, Humboldt Bay-3, Oyster Creek, Connecticut Yankee, and San Onofre-1 nuclear units have provided additional insight into the process, the regulatory aspects, and the technical challenges of decommissioning commercial nuclear units.

Work Difficulty Factors
TLG has historically applied work difficulty adjustment factors (WDFs) to account for the inefficiencies in working in a power plant environment. WDFs were assigned to each unique set of unit factors, commensurate with the inefficiencies associated with working in confined, hazardous environments. The ranges used for the WDFs are as follows:

- Access Factor 10% to 20%
- Respiratory Protection Factor 10% to 50%
- Radiation/ALARA Factor 10% to 40%
- Protective Clothing Factor 10% to 30%
- Work Break Factor 8.33%

The factors and their associated range of values were developed in conjunction with the AIF/NESP-036 study. The application of the factors is discussed in more detail in that publication.

Scheduling Program Durations
The unit factors, adjusted by the WDFs as described above, are applied against the inventory of materials to be removed in the radiological controlled areas. The resulting man-hours, or crew-hours, are used in the development of the decommissioning program schedule, using resource loading and event sequencing considerations. The scheduling of conventional removal and dismantling activities are based upon productivity information available from the "Building Construction Cost Data" publication.

An activity duration critical path is used to determine the total decommissioning program schedule. The schedule is relied upon in calculating the carrying costs, which include program management, administration, field engineering, equipment rental, and support services such as quality control and security. This systematic approach for assembling decommissioning estimates ensures a high degree of confidence in the reliability of the resulting cost estimate.

3.3 IMPACT OF DECOMMISSIONING MULTIPLE REACTOR UNITS (Salem Units 1 and 2)

In estimating the near simultaneous decommissioning of two co-located reactor units there can be opportunities to achieve economies of scale, by sharing costs between units, and coordinating the sequence of work activities. There will also be schedule constraints, particularly where there are requirements for specialty equipment and staff, or practical limitations on when final status surveys can take place. For purposes of the estimate, Units 1 and 2 are assumed to be essentially identical. Common facilities have been assigned to Unit 2. A summary of the principal impacts are listed below.

- The sequence of work generally follows the principal that the work is done at Unit 1 first, followed by similar work at Unit 2. This permits the experience gained at Unit 1 to be applied by the workforce at the second unit. It should be noted however, that the estimates do not consider productivity improvements at the second unit, since there is little documented experience with decommissioning two units simultaneously. The work associated with developing activity specifications and procedures can be considered essentially identical between the two units, therefore the second unit costs are assumed to be a fraction of the first unit (~ 43%).

- Segmenting the reactor vessel and internals will require the use of special equipment. The decommissioning project will be scheduled such that Unit 2's reactor internals and vessel are segmented immediately after the activities at Unit 1 have been completed.
- Some program management and support costs, particularly costs associated with the more senior positions, can be avoided with two reactors undergoing decommissioning simultaneously. As a result, the estimate is based on a "lead" unit that includes these senior positions, and a "second" unit that excludes these positions. The designation as lead is based on the unit undertaking the most complex tasks (for instance vessel segmentation) or performing tasks for the first time.
- The final radiological survey schedule is also affected by a two-unit decommissioning schedule. It would be considered impractical to try to complete the final status survey of Unit 1, while Unit 2 still has ongoing radiological remediation work and waste handling in process. As such, the transfer of the spent fuel from the storage pools and subsequent decontamination of the fuel handling buildings is coordinated so as to synchronize the final status survey for the station.
- The final demolition of buildings at Units 1 and 2 are considered to take place concurrently. Shared systems and structures are generally assigned to Unit 2.
- Unit 1, as the first unit to enter decommissioning, incurs the majority of site characterization costs.
- Station costs such as emergency response fees, regulatory agency fees, corporate overhead, and insurance are generally allocated on an equal basis between the two units.

