

Decommissioning Study of the Yankee Rowe Independent Spent Fuel Storage Installation

Prepared for Yankee Atomic Power Company

Knight Cost Engineering Services, LLC
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1.0 INTRODUCTION

The purpose of this study is to identify the costs associated with the decommissioning of the Yankee Rowe (YR) Independent Spent Fuel Storage Installation (ISFSI). This estimate includes only the structures, systems and land within the NRC licensed area. The YR ISFSI is located in the South East portion of the former reactor site. The NAC-MPC fuel storage and transport canister system chosen by YR is licensed by the NRC for both storage and transportation.

There are 16 dry storage casks on the 50 by 180-foot, three-foot-thick concrete pad at the YR ISFSI. Fifteen of the casks contain the 533 spent fuel assemblies and one cask stores sections of the reactor vessel internals that are classified as Greater Than Class C (GTCC) waste. Each vertical concrete cask has a three and a half-inch steel liner surrounded by 21 inches of reinforced concrete. The entire dry storage process -- procuring materials, fabricating the fuel containers, constructing the storage facility and transferring spent fuel was completed in June 2003.

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. This estimate includes all costs incurred to release the property for unrestricted use.

On June 17, 2011, the NRC published a final rule amending its regulations to improve decommissioning planning. The rule will become effective on December 17, 2012 and requires compliance by March 31, 2013. This rule will require licensees to report additional details in their decommissioning cost estimate. To assist in the implementation of the new rule, the NRC issued NUREG-1757, "Consolidated Decommissioning Guidance, Financial Assurance, Recordkeeping and Timeliness."

NUREG-1757 does not apply to licensees under 10CFR Part 50 nor does it eliminate the need to follow Regulatory Guide 1.202 or NUREG-1713. It does provide additional information to support the development of the cost estimate. This cost estimate was prepared in accordance with the guidelines provided in RG 1.202 and NUREG-1713. In addition, it does take into account the guidelines identified in NUREG-1757.

NUREG-1757 specifies that a contingency of 25% is to be included in the estimate. This estimate takes exception to this contingency level for two reasons. First, the estimate is conservative in that the entire storage pad, concrete overpacks and overpack liners are assumed to be disposed of as potentially contaminated. Second, the YR site has recently been successfully decommissioned. Many of the key personnel involved in that project remain at the YR ISFSI. The lessons learned from that project will be incorporated in the YR ISFSI decommissioning. For this reason it is felt that a 10% contingency is adequate to cover unknown and unplanned occurrences.

The total cost including contingency is **\$9.8 million**, \$8.5 million for radiological removal and \$1.3 million for non-radiological removal. Table 2-1 provides a summary of costs. Cost details are provided in Appendix A

**TABLE 2-1
SUMMARY OF COSTS**

	<u>Total Cost</u>	<u>Radiological Removal \$</u>	<u>Non- radiological Removal \$</u>
Grand Total Building	\$9,848,120	\$8,510,833	\$1,337,287
Tax on General Contractor	\$0	\$0	\$0
General Contractor with contingency	\$6,033,612	\$5,214,301	\$819,311

