ENCLOSURE 2 TO AEP-NRC-2018-71

Decommissioning Study of the D.C. Cook Nuclear Power Plant conducted by Knight Cost Engineering Services, LLC, dated January 21, 2016, Revision 0

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Prepared for Indiana Michigan Power Company

Knight Cost Engineering Services, LLC

January 21, 2016

Revision 0

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1.0 INTRODUCTION

1.1 DONALD C. COOK UNITS 1 AND 2 PLANT SITE

The Donald C. Cook Nuclear Power Plant (D.C. Cook Plant) is a nuclear-powered electrical generating facility located in Bridgman, Michigan. D.C. Cook Plant consists of two pressurized water reactors (PWR). Its electrical rating is 1084 MWe for reactor Unit 1 and 1107 MWe for reactor Unit 2. D.C. Cook Plant has been granted a twenty-year license extension by the Nuclear Regulatory Commission (NRC). Based on the terms of this extension, Unit 1 is scheduled for shutdown on October 25, 2034; Unit 2 is scheduled for shutdown on December 23, 2037. Units 1 & 2 are planned to be decommissioned in series following shut down.

This study is an update of the 2012 site-specific Decommissioning Cost Estimate of the D.C. Cook Nuclear Power Plant, Units 1 & 2, prepared for the Indiana Michigan Power Company (the Company). As such, it reflects site-specific plant information and cost factors. The most current decommissioning experience and logic have been incorporated into this estimate, including spent fuel acceptance rates, spent fuel storage issues, decommissioning methodologies, decommissioning management and waste disposal.

1.2 OVERVIEW OF THE SCENARIO

This study consists of one decommissioning scenario. This scenario includes the cost for the immediate decommissioning of the site (DECON), on-site storage of spent fuel, and clean removal. In addition, it includes the cost for the removal of the Independent Spent Fuel Storage Installation (ISFSI).

The cost estimate contained herein was developed based on a May 2015 configuration. It utilizes site-specific plant systems and building inventory recently generated based on current site configuration, drawings and component database. Costs have been determined for removal, packaging, transportation and disposal.

The decommissioning activities contained herein were previously developed and have been modified as required, with costs determined for each activity. The critical path schedule was previously developed and has been modified based on new spent fuel discharge assumptions and new and modified task durations. Period-dependent costs include utility staff, decommissioning general contractor staff, security, insurance, energy and others. Cost levels were determined based on specific periods or groups of activities per the schedule. Total period dependent costs were determined by the scenario-specific durations. Activity and period dependent costs were totaled to determine overall costs for each scenario.

The purpose of this study is to provide one cost estimate based the actual spent fuel storage conditions. The costs presented are for financial planning. All costs are in summer, 2015 dollars. All costs are based on the aforementioned spent fuel shipping and storage assumptions.

Utilizing the above estimating methodology, the cost for this scenario is $1,634,038,400. In addition there will be an annual cost of $4,912,700 per year of post decommissioning spent fuel storage and $56,952,300 for the eventual decommissioning of the ISFSI.

2.0 SUMMARY

Decommissioning is the safe removal of a facility or site from service and the reduction of radioactivity to a level that permits either the release of the property for unrestricted use and NRC license termination; or a restricted release of the property and NRC license termination.

2.1 DECOMMISSIONING ALTERNATIVES

The NRC allows three types of scenarios in estimating the decommissioning of a nuclear site, DECON, SAFSTOR and ENTOMB. The first, DECON, occurs soon after shutdown. It assumes that all systems, structures and contaminated site areas will be removed or decontaminated and that the facility's license will be terminated.

For the second alternative, SAFSTOR, preparations occur soon after shutdown. It assumes limited site decontamination and dismantlement; that all liquid will be drained from systems; that the facility will be placed in a safe and stable condition; that all spent fuel will be held in storage or shipped from the site; and that the site will be decontaminated and its license terminated within sixty years. This study does not consider the SAFSTOR scenario.

In the third alternative, ENTOMB, preparations occur soon after shutdown. It assumes limited site decontamination and dismantlement; that all liquid will be drained from systems; that the remaining radioactive systems and structures will be encased inside an entombment structure; that the facility will be continuously monitored; that spent fuel will be held in storage or shipped from the site; that the site will be decontaminated and license terminated within 60 years; and that most reactors will have radionuclides in concentrations exceeding the limits for unrestricted release after 100 years. This study does not consider the ENTOMB scenario.

Per NRC regulations, there are specific reporting requirements for decommissioning and spent fuel storage. Regulation 10 CFR 50.75, *Reporting and Recordkeeping for Decommissioning Planning, requires* a decommissioning report certifying that financial assurance will be available for decommissioning. The amount funded must be adjusted annually. A report on the status of funding must be submitted every two years. Costs not associated with decommissioning, such as spent fuel storage and clean removal costs, are specifically excluded.

Five years before license expiration or within 2 years after permanent shutdown, whichever occurs first, NRC regulation 10 CFR 50.54(bb) requires the licensee have a program to manage and provide funding for the management of spent fuel following permanent cessation until title to and possession of all of its spent fuel is transferred to the Department of Energy (DOE) for ultimate disposal in a repository. The licensee must demonstrate the actions will be consistent with NRC requirements and will be implemented on a timely basis according to these requirements.

On June 17, 2011, the NRC published a final rule amending its regulations to improve decommissioning planning. The rule became effective on December 17, 2012 and required

compliance by March 31, 2013. This rule requires licensees to report additional details in their decommissioning cost estimate. To assist in the implementation of the new rule, the NRC revised NUREG-1757, "Consolidated Decommissioning Guidance, Financial Assurance, Recordkeeping and Timeliness," specifically volume 3. This volume applies to the timeliness and recordkeeping requirements for licensees under Title 10 of the Code of Federal Regulations (10 CFR) Parts 30, 40, 70, and 72. It also applies to financial assurance requirements for licensees under 10 CFR Parts 30, 40, 70, and 72. This volume does not apply to licensees under 10 CFR Part 50, "Domestic Licensing of Production and Utilization Facilities." Regulatory Guide 1.159, Revision 1, "Assuring the Availability of Funds for Decommissioning Nuclear Reactors," issued October 2003, provides guidance on financial assurance for these licensees. While the final rule applies to reactor licensees, like Cook, the guidance of NUREG-1757 is not directly applicable but does provide additional information useful in the development of this cost estimate.

While none of the above NRC regulations require Greenfield or clean system and structure removal costs, these costs may be required by local authorities to minimize liability. Removal of clean systems and structures may also be required to access contaminated components and structures. Therefore, Greenfield costs have been included in this study.

Table 2-1 provides a summary of the costs for this scenario. Costs are separated into the three cost categories based on the aforementioned spent fuel shipping and storage assumptions and have been determined based on the described estimating methodology.

TABLE 2-1
SUMMARY OF COSTS

DECON, Indefinite On-Site Dry Storage and Modified Spent Fuel Pool Systems				
Decommissioning Alternative	**Fuel Storage and Decommissioning Cost**	**Dormancy Period Cost**	**Delayed Dismantling Cost**	**Total Program Cost**
10 CFR 50.75(c)	$909,101,862	N/A	N/A	$909,101,862
10 CFR 50.54(bb)	$529,465,643	N/A	N/A	$529,465,643
Greenfield	$195,470,882	N/A	N/A	$195,470,882
			total:	**$1,634,038,387**
Annual ISFSI	$4,912,735 per year			**$4,912,735 per year**
ISFSI Decommissioning	$56,952,278			**$56,952,278**

3.0 DECOMMISSIONING COST ESTIMATING METHODOLOGIES

3.1 DECON

There are typically six periods associated with the DECON methodology of decommissioning cost estimating. Period one consists of decommissioning planning prior to shutdown. Period two involves post-shutdown preparations, including isolation of spent fuel; decontamination of the primary system; flushing and draining of all systems; implementation of cold and dark; and characterization surveys. Period three consists of removal of reactor internals and removal of the reactor vessel. The critical path task for period three is the removal, packaging, shipping and disposal of the reactor internals and the reactor vessel. Also in period three, the steam generators, pressurizers, contaminated systems and structures are removed, packaged, shipped and disposed of. Additionally, clean structures and systems are removed as they become unnecessary. In period four, the buildings undergo decontamination. Building decontamination includes decontamination of the reactor building(s), removal, packaging, shipping and disposition of spent fuel racks after spent fuel has been removed from the spent fuel pool, decontamination of the spent fuel pool and the balance of the auxiliary building(s), a formal site survey of any remaining buildings, and termination of 10 CFR Part 50 license. Period five consists of demolition of clean buildings. In this period, all remaining clean structures are removed with the exception of any required to support spent fuel storage. Period six consists of site restoration. In this period, the site is graded and landscaped to conform to the natural surroundings. Depending on the spent fuel storage assumptions, these periods may be separated by a wet spent fuel storage period, a dry spent fuel storage period, and/or a combination of both.

The estimate in this study utilizes the DECON methodology.

There are advantages to utilizing the DECON methodology. DECON provides sooner termination of the NRC license compared to SAFSTOR. Knowledgeable employees who are familiar with the site will still be available. There is no need for long-term security and surveillance. The DECON method provides a greater certainty of regulatory requirements due to the inherent uncertainty in trying to assess future regulatory requirements. Finally, the total cost will be lower as it is incurred in current dollars and there is no extended dormancy period. DECON offers similar advantages over ENTOMB, primarily avoiding the uncertainty and long-term surveillance costs likely associated with restricted release of the site. In addition, DECON allows more flexible site reuse compared to ENTOMB.

Disadvantages of the DECON methodology compared to SAFSTOR or ENTOMB include the following: the short time period that elapses following shut-down means less radioactive decay and therefore a higher worker dose. The initial cash outlay will be larger. There is time for funds to accrue, which means a larger present value; and work will have to be performed in proximity to the on-site storage of spent fuel.

3.2 SPENT FUEL ACTIVITIES

There are many uncertainties associated with the Department of Energy's (DOE) acceptance of spent fuel. The Department of Energy (DOE) originally contracted to begin accepting spent fuel from nuclear power plants no later than January 31, 1998. To date, no commercial spent fuel has been taken by the DOE under the contract. Many utilities have brought legal proceedings against the DOE for their breach of contract with the majority winning court ordered compensation. Recently, all activity at Yucca Mountain has been shutdown and, at least in the near term, has been removed as a potential spent fuel repository. It appears unlikely that that spent fuel shipments to a Federal repository will occur anytime in the foreseeable future. In light of this fact, all nuclear utilities should be prepared to store spent fuel on-site for a long period of time. This scenario assumes indefinite storage.

In October, 2011 the DOE reached a settlement agreement with Indiana Michigan Power Company in regards to their failure to commence acceptance of spent nuclear fuel and high level waste. The agreement allowed Indiana Michigan to recover costs incurred due to the DOE's failure through December 31, 2013. An Addendum to this settlement agreement was issued in January of 2014. The Addendum extended the termination date of the settlement to December 31, 2016. Allowable reimbursements are based on costs incurred above and beyond those that would have been incurred had the DOE performed according to the contract. But for DOE's failure to perform, Indiana Michigan's spent fuel allocations, those spent fuel assemblies that would have been taken by DOE, are identified in attachment 1 of the Addendum.

This scenario assumes all spent fuel will be transferred to an on-site ISFSI after shutdown. Dry storage will be required during operations to maintain full core discharge capabilities, including expanding the ISFSI, if needed. The ISFSI must be expanded, after shutdown, sufficiently to accommodate the long term storage of all spent fuel from both units. The storage system is anticipated to be licensed for both storage and transportation facilitating the eventual transfer to the DOE site.

It is assumed that spent fuel cannot be transferred to dry storage until it has cooled a minimum of seven years in the spent fuel pool. In order to minimize post-shutdown spent fuel storage costs the spent fuel island concept will be implemented. Modifications to the site will provide self-contained fuel pool cooling, cleanup, monitoring, control and electrical power systems. This will isolate the spent fuel pool from the remainder of the site and will allow decommissioning to continue safely on the balance of site. This option will provide the low cost option for the long term on-site storage of spent fuel.

Per ISFSI Licensing requirements, a 10 CFR part 72 license will be required in order to terminate the 10 CFR Part 50 license. Systems approved for use under the provisions of 10 CFR part 72 Subpart K, a Certificate of Compliance, may be used on a site with a 10 CFR part 50 license without a 10 CFR Part 72 Subpart C license. The process to obtain a 10 CFR Part 72

license will be simplified by utilizing a storage system with a Certificate of Compliance. For this reason, this study assumes the dry storage system utilized will have a Certificate of Compliance.

A site re-evaluation is not required to obtain the Part 72 subpart C ISFSI license if it is shown that original site findings have not changed. A re-evaluation would only be required if new information is available that alters the original findings. It is assumed that the system utilized for dry storage will meet or could be modified to meet the original site design conditions.

3.3 DECOMMISSIONING MANAGEMENT

The utility staff will retain certain of their ongoing functions during decommissioning, including the following:

- Shipment of low-level waste remaining from plant operations
- Radiological health and safety
- Security
- Quality assurance
- Health physics monitoring
- Defueling of the reactor
- Draining and de-energizing of all systems
- Continued safe on-site storage of spent fuel
- Management of the decommissioning general contractor.

The number of staff during each period depends on the major work planned for each period. Details are provided in section seven of this report.

While not directly applicable, consistent with the reasons stated in the NRC guidance of NUREG-1757, Vol. III, App. A, Section A.3.1, this study assumes that the utility will hire an experienced decommissioning general contractor (DGC) who will be responsible for performing the decommissioning activities. The DGC in turn will hire and be responsible for subcontractors hired to perform activities, such as primary system decontamination flush and large component removal. The number of staff during each period depends on the major work planned for each period. Details are provided in section seven of this report.

3.4 COLD & DARK

To simplify the removal of systems and structures, a "cold & dark" status will be implemented. The cold & dark status will allow component removal without individually verifying that each component has been de-energized. To implement cold & dark, all systems will be drained and electrical power to components will be removed as appropriate. After the spent fuel pool isolation has been completed, a new minimized control room will be constructed. Construction power will be supplied to the site for decommissioning and to operate essential loads with color coded wire. This process ensures that all energy sources are removed prior to the beginning of

decommissioning activities, simplifying the removal process and greatly increasing safety during the decommissioning process.

3.5 DECONTAMINATION PROCEDURES

To facilitate the removal of contaminated large components, contamination control envelopes (CCE's) will be set up inside the reactor building. CCEs will have integral ventilation systems for contamination control and to maintain negative pressure. Cutting stations, including for underwater cutting, will be set up within the reactor building.

The reactor vessel internals will be removed from the vessel and transferred to the fuel transfer canal. Once in the transfer canal, they will be segmented and loaded underwater into shipping liners. The liner outer surfaces will be washed and loaded into shipping casks for transport to the disposal facility.

The reactor vessel will be cut into ring segments with each segment transferred to the fuel transfer canal. Here, each segment will be further segmented and loaded into shipping cask liners. The outer surfaces of the liners will be washed and then loaded into shipping casks for transport to the disposal facility.

With the exception of the upper shell, the steam generator will be removed intact. A steam generator transfer system and support equipment will be installed to remove the steam generator from the reactor building. A CCE and ventilation system, scaffolding, temporary lighting and shielding will also be installed. The insulation will be removed from the steam generators, followed by cutting of the main steam, feedwater and miscellaneous piping. Next the upper shell and components will be cut and removed. These will be surveyed, decontaminated and released if possible.

A steel plate will be welded to the top of the lower shell. The lower shell will be removed, transferred from the building, prepared for transport and transported to the disposal facility.

The pressurizer will be removed in a similar fashion, excluding segmentation.

The following process will be used for removal and disposal of contaminated systems, previously drained by the utility staff: Contaminated pipe and components will be cut free and segmented as necessary. The components will be transferred to a packaging area where a crew will package them, survey the containers and prepare the containers for shipment.

Clean pipe and components will be cut free and segmented when necessary. The components will be transferred to a packaging area where a crew will package the material into containers and prepare for them for shipment. It is assumed that clean waste will be disposed of at a local landfill.

With the exception of the reactor building interior, contaminated concrete surfaces will be decontaminated by partial surface removal. In some cases entire walls and/or floors will be removed. The remaining structures will be surveyed for conformance to release limits. Depending on the results of the survey, more decontamination may be required. Bulk removal of the reactor building interior floors and walls will be performed with all of the material being sent out for off-site processing. This leads to a large disposal volume; however, at a lower rate for bulk processing than for direct burial. In addition, there will be far less characterization and iterative decontamination.

Clean structures will be demolished using explosives and/or mechanical means and disposed of at a local landfill.

3.6 CONTINGENCY

Contingencies are applied to cost estimates primarily to account for unknown or unplanned events that experience tells us are likely to occur. These events include increased radioactive waste materials in volumes exceeding the amount anticipated; equipment breakdowns; weather delays; labor strikes, etc. Estimates are based on assumed values of cost, which in reality are subject to variability. The actual costs may be higher or lower than the estimated value; however, they usually go higher. The amount of contingency to be added is directly related to the level of detail and uncertainty contained in the estimate.

The U.S. Department of Energy (DOE) Cost Estimating Guide, DOE G 430.1-1, 3-28-97; defines contingency as follows: "Covers costs that may result from incomplete design, unforeseen and unpredictable conditions, or uncertainties within the defined project scope. The amount of contingency will depend on the status of design, procurement, and construction; and the complexity and uncertainties of the component parts of the project. Contingency is not to be used to avoid making an accurate assessment of expected costs."

DOE G 430.1-1 provides a recommended range of contingencies as a function of program design:

Time of Estimate	Contingency Range as a % of Total Estimate
Planning Phase	20-30
Budget	15-25
Title I	10-20
Title II	5-15

The AACE International Certification Study Guide, Second Edition - Revised, 2003, defines contingency as follows: "Contingency is a cost element of an estimate to cover a statistical probability of the occurrence of unforeseeable elements of cost within the defined project scope

due to a combination of uncertainties, intangibles and unforeseen, highly-unlikely occurrences of future events based on management decisions to assume certain risks."

AIF/NESP-0036 "Guidelines for Producing Nuclear Plant Decommissioning Cost Estimates" (AIF) is another source for published contingency values. This document identifies contingencies for activities specific to nuclear power plant decommissioning. Except for system decontamination, reactor vessel removal and disposal and reactor internals removal and disposal, the contingencies presented in AIF are consistent with the values presented in DOE G 430.1-1 for a Budget/Title I estimate. The contingencies identified in AIF for system decontamination and reactor vessel and reactor internals removal and disposal are higher than the ranges identified in DOE G 430.1-1. This is in part due to the lack of actual decommissioning work performed during the time period the AIF document was published.

While not directly applicable to a Part 50 reactor license, the NRC guidance of NUREG-1757, Vol. III, App. A, Section A.3.1, states that a contingency factor of 25% is normally appropriate. "Because of the uncertainty in contamination levels, waste disposal costs, and other costs associated with decommissioning, the cost estimate is required to apply an 'adequate' contingency factor. In general a contingency of 25 percent applied to the sum of all estimated decommissioning costs should be adequate, but in some cases, a higher contingency may be appropriate." The guidance goes on to recognize that "Proposals to apply the contingency only to selected components of the cost estimate, or to apply a contingency lower than 25 percent, should be approved only in circumstances when a case-specific review has determined that there is an extremely low likelihood of unforeseen increases in the decommissioning costs." For the reasons developed below, this study is an example of circumstances where a case-specific review has determined that applying a contingency lower than 25 percent to some elements of the cost estimate is appropriate.