3.3 IMPACT OF DECOMMISSIONING MULTIPLE REACTOR UNITS (Hope Creek)

The offset in shutdown dates for the Salem and Hope Creek nuclear units are such that there is little interaction in the respective decommissioning activities in a DECON scenarios, i.e., the Salem units are assumed to be decommissioned prior to the cessation of Hope Creek operations. However, ISFSI operation costs are shared over that time period that both Salem and Hope Creek spent fuel is present on site. ISFSI operations are also shared in the SAFSTOR scenario during that time period.

3.3 IMPACT OF DECOMMISSIONING MULTIPLE REACTOR UNITS (Peach Bottom Units 2 and 3)

In estimating the near simultaneous decommissioning of two co-located reactor units there can be opportunities to achieve economies of scale, by sharing costs between units, and coordinating the sequence of work activities. There will also be schedule constraints, particularly where there are requirements for specialty equipment and staff, or practical limitations on when final status surveys can take place. For purposes of the estimate, Units 2 and 3 are assumed to be essentially identical. Common facilities have been assigned to Unit 3. A summary of the principal impacts are listed below.

• The sequence of work generally follows the principal that the work is done at Unit 2 first, followed by similar work at Unit 3. This permits the experience gained at Unit 2 to be applied by the workforce at the second unit. It should be noted however, that the estimates do not consider productivity improvements at the second unit, since there is little documented experience with decommissioning two units simultaneously. The work associated with developing activity specifications and procedures can be considered essentially identical between the two units, therefore the second unit costs are assumed to be a fraction of the first unit (~ 42%).
• Segmenting the reactor vessel and internals will require the use of special equipment. The decommissioning project will be scheduled such that Unit 3's reactor internals and vessel are segmented immediately after the activities at Unit 2 have been completed.
• Some program management and support costs, particularly costs associated with the more senior positions, can be avoided with two reactors undergoing decommissioning simultaneously. As a result, the estimate is based on a "lead" unit that includes these senior positions, and a "second" unit that excludes these positions. The designation as lead is based on the unit undertaking the most complex tasks (e.g., vessel segmentation) or performing tasks for the first time.
• The final radiological survey schedule is also affected by a two-unit decommissioning schedule. It would be considered impractical to try to complete the final status survey of Unit 2, while Unit 3 still has ongoing radiological remediation work and waste handling in process. As such, the transfer of the spent fuel from the storage pools and subsequent decontamination of the reactor buildings are coordinated so as to synchronize the final status survey for the station.
• The final demolition of buildings at Units 2 and 3 are considered to take place concurrently.
• Unit 2, as the first unit to enter decommissioning, incurs the majority of site characterization costs.
• Shared systems and structures are generally assigned to Unit 3.
• Station costs such as emergency response fees, regulatory agency fees, corporate overhead, and insurance are generally allocated on an equal basis between the two units.

3.4 FINANCIAL COMPONENTS OF THE COST MODEL

TLG's proprietary decommissioning cost model, DECCER, produces a number of distinct cost elements. These direct expenditures, however, do not comprise the total cost to accomplish the project goal, i.e., license termination and site restoration.

3.4.1 Contingency

Inherent in any cost estimate that does not rely on historical data is the inability to specify the precise source of costs imposed by factors such as tool breakage, accidents, illnesses, weather delays, and labor stoppages. In the DECCER cost model, contingency fulfills this role. Contingency is added to each line item to account for costs that are difficult or impossible to develop analytically. Such costs are historically inevitable over the duration of a job of this magnitude; therefore, this cost analysis includes funds to cover these types of expenses.

The activity- and period-dependent costs are combined to develop the total decommissioning cost. A contingency is then applied on a line-item basis, using one or more of the contingency types listed in the AIF/NESP-036 study. "Contingencies" are defined in the American Association of Cost Engineers "Project and Cost Engineers' Handbook" as "specific provision for unforeseeable elements of cost within the defined project scope; particularly important where previous experience relating estimates and actual costs has shown that unforeseeable events which will increase costs are likely to occur." The cost elements in this analysis are based upon ideal conditions and maximum efficiency; therefore, consistent with industry practice, a contingency factor has been applied. In the AIF/NESP-036 study, the types of unforeseeable events that are likely to occur in decommissioning are discussed and guidelines are provided for percentage contingency in each category. It should be noted that contingency, as used in this analysis, does not account for price escalation and inflation in the cost of decommissioning over the remaining operating life of the station.