Site Costs with contingency	\$3,814,508	\$3,296,532	\$517,976
General Contractor	\$5,485,102	\$4,740,274	\$744,828
Site Costs	\$3,467,735	\$2,996,847	\$470,888
YR ISFSI	\$8,952,837	\$7,737,121	\$1,215,716
PERIOD DEPENDENT COSTS	\$5,814,531	\$5,024,970	\$789,562
1.1 YR Site Costs	\$3,467,735	\$2,996,847	\$470,888
1.1.1 Project Management	\$1,222,720		
1.1.2 Security Staff	\$889,014		
1.1.3 Fees	\$325,000	\$280,868	\$44,132
1.1.4 Insurance	\$631,000	\$545,316	\$85,684
1.1.5 Legal	\$200,000	\$172,842	\$27,158
1.1.6 Property Taxes	\$200,000	\$172,842	\$27,158
1.2 General Contractor	\$2,346,796	\$2,028,122	\$318,674
1.2.1 Decommissioning General Contractor	\$1,209,290		
1.2.2 Waste Packaging Crew	\$512,621		
1.2.3 Equipment & Materials	\$624,885		
ACTIVITIES	\$3,138,305	\$2,712,151	\$426,154
1.3 Project Engineering	\$21,108	\$18,242	\$2,866
1.3.1 Procedure Development and Review - Offsite	\$10,554		
1.3.2 Preparation of QA and Safety Documents - Offsite (in parallel with 1.2.1)	\$10,554		
1.4 Site Mobilization and General Employee Training (GET)	\$106,669	\$92,184	\$14,485
1.4.1 Site Mobilization	\$27,198		
1.4.2 General Employee Training	\$71,738		
1.4.3 Site Specific Training	\$7,733		
1.5 Site Preparation - Performed by Staff	\$14,404	\$12,448	\$1,956
1.5.1 Initial Site Survey			
1.5.2 Setup work areas			
1.5.3 Decontamination Readiness Review			
1.6 Disconnect all utilities to work areas.	\$7,202	\$6,224	\$978
1.6.1 Electrical	\$3,601		
1.6.2 Ventilation	\$1,800		
1.6.3 Piping	\$1,800		
1.7 Removal inside security fence	\$2,596,684	\$2,535,505	\$61,179
1.7.1 Remove Guard Posts	\$3,305		\$3,305
1.7.2 Instrument Enclosure	\$8,375	\$0	\$8,375
1.7.3 Remove VCCs	\$1,208,823	\$1,208,823	\$0
1.7.3.1 Exterior Concrete	\$612,010	\$0	\$0
1.7.3.2 Steel liner	\$596,812		
1.7.4 Remove Concrete Pad	\$1,326,683	\$1,326,683	
1.7.5 Remove Fence and Towers	\$39,399		\$39,399
1.7.6 Remove Light Towers	\$10,100		\$10,100
1.8 Removal outside security fence	\$334,315		\$334,315

1.8.1	Remove Nuisance Fence	\$70,485		\$70,485
1.8.2	Retaining Wall	\$46,334		\$46,334
1.8.3	Conduit and wire - Instrument Enclosure to Utility Pole	\$23,208		\$23,208
1.8.4	Remove road inside licensed area	\$190,915		\$190,915
1.8.5	Remove vehicle barriers	\$3,373		\$3,373
1.8.10	Miscellaneous			
	Final Site Survey Structure gone - By DGC			
1.9	Staff	\$25,000	\$21,605	\$3,395
1.9.1	Prepare Final Status Survey Plan			
1.9.2	Soil Sampling			
1.9.3	Direct Survey			
1.9.4	Sampling Analysis			
1.9.5	Prepare Final Status Survey Report			
1.1	Orise Site Release Confirmation			
1.11	Outside areas	\$2,904		\$2,904
1.11.1	Backfill, grade and seed	\$2,904		\$2,904
1.12	Demolition Crew Demobilization	\$19,465	\$16,822	\$2,643
1.13	Final Project Report - Offsite	\$10,554	\$9,121	\$1,433

3.0 DECOMMISSIONING COST ESTIMATING APPROACH

Two types of costs were determined in this estimate: activity costs and level of effort costs. The activity costs were developed utilizing a unit cost factor approach. Site material quantities for concrete, steel and equipment were developed from site specific drawings. Productivity factors were applied to these quantities to determine activity durations. Labor crews were developed and applied to the material quantities to determine labor costs and person-hours. The activity durations were used to develop a project schedule.

The level of effort costs such as equipment rental and the General Contractor (GC) staff were developed based on the project schedule duration. A rental equipment file was developed for the construction effort. The GC staff is assumed to be on-site for the duration of the project. The Oversight staff cost is another level of effort cost that is included in the cost estimate.

Bulk removal of the storage pad and concrete storage casks is assumed to be performed using an excavator with a hydraulic hammer attachment. The steel liner will be segmented utilizing torch cutters. All of this waste will be trucked off-site for 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 mechanical means and disposed of at a local landfill.

In addition to the removal labor there is a dedicated waste packaging crew included in this estimate. This crew will consolidate, package and prepare containers for transportation. The waste packaging is estimated to remain on site for the duration of the project. This crew consists of 2 laborers; 1 Health Physics Technician; 1 Equipment Operator and 1 Foreman.