An estimate of the nature developed for D. C. Cook would be considered somewhere between a Budget estimate (based on conceptual design) and a Title I (based on more detailed site specific design). As such, an overall contingency in the 15% to 25% range would be appropriate. Knight Cost Engineering Services, LLC (KCES) has determined contingency values specific to DC Cook utilizing the information presented in AIF and consistent with DOE G 430.1-1. There are a number of large scale decommissioning projects in progress or nearing completion. The DC Cook decommissioning cost estimate incorporates the lessons learned from these projects. As such, costs can be estimated with a greater degree of confidence than was true at the time AIF was published. This increased level of confidence allows for a downward adjustment to the recommended contingency where applicable. Other cost elements, particularly with regard to the reactor vessel segmentation, are less well known and contingency up to 50 percent is appropriate. The following table provides a summary of the contingency values that were applied to each activity for each cost category.

TABLE 3.1

	Staff Labor	Craft Labor	Equip & Mtls	Pkging	Trans-portation	Clean Disposal	Contam-inated Disposal	Energy	Other
Engineering and Project Management	15%								
Contaminated removal		25%		10%	15%		25%		
Reactor Vessel and Internals		50%		25%	25%		50%		
Clean removal		15%		10%	25%	10%			
Supplies and consumables			25%						
Other								15%	15%

There is some variation associated with the contingency analysis for on-site spent fuel storage. The activity costs associated with spent fuel storage, such as the purchase and construction of the ISFSI, the modification of the spent fuel pool and the transfer of spent fuel pool to the ISFSI are subject to many of the unknown or unplanned occurrences for which contingency is based. As such, the above methodology will be applied. During periods of spent fuel storage only, either wet or dry, the operating costs of the spent fuel storage facility include only a ten percent contingency because of the higher degree of knowledge and confidence in the factors comprising the operation of the wet or dry storage facility. Any variability in the duration of the fuel storage period due to failed DOE schedules is excluded from the contingency.

4.0 ASSUMPTIONS

Following is a list of assumptions developed by KCES in completing this study. These assumptions are based on the most current decommissioning methodologies and site-specific considerations.

1. **Component quantities** with the exception of pipe, conduit, cable tray and duct lengths, were developed from directly from the plan EDB system. Pipe, conduit, cable tray and duct lengths were used as is from the previous estimate.

2. **Structure inventory quantities** were developed for this estimate from general arrangement drawings and the site walkdown.

3. **The utility staff** is assumed to be the same size at the time of Unit 2 shutdown as it was in July, 2015.

4. **Utility staff positions and costs** were supplied by the Company and represent July, 2015 salary and benefit data

5. **Subcontractor base labor rates and fringe benefits** were supplied by AEP for most crafts. These rates were current as of June, 2015. The overhead and profit structure for these rates was developed by KCES.

6. **Craft labor rates** for positions not supplied by the Company were determined by KCES.

7. **Activity labor** costs do not include any allowance for delays between activities, nor is there any cost allowance for craft labor retained on-site while waiting for work to become available.

8. All **skilled laborers** will be supplied by the local union hall and hired by the Decommissioning General Contractor (DGC).

9. The **professional personnel** used for the planning and preparation activities will be paid per diem at the rate of $142.00/day. Since the skilled laborers are being supplied by local union hall they will not be paid per diem.

10. The cost for **Utility personnel** assisting the DGC to develop decommissioning activity specifications is included in the Utility Staff costs.

11. **Health Physics technicians** used during vessel and internal removal will be supplied by the Utility Staff.

12. **The DGC staff salaries**, including overhead and profit, were determined by KCES.

13. **Transportation** costs are based on actual mileage from D. C. Cook to each disposal or processing facility utilized in the estimate.

14. **Class B & C radioactive waste base disposal costs** are based on actual out of compact disposal rates and fees incurred at the WCS facility in Andrews, TX. In addition, the disposal costs of the Greater Than Class C waste, e.g., the core baffle and lower core grid plate, include present day curie surcharges as imposed at the WCS facility to more accurately reflect handling costs for highly radioactive material.

15. **Class A waste** will be disposed of at the Energy*Solutions* facility in Utah, Energy*Solutions* metal melt facility in Tennessee or the Studsvik processing facility in Tennessee, which Energy*Solutions* acquired in 2014. Waste is assumed to be transported to the lowest cost facility for which it qualifies. Further details on these processes are presented in Section 8.1.

16. **Clean waste** is assumed to be disposed of at a local landfill at a cost of $90.00 per ton.

17. It is assumed that **all radioactive waste** generated during operations and stored on-site will be disposed of prior to shutdown. The cost of disposal of this material is considered an operating expense and is assumed not to be a decommissioning cost.

18. **Greater than Class C waste** will be removed from the reactor vessel, segmented and packaged in containers of similar size and shape to the spent fuel assemblies. The containers will be stored in the spent fuel pool or transferred to the ISFSI. The additional containers are assumed to be shipped offsite with the spent fuel and are included in the spent fuel shipping analysis. Eighty-four containers will be filled per unit for both scenarios.

19. **All costs** used in these calculations were current on July, 2015.

20. The costs of all **required safety analyses and safety measures** for the protection of the general public, the environment, and decommissioning workers are included in the cost estimates.

21. All post shutdown costs necessitated by the presence of **stored spent fuel** are presented separately.

22. It is assumed that **Unit 1 will shut down** in October, 2034 and that **Unit 2 will remain operational** until December 2037.

23. **On-site dry storage** will utilize the Holtec Vertical Concrete Casks (VCC) and Multi-Purpose Canister (MPC) system. Each MPC is designed to store and transport 32 spent fuel assemblies. Separate overpacks will be used for transportation and disposal.

24. It is assumed that spent fuel will cool seven years in the spent fuel pool prior to being transferred to the ISFSI or shipped off site.

25. Only the costs for the **expanded storage pad, canister and overpacks** projected to be purchased after Unit 1 shutdown are included in this study as a spent fuel storage

expense. All canisters and overpacks required during operations, in order to maintain full core discharge capabilities, are assumed to be an operations expense. The cost per canister and storage overpack is estimated to be $2,000,000, including closure services.

26. **The Unit 1 and Unit 2 reactor vessel and internals** will be removed sequentially.

27. **The Unit 1 and Unit 2 reactor vessel and internals** are considered identical.

28. **Vessel and internals curie estimates** were derived from the values for the Reference PWR vessel and internals in NUREG/CR-0130. These values were adjusted for MWT rating, weight and decay period.

29. While there will in all likelihood be some level of property tax after shutdown, this study does not attempt to estimate the amount. It has been assumed for purpose of this study that **property taxes** for the D.C. Cook Plant will be zero after shutdown. This issue will be addressed as more information becomes available.

30. No **PCBs** will be on-site at shutdown.

31. It is assumed that all **asbestos insulation** will have been removed during the operating life of the plant.

32. **Clean building walls and foundations** more than three feet below grade may be left in place if there are no voids.

33. KCES has assumed that a site specific 10 CFR Part 72 license will be required for the balance of the dry storage period prior to terminating the 10 CFR Part 50 operating license.

34. The decommissioning will be performed under the **current regulations.** These regulations require a Post-Shutdown Decommissioning Activities Report (PSDAR) to be submitted prior to or within two years of after shutdown. In addition, certificates for permanent cessation of operations and permanent removal of fuel from the vessel must be submitted to the NRC 90 days after the PSDAR submittal. Major decommissioning activities that meet the criteria of 10 CFR Part 50.59, may be performed provided NRC agrees with the PSDAR.

35. The VCCs and storage pad may have some level of activation, as such the material will be removed and transported to one of the Energy*Solutions* processing facilities in Tennessee .

5.0 SCENARIO DESCRIPTION

Utilizing the above described estimating methodology cost for this scenario is $1,634,038,400. In addition there will be an annual cost of $4,912,700 per year of post decommissioning spent fuel storage and $56,952,300 for the eventual decommissioning of the ISFSI. The assumptions pertinent to this scenario are described below.

5.1 DECON WITH INDEFINITE ON-SITE DRY STORAGE

This scenario includes Unit 1 shutdown on Oct 25, 2034 and Unit 2 on Dec 23, 2037. The transfer of spent fuel remaining in the spent fuel pool to the dry storage facility will begin in 2039. The existing ISFSI will be expanded to accommodate all spent fuel remaining on-site. With the exception of the last core load of fuel assemblies, transfer of all remaining fuel to the ISFSI will be completed seven years after shutdown. The transfer of the last core load of 193 assemblies and a few remaining assemblies will occur immediately after the required seven year cooling period. The site will remain as an Independent Spent Fuel Storage Installation indefinitely.

The spent fuel pool will be modified immediately after Unit 2 shutdown to isolate it from the remainder of the facility. The capital cost of the skid mounted pool support systems package is included in this estimate. This will allow decommissioning to proceed exclusive of the spent fuel pool. Once all spent fuel has been removed from the spent fuel pool, the spent fuel pool island will be decommissioned. As soon as all spent fuel is transferred to dry storage, the balance of the D.C. Cook Plant will be decommissioned. All spent fuel will be stored on-site in Holtec's VCC and MPC system.

The six sequential periods in this scenario and the major activities occurring in each are as follows:

Period	Description	Period Duration, Months
1	BETWEEN SHUTDOWN OF UNIT 1 AND SHUTDOWN OF UNIT 2 • Planning for spent fuel pool modifications • Planning for cold and dark • Planning for primary systems flush • Select DGC • Planning for decommissioning	38
2	POST-SHUTDOWN ACTIVITIES • Transfer spent fuel from pool to the ISFSI • Modification of spent fuel pool systems • Primary system decontamination flush	12

- Flush and drain non-essential systems
- Perform characterization survey
- Implement cold and dark
- Vessel and Internals removal preparations

3	REMOVAL OF MAJOR COMPONENTS	42

- Transfer spent fuel from pool to the ISFSI
- Removal of Unit 1 and Unit 2 reactor vessels and internals
- Removal of Unit 1 and Unit 2 steam generators
- Removal of Unit 1 contaminated systems
- Remove Unit 1 clean systems
- Decontaminate Unit 1 Reactor Building
- Begin Unit 1 and Unit 2 structures decontamination

4	DECON BALANCE OF SITE	38

- Removal of Unit 2 contaminated systems
- Remove Unit 2 clean systems
- Decontaminate Unit 2 Reactor Building
- Remove spent fuel racks
- Decontaminate spent fuel storage building
- Completion of Unit 1 and Unit 2 structures decontamination
- Final site survey of reactor plant confirming satisfactory removal

5	CLEAN STRUCTURES DEMOLITION	18

- Demolition of decontaminated Unit 1 and Unit 2 structures

6	RESTORATION OF PLANT SITE	2

- Backfill, grading and landscaping of Unit 1 and Unit 2 sites

In this scenario, decommissioning and site restoration will be complete approximately 112 months or 9.3 years after Unit 2 shutdown. Spent fuel will remain on-site indefinitely. The cost for the eventual decontamination and removal of the ISFSI is included in the estimate.

6.0 SCHEDULES

A scenario-specific schedule has been developed for this study. The schedule is based on some combination of the following assumptions:

- DECON
- Spent fuel shipping start date
- Spent fuel shipping rate
- Construction and maintenance of on-site dry storage facility

The first step in determining each schedule is assessment of the spent fuel disposition. The spent fuel disposition schedule will have a major influence on the overall schedule critical path. The spent fuel disposition analysis will then be combined with the decommissioning activities to determine the overall project schedule.

Activity durations are determined based on the unit cost factor approach. Once the plant material inventory has been determined specific unit rates for cost, man hours and schedule hours for a specific activity, such as surface decontamination, are applied to the inventory. From this calculation the removal or decontamination cost, total man hours and total schedule hours are determined for an activity. The schedule hours are then entered into the schedule to determine project duration. The schedule will be divided into multiple periods depending on the activities occurring during that time period. The separation into multiple periods allows for better control in determining the period dependent costs such as staffing, insurance and security.

The spent fuel disposition analysis for Unit 1 and Unit 2 are presented in Table 6.1. This scenario assumes an indefinite on-site storage period. A detailed decommissioning schedule, based upon this spent fuel transfer schedule and a critical path analysis of the decommissioning activities, is presented in Appendix A.

6.1 DECON WITH ON-SITE DRY STORAGE AND NO SPENT FUEL SHIPPING

Spent fuel is assumed to remain on-site in dry storage indefinitely. The schedule of spent fuel movements is reflected in Table 6.1. The detailed project schedule is present in Appendix A. The decommissioning schedule has been optimized within the limitations imposed by the spent fuel storage requirements. Program periods and durations for this scenario are as follows:

Period	Description	Duration, months
1	U1 & U2 Decommissioning Planning Cost:	38
2	Post-Shutdown Activities Costs:	12
3	Vessel and Internals Removal Costs:	42

4	Decontaminate Balance of Site Costs:	38
5	Clean Structure Demolition Costs:	18
6	Restore Site Costs:	2
7	Dry Storage (Indefinitely)	
8	Eventual decontamination and removal of ISFSI	21

Decommissioning of the site will be complete in 2047, which is 112 months after the shutdown of Unit 2. Spent fuel will remain on site in dry storage indefinitely.

TABLE 6.1
SPENT FUEL SHIPPING SCHEDULE

Year	Unit 1 Fuel Discharged	Unit 2 Fuel Discharged	Assemblies To DOE	Total Assemblies & other items on Site	Assemblies to Dry Storage	Total Assemblies in Dry Storage	Pool Locations Occupied
2015		84 [note 1]		3684	512	896	2788
2016	89	89		3862	0	896	2966
2017	89	0		3951	0	896	3055
2018	0	89		4040	512	1408	2632
2019	89	89		4218	0	1408	2810
2020	89	0		4307	0	1408	2899
2021	0	89		4396	512	1920	2476
2022	89	89		4574	0	1920	2654
2023	89	0		4663	0	1920	2743
2024	0	89		4752	384	2304	2448
2025	89	89		4930	0	2304	2626
2026	89	0	0 [note 3]	5019	0	2304	2715
2027	0	89	0	5108	384	2688	2420
2028	89	89	0	5286	0	2688	2598
2029	89	0	0	5375	0	2688	2687
2030	0	89	0	5464	320	3008	2456
2031	89	89	0	5642	0	3008	2634
2032	89	0	0	5731	0	3008	2723
2033	0	89	0	5820	0	3008	2812
2034	193	89	0	6102	0	3008	3094
2035		0	0	6102	0	3008	3094
2036		89	0	6191	0	3008	3183
2037		193	0	6384	0	3008	3376
2038			0	6384	0	3008	3376
2039		42 [note 2]	0	6426	320	3328	3098
2040		84	0	6510	384	3712	2798
2041		42	0	6552	512	4224	2328
2042			0	6552	512	4736	1816
2043			0	6552	704	5440	1112
2044			0	6552	704	6144	408
2045			0	6552	408	6552	0
2046			0	6552		6552	0

NOTES:

1. Discharge supplied by AEP 5/5/15.
2. 84 spent fuel baskets loaded with GTCC will be discharged into the spent fuel pool, from each unit, during internals removal.
3. Spent fuel will remain on-site indefinitely.
4. Assemblies to dry storage determined by AEP through, 2033. Assemblies to dry storage after Unit 1 shutdown determined by KCES
5. Max number of casks required: 205
6. Casks purchased after shutdown 111

7.0 PROJECT MANAGEMENT

There are three components to project management during decommissioning, Utility Staff (staff), Decommissioning General Contractor Staff (DGC) and Security. Each of these is further broken down into that required for decommissioning and that required for spent fuel storage. The person levels for each are specific to each decommissioning period.

7.1 UTILITY STAFF

The staff size at Unit 1 shutdown is assumed to be the same size and composition as it was in the spring of 2015. Immediately after Unit 1 shutdown, the staff is reduced approximately 33%, severance payments for the severed personnel are included in period one of this study. The majority of the remaining staff is attributed to the operation of Unit 2. Upon shutdown of Unit 2 this staff is reduced to the level required for decommissioning operations and spent fuel storage, the severance payments for the severed personnel are included in period two of this study. Severance payments are tracked through the decommissioning and all costs are included in this study. All severed employees will receive a severance package based on the existing severance policy.

There are two components to the staff, decommissioning and spent fuel storage. The majority of the staff during the early part of the decommissioning process will be attributed to decommissioning. A staff level of 11.5 full time employees (FTE) will be required during period 1, between Unit 1 and Unit 2 shutdown. Upon shutdown of Unit 2, period 2, approximately 145 FTEs will be required to prepare the site for decommissioning, including the spent fuel pool, security and control room modifications. Once these modifications have been made the staff will be reduced to 96 FTEs to support the reactor internals and reactor vessel removal, period 3. The staff will be further reduced to 78 FTEs, 7 FTEs and 3 FTEs for period 4 site decontamination, period 5 structures removal and period 6 site restorations, respectively.

During the decommissioning process there is a need to manage the safe operations of the spent fuel storage facilities, whether spent fuel is in wet storage or dry storage. The Utility staff will maintain responsibility for these actions. Spent fuel will remain in the spent fuel pool for a minimum of seven years. Also, there is an existing ISFSI, required during operations to maintain full core off load capabilities. As such, there are two on-site spent fuel storage scenarios, wet and dry storage in operations at the same time and dry storage only. During the wet and dry storage periods the Utility staff will be 33 FTEs and 14.25 during dry storage only. There will be some fluctuation in these staffs due to sharing of upper management personnel with the decommissioning staff.

7.2 DECOMMISSIONING GENERAL CONTRACTOR

The DGC is assumed to have no role in the post shutdown management of the spent fuel storage facility. Upon selection of a DGC contractor, the contractor will begin to mobilize on site. A DGC staff of 27 FTEs is assumed to be on site during the last 12 months of period 1, between Unit 1 and Unit 2 shutdown. A DGC staff of 76 FTEs will be on site to prepare for decommissioning during period 2 site preparations. The DGC staff will be increased to 89 FTEs to support the reactor internals and reactor vessel removal, period 3. The DGC staff will be reduced to 76 FTEs, 34 FTEs and 15 FTEs for period 4 site decontamination, period 5 structures removal and period 6 site restorations, respectively.

7.3 SECURITY

There are two components to the security staff, decommissioning and spent fuel storage. The majority of the security staff during the early part of the decommissioning process will be attributed to decommissioning. An apportionment of the full security staff is allocated to Unit 1 during period 1, between Unit 1 and Unit 2 shutdown, estimated to be 5 full time employees (FTE). Upon shutdown of Unit 2, period 2, approximately 72 FTEs will be required during preparations for decommissioning. Once modifications have been made to the spent fuel pool, security and control room the security staff will be reduced to 32 FTEs to support the reactor internals and reactor vessel removal, period 3 and site decontamination, period 4. The staff will be further reduced to 7 FTEs and 2 FTEs for period 5 structures removal and period 6 site restorations, respectively.