For this study, TLG examined the major activity-related problems (decontamination, segmentation, equipment handling, packaging, transport, and waste disposal) that necessitate a contingency. Individual activity contingencies ranged from 10% to 75%, depending on the degree of difficulty judged to be appropriate from TLG's actual decommissioning experience. The contingency values used in this study are as follows:

Decontamination 50%
Contaminated Component Removal 25%
Contaminated Component Packaging 10%
Contaminated Component Transport 15%
Low-Level Radioactive Waste Disposal 25%

Reactor Segmentation 75%
NSSS Component Removal 25%
Reactor Waste Packaging 25%
Reactor Waste Transport 25%
Reactor Vessel Component Disposal 50%
GTCC Disposal 15%

Non-Radioactive Component Removal 15%
Heavy Equipment and Tooling 15%
Supplies 25%
Engineering 15%
Energy 15%

Characterization and Termination Surveys 30%
Construction 15%
Taxes and Fees 10%
Insurance 10%
Staffing 15%

The contingency values are applied to the appropriate components of the estimates on a line-item basis. A composite value is then reported at the end of each estimate. For example, the composite contingency value reported for the DECON alternative is 18.2%. The corresponding value for the SAFSTOR alternative is 17.2%.

3.4.2 Financial Risk

In addition to the routine uncertainties addressed by contingency, another cost element that is sometimes necessary to consider when bounding decommissioning costs relates to uncertainty, or risk. Examples can include changes in work scope, pricing, job performance, and other variations that could conceivably, but not necessarily, occur. Consideration is sometimes necessary to generate a level of confidence in the estimate, within a range of probabilities. TLG considers these types of costs under the broad term "financial risk." Included within the category of financial risk are:

- Transition activities and costs: ancillary expenses associated with eliminating 50% to 80% of the site labor force shortly after the cessation of plant operations, added cost for worker separation packages throughout the decommissioning program, national or company-mandated retraining, and retention incentives for key personnel.
- Delays in approval of the decommissioning plan due to intervention, public participation in local community meetings, legal challenges, and national and local hearings.
- Changes in the project work scope from the baseline estimate, involving the discovery of unexpected levels of contaminants, contamination in places not previously expected, contaminated soil previously undiscovered (either radioactive or hazardous material contamination), variations in plant inventory or configuration not indicated by the as-built drawings.
- Regulatory changes (e.g., affecting worker health and safety, site release criteria, waste transportation, and disposal).
- Policy decisions altering national commitments (e.g., in the ability to accommodate certain waste forms for disposition) or in the timetable for such, for example, the start and rate of acceptance of spent fuel by the DOE.
- Pricing changes for basic inputs such as labor, energy, materials, and disposal. Items subject to widespread price competition (such as materials) may not show significant variation; however, others such as waste disposal could exhibit large pricing uncertainties, particularly in markets where limited access to services is available.

This cost study does not add any additional costs to the estimate for financial risk, since there is insufficient historical data from which to project future liabilities. Consequently, the areas of uncertainty or risk are revisited periodically and addressed through repeated revisions or updates of the base estimates.

3.5 SITE-SPECIFIC CONSIDERATIONS (Hope Creek and Salem Units 1 and 2)

There are a number of site-specific considerations that affect the method for dismantling and removal of equipment from the site and the degree of restoration required. The cost impacts of the considerations identified below are included in this cost study.

3.5.1 Spent Fuel Management

The cost to dispose of spent fuel generated from plant operations is not reflected within the estimates to decommission Salem. Ultimate disposition of the spent fuel is within the province of the DOE's Waste Management System, as defined by the Nuclear Waste Policy Act. As such, the disposal cost is financed by a 1 mill/kWhr surcharge paid into the DOE's waste fund during operations. However, the NRC requires licensees to establish a program to manage and provide funding for the management of all irradiated fuel at the reactors until title of the fuel is transferred to the Secretary of Energy. This funding requirement is fulfilled through inclusion of certain high-level waste cost elements within the estimate, as described below.