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** were developed from actual plant listings.
2. **Concrete volumes** were developed from plant drawings.
3. **The oversight staff** is assumed to be the similar size and configuration as it is currently.
4. **The oversight staff positions and costs** were supplied by the Company and represent July, 2012 salary and benefit data.
5. **Subcontractor base labor rates and fringe benefits** were taken directly from the 2012 R. S. Means Heavy Construction Cost Data and adjusted to Massachusetts based on the City Cost Indexes for Pittsfield, MA.
6. **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.
7. All **skilled laborers** will be supplied locally and hired by the Decommissioning General Contractor (DGC).
8. The cost for **Utility personnel** assisting the DGC to develop decommissioning activity specifications is included in the Utility Staff costs.
9. **The separate DGC staff salaries**, including overhead and profit, were determined by KCES.
10. **Transportation** costs are based on actual mileage from YR to Memphis, TN processing facility utilized in the estimate.
11. **The ISFSI Concrete Pad, VCC exterior concrete and VCC liner steel** are assumed to be Class A waste. This waste will be disposed of at the Studsvik processing facility in Tennessee. A disposal rate of \$0.13 per pound has been used in this estimate and is based on information provided by Studsvik.
12. **The following buildings are disposed of as Clean waste** in local landfill. A disposal rate of \$91.80 per ton has been used in this estimate and is based on information provided in the 2012 R. S. Means Building Construction Cost Data.

Guard Posts
Instrument Enclosure

Security Fence
Light Towers
Nuisance Fence
Retaining Wall
Conduit and wire - Instrument Enclosure to Utility Pole
Road inside licensed area
Vehicle barrier

13. **All costs** used in these calculations were current on July, 2012.
14. 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.
15. It is assumed that all **MPCs containing both spent fuel and GTCC will have been removed from site** prior to the start of decommissioning.
16. **Property taxes** are included in the estimate at the current cost of \$200,000 per year.
17. **Fees** are included in the estimate at the current cost of \$325,000 per year.
18. **Insurance** costs are included in the estimate at the current cost of \$631,000 per year.
19. **Legal** costs are included in the estimate at the current cost of \$200,000 per year.
20. The decommissioning will be performed under the **current regulations**.
21. Removal of the pad and concrete overpacks will be performed in Tyvek coveralls. **Productivity rates** have been adjusted to account for this.
22. No **subsurface material** is assumed to require remediation regarding radionuclides. This assumption is justified because: 1) the ISFSI area was confirmed to be clean of radiological contaminants prior to the construction of the ISFSI; 2) the ISFSI area will be maintained clean of loose radiological contaminants during the storage period; 3) the irradiated fuel and GTCC waste are stored in sealed canisters; 4) nuclear activation of the VCCs, VCCs liners, and ISFSI pad are anticipated; the activation products will remain fixed during the storage period; and 5) if contamination of subsurface material occurs during decommissioning activities, the contamination is expected to remain below the decommissioning criteria of 25 millirem per year Total Effective Dose Equivalent.