During the decommissioning process there will be a need to manage the safe operations of the spent fuel storage facilities, whether spent fuel is in wet storage or dry storage. A dedicated security staff will be assigned to both the wet and dry storage facility. Spent fuel will remain in the spent fuel pool for a minimum of seven years. There is an existing ISFSI, required during operations to maintain full core off load capabilities. As such, there are two on-site spent fuel storage scenarios, wet and dry storage in operations at the same time and dry storage only. During the wet and dry storage periods the security staff will be 20 FTEs and during dry storage only the security staff will consist of 13 FTEs. A security staff of 13 FTEs is attributed to spent fuel storage during the ISFSI removal.

The following Table 7-1 is a summary of the utility staff, DGC and security staff levels required.

7.4 DECON WITH INDEFINITE DRY STORAGE

Table 7.1 summarizes the staff level for Decommissioning and Table 7.2 summarizes the staff levels for spent fuel storage as defined above, by period.

TABLE 7-1 DECOMMISSIONING STAFF SUMMARY

Position:	1	2	3	4	5	6	7
Health Physics	2.25	29	24	24	0	0	0
Engineering	1.25	20	11	10	2	1	0
Maintenance Services	2.75	19	5	5	3	0	0
Operations	0.75	38	14	5	0	0	0
Projects	3.25	13	29	22	0	0	0
Administration	1.25	26	13	12	2	2	0
	11.5	**145**	**96**	**78**	**7**	**3**	**0**
DGC	27	76	89	76	34	15	
Security Guards	5	72	32	32	7	2	

TABLE 7-2 SPENT FUEL STORAGE STAFF SUMMARY

Position:	1	2	3	4	5	6	7	8
Health Physics	0	5	5	5	1.25	1.25	1.25	4
Engineering	0	1	1	1	0	0	0	0
Maintenance Services	0	5	5	5	2	2	2	2
Operations	0	13	13	13	5	5	5	6
Projects	0	0	0	0	2	2	2	1
Administration	0	9	9	9	4	4	4	4
	0	**33**	**33**	**33**	**14.25**	**14.25**	**14.25**	**17**
DGC	0	0	0	0	0	0	0	14
Security Guards	0	24	20	20	13	13	13	13

8.0 WASTE DISPOSAL

8.1 LOW LEVEL WASTE DISPOSAL BACKGROUND

The Low-Level Waste Policy Act (LLWPA), passed by Congress in 1980 and the Low-Level Waste Policy Amendments Act of 1985 encouraged states to form compacts for the disposal of low-level radioactive waste. The Acts made each state responsible for disposing of their own radioactive waste. The formation of compacts allowed states to limit their disposal facility to compact members thereby limiting the amount of waste accepted. On the other hand, the Acts also required that states not participating in the process would be required to take title to waste generated within that state. This provision was overturned by the U. S. Supreme Court in 1992 thus eliminating the need for states to develop their own disposal facility, including those already in a compact. The compact process has not resulted in the expected regionalization of low level radioactive waste disposal; to date there has been just one new disposal facility licensed to accept all low level radioactive waste, including Class A, B & C.

There are currently three facilities licensed to accept all low level radioactive waste: the Barnwell, South Carolina facility operated by Energy*Solutions*, LLC; the Waste Control Specialists, LLC (WCS) facility in Andrews, TX and the Hanford, Washington facility operated by U. S. Ecology. There is one other site in Clive, Utah owned and operated by Energy*Solutions*, LLC; however, this facility is currently licensed to accept only Class A radioactive waste. As of July 1, 2008 the Barnwell facility will only accept waste from the Atlantic Compact states. The Atlantic Compact member states include South Carolina, Connecticut and New Jersey. The Hanford facility only accepts waste from the Northwest Compact and the Rocky Mountain Compact; this has been the case since 1993. The Northwest Compact and Rocky Mountain Compact member states include Alaska, Colorado, Hawaii, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington and Wyoming. While the WCS facility is the compact disposal facility for Texas and Vermont it will accept waste from out of compact. WCS is licensed to accept Class A, B and C radioactive waste, as such this estimate assumes that Class B & C waste will be disposed of at this facility with the costs based on the current rate structure for out of compact waste.

8.2 CLASS A WASTE DISPOSAL

There are currently multiple options for the disposition of Class A waste. These include metal melt, direct burial and waste processing. Table 8-1 provides a summary of waste disposition options for Class A waste and their unit rates considered in this estimate. KCES assumes that each waste stream will be transported to the least cost option for which it qualifies. Packaging and transportation costs have been calculated based on these specific locations.

Table 8-1
Class A Waste Disposal Options

Description	Disposal Cost, $/cu. ft.
ENERGY*SOLUTIONS* disposal	$171.84 per cubic foot
WCS disposal	$208.79 per cubic foot
BSFR processing	$0.25 per pound

KCES assumed that the reactor building internal floors and walls will be removed in bulk and sent for processing to a BSFR facility. This approach will produce a large volume of waste compared to the traditional decontamination, survey and release methodology but at a lower rate. In addition, the approach will reduce the amount of characterization and iterative decontamination. Other contaminated structures will follow the decontamination, survey and release approach due to the smaller areas of potentially contaminated surfaces.

The steel in the vertical concrete casks and the storage pad for the ISFSI are assumed to be potentially activated. The entire volume of the VCCs and pad will be sent to the BSFR facility in Tennessee for processing. Sending the entire volume of this material for processing will eliminate the time consuming processing of separating, surveying and repeating as necessary. The remainder of the material associated with the ISFSI will be removed as clean material.

8.3 CLASS B & C WASTE DISPOSAL

As discussed above, the WCS facility is licensed to accept Class B and C waste. This study assumes that all Class B & C waste will be disposed of at WCS. There is currently only a published fee and surcharge structure for in compact generators. Based on guidance from WCS personnel, increasing the published fees and surcharges by 20% would be representative of the rates that would be charged to out of compact generators. The base disposal rate for Class B & C waste is currently $2,680/cubic foot. This rate was provided by AEP.

Additionally, there is a dose rate surcharge and a millicurie charge that must be added. The basic millicurie charge is $0.55 per millicurie up to $220,000 per shipment. There is also a weight surcharge, up to $20,000 per shipment; a dose rate surcharge, up to $400 per cu. ft.; an irradiated hardware there is an additional surcharge of $75,000 per shipment and a cask handling surcharge of $2,500 per cask. Finally there are State and County fees of 5% each. These rates appear to be unchanged from 2012. This estimate includes all applicable surcharges and fees.

8.4 DISPOSAL OF WASTES GREATER THAN CLASS C

While waste identified as Class A, B and C, according to 10 CFR 61, may be disposed of at a near-surface disposal facility, certain components may exceed the radionuclide concentration limitations for 10 CFR 61 Class C waste. These components cannot be disposed in a near-surface radioactive waste disposal facility based on 10 CFR 61 definitions. They will have to be transferred to a geologic repository or a similar site approved by the NRC.

The KCES site-specific classification of radioactive wastes for the D.C. Cook Plant identified that the Spent Fuel Assemblies and two components within each reactor vessel (the Core Baffle and the Lower Core Grid Plate) will exceed Class C limitations. Like the spent fuel assemblies, the reactor vessel components will be stored with the spent fuel either in wet or dry storage. Here they will wait for transportation to a DOE geologic disposal facility for disposal. The costs for disposing of these components was estimated based upon the maximum curie surcharges currently in effect at the WCS disposal facility. Prior to placing in storage with the spent fuel, these components will be segmented and the pieces placed into spent fuel sized containers, it is estimated that 168 containers will be generated from the two units.

8.5 RADIOACTIVE WASTE VOLUMES PER 10 CFR 61 CLASSIFICATIONS

KCES has determined the classifications of radioactive wastes resulting from decommissioning the D.C. Cook Plant. The radioactive waste associated with each decommissioning activity is based upon the site-specific decommissioning calculations prepared for this cost estimate. The total volumes of 10 CFR 61 wastes for Units 1 and 2 are presented in Table 8.2. These volumes represent waste volumes generated at the site, for both units, excluding the waste generated by removing the ISFSI.

Table 8-2
10 CFR 61 Radioactive Waste Volumes (cubic feet)

Class A	3,622,768
Class B	5,480
Class C	2,344
Greater Than Class C	1,512
Total:	3,632,104

Waste associated with the removal of the ISFSI, is identified in Table 8-3 below.

Table 8-3
10 CFR 61 Radioactive Waste Volumes (cubic feet)

ISFSI	534,981

8.6 PROJECTION OF NON-RADIOACTIVE WASTE QUANTITIES

KCES has included the cost for disposal of all non-contaminated waste at a local landfill. As seen in the Maine Yankee decommissioning, on-site use of concrete rubble to fill below grade voids can be problematic. Maine Yankee originally intended to utilize remediated concrete to fill below grade voids. Many felt that this would essentially be considered on-site disposal of radioactive material since the concrete, although below the limits specified in the License Termination Plan (LTP), might still be slightly radioactive. Maine Yankee decided to eliminate potential legacy waste by transporting and disposing of this material in a licensed landfill. For this reason KCES has assumed that all non-contaminated waste, including pipe and components will be disposed of in a licensed landfill at a rate of $0.045 per pound. Table 8-4 presents the total volumes of non-contaminated waste resulting from the decommissioning program.

Table 8-4
Non-Contaminated Waste (pounds)

Structures	1,006,158,339
Systems	45,885,045

9.0 COST SUMMARIES

9.1. ESTIMATING APPROACH

The estimating methodology utilized in the development of the cost estimate in this study is consistent with that presented in both *Guidelines for Producing Commercial Nuclear Power Plant Decommissioning Cost Estimates*, AIF/NESP-036, May 1986 and *Revised Analysis of Decommissioning for the Reference Pressurized Water Reactor Power Station*, NUREG/CR-5884, PNL-8742, November 1995. Specifically the estimating methodology used by KCES herein is based on the Unit Cost Factor (UCF) approach. In addition, current experience from recently completed decommissioning projects has been considered in developing the estimating methodology.

KCES has developed a database of unit cost factors specific to the work activities associated with decommissioning a nuclear power reactor such as the cutting of a section of six inch contaminated pipe. These UCFs define the duration of an activity on a unit basis, including for the example above, contamination control set-up, cutting, capping pipe ends, removal from area, removal of contamination control and productivity adjustment factors. From the durations, local labor rates and equipment and material costs, removal costs are determined, including associated consumable costs. Material waste volumes, man-hours, disposal costs, packaging costs and transportation costs are also determined, again on a unit basis for each UCF. Each UCF is adjusted based on site specific factors such as labor rates, transportation costs and disposal rates.

The first step in developing the site specific activity removal and disposal cost is to develop a site specific plant inventory. KCES developed the structure inventory for this estimate from current site specific drawings supported by a site walkdown. The systems inventory was developed from the site component database supported by referencing flow diagrams and the USAR. The plant system inventory list was separated into contaminated and non-contaminated components and unique unit cost factors were developed for each radiological condition. The site specific material quantities are then multiplied by the appropriate UCF to determine the total activity cost and removal man-hours.

The decommissioning activities are inserted into a project schedule and sequenced based on order of performance. The schedule hours, as determined by the UCFs for each activity are then incorporated in the project schedule to determine the critical path of the project. The schedule is then divided into several periods. Each period is defined by an activity or group of activities requiring a specific amount of oversight or support. For instance, during the vessel internals and reactor vessel removal activities the Utility staff, DGC staff and security staff are required to be maintained at a certain level. Once these activities are complete the levels may change based on the controlling activities.

Period dependent costs are those costs that are not specific to the decommissioning activities but are required as support. Costs such as those for the Utility staff, DGC staff, security staff, insurance, health physics supplies and energy are calculated on a monthly basis based on the major activities defining a given period. These monthly costs are then multiplied by the duration of the respective period to determine period dependent costs. The activity and period dependent costs are then summed to determine total decommissioning costs.

These activity and period dependent costs are either spent fuel storage related (10 CFR 50.54(bb)), decommissioning related (10 CFR 50.75(c)), greenfield (g) or a combination of the three. KCES has separated costs in each of these categories during the estimating process.

A detailed decommissioning cost table is presented in Appendix B and is summarized below. All costs are presented in 2015 dollars. The summarized costs include contingency.

9.2 DECON WITH INDEFINITE ON-SITE DRY STORAGE

The total cost for this scenario is **$1,634.0** million fixed and **$4.9** million annual, as shown in Table 9.1. A total of $529.5 million fixed is attributed to the preparation and transfer of spent fuel to the ISFSI. An annual cost of $4.9 million will be incurred for the continuing maintenance and surveillance of the ISFSI. A total of $909.1 million is attributed to the decommissioning, and $195.5 million for greenfield. For this scenario, there is a large fixed cost required for the design, license, cask procurement, and construction and installation of the dry storage facility. There are also annual surveillance costs, NRC license fees and NRC inspection fees. The cost attributed to the operation and maintenance of the spent fuel pool has been optimized by minimizing the spent fuel support systems. There is an additional cost of $57.0 million for the eventual decontamination and removal of the ISFSI.

An ISFSI will have been constructed during operations in order to maintain full core offload capabilities in the spent fuel pool. The existing facility will be expanded shortly after Unit 1 shutdown to accommodate the long term storage of spent fuel. The transfer of the spent fuel assemblies remaining in the spent fuel pool at shutdown, to the ISFSI, will begin just after Unit 2 shutdown. This transfer will proceed at a rate sufficient to allow the spent fuel pool to be empty approximately 7.5 years after Unit 2 shutdown. The maximum number of spent fuel assemblies stored at the ISFSI at any time will be approximately 6,552 requiring 205 storage casks, 111 of which will have been purchased to maintain full core offload capability and are an operations expense. In addition to the spent fuel, 168 spent fuel size containers loaded with GTCC will be stored at the ISFSI, requiring an additional six casks.

The existing ISFSI and infrastructure will have to be expanded to accommodate the post shutdown transfer of spent fuel. The additional pad and infrastructure will cost approximately

$135 million, before contingency. It is assumed that the Holtec vertical storage system will be utilized in the ISFSI at a cost of $2,000,000 per 32 assembly PWR canister and overpack, including welding services. All casks purchased during operations to maintain full core offload capability would be expended prior to Unit 1 shutdown, so would not be an expense of the decommissioning trust. A total of 111 casks will be purchased after Unit 2 shutdown at a cost of $222.0 million, before contingency. All costs associated with the operation of the ISFSI such as staff oversight, maintenance costs, insurance costs, etc. are included in the 10 CFR 50.54(bb) costs.

TABLE 9.1

PERIOD	DESCRIPTION	50.75(c) Cost	50.54(bb) Cost	Greenfield Cost	Total Cost
1	U1 & U2 DECOMMISSIONING PLANNING COST:	$50,041,436	$173,086,201		$223,127,637
2	POST-SHUTDOWN ACTIVITIES COSTS:	$126,358,434	$153,329,659		$279,688,093
3	VESSEL AND INTERNALS REMOVAL COSTS:	$487,208,650	$169,529,044	$27,958,874	$684,696,569
4	DECONTAMINATE BALANCE OF SITE COSTS:	$245,493,342	$27,478,897	$20,813,681	$293,785,921
5	CLEAN STRUCTURE DEMOLITION COSTS:		$5,493,075	$144,693,529	$150,186,604
6	RESTORE SITE COSTS:		$548,766	$2,004,798	$2,553,564
	TOTAL COSTS:	$909,101,862	$529,465,643	$195,470,882	$1,634,038,387
7	ANNUAL DRY STORAGE		$4,912,735		$4,912,735
8	ISFSI DECONTAMINATION AND REMOVAL		$56,952,278		$56,952,278

10.0 REFERENCES

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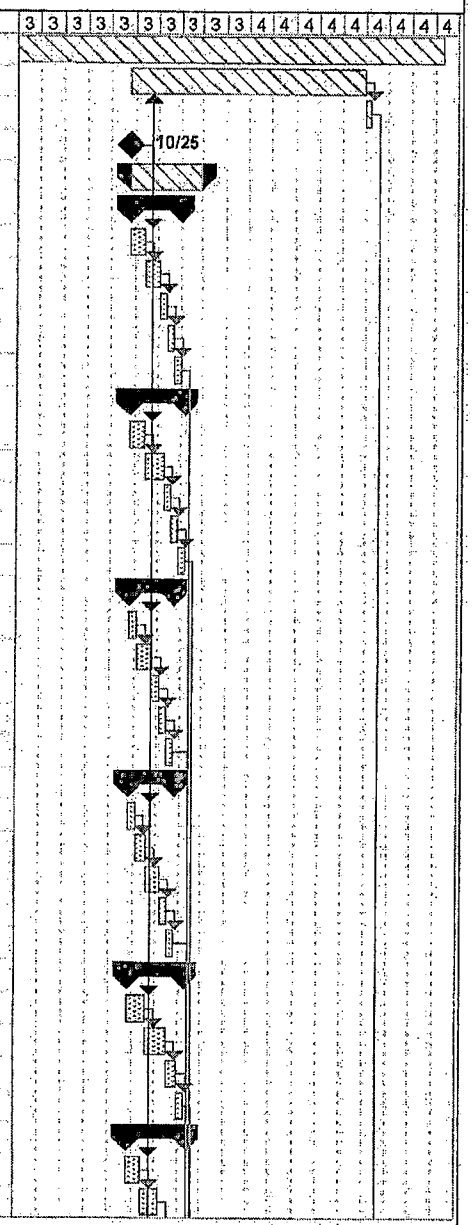
APPENDIX A