Completion of the decommissioning process is highly dependent upon the DOE’s ability to remove spent fuel from the site. The DOE was to begin accepting spent fuel by January 31, 1998; however, to date no progress in the removal of spent fuel from commercial generating sites has been made.

For purposes of this analysis, PSEG’s current spent fuel management plan for the Salem spent fuel assumes “just-in-time” acceptance, i.e., the DOE will be able to complete the transfer of spent fuel so as not to impede a deferred decommissioning scenario (SAFSTOR) and the termination of the operating license within the required 60 year period (from the cessation of operations). To achieve this objective, based upon the oldest fuel receiving the highest priority and an annual maximum rate of transfer of 3,000 metric tons of uranium, DOE would commence pickup of spent fuel from commercial generators no later than 2033, with the first Salem fuel assemblies leaving the site in 2037. The last Salem assemblies would be removed from Artificial Island by 2084.

ISFSI

The ISFSI will continue to operate throughout decommissioning, and beyond the conclusion of the remediation phase in the DECON decommissioning scenario, until such time that the transfer of spent fuel to the DOE can be completed. The scenario is similar for the SAFSTOR alternative; however, based upon the expected completion date for fuel transfer, the ISFSI will be emptied prior to the commencement of decommissioning operations.

Operation and maintenance costs for the spent fuel pool and the ISFSI are included within the estimates and address the cost for staffing the facility, as well as security, insurance, and licensing fees. Costs are also provided for the final disposition of the facilities once the transfer is complete. Whenever appropriate, costs for maintaining the ISFSI are shared between Salem and the adjacent Hope Creek unit.

Canister Design (Hope Creek)

The Holtec HI-STORM system (with a 68 fuel assembly capacity) is assumed for future cask acquisitions. For fuel transferred directly from the pool to the DOE, for purposes of this estimate only, the DOE was assumed to provide Transport, Aging and Disposal (TAD) canisters with a 44 assembly capacity. DOE has not identified any cask systems it may use.

Canister Design (Salem Units 1 and 2)

The Holtec HI-STORM dry storage system (with a 32 fuel assembly capacity) is assumed for future cask acquisitions. For fuel transferred directly from the pools to the DOE, for purposes of this estimate only, the DOE was assumed to provide Transport, Aging and Disposal (TAD) canisters with a 21 assembly capacity. DOE has not identified any cask systems it may use.

Canister Loading and Transfer
The estimates include the cost for the labor and equipment to transfer and load each spent fuel canister into the DOE transport cask or to the ISFSI from the wet storage pools. For estimating purposes, an allowance is used to estimate the cost to transfer the fuel from the ISFSI into the DOE transport cask.

Operations and Maintenance
The estimates also include the cost of operating and maintaining the spent fuel pools and the ISFSI, respectively. Pool operations are expected to continue approximately five and one half years at each unit following the cessation of operations. ISFSI operating costs are allocated between Salem and the adjacent Hope Creek unit.

ISFSI Design Considerations (Hope Creek)

The final core off load, requiring 12 canisters, is assumed to have some level of neutron-induced activation as a result of the long-term storage of the fuel (i.e., to levels exceeding free-release limits). These canisters' concrete overpacks are disposed of at a licensed facility. The cost of the disposition of this material, as well as the demolition of the ISFSI facility, is included in the estimate.

ISFSI Design Considerations (Salem Units 1 and 2)
The canisters containing the final core off load, requiring 7 canisters per unit, are assumed to have some level of neutron-induced activation as a result of the long-term storage of the fuel (i.e., to levels exceeding freerelease limits). These canisters' concrete overpacks are disposed of at a licensed facility. The cost of the disposition of this material, as well as the demolition of the ISFSI facility, is included in the estimate.