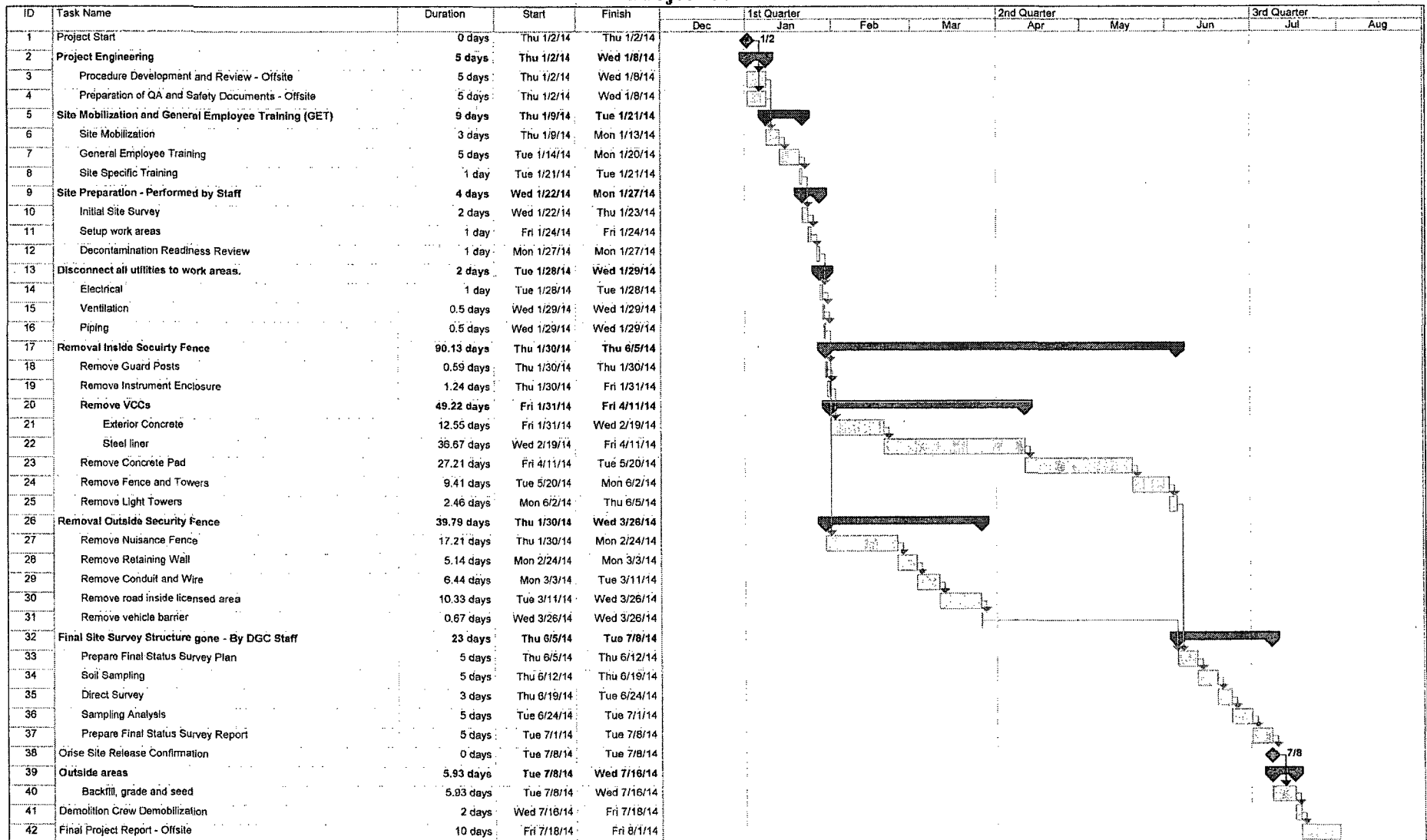
5.0 SCHEDULE

A scenario-specific schedule has been developed for estimate.

Activity durations were determined based on the unit cost factor approach. Plant material inventory quantities were developed from site specific material. Unit rates for cost, man hours and schedule hours were applied to the material quantities. From this calculation the removal or decontamination cost, total man hours and total schedule hours were determined for an activity. The schedule hours are then entered into the schedule to determine project duration. Two work crews are assumed for the concrete pad and concrete overpacks. All other work was assumed to be performed by one crew. Work outside of the security fence will be performed in parallel with the work inside the fence. The total project duration is 6.96 months.

Figure 5-1 provides the detailed decommissioning schedule.

Figure 5-1
Project Schedule



6.0 PROJECT MANAGEMENT

There are three components to project management during decommissioning, Oversight Staff (staff), Decommissioning General Contractor Staff (DGC) and Security. The person levels for each are identified below.

6.1 OVERSIGHT STAFF

The staff size is currently at a level of 18 and is assumed to be maintained at this level and at a similar configuration during the decommissioning. In addition, one final status survey resource will be added and one licensing person will be added to assist in the decommissioning. The staff will provide DGC oversight as well as maintain license compliance. Table 7-1 provides a summary of this staff.

**TABLE 6-1
OVERSIGHT STAFF**

<u>Staff</u>	<u>Number</u>
President	1
Cask Relicensing Project Manager	1
Workers Concerns Manager	1
Business Manager	1
ISFSI Manager	2
ISFSI QA Manager	1
Director Government Relations	1
General Counsel	1
Business Administrator	1
Treasurer	1
Accountant	1
Benefits Manager	1
IT Services	1
ISFSI Operations Specialist	2
Program Manager	1
ISFSI Administrator	1
Licensing Engineer	1
Security Manager	1
	20

6.2 DECOMMISSIONING GENERAL CONTRACTOR

The DGC will be responsible for all of the physical work. The staff will oversee the work crews, schedule work and supply HP support. The DGC will be responsible for finishing the project on time and on budget. Table 7-2 provides a summary of the DGC staff.