SCHEDULE

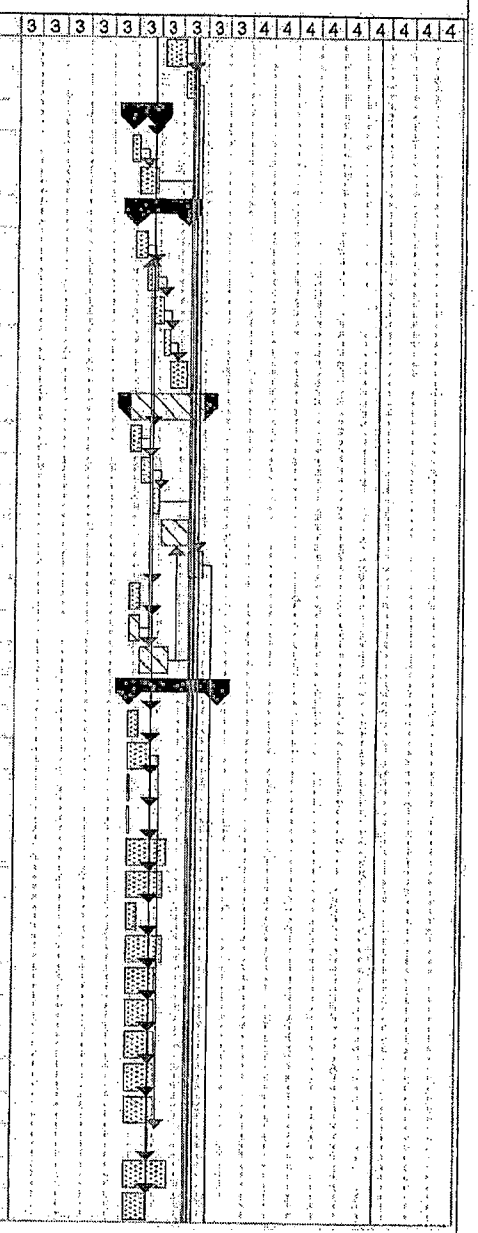
2015 D. C. Cook
Scenario 1

ID	Task Name	Duration	Start	Finish	Predecessors
1	Dry spent fuel storage	1925 wks	Fri 7/1/11	Thu 5/21/48	
2	Post-shutdown wet storage	531 wks	Wed 10/25/34	Tue 12/27/44	4
3	Transfer remaining assemblies to ISFSI	13 wks	Wed 12/28/44	Tue 3/28/45	2
4	Unit 1 Down	0 days	Wed 10/25/34	Wed 10/25/34	
5	**Period 1 Decommissioning Planning**	**825 days**	**Wed 10/25/34**	**Tue 12/22/37**	
6	**Modify spent fuel support systems**	**576 days**	**Wed 10/25/34**	**Wed 1/7/37**	
7	Define systems modification	168 days	Wed 10/25/34	Fri 6/15/35	4
8	Design systems modification and equipment specificatons	168 days	Mon 6/18/35	Wed 2/6/36	7
9	Prepare installation procedures	80 days	Thu 2/7/36	Wed 5/28/36	8
10	Prepare test procedures	80 days	Thu 5/29/36	Wed 9/17/36	9
11	Prepare maintenance procedures	80 days	Thu 9/18/36	Wed 1/7/37	10
12	**Control room relocation**	**624 days**	**Wed 10/25/34**	**Mon 3/16/37**	
13	Define control room equipment	168 days	Wed 10/25/34	Fri 6/15/35	4
14	Design control room modification and equipment specificatons	216 days	Mon 6/18/35	Mon 4/14/36	13
15	Prepare installation procedures	80 days	Tue 4/15/36	Mon 8/4/36	14
16	Prepare test procedures	80 days	Tue 8/5/36	Mon 11/24/36	15
17	Prepare maintenance procedures	80 days	Tue 11/25/36	Mon 3/16/37	16
18	**Design spent fuel storage security modifications**	**504 days**	**Wed 10/25/34**	**Mon 9/29/36**	
19	Define modification	88 days	Wed 10/25/34	Fri 2/23/35	4
20	Design modification and equipment specificatons	176 days	Mon 2/26/35	Mon 10/29/35	19
21	Prepare installation procedures	80 days	Tue 10/30/35	Mon 2/18/36	20
22	Prepare test procedures	80 days	Tue 2/19/36	Mon 6/9/36	21
23	Prepare maintenance procedures	80 days	Tue 6/10/36	Mon 9/29/36	22
24	**Primary system decontamination**	**520 days**	**Wed 10/25/34**	**Tue 10/21/36**	
25	Define scope	80 days	Wed 10/25/34	Tue 2/13/35	4
26	Evaluate processes	120 days	Wed 2/14/35	Tue 7/31/35	25
27	Prepare bid specifications and RFP	160 days	Wed 8/1/35	Tue 3/11/36	26
28	Qualify Contractors	80 days	Wed 3/12/36	Tue 7/1/36	27
29	Evaluate Proposals	80 days	Wed 7/2/36	Tue 10/21/36	28
30	**Select Decommissioning General Contractor**	**640 days**	**Wed 10/25/34**	**Tue 4/7/37**	
31	Define scope	200 days	Wed 10/25/34	Tue 7/31/35	4
32	Prepare bid specifications and RFP	240 days	Wed 8/1/35	Tue 7/1/36	31
33	Qualify Contractors	120 days	Wed 7/2/36	Tue 12/16/36	32
34	Evaluate Proposals	80 days	Wed 12/17/36	Tue 4/7/37	33
35	**U1 & U2 cold and dark site repowering**	**680 days**	**Wed 10/25/34**	**Tue 6/2/37**	
36	Define scope	160 days	Wed 10/25/34	Tue 6/5/35	4
37	Design modification and equipment specificatons	200 days	Wed 6/6/35	Tue 3/11/36	36



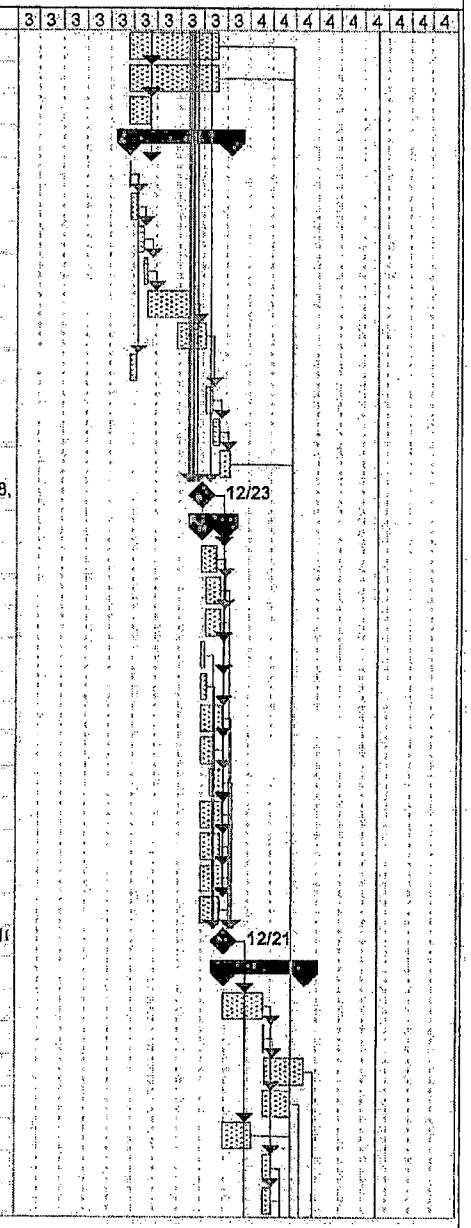
2015 D. C. Cook
Scenario 1

ID	Task Name	Duration	Start	Finish	Predecessors
38	Prepare installation procedures	240 days	Wed 3/12/36	Tue 2/10/37	37
39	Prepare test procedures	80 days	Wed 2/11/37	Tue 6/2/37	38
40	**Modify U1 & U2 containment access**	**280 days**	**Wed 10/25/34**	**Tue 11/20/35**	
41	Select new access location	80 days	Wed 10/25/34	Tue 2/13/35	4
42	Design access and equipment specificatons	200 days	Wed 2/14/35	Tue 11/20/35	41
43	**U1 & U2 Site Characterization**	**590 days**	**Wed 12/27/34**	**Tue 3/31/37**	
44	Define scope	120 days	Wed 12/27/34	Tue 6/12/35	56FS-75 days
45	Prepare bid specifications and RFP	120 days	Wed 6/13/35	Tue 11/27/35	44
46	Qualify Contractors	120 days	Wed 9/19/35	Tue 3/4/36	45FS-50 days
47	Evaluate Proposals	80 days	Wed 3/5/36	Tue 6/24/36	46
48	Prepare procedures	200 days	Wed 6/25/36	Tue 3/31/37	47
49	**ADMINISTRATIVE ACTIVITIES**	**825 days**	**Wed 10/25/34**	**Tue 12/22/37**	
50	Develop staff transition plan	120 days	Wed 10/25/34	Tue 4/10/35	4
51	Develop severance and retention policy	120 days	Wed 4/11/35	Tue 9/25/35	50
52	Prepare project administrative procedures	80 days	Wed 9/26/35	Tue 1/15/36	51
53	Develop area based decommissioning cost estimate	320 days	Wed 2/20/36	Tue 5/12/37	57FS-19 wks
54	Develop project budget and schedule controls	160 days	Wed 5/13/37	Tue 12/22/37	53
55	Assemble plant drawings	120 days	Wed 10/25/34	Tue 4/10/35	4
56	Define end product	120 days	Wed 10/25/34	Tue 4/10/35	4
57	Develop technical approach and detailed project plans	320 days	Wed 4/11/35	Tue 7/1/36	56
58	**LICENSING/PERMITTING DOCUMENTATION**	**1000 days**	**Wed 10/25/34**	**Tue 8/24/38**	
59	Insurance exemption	120 days	Wed 10/25/34	Tue 4/10/35	4
60	Prepare Post-Shutdown Decommissioning Activities Report	240 days	Wed 10/25/34	Tue 9/25/35	4
61	Prepare certification of permanent cessation of operations	24 days	Wed 10/25/34	Mon 11/27/34	4
62	Prepare certification of permanent reactor defueling	24 days	Wed 10/25/34	Mon 11/27/34	4
63	Prepare post-shutdown technical specification modifications	440 days	Wed 10/25/34	Tue 7/1/36	4
64	Update FSAR	400 days	Wed 10/25/34	Tue 5/6/36	4
65	Develop certified fuel handler program	120 days	Wed 10/25/34	Tue 4/10/35	4
66	Prepare post-shutdown emergency plan	400 days	Wed 10/25/34	Tue 5/6/36	4
67	Prepare post-shutdown QA plan	320 days	Wed 10/25/34	Tue 1/15/36	4
68	Prepare post-shutdown security plan	320 days	Wed 10/25/34	Tue 1/15/36	4
69	Prepare post-shutdown fire protection plan	320 days	Wed 10/25/34	Tue 1/15/36	4
70	Prepare post-shutdown radiation protection manual	320 days	Wed 10/25/34	Tue 1/15/36	4
71	Prepare and submit state and local permits	320 days	Wed 10/25/34	Tue 1/15/36	4
72	Respond to NRC questions on PSDAR	24 days	Wed 9/26/35	Mon 10/29/35	60
73	Prepare detailed resource loaded project schedule	480 days	Wed 10/25/34	Tue 8/26/36	4
74	Perform 50.59 unreviewed safety questions	240 days	Wed 10/25/34	Tue 9/25/35	4



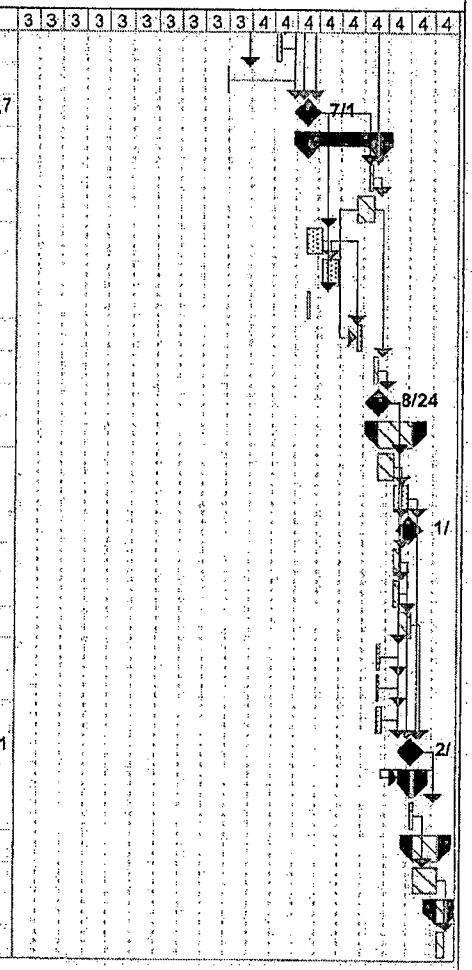
2015 D. C. Cook
Scenario 1

ID	Task Name	Duration	Start	Finish	Predecessors
75	Prepare activity specifications	1000 days	Wed 10/25/34	Tue 8/24/38	4
76	Prepare detailed work procedures	1000 days	Wed 10/25/34	Tue 8/24/38	4
77	Select shipping casks and obtain permits	240 days	Wed 10/25/34	Tue 9/25/35	4
78	**LICENSE TERMINATION PLAN**	**1144 days**	**Wed 10/25/34**	**Mon 3/14/39**	
79	General information	16 days	Wed 10/25/34	Wed 11/15/34	4
80	Site Characterization	80 days	Thu 11/16/34	Wed 3/7/35	79
81	Identification of remaining site dismantlement activities	80 days	Thu 3/8/35	Wed 6/27/35	80
82	Remediation Plans	40 days	Thu 6/28/35	Wed 8/22/35	81
83	Final Radiation Survey Plan	480 days	Thu 8/23/35	Wed 6/24/37	82
84	Compliance with the radiological criteria for license termination	320 days	Thu 11/27/36	Wed 2/17/38	83FS-150 days
85	Update decommissioning cost estimate	80 days	Thu 11/16/34	Wed 3/7/35	79
86	Supplement to the environmental report	80 days	Thu 2/18/38	Wed 6/9/38	84
87	Respond to NRC questions	80 days	Thu 6/10/38	Wed 9/29/38	86
88	Update LTP	118 days	Thu 9/30/38	Mon 3/14/39	87
89	Unit 2 Down	0 days	Wed 12/23/37	Wed 12/23/37	11,17,23,29,34,38,
90	**Period 2 Post-Shutdown Activities**	**260 days**	**Wed 12/23/37**	**Tue 12/21/38**	
91	Modify Spent Fuel Cooling System	173 days	Wed 12/23/37	Fri 8/20/38	89
92	Modify control room	173 days	Mon 3/1/38	Wed 10/27/38	91FS-125 days
93	Modify security system	173 days	Mon 3/1/38	Wed 10/27/38	91FS-125 days
94	Primary System Decon	40 days	Wed 12/23/37	Tue 2/16/38	89
95	Flush & Drain Systems	60 days	Wed 12/23/37	Tue 3/16/38	89
96	Implement cold & dark	240 days	Wed 12/23/37	Tue 11/23/38	89
97	Modify U1 Containment Access	160 days	Wed 12/23/37	Tue 8/3/38	89
98	Modify U2 Containment Access	160 days	Wed 5/12/38	Tue 12/21/38	97FS-60 days
99	Historical Site Assessment	240 days	Wed 12/23/37	Tue 11/23/38	89
100	Vessel and internals activation analysis	215 days	Wed 12/23/37	Tue 10/19/38	89
101	Characterization survey	250 days	Wed 12/23/37	Tue 12/7/38	89
102	Test special equipment and training	215 days	Wed 12/23/37	Tue 10/19/38	89
103	End Period 2	0 days	Tue 12/21/38	Tue 12/21/38	94,95,96,99,100,1(
104	**Period 3 Reactor Vessel and Internals Removal**	**920 days**	**Wed 12/22/38**	**Tue 7/1/42**	
105	Remove Unit 1 reactor vessel internals and reactor vessel	450 days	Wed 12/22/38	Tue 9/11/40	103
106	Transfer Equipment to Unit 2	4 wks	Wed 9/12/40	Tue 10/9/40	105
107	Remove Unit 2 reactor vessel internals and reactor vessel	450 days	Wed 10/10/40	Tue 7/1/42	106
108	Remove Unit 1 steam generators	65 wks	Wed 9/12/40	Tue 12/10/41	105
109	Remove Unit 2 steam generators	65 wks	Wed 12/22/38	Tue 3/20/40	103
110	Remove Unit 1 contaminated systems	105 days	Wed 9/12/40	Tue 2/5/41	105
111	Remove Unit 1 clean systems	103 days	Wed 9/12/40	Fri 2/1/41	105



2015 D. C. Cook
Scenario 1

ID	Task Name	Duration	Start	Finish	Predecessors
112	Decon Unit 1 reactor building	56 days	Wed 2/6/41	Wed 4/24/41	110,111
113	Remove miscellaneous structures	8 days	Wed 12/22/38	Fri 12/31/38	103
114	End Period 3	0 days	Tue 7/1/42	Tue 7/1/42	108,109,112,113,7
115	**Period 4 Building Decontamination**	**822 days**	**Wed 7/2/42**	**Thu 8/24/45**	
116	Remove Spent fuel storage racks	8 wks	Wed 3/29/45	Tue 5/23/45	114,3
117	Remove Unit 2 contaminated systems	194 days	Thu 9/22/44	Tue 6/20/45	116FS-174 days
118	Remove Unit 2 clean systems	190 days	Wed 7/2/42	Tue 3/24/43	114
119	Remove Turbine Building	188 days	Wed 3/25/43	Fri 12/11/43	118
120	Decon Steam Generator Storage Building	35 days	Wed 7/2/42	Tue 8/19/42	114
121	Decon Unit 2 Reactor Building	56 days	Thu 9/22/44	Thu 12/8/44	117SS,118
122	Decon Auxiliary Building	47 days	Wed 6/21/45	Thu 8/24/45	117
123	End Period 4	0 days	Thu 8/24/45	Thu 8/24/45	122
124	**Period 5 Clean Removal**	**392 days**	**Fri 8/25/45**	**Mon 2/25/47**	
125	Perform final radiological survey of all structures	36 wks	Fri 8/25/45	Thu 5/3/46	123
126	Perform final survey of the site	36 wks	Fri 5/4/46	Thu 1/10/47	125
127	Obtain NRC approval	0 days	Thu 1/10/47	Thu 1/10/47	126,125
128	Remove Unit 1 reactor building	80 days	Fri 5/4/46	Thu 8/23/46	125
129	Remove Unit 2 reactor building	80 days	Fri 5/4/46	Thu 8/23/46	125
130	Remove Auxiliary Building	132 days	Fri 8/24/46	Mon 2/25/47	129,126
131	Remove Steam Generator Storage Building	40 days	Fri 8/25/45	Thu 10/19/45	123
132	Remove Administration building	31 days	Fri 8/25/45	Fri 10/6/45	123
133	Remove Low Level Radwaste building	68 days	Fri 8/25/45	Fri 11/24/45	123
134	End Period 5	0 days	Mon 2/25/47	Mon 2/25/47	129,131,132,133,1
135	**Period 6 Restore site**	**40 days**	**Tue 2/26/47**	**Mon 4/22/47**	**134**
136	Restore site	8 wks	Tue 2/26/47	Mon 4/22/47	134
137	**Period 7 Dry Storage**	**260 days**	**Tue 4/23/47**	**Mon 4/20/48**	
138	Dry Storage	52 wks	Tue 4/23/47	Mon 4/20/48	136
139	**Period 8 ISFSI Removal**	**84 days**	**Tue 4/21/48**	**Fri 8/14/48**	
140	Decon and remove ISFSI	16.8 wks	Tue 4/21/48	Fri 8/14/48	138