GTCC
The dismantling of the reactor internals is expected to generate radioactive waste considered unsuitable for shallow land disposal (i.e., low-level radioactive waste with concentrations of radionuclides that exceed the limits established by the NRC for Class C radioactive waste (GTCC)). The Low-Level Radioactive Waste Policy Amendments Act of 1985 assigned the federal government the responsibility for the disposal of this material. The Act also stated that the beneficiaries of the activities resulting in the generation of such radioactive waste bear all reasonable costs of disposing of such waste. Although the DOE is responsible for disposing of GTCC waste, any costs for that service have not been determined. For purposes of this estimate, the GTCC radioactive waste has been assumed to be packaged in the same canisters used to store spent fuel and disposed of as high-level waste, at a cost equivalent to that envisioned for the spent fuel.

It is assumed that the DOE would not accept this waste prior to completing the transfer of spent fuel. Therefore, until such time the DOE is ready to accept GTCC waste, it is reasonable to assume that this material would remain in storage at the Salem site (for the DECON alternative). In the SAFSTOR scenario, the GTCC material is shipped directly to a DOE facility as it is generated, since the fuel has been removed from the site prior to the start of decommissioning. GTCC costs have been segregated and included within the "License Termination" expenditures.

3.5 SITE-SPECIFIC CONSIDERATIONS (Peach Bottom Units 2 and 3)

There are a number of site-specific considerations that affect the method for dismantling and removal of equipment from the site and the degree of restoration required. The cost impacts of the considerations identified below are included in this cost study.

3.5.1 Spent Fuel Management

The cost to dispose of spent fuel generated from plant operations is not reflected within the estimates to decommission the Peach Bottom site. Ultimate disposition of the spent fuel is within the province of the DOE's Waste Management System, as defined by the NWPA. As such, the disposal cost is financed by a 1 mill/kWhr surcharge paid into the DOE's waste fund during operations. However, the NRC requires licensees to establish a program to manage and provide funding for the management of all irradiated fuel at the reactors until title of the fuel is transferred to the Secretary of Energy. This funding requirement is fulfilled through inclusion of certain high-level waste cost elements within the estimate, as described below.

Completion of the decommissioning process is highly dependent upon the DOE's ability to remove spent fuel from the site. The DOE was to begin accepting spent fuel by January 31, 1998; however, to date no progress in the removal of spent fuel from commercial generating sites has been made.

For purposes of this analysis, PSEG is relying upon Exelon's spent fuel pickup assumptions (developed for the Exelon fleet). However, the DOE start date has been deferred, consistent with the timeline developed in the decommissioning studies for the Hope Creek and Salem nuclear units. As such, the pickup of commercial fuel is assumed to begin in the year 2033. Fuel is projected to be removed from the Peach Bottom site beginning in 2061 (a 13 year delay from Exelon's fleet projections) and be completed by 2071.

ISFSI

The ISFSI will continue to operate throughout decommissioning, and beyond the conclusion of the remediation phase in the DECON decommissioning scenario, until such time that the transfer of spent fuel to the DOE can be completed. The scenario is similar for the SAFSTOR alternative; however, based upon the expected completion date for fuel transfer, the ISFSI will be emptied prior to the commencement of decommissioning operations.

Operation and maintenance costs for the spent fuel pools and the ISFSI are included within the estimates and address the cost for staffing the facility, as well as security, insurance, and licensing fees. Costs are also provided for the final disposition of the facilities once the transfer is complete.

Canister Design

Peach Bottom is current using the Transnuclear TN-68 for the storage of spent fuel. The TN-68 is a vertical storage system that can be converted for transportation by the addition of impact limiters. The steel cask has no concrete shielding. However, it is possible that an alternative dry fuel storage system will be used in the future.

For purposes of this analysis, the fuel off-loaded from the spent fuel pools at the permanent cessation of operations is assumed to be stored in a multi-purpose canister, with a concrete overpack (e.g., the Holtec HI-STORM design).