TABLE 6-2
DGC STAFF

<u>Position</u>	2012 Base <u>Salary</u>	Person <u>Level</u>
Project Superintendent	\$148,000	1.00
QA Auditor/Inspector	\$70,000	1.00
Health & Safety Supervisor	\$117,000	1.00
Packaging/Shipping Specialist	\$70,000	1.00
Cost Control Accountant	\$55,000	1.00
Scheduler II	\$60,000	1.00
Demolition Specialist	\$86,000	1.00
Industrial Safety	\$86,000	1.00
Engineering Supervisor	\$117,000	1.00
Project Supervisor	\$79,000	1.00
Decontamination Tech	\$55,000	2.00
Instrumentation Tech	\$55,000	1.00
Tool Crib Attendant	\$43,000	<u>1.00</u>
		14.00

6.3 SECURITY

Once spent fuel has been removed from the site the security force will be significantly reduced. This estimate assumes a force of 13 guards and one manager. This will allow a security person level of 5 guards during work time and two guards all other times. The guard force was assumed to consist of various levels of guards and the rate used has been adjusted accordingly.

7.0 References

1. R.S. Means, Inc, *Building Construction Cost Data*, Kingston, Massachusetts, 2012.
2. Regulatory Guide 1.202, "Standard Format and Content of Decommissioning Cost Estimates for Nuclear Power Reactors"
3. NUREG-1713, "Standard Review Plan for Decommissioning Cost Estimates for Nuclear Power Reactors"
4. NUREG-1757, "Consolidated Decommissioning Guidance, Financial Assurance, Recordkeeping and Timeliness"