APPENDIX B

COST TABLE

2015 D.C.Cook
Scenario 1
DECON and Permanent On-Site Dry Storage

	Type		Staff Labor,$	Craft Labor,$	Equipment & Materials, $	Packaging $	Transportation, $	Clean Disposal, $	Contaminated Disposal, $	Energy, $	Other, $	Subtotal without Contingency, $	Contingency, $	Total with Contingency, $	Staff Manhours	Clean Craft Manhours	Contaminated Craft Manhours
PERIOD 1 - U1 & U2 DECOMMISSIONING PLANNING COST:																	
		SPENT FUEL ACTIVITIES															
		Modify spent fuel support systems															
1	A 50.54(bb)	Define systems modification	$65,204									$65,204	$9,800	$75,004	608		
1	A 50.54(bb)	Design systems modification and equipment specifications	$155,196									$155,196	$23,300	$178,496	1,560		
1	A 50.54(bb)	Prepare installation procedures	$19,042									$19,042	$2,900	$21,942	192		
1	A 50.54(bb)	Prepare test procedures	$19,042									$19,042	$2,900	$21,942	192		
1	A 50.54(bb)	Prepare maintenance procedures	$19,042									$19,042	$2,900	$21,942	192		
		Control room relocation															
1	A 50.54(bb)	Define control room equipment	$65,204									$65,204	$9,800	$75,004	608		
1	A 50.54(bb)	Design control room modification and equipment specifications	$188,091									$188,091	$28,200	$216,291	1,896		
1	A 50.54(bb)	Prepare installation procedures	$19,042									$19,042	$2,900	$21,942	192		
1	A 50.54(bb)	Prepare test procedures	$19,042									$19,042	$2,900	$21,942	192		
1	A 50.54(bb)	Prepare maintenance procedures	$19,042									$19,042	$2,900	$21,942	192		
		Design spent fuel storage security modifications															
1	A 50.54(bb)	Define modification	$30,754									$30,754	$4,600	$35,354	288		
1	A 50.54(bb)	Design modification and equipment specifications	$107,927									$107,927	$16,200	$124,127	1,016		
1	A 50.54(bb)	Prepare installation procedures	$19,042									$19,042	$2,900	$21,942	192		
1	A 50.54(bb)	Prepare test procedures	$19,042									$19,042	$2,900	$21,942	192		
1	A 50.54(bb)	Prepare maintenance procedures	$19,042									$19,042	$2,900	$21,942	192		
1	A 50.54(bb)	ISFSI Pad Construction		$135,000,000								$135,000,000	$32,181,700	$167,181,700	192		
		SUBTOTAL - SPENT FUEL ACTIVITIES	$793,759	$135,000,000								$135,793,759	$32,209,700	$168,003,459	7,904		
		SPENT FUEL PERIOD DEPENDENT															
1	PD 50.54(bb)	Utility Staff															
1	PD 50.54(bb)	Security															
1	PD 50.54(bb)	Insurance															
1	PD 50.54(bb)	O & M Budget Items									$2,882,843	$2,882,843	$432,400	$3,318,243			
1	PD 50.54(bb)	Permits & Fees															
1	PD 50.54(bb)	Waste Transfer and Loading															
1	PD 50.54(bb)	Energy															
1	PD 50.54(bb)	Spent Fuel Storage Maintenance Supplies															
1	PD 50.54(bb)	Small Tools															
					$1,350,000							$1,350,000	$337,500	$1,687,500			
		SUBTOTAL - SPENT FUEL PERIOD DEPENDENT			$1,350,000						$2,882,843	$4,232,843	$769,900	$5,002,743			
		DECOMMISSIONING ACTIVITIES															
		Primary system decontamination															
1	A 50.75(c)	Define scope	$43,826									$43,826	$6,600	$50,426	328		
1	A 50.75(c)	Evaluate processes	$55,757									$55,757	$8,400	$64,157	448		
1	A 50.75(c)	Prepare bid specifications and RFP	$55,713									$55,713	$8,400	$64,113	512		
1	A 50.75(c)	Qualify Contractors	$15,010									$15,010	$2,300	$17,310	112		
1	A 50.75(c)	Evaluate Proposals	$41,198									$41,198	$6,200	$47,398	248		
		Select Decommissioning General Contractor															
1	A 50.75(c)	Define scope	$83,634									$83,634	$12,500	$96,134	736		
1	A 50.75(c)	Prepare bid specifications and RFP	$88,549									$88,549	$13,300	$101,849	776		
1	A 50.75(c)	Qualify Contractors	$23,013									$23,013	$3,500	$26,513	176		
1	A 50.75(c)	Evaluate Proposals	$41,198									$41,198	$6,200	$47,398	248		
		U1 & U2 cold and dark site repowering															
1	A 50.75(c)	Define scope	$71,703									$71,703	$10,800	$82,503	616		
1	A 50.75(c)	Design modification and equipment specifications	$158,617									$158,617	$23,800	$182,417	1,560		
1	A 50.75(c)	Prepare installation procedures	$222,007									$222,007	$33,400	$255,007	2,080		
1	A 50.75(c)	Prepare test procedures	$19,042									$19,042	$2,900	$21,942	192		
		Modify U1 & U2 containment access															
1	A 50.75(c)	Select new access location	$31,895									$31,895	$4,800	$36,695	208		
1	A 50.75(c)	Design access and equipment specifications	$140,511									$140,511	$21,100	$161,611	1,320		
		U1 & U2 Site Characterization															
1	A 50.75(c)	Define scope	$50,169									$50,169	$7,500	$57,669	408		
1	A 50.75(c)	Prepare bid specifications and RFP	$56,812									$56,812	$8,500	$65,312	496		
1	A 50.75(c)	Qualify Contractors	$23,013									$23,013	$3,500	$26,513	176		
1	A 50.75(c)	Evaluate Proposals	$41,198									$41,198	$6,200	$47,398	248		
1	A 50.75(c)	Prepare procedures	$139,929									$139,929	$21,000	$160,929	1,256		
		ADMINISTRATIVE ACTIVITIES															
1	A 50.75(c)	Develop staff transition plan	$43,226									$43,226	$6,500	$49,726	352		
1	A 50.75(c)	Develop severance and retention policy	$43,226									$43,226	$6,500	$49,726	352		
1	A 50.75(c)	Prepare project administrative procedures	$46,957									$46,957	$7,000	$53,957	488		
1	A 50.75(c)	Develop area based decommissioning cost estimate	$217,919									$217,919	$32,700	$250,619	2,240		
1	A 50.75(c)	Develop project budget and schedule controls	$63,304									$63,304	$9,500	$72,804	648		
1	A 50.75(c)	Assemble plant drawings	$25,276									$25,276	$3,800	$29,076	296		
1	A 50.75(c)	Define end product	$38,096									$38,096	$5,700	$43,796	280		
1	A 50.75(c)	Develop technical approach and detailed project plans	$234,646									$234,646	$35,200	$269,746	2,440		

2015 D. C. Cook
Scenario 1
DECON and Permanent On-Site Dry Storage

	Type		Staff Labor, $	Craft Labor, $	Equipment & Materials, $	Packaging, $	Transportation, $	Clean Disposal, $	Contaminated Disposal, $	Energy, $	Other, $	without Contingency, $	Contingency, $	with Contingency, $	Staff Manhours	Craft Manhours	Craft Manhours
		LICENSING/PERMITTING DOCUMENTATION															
1	A 50.75(c)	Insurance exemption	$48,428									$48,428	$7,200	$55,728	376		
1	A 50.75(c)	Prepare Post-Shutdown Decommissioning Activities Report	$140,561									$140,561	$21,100	$161,661	1,400		
1	A 50.75(c)	Prepare certification of permanent cessation of operations	$6,394									$6,394	$1,000	$7,394	40		
1	A 50.75(c)	Prepare certification of permanent reactor defueling	$6,394									$6,394	$1,000	$7,394	40		
1	A 50.75(c)	Prepare post-shutdown technical specification modifications	$347,695									$347,695	$52,200	$399,895	3,600		
1	A 50.75(c)	Update PSAR	$322,717									$322,717	$48,400	$371,117	3,360		
1	A 50.75(c)	Develop certified fuel handler program	$37,648									$37,648	$5,600	$43,248	336		
1	A 50.75(c)	Prepare post-shutdown emergency plan	$169,694									$169,694	$25,500	$195,194	1,480		
1	A 50.75(c)	Prepare post-shutdown QA plan	$108,471									$108,471	$16,300	$124,771	1,000		
1	A 50.75(c)	Prepare post-shutdown security plan	$108,471									$108,471	$16,300	$124,771	1,000		
1	A 50.75(c)	Prepare post-shutdown fire protection plan	$108,471									$108,471	$16,300	$124,771	1,000		
1	A 50.75(c)	Prepare post-shutdown radiation protection manual	$108,471									$108,471	$16,300	$124,771	1,000		
1	A 50.75(c)	Prepare and submit state and local permits	$98,477									$98,477	$14,800	$113,277	960		
1	A 50.75(c)	Respond to NRC questions on PSDAR	$6,394									$6,394	$1,000	$7,394	40		
1	A 50.75(c)	Prepare detailed resource loaded project schedule	$267,312									$267,312	$40,100	$307,412	2,480		
1	A 50.75(c)	Perform 50.59 unreviewed safety questions	$97,771									$97,771	$14,700	$112,471	738		
1	A 50.75(c)	Prepare activity specifications	$1,807,127									$1,807,127	$271,100	$2,078,227	18,060		
1	A 50.75(c)	Prepare detailed work procedures	$1,667,732									$1,667,732	$250,200	$1,917,932	16,080		
1	A 50.75(c)	Select shipping casks and obtain permits	$25,243									$25,243	$3,800	$29,043	240		
		LICENSE TERMINATION PLAN															
1	A 50.75(c)	General information	$1,407									$1,407	$200	$1,607	16		
1	A 50.75(c)	Site Characterization	$35,465									$35,465	$5,300	$40,765	336		
1	A 50.75(c)	Identification of remaining site dismantlement activities	$35,465									$35,465	$5,300	$40,765	336		
1	A 50.75(c)	Remediation Plans	$18,631									$18,631	$2,800	$21,431	176		
1	A 50.75(c)	Final Radiation Survey Plan	$353,367									$353,367	$53,000	$406,367	3,520		
1	A 50.75(c)	Compliance with the radiological criteria for license termination	$237,240									$237,240	$35,600	$272,840	2,440		
1	A 50.75(c)	Update decommissioning cost estimate	$57,848									$57,848	$8,700	$66,548	566		
1	A 50.75(c)	Supplement to the environmental report	$27,395									$27,395	$4,100	$31,495	200		
1	A 50.75(c)	Respond to NRC questions	$53,329									$53,329	$8,000	$61,329	326		
1	A 50.75(c)	Update LTP															
		SUBTOTAL - DECOMMISSIONING ACTIVITY COSTS:	$8,477,411									$8,477,411	$1,272,600	$9,749,911	81,340		
		DECOMMISSIONING PERIOD DEPENDENT															
1	PD 50.75(c)	Utility Staff	$3,974,726									$3,974,726	$596,200	$4,570,926	75,575		
1	PD 50.75(c)	DOC Staff	$4,033,240									$4,033,240	$605,000	$5,638,240	56,169		
1	PD 50.75(c)	Security	$755,209									$755,209	$113,300	$868,509	20,973		
1	PD 50.75(c)	HP Supplies			$276,718							$276,718	$69,200	$345,918			
1	PD 50.75(c)	Equipment			$301,422							$301,422	$75,400	$376,822			
1	PD 50.75(c)	Unit 1 Insurance									$1,223,073	$1,223,073	$183,500	$1,406,573			
1	PD 50.75(c)	Unit 2 Insurance															
1	PD 50.75(c)	O & M Budget Items			$156,229							$156,229	$38,100	$195,329			
1	PD 50.75(c)	Permits & Fees									$1,005,919	$1,005,919	$299,400	$2,295,319			
1	PD 50.75(c)	Waste Transfer and Loading															
1	PD 50.75(c)	Energy								$3,482,181		$3,482,181	$522,300	$4,004,481			
1	PD 50.75(c)	Severance	$18,173,408									$18,173,408	$2,726,000	$20,899,408			
1	PD 50.75(c)	Small Tools															
		SUBTOTAL - DECOMMISSIONING PERIOD DEPENDENT	$27,536,583		$734,369					$3,482,181	$3,210,992	$34,972,125	$5,319,400	$40,291,525	151,307		
		TOTAL PERIOD 1 - U1 & U2 DECOMMISSIONING PLANNING COST:	$36,797,782	$135,000,000	$2,084,369					$3,482,181	$6,101,835	$183,466,137	$39,681,500	$223,127,637	280,652		
		ACTIVITY															
		UNIT 1 - PERIOD 1 COSTS															
		Unit 1 Subtotal 10 CFR 50.75(c):															
		Unit 1 Subtotal 10 CFR 50.54(bb):															
		UNIT 2															
		Unit 2 Subtotal 10 CFR 50.75(c):															
		Unit 2 Subtotal 10 CFR 50.54(bb):															
		Common															
		Total 10 CFR 50.75(c):	$8,477,411									$8,477,411	$1,272,600	$9,749,911	81,340		
		Total 10 CFR 50.54(bb):	$783,768	$135,000,000								$135,783,768	$37,299,700	$168,083,468	7,904		
		PERIOD DEPENDENT															
		UNIT 1 - PERIOD 1 COSTS															
		Unit 1 Subtotal 10 CFR 50.75(c):	$27,536,583		$734,369					$3,482,181	$3,210,992	$34,972,125	$5,319,400	$40,291,525	151,307		
		Unit 1 Subtotal 10 CFR 50.54(bb):															
		UNIT 2															
		Unit 2 Subtotal 10 CFR 50.75(c):															
		Unit 2 Subtotal 10 CFR 50.54(bb):															
		Common															

Type			Staff Labor $	Craft Labor $	Equipment & Materials $	Packaging $	Transportation $	Clean Disposal $	Contaminated Disposal $	Energy $	Other $	without Contingency $	Contingency $	with Contingency $	Staff Manhours	Craft Manhours	Craft Manhours
		Total 10 CFR 50.75(c):															
		Total 10 CFR 50.54(bb):			$1,350,000						$2,892,843	$4,242,843	$760,900	$5,002,743			
		Unit 1, Unit 2 & Common															
		Total 10 CFR 50.75(c):	$36,013,804		$734,369					$3,402,181	$3,210,992	$43,449,638	$6,591,800	$50,041,436	242,648		
		Total 10 CFR 50.54(bb):	$783,750	$135,000,000	$1,350,000						$2,892,843	$140,018,601	$33,089,600	$173,008,201	7,904		
PERIOD 2 - POST-SHUTDOWN ACTIVITIES COSTS:																	
		SPENT FUEL ACTIVITIES															
2	A 50.54(bb)	Modify Spent Fuel Cooling System		$640,667	$1,169,000							$1,809,667	$444,000	$2,249,667		9,360	
2	A 50.54(bb)	Modify control room		$565,869	$800,000							$1,365,869	$340,400	$1,726,269		9,360	
2	A 50.54(bb)	Modify security system		$459,341	$525,000							$984,341	$240,700	$1,225,041		7,280	
2	A 50.54(bb)	Puchase ISFSI casks			$111,000,000							$111,000,000	$27,750,000	$138,750,000		7,280	
		SUBTOTAL - SPENT FUEL ACTIVITIES		$1,666,877	$113,494,000							$115,160,877	$28,775,100	$143,935,977		33,280	
		SPENT FUEL PERIOD DEPENDENT															
2	PD 50.54(bb)	Utility Staff	$3,363,848									$3,363,848	$804,500	$3,868,148	66,400		
2	PD 50.54(bb)	Security	$1,295,527									$1,295,527	$194,300	$1,489,827	49,750		
2	PD 50.54(bb)	Insurance									$1,619,316	$1,619,316	$242,900	$1,862,216			
2	PD 50.54(bb)	O & M Budget Items															
2	PD 50.54(bb)	Permits & Fees									$1,007,525	$1,007,525	$151,100	$1,158,625			
2	PD 50.54(bb)	Waste Transfer and Loading															
2	PD 50.54(bb)	Energy								$848,474		$848,474	$127,300	$975,774			
2	PD 50.54(bb)	Spent Fuel Storage Maintenance Supplies															
2	PD 50.54(bb)	Small Tools			$18,689							$18,689	$2,200	$21,089			
		SUBTOTAL - SPENT FUEL PERIOD DEPENDENT	$4,659,176		$18,689					$848,474	$2,626,843	$8,151,382	$1,224,300	$9,375,682	116,165		
		DECOMMISSIONING ACTIVITIES															
2	A 50.75(c)	Primary System Decon Unit 1 & 2		$8,902,125	$1,476,125				$9,340,250			$19,718,500	$6,008,600	$25,727,100			
2	A 50.75(c)	Flush & Drain Systems (PERFORMED BY UTILITY STAFF)															
2	A 50.75(c)	Implement cold & dark		$773,783	$1,600,000							$2,373,783	$584,500	$2,958,283		11,520	
2	A 50.75(c)	Modify U1 Containment Access		$351,391	$525,000							$876,391	$215,000	$1,091,391		5,760	
2	A 50.75(c)	ModifyU2 Containment Access		$351,391	$525,000							$876,391	$215,000	$1,091,291		5,760	
2	A 50.75(c)	Historical Site Assessment	$331,734									$331,734	$49,800	$381,534	4,660		
2	A 50.75(c)	Vessel and internals activation analysis	$116,901									$116,901	$17,500	$134,401	640		
2	A 50.75(c)	Characterization survey	$754,270									$754,270	$113,100	$867,370	12,860		
2	A 50.75(c)	Test special equipment and training		$947,439								$947,439	$225,900	$1,173,339		13,440	
		SUBTOTAL - DECOMMISSIONING ACTIVITY COSTS:	$1,202,905	$11,326,129	$4,126,125				$9,340,250			$26,095,410	$7,428,400	$33,424,810	18,460	36,480	
		DECOMMISSIONING PERIOD DEPENDENT															
2	PD 50.75(c)	Utility Staff	$15,093,537									$15,093,537	$2,264,000	$17,357,537	300,570		
2	PD 50.75(c)	DOC Staff	$11,310,434									$11,310,434	$1,696,600	$13,007,034	157,540		
2	PD 50.75(c)	Security	$3,674,302									$3,674,302	$551,100	$4,225,402	140,249		
2	PD 50.75(c)	HP Supplies			$929,328							$929,328	$232,300	$1,161,628			
2	PD 50.75(c)	Equipment			$1,286,080							$1,286,080	$321,500	$1,607,580			
2	PD 50.75(c)	Unit 1 Insurance									$385,787	$385,787	$57,900	$443,687			
2	PD 50.75(c)	Unit 2 Insurance									$385,787	$385,787	$57,900	$443,687			
2	PD 50.75(c)	O & M Budget Items			$11,459,323							$11,459,323	$2,004,800	$14,324,123			
2	PD 50.75(c)	Permits & Fees									$2,440,340	$2,440,340	$366,100	$2,806,440			
2	PD 50.75(c)	Waste Transfer and Loading															
2	PD 50.75(c)	Energy								$4,201,784		$4,201,784	$630,300	$4,832,084			
2	PD 50.75(c)	Spent Fuel Storage	$28,209,601									$28,209,601	$4,231,500	$32,441,301			
2	PD 50.75(c)	Small Tools			$228,523							$228,523	$34,600	$263,123			
		SUBTOTAL - DECOMMISSIONING PERIOD DEPENDENT	$58,288,078		$13,901,251					$4,201,784	$3,211,916	$79,603,024	$12,330,800	$92,933,824	607,359		
		TOTAL PERIOD 2 - POST-SHUTDOWN ACTIVITIES COSTS:	$64,150,156	$13,016,006	$131,534,204				$9,340,250	$5,050,259	$5,838,757	$228,928,693	$50,759,400	$279,688,093	743,814	69,760	
		ACTIVITY															
		UNIT 1															
		Unit 1 Subtotal 10 CFR 50.75(c):		$4,602,454	$1,263,093				$4,670,125			$10,735,641	$3,219,300	$13,954,941		5,760	
		Unit 1 Subtotal 10 CFR 50.54(bb):															
		UNIT 2															
		Unit 2 Subtotal 10 CFR 50.75(c):		$4,602,454	$1,263,093				$4,670,125			$10,735,641	$3,219,300	$13,954,941		5,760	
		Unit 2 Subtotal 10 CFR 50.54(bb):															
		Common															
		Common Subtotal - 10 CFR 50.75(c):	$1,202,908	$1,731,222	$1,600,000							$4,534,127	$980,800	$5,514,927	18,400	24,960	
		Common Subtotal - 10 CFR 50.54(bb):		$1,666,877	$113,494,000							$115,160,877	$28,775,100	$143,935,977		33,280	