Canister Loading and Transfer

The estimates include the cost for the labor and equipment to transfer and load each spent fuel canister into the DOE transport cask or to the ISFSI from the wet storage pools. For estimating purposes, an allowance is used to estimate the cost to transfer the fuel from the ISFSI into the DOE transport cask.

Operations and Maintenance

The estimates also include the cost of operating and maintaining the spent fuel pools and the ISFSI, respectively. Pool operations are expected to continue approximately five and one half years at each unit following the cessation of operations.

ISFSI Design Considerations

The canisters containing the final core off load, requiring 12 canisters per unit, are assumed to have some level of neutron-induced activation as a result of the long-term storage of the fuel (i.e., to levels exceeding free-release limits). These canisters' concrete overpacks are disposed of at a licensed facility. The cost of the disposition of this material, as well as the demolition of the ISFSI facility, is included in the estimate.

GTCC

The dismantling of the reactor internals is expected to generate radioactive waste considered unsuitable for shallow land disposal (i.e., low-level radioactive waste with concentrations of radionuclides that exceed the limits established by the NRC for Class C radioactive waste (GTCC)). The Low-Level Radioactive Waste Policy Amendments Act of 1985 assigned the federal government the responsibility for the disposal of this material. The Act also stated that the beneficiaries of the activities resulting in the generation of such radioactive waste bear all reasonable costs of disposing of such waste. Although the DOE is responsible for disposing of GTCC waste, any costs for that service have not been determined. For purposes of this estimate, the GTCC radioactive waste has been assumed to be packaged in the same canisters used to store spent fuel and disposed of as high-level waste, at a cost equivalent to that envisioned for the spent fuel.

It is assumed that the DOE would not accept this waste prior to completing the transfer of spent fuel. Therefore, until such time the DOE is ready to accept GTCC waste, it is reasonable to assume that this material would remain in storage at the Peach Bottom site (for the DECON alternative). In the SAFSTOR scenario, the GTCC material is shipped directly to a DOE facility as it is generated, since the fuel has been removed from the site prior to the start of decommissioning. GTCC costs have been segregated and included within the "License Termination" expenditures.

3.6 ASSUMPTIONS

The following are the major assumptions made in the development of the estimates for decommissioning the site.

3.6.1 Estimating Basis

The study follows the principles of ALARA through the use of work duration adjustment factors. These factors address the impact of activities such as radiological protection instruction, mock-up training, and the use of respiratory protection and protective clothing. The factors lengthen a task's duration, increasing costs and lengthening the overall schedule. ALARA planning is considered in the costs for engineering and planning, and in the development of activity specifications and detailed procedures. Changes to worker exposure limits may impact the decommissioning cost and project schedule.

3.6.2 Labor Costs

The craft labor required to decontaminate and dismantle the nuclear station will be acquired through standard site contracting practices. The current cost of labor at the site is used as an estimating basis.

For purposes of this analysis, it is assumed that the owners (PSEG and Exelon) will hire a Decommissioning Operations Contractor (DOC) to manage the decommissioning. PSEG or Exelon (as the licensed operator) will provide site security, radiological health and safety, quality assurance and overall site administration during the decommissioning and demolition phases. Contract personnel will provide engineering services (e.g., for preparing the activity specifications, work procedures, neutron activation, and structural analyses) under the direction of PSEG or Exelon.

Personnel costs are based upon average salary information provided by PSEG and Exelon. Overhead costs are included for site and corporate support, reduced commensurate with the staffing of the project.

Security, while reduced from operating levels, is maintained throughout the decommissioning for access control, material control, and to safeguard the spent fuel.

3.6.3 Design Conditions

Any fuel cladding failure that occurred during the lifetime of the plant is assumed to have released fission products at sufficiently low levels that the buildup of quantities of long-lived isotopes (e.g., ^{137}Cs, ^{90}Sr, or transuranics) has been prevented from reaching levels exceeding those that permit the major NSSS components to be shipped under current transportation regulations and disposal requirements.