2015 D.C. Cook
Scenario 1
DECON and Permanent On-Site Dry Storage

	Type		Staff Labor $	Craft Labor $	Equipment & Materials $	Packaging $	Transportation $	Clean Disposal $	Contaminated Disposal $	Energy $	Other $	Without Contingency $	Contingency $	With Contingency $	Staff Manhours	Craft Manhours	Craft Manhours	
		PERIOD DEPENDENT																
		Unit 1																
		Unit 1 Subtotal 10 CFR 50.75(c):																
		Unit 1 Subtotal 10 CFR 50.54(bb):																
		Unit 2																
		Unit 2 Subtotal 10 CFR 50.75(c):																
		Unit 2 Subtotal 10 CFR 50.54(bb):																
		Common																
		Common Subtotal - 10 CFR 50.75(c):	$58,288,078		$13,861,251					$4,201,794	$3,211,916	$79,603,024	$13,339,600	$92,933,624	607,369			
		Common Subtotal - 10 CFR 50.54(bb):	$4,869,176		$16,099					$949,474	$2,626,843	$8,161,382	$1,724,300	$9,376,692	110,155			
		Unit 1, Unit 2 & Common																
		Total 10 CFR 50.75(c):	$59,490,981	$11,326,120	$18,027,376				$9,340,250	$4,201,794	$3,211,916	$105,598,434	$20,760,000	$128,369,434	626,769	36,460		
		Total 10 CFR 50.54(bb):	$4,869,176	$1,980,877	$113,606,889					$949,474	$2,626,843	$123,930,259	$28,595,400	$153,329,569	110,155	33,290		
PERIOD 3 VESSEL AND INTERNALS REMOVAL COSTS:																		
		SPENT FUEL ACTIVITIES																
3	A 50.54(bb)	Purchase ISFSI Costs			$111,000,000							$111,000,000	$27,750,000	$138,750,000				
		SUBTOTAL - SPENT FUEL ACTIVITIES			$111,000,000							$111,000,000	$27,750,000	$138,750,000				
		SPENT FUEL PERIOD DEPENDENT																
3	PD 50.54(bb)	Utility Staff	$11,892,900									$11,892,900	$1,783,900	$13,676,800	241,603			
3	PD 50.54(bb)	Security	$3,844,479									$3,044,479	$546,700	$4,191,179	234,534			
3	PD 50.54(bb)	Insurance									$5,725,446	$5,725,446	$858,600	$6,584,246				
3	PD 50.54(bb)	O & M Budget Items																
3	PD 50.54(bb)	Permits & Fees									$3,552,320	$3,552,320	$534,300	$4,086,620				
3	PD 50.54(bb)	Waste Transfer and Loading																
3	PD 50.54(bb)	Energy								$1,939,299		$1,939,299	$290,900	$2,230,199				
3	PD 50.54(bb)	Spent Fuel Storage Maintenance Supplies																
3	PD 50.54(bb)	Small Tools																
		SUBTOTAL - SPENT FUEL PERIOD DEPENDENT	$16,637,379							$1,939,299	$9,297,766	$26,794,844	$4,014,600	$30,779,044	476,395			
		DECOMMISSIONING ACTIVITIES																
		UNIT 1																
3	A 50.75(c)	Install all reactor operating floor contamination control envelopes (CCEs), support structures, rigging, internals work platforms and process equipment (BY UTILITY STAFF)																
3	A 50.75(c)	Finalize Residual Radiation Inventory (WITH SITE CHARACTERIZATION)																Utility Staff
3	A 50.75(c)	Finalize Internals and Vessel Segmenting Details (WITH ACTIVATION ANALYSIS)																
3	A 50.75(c)	Remove, pack, ship and bury Unit 1 Pressurizer		$1,064,197		$800	$71,760		$933,410			$2,070,176	$621,000	$2,691,176		19,407		
3	A 50.75(c)	Drain, remove, package, ship and bury Unit 1 steam generators		$4,340,246	$1,532,267	$12,800	$623,395		$12,500,368			$19,308,074	$6,344,600	$25,652,674		79,163		
3	A 50.75(c)	Remove Unit 1 equipment hatch closure (BY UTILITY STAFF)																Utility Staff
3	A 50.75(c)	Remove Unit 1 control rod drive and reactor cavity missile shields (BY UTILITY STAFF)																Utility Staff
3	A 50.75(c)	Remove Unit 1 CRD mechanisms and cables, air ducts, and reactor vessel head (BY UTILI																Utility Staff
3	A 50.75(c)	Remove, segment, package and bury Unit 1 vessel & vessel head insulation		$182,000					$364,625			$546,625	$180,700	$727,325				
3	A 50.75(c)	Prepare Unit 1 vessel head for shipment as its own container (WITH VESSEL REMOVAL)																Utility Staff
3	A 50.75(c)	Decontaminate and clean up Unit 1 plant areas (BY UTILITY STAFF)																
3	A 50.75(c)	Process liquid and solid radioactive wastes (BY UTILITY STAFF)																Utility Staff
3	A 50.75(c)	Decon, remove, package, ship and dispose of Unit 1 contaminated systems		$13,012,607	$1,164,896	$61,337	$600,074		$5,142,675			$20,811,588	$5,663,600	$26,475,588		270,042		Utility Staff
3	A Greenfield	Remove, package, ship and dispose of Unit 1 clean systems		$14,674,166	$1,244,671		$182,236	$1,043,488				$17,044,553	$3,929,700	$20,974,253		264,077		
3	A 50.75(c)	Install Unit 1 water cleanup system in fuel transfer canal (BY UTILITY STAFF)																
3	A 50.75(c)	Segment, package and ship Unit 1 internals as radioactive waste		$2,606,135	$520,565	$90,000	$5,022,524		$38,003,376			$46,247,569	$16,177,600	$62,426,200		47,360		Vessel Removal
3	A 50.75(c)	Decontaminate internals work platform and store (BY UTILITY STAFF)																
3	A 50.75(c)	Install Unit 1 vessel support structure (WITH VESSEL REMOVAL)																Vessel Removal
3	A 50.75(c)	Segment and process Unit 1 reactor vessel and associated equipment as LLW		$2,701,810	$148,187	$24,000	$2,339,070		$14,901,905			$20,114,971	$6,809,400	$26,924,371		49,190		Vessel Removal
3	A 50.75(c)	Decontaminate reactor vessel platform and store																
3	A 50.75(c)	Decontaminate Unit 1 reactor building		$2,529,030	$513,760	$294,710	$1,786,462		$9,397,096			$14,430,095	$4,662,600	$19,092,695		43,847		Vessel Removal
		UNIT 2																
3	A 50.75(c)	Finalize Residual Radiation Inventory (WITH SITE CHARACTERIZATION)																
3	A 50.75(c)	Finalize Internals and Vessel Segmenting Details (WITH ACTIVATION ANALYSIS)																
3	A 50.75(c)	Revise Integrated Work Sequence and Schedule	$53,462									$53,462	$8,000	$61,462				
3	A 50.75(c)	Transfer all reactor operating floor CCEs support structures, rigging, internals work platforms and process equipment to position and install (BY UTILITY STAFF)																
3	A 50.75(c)	Remove Unit 2 equipment hatch closure (BY UTILITY STAFF)																Utility Staff
3	A 50.75(c)	Remove Unit 2 CRD missile and reactor cavity missile shields (BY UTILITY STAFF)																Utility Staff
3	A 50.75(c)	Remove Unit 2 CRD mechanisms and cables, air ducts, and reactor vessel head (BY UTIL																Utility Staff
3	A 50.75(c)	Remove, segment, package and bury Unit 2 vessel & vessel head insulation		$182,000					$364,625			$546,625	$180,700	$727,325				Utility Staff

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Scenario 1
DECON and Permanent On-Site Dry Storage

	Type		Staff Labor, $	Craft Labor, $	Equipment & Materials, $	Packaging, $	Transportation, $	Clean Disposal, $	Contaminated Disposal, $	Energy, $	Other, $	without Contingency, $	Contingency, $	with Contingency, $	Staff Manhours	Craft Manhours	Craft Manhours	
3	A 50.75(c)	Prepare Unit 2 vessel head for shipment as its own container (WITH VESSEL REMOVAL)																Utility Staff
3	A 50.75(c)	Decontaminate and clean up Unit 2 plant areas (BY UTILITY STAFF)																Utility Staff
3	A 50.75(c)	Process liquid and solid radioactive wastes (BY UTILITY STAFF)																Vessel Removal
3	A 50.75(c)	Install Unit 2 water cleanup system in fuel transfer canal (BY UTILITY STAFF)																
3	A 50.75(c)	Segment, package and ship Unit 2 internals as radioactive waste		$2,609,135	$526,545	$90,000	$5,022,524		$38,003,376			$46,247,599	$16,177,900	$62,425,399			47,360	
3	A 50.75(c)	Decontaminate internals work platform and process as LLW (BY UTILITY STAFF)																Vessel Removal
3	A 50.75(c)	Install Unit 2 vessel support structure (WITH VESSEL REMOVAL)																Vessel Removal
3	A 50.75(c)	Segment and process Unit 2 reactor vessel and associated equipment as LLW		$2,701,610	$148,187	$24,000	$2,339,070		$14,901,905			$20,114,971	$6,609,400	$26,724,371			48,100	
3	A 50.75(c)	Decon reactor vessel cutting equipment and work platform; package and process as LLW (I																Vessel Removal
3	A 50.75(c)	Decon, remove, package, ship and bury Unit 2 steam generators		$4,340,240	$1,532,267	$12,600	$823,365		$12,599,366			$19,308,074	$6,344,600	$25,652,674			79,163	
3	A 50.75(c)	Remove, pack, ship and bury Unit 2 Pressurizer		$1,084,197		$600	$71,768		$933,410			$2,070,175	$621,000	$2,691,175			19,407	
3	A 50.75(c)	Decontaminate non-essential structures		$71,104	$40,556	$621	$10,774		$414,818			$537,873	$185,700	$723,573			1,438	
3	A Greenfield	Remove non-essential structures		$2,477,040	$692,900		$331,135	$2,179,243				$5,680,321	$1,104,300	$6,984,621		42,221		
		SUBTOTAL - DECOMMISSIONING ACTIVITY COSTS:	$53,462	$55,250,916	$8,270,865	$641,887	$19,433,198	$3,222,731	$148,460,156			$235,333,185	$75,321,300	$211,164,483		326,269	706,886	
		DECOMMISSIONING PERIOD DEPENDENT																
3	PD 50.75(c)	Utility Staff	$39,154,015									$39,154,015	$5,874,600	$45,030,615	703,631			
3	PD 50.75(c)	DGC Staff	$46,406,697									$46,406,697	$6,981,000	$53,387,697	652,297			
3	PD 50.75(c)	Security	$5,905,496									$5,905,496	$885,900	$6,791,296	234,534			
3	PD 50.75(c)	HP Supplies			$10,971,689							$10,971,689	$2,742,900	$13,714,589				
3	PD 50.75(c)	Equipment			$7,116,150							$7,116,150	$1,779,000	$8,895,150				
3	PD 50.75(c)	Unit 1 Insurance									$1,364,034	$1,364,034	$204,600	$1,568,634				
3	PD 50.75(c)	Unit 2 Insurance									$1,364,034	$1,364,034	$204,600	$1,568,634				
3	PD 50.75(c)	O & M Budget Items			$27,219,510							$27,219,510	$6,804,000	$34,024,410				
3	PD 50.75(c)	Permits & Fees									$7,910,024	$7,910,024	$1,186,500	$9,096,524				
3	PD 50.75(c)	Waste Transfer and Loading		$9,400,235								$9,400,235	$2,240,900	$11,641,135			183,261	
3	PD 50.75(c)	Energy								$12,282,974		$12,282,974	$1,842,400	$14,125,374				
3	PD 50.75(c)	Severance	$2,229,959									$2,229,959	$334,500	$2,564,459				
3	PD 50.75(c)	Small Tools			$1,293,023							$1,293,023	$323,300	$1,616,323				
		SUBTOTAL - DECOMMISSIONING PERIOD DEPENDENT	$93,706,369	$9,400,235	$46,600,371					$12,282,974	$10,638,092	$172,028,040	$31,385,000	$204,013,040	1,590,431		183,261	
		TOTAL PERIOD 3 VESSEL AND INTERNALS REMOVAL COSTS:	$109,297,209	$64,651,150	$105,871,220	$641,887	$19,433,198	$3,222,731	$148,460,156	$14,222,273	$10,925,860	$346,726,685	$106,706,300	$604,689,568	2,066,928	326,269	889,247	
		ACTIVITY																
		UNIT 1																
		Unit 1 Subtotal 10 CFR 50.75(c):		$27,236,225	$3,985,711	$513,946	$10,652,293		$81,242,653			$123,628,829	$40,459,900	$163,089,429			509,519	
		Unit 1 Subtotal 10 CFR 50.54(bb):																
		Unit 1 Subtotal Greenfield:		$14,674,168	$1,244,671		$182,239	$1,043,489				$17,044,563	$3,930,700	$20,974,263		224,077		
		UNIT 2																
		Unit 2 Subtotal 10 CFR 50.75(c):	$53,462	$10,393,388	$2,207,018	$127,600	$8,258,767		$66,602,803			$88,340,903	$30,141,700	$118,482,603			185,030	
		Unit 2 Subtotal 10 CFR 50.54(bb):																
		Unit 2 Subtotal Greenfield:																
		Common																
		Total 10 CFR 50.75(c):		$71,104	$40,556	$621	$10,774		$414,818			$537,873	$185,700	$723,573			1,438	
		Total 10 CFR 50.54(bb):			$111,000,000							$111,000,000	$27,750,000	$138,750,000				
		Total Greenfield		$2,477,040	$692,900		$331,135	$2,179,243				$5,680,321	$1,104,300	$6,984,621		42,221		
		PERIOD DEPENDENT																
		UNIT 1																
		Unit 1 Subtotal 10 CFR 50.75(c):																
		Unit 1 Subtotal 10 CFR 50.54(bb):																
		UNIT 2																
		Unit 2 Subtotal 10 CFR 50.75(c):																
		Unit 2 Subtotal 10 CFR 50.54(bb):																
		Common																
		Total 10 CFR 50.75(c):	$93,706,968	$9,400,235	$46,600,371					$12,282,974	$10,638,092	$172,028,040	$31,385,000	$204,013,040	1,590,431		183,261	
		Total 10 CFR 50.54(bb):	$15,637,370							$1,939,289	$9,287,768	$26,764,444	$4,014,000	$30,778,044	476,396			
		Unit 1, Unit 2 & Common																
		Total 10 CFR 50.75(c):	$93,760,930	$47,599,952	$62,733,656	$641,887	$18,919,824		$149,460,156	$12,282,974	$10,638,092	$385,036,350	$102,172,300	$487,208,650	1,590,431		889,247	
		Total 10 CFR 50.54(bb):	$15,637,370		$111,000,000					$1,939,289	$9,287,768	$137,764,444	$31,764,000	$169,528,044	476,396			
		Total Greenfield		$17,051,189	$2,137,571		$513,374	$3,222,731				$22,924,874	$5,034,000	$27,958,874		326,269		
PERIOD 4 DECONTAMINATE BALANCE OF SITE COSTS:																		
		SPENT FUEL PERIOD DEPENDENT																
4	PD 50.54(bb)	Utility Staff	$10,517,670									$10,517,670	$1,692,700	$12,210,370	215,928			
4	PD 50.54(bb)	Security	$3,253,090									$3,253,090	$488,100	$3,741,790	130,865			
4	PD 50.54(bb)	Insurance									$5,111,529	$5,111,529	$766,700	$5,878,229				
4	PD 50.54(bb)	O & M Budget Items																

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	Type		Staff Labor $	Craft Labor $	Equipment & Materials $	Packaging $	Transportation $	Clean Disposal $	Contaminated Disposal $	Energy $	Other $	without Contingency $	Contingency $	with Contingency $	Staff Manhours	Craft Manhours	Craft Manhours
4	PD 50.54(bb)	Permits & Fees									$3,180,346	$3,180,346	$477,100	$3,657,446			
4	PD 50.54(bb)	Waste Transfer and Loading															
4	PD 50.54(bb)	Energy								$1,731,356		$1,731,356	$239,700	$1,991,056			
4	PD 50.54(bb)	Spent Fuel Storage Maintenance Supplies															
4	PD 50.54(bb)	Small Tools															
		SUBTOTAL - SPENT FUEL PERIOD DEPENDENT	$13,871,366							$1,731,356	$8,291,875	$23,894,597	$3,594,300	$27,478,897	349,795		
		DECOMMISSIONING ACTIVITIES															
4	A 50.75(c)	Decon, remove, package, ship and dispose of Unit 2 contaminated systems		$13,636,692	$1,131,353	$84,469	$304,325		$4,704,253			$20,111,297	$5,437,200	$25,548,492			207,188
4	A Greenfield	Remove, package, ship and dispose of Unit 2 clean systems		$14,440,360	$1,221,462		$186,260	$1,069,979				$16,918,061	$3,895,600	$20,813,661		281,382	
4	A 50.75(c)	Decon Steam Generator Storage Building	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!
4	A 50.75(c)	Decon Unit 2 Reactor Building		$2,529,033	$513,798	$294,710	$1,705,462		$9,297,088			$14,430,090	$4,662,600	$19,092,695			49,847
4	A 50.75(c)	Remove Spent fuel storage racks		$2,661,342	$50,370	$0,348	$46,039		$1,655,793			$4,220,895	$1,220,000	$5,440,895			49,874
4	A 50.75(c)	Decon Auxiliary Building		$8,741,650	$1,291,150	$521,466	$3,162,575		$11,365,733			$22,082,576	$6,729,600	$28,812,176			101,651
4	A 50.75(c)	Perform final radiological survey of all structures		$1,604,760	$35,583							$1,640,333	$463,000	$2,403,333			
4	A 50.75(c)	Perform final survey of the site		$10,033,000	$229,126							$10,262,125	$2,449,000	$12,711,125			
4	A 50.75(c)	Obtain NRC approval															
4	A 50.75(c)	Prepare final report of dismantling program	$51,018									$51,018	$7,700	$58,718	456		
		SUBTOTAL - DECOMMISSIONING ACTIVITY COSTS:	$51,018	$50,847,024	$4,472,861	$908,992	$5,743,661	$1,069,979	$26,922,860			$90,016,415	$24,864,700	$114,881,115	456	281,382	462,760
		DECOMMISSIONING PERIOD DEPENDENT															
4	PD 50.75(c)	Utility Staff	$26,677,111									$26,677,111	$4,301,600	$32,978,711	510,377		
4	PD 50.75(c)	DOC Staff	$35,702,442									$35,702,442	$5,355,400	$41,057,842	497,291		
4	PD 50.75(c)	Security	$5,272,273									$5,272,273	$790,600	$6,063,073	209,366		
4	PD 50.75(c)	HP Supplies			$7,925,608							$7,925,608	$1,981,400	$9,907,008			
4	PD 50.75(c)	Equipment			$8,097,070							$8,097,070	$2,024,300	$10,121,370			
4	PD 50.75(c)	Unit 1 Insurance									$1,217,774	$1,217,774	$182,700	$1,400,474			
4	PD 50.75(c)	Unit 2 Insurance									$1,217,774	$1,217,774	$182,700	$1,400,474			
4	PD 50.75(c)	O & M Budget Items			$13,489,788							$13,489,788	$3,372,400	$16,862,188			
4	PD 50.75(c)	Permits & Fees									$9,964,162	$9,964,162	$894,600	$8,858,762			
4	PD 50.75(c)	Waste Transfer and Loading		$8,392,285								$8,392,285	$2,000,600	$10,392,885			163,611
4	PD 50.75(c)	Energy								$10,400,068		$10,400,068	$1,560,000	$11,960,068			
4	PD 50.75(c)	Severance	$819,169									$819,169	$122,900	$942,069			
4	PD 50.75(c)	Small Tools			$1,184,788							$1,184,788	$296,200	$1,480,986			
		SUBTOTAL - DECOMMISSIONING PERIOD DEPENDENT	$70,470,995	$8,392,285	$30,697,253					$10,400,068	$8,399,710	$128,360,309	$23,065,600	$151,425,909	1,217,053		163,611
		TOTAL PERIOD 4 DECONTAMINATE BALANCE OF SITE COSTS:	$84,393,379	$59,239,309	$35,170,114	$908,992	$5,743,661	$1,069,979	$26,922,860	$12,131,422	$16,691,585	$242,271,321	$51,514,600	$293,785,921	1,564,304	281,382	626,370
		ACTIVITY															
		UNIT 1															
		Unit 1 Subtotal 10 CFR 50.75(c):															
		Unit 1 Subtotal 10 CFR 50.54(bb):															
		Unit 1 Subtotal Greenfield:															
		UNIT 2															
		Unit 2 Subtotal 10 CFR 50.75(c):		$16,105,821	$1,046,161	$370,176	$2,349,797		$14,031,349			$34,541,388	$10,099,800	$44,641,188			311,035
		Unit 2 Subtotal 10 CFR 50.54(bb):															
		Unit 2 Subtotal Greenfield:		$14,440,360	$1,221,462		$186,260	$1,069,979				$16,918,061	$3,895,600	$20,813,661		281,382	
		Common															
		Common Subtotal 10 CFR 50.75(c):	$51,018	$30,240,742	$1,606,229	$529,814	$5,207,814		$12,621,531			$50,056,149	$10,000,300	$49,426,248	456		151,725
		Common Subtotal 10 CFR 50.54(bb):															
		Common Subtotal Greenfield:															
		PERIOD DEPENDENT															
		UNIT 1															
		Unit 1 Subtotal 10 CFR 50.75(c):															
		Unit 1 Subtotal 10 CFR 50.54(bb):															
		UNIT 2															
		Unit 2 Subtotal 10 CFR 50.75(c):															
		Unit 2 Subtotal 10 CFR 50.54(bb):															
		Common															
		Common Subtotal 10 CFR 50.75(c):	$70,470,996	$8,392,285	$30,697,253					$10,400,068	$8,399,710	$128,360,309	$23,065,600	$151,425,908	1,217,053		163,611
		Common Subtotal 10 CFR 50.54(bb):	$13,871,366							$1,731,356	$8,291,875	$23,894,597	$3,594,300	$27,478,897	349,795		
		Unit 1, Unit 2 & Common															
		Total 10 CFR 50.75(c):	$70,522,013	$44,798,848	$33,348,632	$908,992	$5,657,401		$26,922,860	$10,400,068	$8,399,710	$201,459,642	$44,034,700	$245,493,342	1,217,509		626,370
		Total 10 CFR 50.54(bb):	$13,871,366							$1,731,356	$8,291,875	$23,894,597	$3,594,300	$27,478,897	349,795		
		Total Greenfield		$14,440,360	$1,221,462		$186,260	$1,069,979				$16,918,061	$3,895,600	$20,813,661		281,382	

	Type		Staff Labor $	Craft Labor $	Equipment & Materials $	Packaging $	Transportation $	Clean Disposal $	Contaminated Disposal $	Energy $	Other $	Without Contingency $	Contingency $	With Contingency $	Staff Manhours	Craft Manhours	Craft Manhours
PERIOD 5 - CLEAN STRUCTURE DEMOLITION COSTS:																	
		SPENT FUEL PERIOD DEPENDENT															
5	PD 50.54(bb)	Utility Staff	$2,534,303									$2,534,303	$380,100	$2,914,403	44,652		
5	PD 50.54(bb)	Security	$1,142,376									$1,142,376	$171,400	$1,313,776	40,644		
5	PD 50.54(bb)	HP Supplies			$109,494							$109,494	$27,400	$136,894	40,644		
5	PD 50.54(bb)	Equipment															
5	PD 50.54(bb)	Insurance									$300,624	$300,624	$45,100	$345,724			
5	PD 50.54(bb)	O & M Budget Items															
5	PD 50.54(bb)	Permits & Fees									$654,924	$654,924	$98,200	$753,124			
5	PD 50.54(bb)	Waste Transfer and Loading															
5	PD 50.54(bb)	Energy								$25,365		$25,365	$3,800	$29,165			
5	PD 50.54(bb)	Spent Fuel Storage Maintenance Supplies															
5	PD 50.54(bb)	Small Tools															
		SUBTOTAL - SPENT FUEL PERIOD DEPENDENT	$3,676,679		$109,494					$25,365	$955,548	$4,767,076	$720,000	$5,493,076	125,939		
		DECOMMISSIONING ACTIVITIES															
5	A Greenfield	Remove Unit 1 reactor building		$6,713,605	$4,046,017		$1,019,495	$12,835,197				$25,316,204	$4,297,000	$29,612,204		109,447	
5	A Greenfield	Remove Unit 2 reactor building		$6,713,605	$4,046,017		$1,019,495	$12,835,197				$25,316,204	$4,297,000	$29,612,204		109,447	
5	A Greenfield	Remove Auxiliary Building		$5,402,726	$3,843,181		$1,107,078	$7,267,449				$17,730,435	$3,241,900	$20,972,335		65,778	
5	A Greenfield	Remove Turbine Building		$3,928,953	$3,659,587		$1,090,600	$7,178,930				$15,858,100	$2,806,300	$18,664,400		64,508	
5	A Greenfield	Remove Steam Generator Storage Building		$787,830	$1,334,759		$159,894	$1,052,516				$3,335,099	$661,900	$3,996,999		13,110	
5	A Greenfield	Remove Electrical Transformers		$419,247	$16,504		$51,528	$405,000				$902,277	$158,100	$1,060,377		6,297	
5	A Greenfield	Removal of Unit 1 Turbine Generator		$155,209	$9,273		$6,833	$45,000				$216,316	$45,300	$261,616		2,697	
5	A Greenfield	Removal of Unit 1 Main Condenser		$1,349,930	$9,683		$75,023	$493,846				$1,928,182	$390,000	$2,318,182		21,580	
5	A Greenfield	Removal of Unit 2 Turbine Generator		$155,209	$9,273		$6,830	$45,000				$216,316	$45,300	$261,616		2,697	
5	A Greenfield	Removal of Unit 2 Main Condenser		$1,349,930	$9,683		$75,023	$493,846				$1,928,182	$390,000	$2,318,182		21,580	
5	A Greenfield	Remove of Standby Diesel Generators		$30,929	$7,483		$2,051	$13,500				$53,963	$11,000	$64,963		532	
5	A Greenfield	Remove Administration building		$237,595	$211,979		$56,128	$369,471				$875,174	$168,900	$1,034,074		4,105	
5	A Greenfield	Remove Low Level Radwaste building		$919,937	$219,463		$169,275	$1,048,444				$2,349,824	$413,900	$2,760,724		14,743	
		SUBTOTAL - DECOMMISSIONING ACTIVITY COSTS:		$28,751,958	$17,727,998		$5,015,657	$44,884,075				$96,159,694	$17,260,400	$113,427,094		497,881	
		DECOMMISSIONING PERIOD DEPENDENT															
5	PD Greenfield	Utility Staff	$983,855									$983,855	$147,800	$1,131,455	21,889		
5	PD Greenfield	DOC Staff	$6,592,832									$6,592,832	$1,288,900	$8,881,532	109,200		
5	PD Greenfield	Security	$557,764									$557,764	$83,700	$641,464	21,865		
5	PD Greenfield	HP Supplies															
5	PD Greenfield	Equipment			$3,276,704							$3,276,704	$819,200	$4,095,904			
5	PD Greenfield	Unit 1 Insurance									$428,340	$428,340	$64,300	$492,640			
5	PD Greenfield	Unit 2 Insurance									$428,340	$428,340	$64,300	$492,640			
5	PD Greenfield	O & M Budget Items			$2,473,265							$2,473,265	$618,300	$3,091,565			
5	PD Greenfield	Permits & Fees									$300,416	$300,416	$46,000	$352,416			
5	PD Greenfield	Waste Transfer and Loading		$2,527,775								$2,527,775	$602,600	$3,130,375		46,905	
5	PD Greenfield	Energy								$414,294		$414,294	$62,100	$476,394			
5	PD Greenfield	Severance	$4,084,466									$4,084,466	$612,700	$4,697,166			
5	PD Greenfield	Small Tools			$625,595							$625,595	$156,400	$781,995			
		SUBTOTAL - DECOMMISSIONING PERIOD DEPENDENT	$14,219,717	$2,527,775	$6,376,663					$414,294	$1,163,096	$24,699,546	$4,589,100	$28,285,646	150,069	46,905	
		TOTAL PERIOD 5 - CLEAN STRUCTURE DEMOLITION COSTS:	$17,896,396	$31,279,733	$24,213,041		$5,015,657	$44,884,075		$439,659	$2,118,644	$127,626,104	$22,569,500	$150,108,604	275,909	514,588	
		ACTIVITY															
		UNIT 1															
		Unit 1 Subtotal Greenfield (g):		$8,218,444	$4,085,873		$2,001,344	$13,174,043				$27,459,704	$4,732,300	$32,192,004		133,724	
		Unit 1 Subtotal 10 CFR 50.54(bb):															
		UNIT 2															
		Unit 2 Subtotal Greenfield (g):		$8,218,444	$4,085,873		$2,001,344	$13,174,043				$27,459,704	$4,732,300	$32,192,004		133,724	
		Unit 2 Subtotal 10 CFR 50.54(bb):															
		Common															
		Common Subtotal Greenfield (g)		$12,315,069	$9,698,249		$2,612,669	$18,516,999				$43,140,176	$7,803,800	$51,043,976		200,933	
		Common Subtotal 10 CFR 50.54(bb):															
		PERIOD DEPENDENT															
		UNIT 1															
		Unit 1 Subtotal Greenfield (g):															
		Unit 1 Subtotal 10 CFR 50.54(bb):															
		UNIT 2															
		Unit 2 Subtotal Greenfield (g):															
		Unit 2 Subtotal 10 CFR 50.54(bb):															

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Type			Staff Labor, $	Craft Labor, $	Equipment & Materials, $	Packaging, $	Transportation, $	Clean Disposal, $	Contaminated Disposal, $	Energy, $	Other, $	without Contingency, $	Contingency, $	with Contingency, $	Staff Manhours	Craft Manhours	Craft Manhours
		Common															
		Common Subtotal Greenfield (g)	$14,218,717	$2,527,778	$6,375,663					$414,294	$1,183,096	$24,699,445	$4,664,100	$29,265,545	150,099	46,805	
		Common Subtotal 10 CFR 50.54(bb):	$3,676,678		$109,484					$25,365	$955,540	$4,767,075	$724,000	$5,493,075	125,839		
		Unit 1, Unit 2 & Common															
		Total Greenfield (g):	$14,218,717	$31,279,733	$24,103,669			$6,810,557	$44,664,075	$414,294	$1,183,096	$122,859,028	$21,034,500	$144,093,529	160,063	514,588	
		Total 10 CFR 50.54(bb):	$3,676,678		$109,484					$25,365	$955,540	$4,767,075	$724,000	$5,493,075	125,839		
PERIOD 6 - RESTORE SITE COSTS:																	
		SPENT FUEL PERIOD DEPENDENT															
6	PD 50.54(bb)	Utility Staff	$253,992									$253,992	$38,100	$291,092	4,463		
6	PD 50.54(bb)	Security	$114,446									$114,446	$17,200	$131,646	4,072		
6	PD 50.54(bb)	HP Supplies			$9,759							$9,759	$2,400	$12,159	4,072		
6	PD 50.54(bb)	Insurance									$30,117	$30,117	$4,600	$34,617			
6	PD 50.54(bb)	Equipment															
6	PD 50.54(bb)	O & M Budget items															
6	PD 50.54(bb)	Permits & Fees									$65,612	$65,612	$9,800	$75,412			
6	PD 50.54(bb)	Waste Transfer and Loading															
6	PD 50.54(bb)	Energy								$2,541		$2,541	$400	$2,941			
6	PD 50.54(bb)	Spent Fuel Storage Maintenance Supplies															
6	PD 50.54(bb)	Small Tools															
		SUBTOTAL - SPENT FUEL PERIOD DEPENDENT	$368,438		$9,759					$2,541	$95,729	$476,306	$72,400	$548,706	12,607		
		DECOMMISSIONING ACTIVITIES															
5	A Greenfield	Backfill, grade and landscape site		$183,678								$183,678	$43,800	$227,478		1,757	
		SUBTOTAL - DECOMMISSIONING ACTIVITY COSTS:		$183,678								$183,678	$43,800	$227,478		1,757	
		DECOMMISSIONING PERIOD DEPENDENT															
8	PD Greenfield	Utility Staff	$42,029									$42,029	$8,300	$50,329	940		
6	PD Greenfield	DGC Staff	$425,069									$425,069	$63,800	$488,869	4,698		
6	PD Greenfield	Security	$13,941									$13,941	$2,100	$16,041	626		
6	PD Greenfield	HP Supplies															
6	PD Greenfield	Equipment			$119,433							$119,433	$29,900	$149,333			
6	PD Greenfield	Unit 1 Insurance									$42,912	$42,912	$6,400	$49,312			
6	PD Greenfield	Unit 2 Insurance									$42,912	$42,912	$6,400	$49,312			
6	PD Greenfield	O & M Budget items			$179,262							$179,262	$44,800	$224,062			
6	PD Greenfield	Permits & Fees									$30,697	$30,697	$4,600	$35,297			
6	PD Greenfield	Waste Transfer and Loading		$253,238								$253,238	$60,400	$313,638		4,699	
6	PD Greenfield	Energy								$22,402		$22,402	$3,400	$25,802			
6	PD Greenfield	Gevorance	$318,560									$318,560	$47,800	$366,360			
6	PD Greenfield	Small Tools			$8,738							$8,738	$2,200	$10,938			
		SUBTOTAL - DECOMMISSIONING PERIOD DEPENDENT	$799,605	$253,238	$307,454					$22,402	$118,621	$1,499,320	$278,100	$1,777,320	6,264	4,699	
		TOTAL PERIOD 6 - RESTORE SITE COSTS:	$1,167,842	$436,916	$317,212					$24,943	$212,250	$2,159,264	$394,305	$2,553,694	18,871	6,456	
		ACTIVITY															
		UNIT 1															
		Unit 1 Subtotal Greenfield (g):															
		Unit 1 Subtotal 10 CFR 50.54(bb):															
		UNIT 2															
		Unit 2 Subtotal Greenfield (g):															
		Unit 2 Subtotal 10 CFR 50.54(bb):															
		Common															
		Common Subtotal Greenfield (g)		$183,678								$183,678	$43,800	$227,478		1,757	
		Common Subtotal 10 CFR 50.54(bb):															
		PERIOD DEPENDENT															
		UNIT 1															
		Unit 1 Subtotal Greenfield (g):															
		Unit 1 Subtotal 10 CFR 50.54(bb):															
		UNIT 2															
		Unit 2 Subtotal Greenfield (g):															
		Unit 2 Subtotal 10 CFR 50.54(bb):															
		Common															
		Common Subtotal Greenfield (g)	$799,605	$253,238	307,454					$22,402	$118,621	$1,499,320	$278,100	$1,777,320	6,264	4,699	

2015 D. C. Cook
Scenario 1
DECON and Permanent On-Site Dry Storage

	Type		Staff Labor $	Craft Labor $	Equipment & Materials $	Packaging $	Transportation $	Clean Disposal $	Contaminated Disposal $	Energy $	Other $	without Contingency $	Contingency $	with Contingency $	Staff Manhours	Craft Manhours	Craft Manhours
		Common Subtotal 10 CFR 50.54(bb):	$368,339		$9,769					$2,541	$95,729	$476,366	$72,400	$548,766	12,607		
		Unit 1, Unit 2 & Common															
		Total Greenfield (g):	$789,605	$438,916	$307,454					$22,402	$116,621	$1,687,898	$321,900	$2,009,798	6,284	6,459	
		Total 10 CFR 50.54(bb):	$368,339		$9,769					$2,541	$95,729	$476,366	$72,400	$548,766	12,607		
PERIOD 7 - DRY STORAGE COSTS:																	
		SPENT FUEL ACTIVITIES															
7	A 50.54(bb)	Continue to ship fuel to repository															
		SUBTOTAL - SPENT FUEL ACTIVITIES															
		SPENT FUEL PERIOD DEPENDENT															
7	PD 50.54(bb)	Utility Staff	$1,636,027									$1,636,027	$292,900	$1,928,927	29,830		
7	PD 50.54(bb)	Security	$760,002									$760,002	$114,000	$874,002	27,039		
7	PD 50.54(bb)	Insurance									$200,000	$200,000	$20,000	$220,000			
7	PD 50.54(bb)	O & M Budget Items			$1,175,305							$1,175,305	$117,500	$1,292,805			
7	PD 50.54(bb)	Permits & Fees									$435,709	$435,709	$43,600	$479,309			
7	PD 50.54(bb)	Waste Transfer and Loading															
7	PD 50.54(bb)	Energy								$16,675		$16,675	$1,700	$18,575			
7	PD 50.54(bb)	Equipment			$22,178							$22,178	$2,200	$24,378			
7	PD 50.54(bb)	HP Supplies			$56,779							$56,779	$5,900	$64,679			
7	PD 50.54(bb)	Spent Fuel Storage Maintenance Supplies															
7	PD 50.54(bb)	Severance															
7	PD 50.54(bb)	Small Tools															
		SUBTOTAL - SPENT FUEL PERIOD DEPENDENT	$2,446,029		$1,256,322					$16,675	$635,709	$4,354,935	$557,800	$4,912,735	56,679		
		TOTAL PERIOD 7 - DRY STORAGE COSTS:	$2,446,029		$1,256,322					$16,675	$635,709	$4,354,935	$557,800	$4,912,735	56,679		
		ACTIVITY															
		Common															
		Common Subtotal 10 CFR 50.75(c):															
		Common Subtotal 10 CFR 50.54(bb):															
		PERIOD DEPENDENT															
		Common															
		Common Subtotal 10 CFR 50.75(c):															
		Common Subtotal 10 CFR 50.54(bb):	$2,446,029		$1,256,322					$16,675	$635,709	$4,354,935	$557,800	$4,912,735	56,679		
		Unit 1, Unit 2 & Common															
		Total 10 CFR 50.75(c):															
		Total 10 CFR 50.54(bb):	$2,446,029		$1,256,322					$16,675	$635,709	$4,354,935	$557,800	$4,912,735	56,679		
PERIOD 8 - ISFSI REMOVAL COSTS:																	
		SPENT FUEL ACTIVITIES															
				$3,001,256	$109,980			$175,709	$25,681,914			$28,968,859	$10,432,000	$39,400,859		376	54,839
		SUBTOTAL - SPENT FUEL ACTIVITIES		$3,001,256	$109,980			$175,709	$25,681,914			$28,968,859	$10,432,000	$39,400,859		376	54,839
		SPENT FUEL PERIOD DEPENDENT															
8	PD 50.54(bb)	Utility Staff	$3,679,010									$3,679,010	$551,900	$4,230,910			
8	PD 50.54(bb)	DCC Staff	$3,784,123									$3,784,123	$567,000	$4,351,723			
8	PD 50.54(bb)	Security	$1,211,538									$1,211,538	$161,700	$1,393,330			
8	PD 50.54(bb)	HP Supplies			$44,630							$44,630	$11,200	$55,830			
8	PD 50.54(bb)	Insurance									$569,034	$569,034	$85,500	$654,434			
8	PD 50.54(bb)	Equipment			$1,962,711							$1,962,711	$193,300	$2,156,011			
8	PD 50.54(bb)	O & M Budget Items			$900,576							$900,576	$228,600	$1,133,176			
8	PD 50.54(bb)	Permits & Fees									$669,519	$669,519	$130,500	$1,000,319			
8	PD 50.54(bb)	Waste Transfer and Loading		$1,221,960								$1,221,960	$291,200	$1,513,160			
8	PD 50.54(bb)	Energy								$100,929		$100,929	$15,100	$116,029			
8	PD 50.54(bb)	Spent Fuel Storage Maintenance Supplies															
8	PD 50.54(bb)	Severance	$773,659									$773,659	$116,000	$889,659			
8	PD 50.54(bb)	Small Tools			$42,232							$42,232	$10,000	$52,232			
		SUBTOTAL - SPENT FUEL PERIOD DEPENDENT	$9,448,430	$1,221,960	$2,956,149					$100,929	$1,439,752	$15,167,120	$2,384,300	$17,551,420			
		TOTAL PERIOD 8 - ISFSI REMOVAL COSTS:	$9,448,430	$4,223,216	$3,066,129			$175,709	$25,681,914	$100,929	$1,439,752	$44,136,978	$12,816,300	$56,952,278		376	54,839
		ACTIVITY															
		Common															