The curie contents of the vessel and internals at final shutdown are derived from those listed in NUREG/CR-3474. Actual estimates are derived from the curie/gram values contained therein and adjusted for the different mass of the Salem components, projected operating life, and different periods of decay. Additional short-lived isotopes were derived from NUREG/CR-0130 and NUREG/CR-0672, and benchmarked to the long-lived values from NUREG/CR-3474.

The control elements are disposed of along with the spent fuel (i.e., there is no additional cost provided for their disposal).

Activation of the reactor building structures is confined to the biological shield.

3.6.4 General

Transition Activities
Existing warehouses will be cleared of non-essential material and remain for use by PSEG or Exelon and its subcontractors. The plant's operating staff will perform the following activities at no additional cost or credit to the project during the transition period:

- Drain and collect fuel oils, lubricating oils, and transformer oils for recycle and/or sale.
- Drain and collect acids, caustics, and other chemical stores for recycle and/or sale.
- Processes operating waste inventories, i.e., the estimates do not address the disposition of any legacy wastes; the disposal of operating wastes during this initial period is not considered a decommissioning expense.

Scrap and Salvage
The existing plant equipment is considered obsolete and suitable for scrap as deadweight quantities only. PSEG or Exelon will make economically reasonable efforts to salvage equipment following final plant shutdown. However, dismantling techniques assumed by TLG for equipment in this analysis are not consistent with removal techniques required for salvage (resale) of equipment. Experience has indicated that some buyers wanted equipment stripped down to very specific requirements before they would consider purchase. This required expensive rework after the equipment had been removed from its installed location. Since placing a salvage value on this machinery and equipment would be speculative, and the value would be small in comparison to the overall decommissioning expenses, this analysis does not attempt to quantify the possible salvage value that an owner may realize based upon those efforts.

It is assumed, for purposes of this analysis, that any value received from the sale of scrap generated in the dismantling process would be offset by the on-site processing costs. The dismantling techniques assumed in the decommissioning estimates do not include the additional cost for size reduction and preparation to meet "furnace ready" conditions. For example, the recovery of copper from electrical cabling may require the removal and disposition of any contaminated insulation, an added expense. With a volatile market, the potential profit margin in scrap recovery is highly speculative, regardless of the ability to free release this material. This assumption is an implicit recognition of scrap value in the disposal of clean metallic waste at no additional cost to the project.

Furniture, tools, mobile equipment such as forklifts, trucks, bulldozers, and other property will be removed at no cost or credit to the decommissioning project. Disposition may include relocation to other facilities. Spare parts will also be made available for alternative use.

Energy
For estimating purposes, the plant is assumed to be de-energized, with the exception of those facilities associated with spent fuel storage. Replacement power costs are used for the cost of energy consumption during decommissioning for tooling, lighting, ventilation, and essential services.

Insurance

Costs for continuing coverage (nuclear liability and property insurance) following cessation of plant operations and during decommissioning are included and based upon current operating premiums. Reductions in premiums, throughout the decommissioning process, are based upon the guidance and the limits for coverage defined in the NRC's proposed rulemaking "Financial Protection Requirements for Permanently Shutdown Nuclear Power Reactors." NRC's financial protection requirements are based on various reactor (and spent fuel) configurations.

Taxes (Salem Unit 1 and 2)

Property taxes are included for all decommissioning periods. PSEG provided a property tax payment for the entire Artificial Island site of $75,000 per year. Approximately 59% of this payment is assigned to Salem and is maintained for the entire decommissioning program.

Taxes (Hope Creek)

Property taxes are included for all decommissioning periods. PSEG provided a property tax payment for the entire Artificial Island site of $75,000 per year. Approximately 41% of this payment is assigned to Hope Creek and is maintained for the entire decommissioning program.

Taxes (Peach Bottom Unit 2 and 3)

Property taxes are included for all decommissioning periods. Exelon provided a schedule of decreasing tax payments against the current tax assessment. These reductions continue until reaching a minimum property tax payment for the site; this level is maintained for the balance of the decommissioning program.

Site Modifications

The perimeter fence and in-plant security barriers will be moved, as appropriate, to conform to the Site Security Plan in force during the various stages of the project.