2016 D.C. Cook
Scenario 1
DECON and Permanent On-Site Dry Storage

Type	Staff Labor $	Craft Labor $	Equipment & Materials $	Packaging $	Transportation $	Clean Disposal $	Contaminated Disposal $	Energy $	Other $	without Contingency $	Contingency $	with Contingency $	Staff Manhours	Craft Manhours	Craft Manhours
Total 10 CFR 50.75(c):															
Common Subtotal Greenfield (g):															
Common Subtotal 50.54 (bb)		$3,001,266	$109,980			$175,700	$25,691,914			$28,968,860	$10,433,000	$39,400,968		375	64,039
PERIOD DEPENDENT.															
Common															
Total 10 CFR 50.75(c):															
Common Subtotal Greenfield (g)															
Common Subtotal 50.54 (bb)	$9,449,430	$1,221,960	$2,956,149					$100,829	$1,439,752	$15,167,120	$2,384,800	$17,551,420			
Unit 1, Unit 2 & Common															
Total 10 CFR 50.75(c):															
Total Greenfield (g):															
Total 50.54(bb)	$9,449,430	$4,223,219	$3,066,129			$175,700	$25,691,914	$100,829	$1,439,752	$44,135,979	$12,816,300	$56,952,279		375	64,039
TOTAL ACTIVITY COSTS:															
UNIT 1															
SUBTOTAL UNIT 1 10 CFR 50.75(C) COSTS FOR PERIODS 1 - 6		$32,037,678	$5,149,773	$613,646	$10,052,293		$86,912,778			$134,266,170	$43,078,200	$177,344,370		5,760	609,519
SUBTOTAL UNIT 1 10 CFR 50.54(bb) COSTS FOR PERIODS 1 - 6															
SUBTOTAL UNIT 1 GREENFIELD COSTS FOR PERIODS 1 - 6		$22,792,903	$5,310,546		$2,183,550	$14,217,631				$44,504,259	$8,652,000	$53,156,259		417,901	
UNIT 2															
SUBTOTAL UNIT 2 10 CFR 50.75(C) COSTS FOR PERIODS 1 - 6	$53,462	$31,861,763	$5,115,231	$506,778	$10,608,544		$86,474,157			$133,617,936	$43,460,800	$177,078,736		5,760	609,065
SUBTOTAL UNIT 2 10 CFR 50.54(bb) COSTS FOR PERIODS 1 - 6															
SUBTOTAL UNIT 2 GREENFIELD COSTS FOR PERIODS 1 - 6		$22,559,905	$5,287,395		$2,107,604	$14,244,022				$44,377,786	$8,627,900	$53,005,686		415,106	
COMMON															
SUBTOTAL COMMON 10 CFR 50.75(C) COSTS FOR PERIODS 1 - 6	$9,731,938	$23,033,607	$3,246,704	$530,435	$3,219,388		$13,336,350			$52,086,360	$13,318,300	$65,414,660	100,106	24,960	163,163
SUBTOTAL COMMON 10 CFR 50.54(bb) COSTS FOR PERIODS 1 - 6	$783,760	$136,688,877	$224,490,000							$361,962,635	$88,824,600	$450,787,436	7,904	33,290	
SUBTOTAL COMMON GREENFIELD COSTS FOR PERIODS 1 - 6		$14,976,787	$10,499,148		$3,144,008	$20,695,232				$49,304,175	$8,961,900	$58,266,075		244,211	
TOTAL PERIOD DEPENDENT COSTS.															
UNIT 1															
SUBTOTAL UNIT 1 10 CFR 50.75(C) COSTS FOR PERIODS 1 - 6	$27,636,563		$734,369					$3,492,101	$3,216,992	$34,072,125	$6,319,400	$40,291,525	191,307		
SUBTOTAL UNIT 1 10 CFR 50.54(bb) COSTS FOR PERIODS 1 - 6															
SUBTOTAL UNIT 1 GREENFIELD COSTS FOR PERIODS 1 - 6															
UNIT 2															
SUBTOTAL UNIT 2 10 CFR 50.75(C) COSTS FOR PERIODS 1 - 6															
SUBTOTAL UNIT 2 10 CFR 50.54(bb) COSTS FOR PERIODS 1 - 6															
SUBTOTAL UNIT 2 GREENFIELD COSTS FOR PERIODS 1 - 6															
COMMON															
SUBTOTAL COMMON 10 CFR 50.75(C) COSTS FOR PERIODS 1 - 6	$222,455,437	$17,782,620	$91,190,076					$26,094,924	$22,249,717	$380,591,373	$67,781,200	$449,372,573	3,414,844		348,072
SUBTOTAL COMMON 10 CFR 50.54(bb) COSTS FOR PERIODS 1 - 6	$39,112,937		$1,489,131					$4,647,038	$24,140,604	$68,289,709	$10,391,500	$78,678,209	1,079,792		
SUBTOTAL COMMON GREENFIELD COSTS FOR PERIODS 1 - 6	$15,018,322	$2,781,013	$6,593,017					$436,698	$1,279,617	$26,198,664	$4,844,200	$31,042,864	158,333	51,604	
ANNUAL SPENT FUEL STORAGE	$2,449,029		$1,258,322					$16,975	$836,709	$4,354,935	$557,800	$4,912,735	59,679		
UNIT 1, UNIT 2 & COMMON.															
GRAND TOTAL ACTIVITY COSTS FOR PERIODS 1-6	$10,568,356	$283,049,681	$268,087,838	$1,650,060	$31,992,416	$49,159,784	$184,723,266			$829,129,318	$216,524,900	$1,036,653,218	109,100	1,146,979	1,188,749
GRAND TOTAL PERIOD DEPENDENT COSTS FOR PERIODS 1-6	$303,193,279	$20,673,532	$100,102,391					$35,350,737	$50,868,928	$510,049,869	$89,336,300	$599,385,169	4,812,276	51,604	348,072
ANNUAL SPENT FUEL STORAGE	$2,449,029		$1,258,322					$16,975	$836,709	$4,354,935	$557,800	$4,912,735	59,679		
GRAND TOTAL	$313,701,635	$303,622,113	$359,190,227	$1,650,059	$31,992,416	$49,159,784	$184,723,266	$35,350,737	$50,868,928	$1,339,177,197	$305,881,300	$1,644,038,497	4,920,377	1,198,482	1,536,818
ISFSI DECONTAMINATION AND REMOVAL	$9,449,430	$4,223,219	$3,066,129			$175,700	$25,691,914	$100,829	$1,439,752	$44,135,979	$12,816,300	$56,952,279		375	64,039
SUBTOTAL UNIT 1 DECON PROGRAM FINANCIAL PLANNING COST FOR 10 CFR 50.75(c):	$27,636,563	$32,037,678	$5,883,142	$613,646	$10,052,293		$86,912,778	$3,492,101	$3,216,992	$169,237,294	$49,999,600	$219,235,894	191,307	5,760	609,519
SUBTOTAL UNIT 1 DECON PROGRAM FINANCIAL PLANNING COST FOR 10 CFR 50.54(bb):															
SUBTOTAL UNIT 1 DECON PROGRAM FINANCIAL PLANNING COST FOR GREENFIELD (g):		$22,792,903	$5,310,546		$2,183,550	$14,217,631				$44,504,259	$8,652,000	$53,156,259		417,901	
SUBTOTAL UNIT 2 DECON PROGRAM FINANCIAL PLANNING COST FOR 10 CFR 50.75(c):	$53,462	$31,861,763	$5,115,231	$506,778	$10,608,544		$86,474,157			$133,617,936	$43,460,800	$177,078,736		5,760	609,065
SUBTOTAL UNIT 2 DECON PROGRAM FINANCIAL PLANNING COST FOR 10 CFR 50.54(bb):															
SUBTOTAL UNIT 2 DECON PROGRAM FINANCIAL PLANNING COST FOR GRENNFIELD (g):		$22,559,905	$5,287,395		$2,107,604	$14,244,022				$44,377,786	$8,627,900	$53,005,686		415,106	
SUBTOTAL COMMON DECON PROGRAM FINANCIAL PLANNING COST FOR 10 CFR 50.75(c):	$232,186,772	$38,926,887	$94,445,859	$530,435	$3,219,388		$13,336,350	$26,094,924	$22,249,717	$432,697,732	$81,099,100	$513,797,232	3,516,040	24,960	500,034
SUBTOTAL COMMON DECON PROGRAM FINANCIAL PLANNING COST FOR 10 CFR 50.54(bb):	$38,896,695	$136,688,877	$225,979,131					$4,647,038	$24,140,604	$430,249,343	$99,216,100	$529,465,443	1,087,696	33,290	
SUBTOTAL COMMON DECON PROGRAM FINANCIAL PLANNING COST FOR GRENNFIELD (g):	$15,018,322	$17,756,800	$17,172,164		$3,144,008	$20,695,232		$436,698	$1,279,617	$75,502,839	$13,796,100	$89,298,939	158,333	295,616	
TOTAL UNIT 1 & 2 DECON PROGRAM FINANCIAL PLANNING COST FOR 10 CFR 50.75(c):	$259,766,817	$103,726,029	$105,444,032	$1,550,859	$24,477,225		$184,723,266	$30,587,063	$25,466,708	$735,542,852	$173,058,600	$908,101,862	3,676,348	36,480	1,518,618
TOTAL UNIT 1 & 2 DECON PROGRAM FINANCIAL PLANNING COST FOR 10 CFR 50.54(bb):	$38,896,695	$136,688,877	$225,979,131					$4,647,038	$24,140,604	$430,249,343	$99,216,100	$529,465,443	1,087,696	33,290	
TOTAL UNIT 1 & 2 DECON PROGRAM FINANCIAL PLANNING COST FOR GRENNFIELD (g):	$15,018,322	$63,305,207	$27,770,064		$7,615,161	$49,155,784		$436,698	$4,279,617	$184,384,882	$31,055,000	$198,470,882	158,333	1,128,722	
GRAND TOTAL	$313,701,835	$303,622,113	$359,190,227	$1,650,859	$31,992,416	$49,159,784	$184,723,266	$35,350,737	$50,868,928	$1,330,177,197	$303,881,300	$1,634,038,497	4,920,377	1,198,482	1,518,618

APPENDIX C

CASH FLOW TABLE

2015 D. C. Cook
Scenario 1 Draft
DECON and Permanent On-Site Dry Storage

Scenario 1 - Yearly costs:

UNIT 1

Year	Labor	Material & Equipment	Packaging, Transportation & Disposal	Energy	Other	Contingency for 10 CFR 50.75(c) and Greenfield	Total for 10 CFR 50.75(c) and Greenfield	10 CFR 50.54(bb) costs with Contingency
2034	$1,598,700	$42,600	$0	$202,200	$186,900	$308,800	$2,339,200	
2035	$8,715,300	$232,400	$0	$1,102,100	$1,018,800	$1,683,600	$12,752,200	
2036	$8,715,300	$232,400	$0	$1,102,100	$1,018,800	$1,683,600	$12,752,200	
2037	$8,622,300	$257,100	$111,900	$1,075,800	$994,500	$1,720,500	$12,782,100	
2038	$5,011,000	$1,272,500	$5,262,900	$0	$0	$3,485,700	$15,052,100	
2039	$11,865,200	$1,456,000	$26,572,600	$0	$0	$12,597,400	$52,491,200	
2040	$11,865,200	$1,456,000	$26,572,600	$0	$0	$12,597,400	$52,491,200	
2041	$11,865,200	$1,456,000	$26,572,600	$0	$0	$12,597,400	$52,491,200	
2042	$5,890,300	$722,800	$13,191,700	$0	$0	$6,253,900	$26,058,700	
2043	$0	$0	$0	$0	$0	$0	$0	
2044	$0	$0	$0	$0	$0	$0	$0	
2045	$1,955,700	$967,500	$3,611,100	$0	$0	$1,126,100	$7,660,400	
2046	$5,467,600	$2,705,000	$10,095,900	$0	$0	$3,148,300	$21,416,800	
2047	$795,200	$393,400	$1,468,300	$0	$0	$457,900	$3,114,800	
2048	$0	$0	$0	$0	$0	$0	$0	
2049	$0	$0	$0	$0	$0	$0	$0	
2050	$0	$0	$0	$0	$0	$0	$0	
	$82,367,000	$11,193,700	$113,479,600	$3,482,200	$3,219,000	$57,660,600	$271,402,100	
					Rounding Allowance:		$52	
							$271,402,152	

UNIT 2

Year	Labor	Material & Equipment	Packaging, Transportation & Disposal	Energy	Other	Contingency for 10 CFR 50.75(c) and Greenfield	Total for 10 CFR 50.75(c) and Greenfield	10 CFR 50.54(bb) costs with Contingency
2034	$0	$0	$0	$0	$0	$0	$0	
2035	$0	$0	$0	$0	$0	$0	$0	
2036	$0	$0	$0	$0	$0	$0	$0	
2037	$115,000	$30,300	$111,900	$0	$0	$77,100	$334,300	
2038	$4,772,100	$1,249,900	$5,140,100	$0	$0	$3,375,400	$14,537,500	
2039	$3,106,600	$626,300	$21,337,500	$0	$0	$8,554,000	$33,624,400	
2040	$3,106,600	$626,300	$21,337,500	$0	$0	$8,554,000	$33,624,400	
2041	$3,106,600	$626,300	$21,337,500	$0	$0	$8,554,000	$33,624,400	
2042	$6,441,400	$769,800	$13,471,900	$0	$0	$6,486,800	$27,169,900	
2043	$9,729,000	$911,200	$5,717,500	$0	$0	$4,448,800	$20,806,500	
2044	$9,729,000	$911,200	$5,717,500	$0	$0	$4,448,800	$20,806,500	
2045	$8,204,800	$1,552,800	$7,283,600	$0	$0	$3,983,600	$21,024,800	
2046	$5,467,600	$2,705,000	$10,095,900	$0	$0	$3,148,300	$21,416,800	
2047	$795,200	$393,400	$1,468,300	$0	$0	$457,900	$3,114,800	
2048	$0	$0	$0	$0	$0	$0	$0	
2049	$0	$0	$0	$0	$0	$0	$0	
2050	$0	$0	$0	$0	$0	$0	$0	
	$54,573,900	$10,402,500	$113,019,200	$0	$0	$52,088,700	$230,084,300	
					Rounding Allowance:		$121	
							$230,084,421	

Common

Year	Labor	Material & Equipment	Packaging, Transportation & Disposal	Energy	Other	Contingency for 10 CFR 50.75(c) and Greenfield	Total for 10 CFR 50.75(c) and Greenfield	10 CFR 50.54(bb) costs with Contingency
2034	$492,200	$0	$0	$0	$0	$73,900	$566,100	$10,049,200
2035	$2,683,100	$0	$0	$0	$0	$402,700	$3,085,800	$54,781,600
2036	$2,683,100	$0	$0	$0	$0	$402,700	$3,085,800	$54,781,600
2037	$4,085,400	$371,300	$0	$100,700	$76,900	$736,200	$5,370,500	$57,146,900
2038	$60,563,500	$15,497,600	$22,700	$4,196,200	$3,217,300	$14,231,200	$97,728,700	$150,968,500
2039	$29,983,900	$13,489,700	$833,400	$3,485,800	$3,019,000	$9,272,900	$60,084,700	$48,110,900
2040	$29,983,900	$13,489,700	$833,400	$3,485,800	$3,019,000	$9,272,900	$60,084,700	$48,110,900
2041	$29,983,900	$13,489,700	$833,400	$3,485,800	$3,019,000	$9,272,900	$60,084,700	$48,110,900
2042	$30,757,000	$11,867,600	$3,080,300	$3,395,200	$2,843,300	$10,035,400	$61,978,800	$28,282,800
2043	$31,519,000	$10,268,500	$5,295,500	$3,305,900	$2,670,100	$10,787,100	$63,846,100	$8,734,900
2044	$31,519,000	$10,268,500	$5,295,500	$3,305,900	$2,670,100	$10,787,100	$63,846,100	$8,734,900
2045	$27,160,700	$10,396,300	$8,476,800	$2,222,000	$1,991,800	$9,872,300	$60,119,900	$6,917,700
2046	$19,334,100	$10,625,800	$14,189,700	$275,600	$773,800	$8,229,500	$53,428,500	$3,654,400
2047	$4,048,500	$1,852,800	$2,063,700	$62,500	$229,100	$1,518,800	$9,775,400	$1,080,300
2048	$0	$0	$0	$0	$0	$0	$0	$0
2049	$0	$0	$0	$0	$0	$0	$0	$0
2050	$0	$0	$0	$0	$0	$0	$0	$0
	$304,797,300	$111,617,700	$40,924,400	$27,321,400	$23,529,400	$94,895,600	$603,085,800	$529,465,500
					Rounding Allowance:		$371	$ 143
							$603,086,171	$529,465,643
	$136,940,900	$21,596,200	$226,498,800	$3,482,200	$3,219,000	$109,749,300	$1,104,572,745	$529,465,643
								$1,634,038,387

Annual Storage Cost	
ISFSI decommissioning Year 1	$4,912,700
ISFSI decommissioning Year 2	$33,123,000
	$23,829,300
	$56,952,300