APPENDIX A

Yankee Rowe ISFSI Decommissioning Cost Estimate Details

	Order	Unrecorded Duration (Days/Week)	Final Factor	Adjusted Duration	Man-hours	L&A Waste Disposal Vol (cu)	Hazardous Waste Vol (cu)	Ballast Volume (cu)	Insul Waste Vol (cu)	Clean Waste Volume (cu)	Lead Waste Volume (cu)	Activated Waste Volume (cu)	Materials, Consumables, & Equipment	Labor Cost	L&A Waste Cost	Hazardous Waste Cost	Mixed Waste Cost	Clean Waste Cost	Lead Waste Cost	Activated Waste Cost	Total Cost	88.42% Radiological Removal \$	13.03% Non-radiological Removal \$	
Grand Total Building																					\$9,848,120	\$8,810,899	\$1,537,267	
Contingency =																					\$986,294			
Tax on General Contractor	0.60%													\$0	\$0	\$0			\$0		\$0	\$0	\$0	
General Contractor with contingency	16.90%													\$763,251	\$2,949,107	\$2,114,922		\$209,591			\$8,033,612	\$8,214,361	\$819,311	
Site Costs with contingency														\$1,491,800	\$2,322,908	\$0		\$0			\$3,814,508	\$3,296,532	\$517,976	
General Contractor					34,564	34,427				548,352				\$893,894	\$2,618,200	\$1,822,857		\$190,301			\$5,485,102	\$4,740,274	\$744,828	
Site Costs					39,789	0								\$1,399,000	\$2,111,735	\$0		\$0			\$3,467,735	\$2,999,847	\$470,888	
YR 18P8					74,473	64,427				548,352				\$2,043,984	\$4,780,614	\$1,822,857		\$190,301			\$8,862,827	\$7,737,121	\$1,216,716	
PERIOD DEPENDENT COSTS					61,439									\$1,980,685	\$3,833,648	\$0		\$0			\$5,814,531	\$5,024,870	\$789,582	
1.1 YR Site Costs					39,789									\$1,399,000	\$2,111,735						\$3,467,735	\$2,999,847	\$470,888	
Project duration =	211.00 150.71	days/days/week =	30.14	6.98	months																			
Labor cost =	4,790,014	(Used to determine small local costs and HP Statistics)																						
1.1.1 Project Management					24,114										\$1,232,720							\$1,222,720		
Staff	Number	Rate	Duration, days*	Use Factor	Cost	Man-hours	FTEs																	
Principal	1	\$80.53	150.71	100.00%	\$97,095	1,205.71	1																	
Chief Radiological Protocol Manager	1	\$28.17	150.71	100.00%	\$35,187	1,205.71	1																	
Workers Concerns Manager	1	\$11.54	150.71	100.00%	\$13,812	1,205.71	1																	
Business Manager	1	\$20.67	150.71	100.00%	\$32,155	1,205.71	1																	
ISPS Manager (includes add. LM)	2	\$101.69	150.71	100.00%	\$246,309	2,411.43	2																	
ISFSI QA Manager	1	\$8.95	150.71	100.00%	\$10,434	1,205.71	1																	
Director Government Relations	1	\$40.13	150.71	100.00%	\$48,382	1,205.71	1																	
General Counsel	1	\$28.64	150.71	100.00%	\$35,916	1,205.71	1																	
Business Administrator	1	\$24.25	150.71	100.00%	\$29,357	1,205.71	1																	
Treasurer	1	\$43.75	150.71	100.00%	\$52,750	1,205.71	1																	
Accountant	1	\$65.47	150.71	100.00%	\$82,500	1,205.71	1																	
Benefits Manager	1	\$13.85	150.71	100.00%	\$16,899	1,205.71	1																	
IT Services	1	\$72.12	150.71	100.00%	\$88,851	1,205.71	1																	
ISFSI Operations Specialist (includes 1 FFS Man	1	\$51.08	150.71	100.00%	\$76,826	2,411.43	2																	
Program Manager	1	\$59.04	150.71	100.00%	\$71,164	1,205.71	1																	
ISFSI Administrator	1	\$42.28	150.71	100.00%	\$50,941	1,205.71	1																	
Licensing Engineer	1	\$49.60	150.71	100.00%	\$59,683	1,205.71	1																	
Geology Manager	1	\$52.52	150.71	100.00%	\$63,859	1,205.71	1																	
	20				\$1,222,720	24,114.29	20.00																	
1.1.2 Security Staff															\$889,014							\$889,014		
Project duration =	211.00	days/days/week =	30.14	weeks	6.93	Months																		
Staff	Number	Rate	Duration, weeks	Use Factor	Cost	Man-hours																		
Security Guards - blended rate	13	\$42.42	30.14	100.00%	\$584,861	15,974.29																		
			Duration, Months	Use Factor	Cost																			
Medical		\$/month	6.93	30.00%	\$54,745																			
Dental	1	\$1,433.00	6.93	30.00%	\$3,901																			
401(k)	1	\$25,468.00	6.93	30.00%	\$82,969																			
Arms	1	\$15,000.00	6.93	30.00%	\$31,195																			
Uniforms	13	\$39,590.00	6.93	30.00%	\$82,253																			
					\$889,014	15,974.29																		
1.1.3 Fees	\$325,500.00 per year		1.00	years										\$325,500								\$325,500	\$280,808	\$44,132
1.1.4 Insurance	\$631,200.00 per year		1.00	years										\$631,200								\$631,200	\$545,316	\$85,684
1.1.5 Legal	\$200,000.00 per year		1.00	years										\$200,000								\$200,000	\$172,842	\$27,158
1.1.6 Property Taxes	\$200,000.00 per year		1.00	years										\$200,000								\$200,000	\$172,842	\$27,158
1.2 General Contractor					21,650										\$624,805	\$1,721,811						\$2,346,796	\$2,028,122	\$318,674
1.2.1 Decommissioning General Contractor					14,114										\$1,209,290								\$1,209,290	
Project duration =	190.00 135.71	days/days/week =	27.14	working days																				
Staff	Number	Rate	Duration, days*	Use Factor	Cost	Man-hours																		
Project Superintendent	1	\$133.27	135.71	100.00%	\$144,888	1,085.71																		
QA Auditor/Inspector	1	\$76.45	135.71	100.00%	\$82,596	1,085.71																		
Health & Safety Supervisor	1	\$111.30	135.71	100.00%	\$129,837	1,085.71																		
Radioactive/Chemical Specialist	1	\$76.45	135.71	100.00%	\$82,596	1,085.71																		
Cost Control Accountant	1	\$65.24	135.71	100.00%	\$70,829	1,085.71																		
Schedule E	1	\$68.97	135.71	100.00%	\$74,885	1,085.71																		
Decommission Specialist	1	\$39.40	135.71	100.00%	\$53,640	1,085.71																		
Industrial Safety	1	\$68.40	135.71	100.00%	\$85,980	1,085.71																		
Environmental Supervisor	1	\$111.30	135.71	100.00%	\$129,837	1,085.71																		
Project Supervisor	1	\$83.17	135.71	100.00%	\$90,390	1,085.71																		
Decontamination Tech	1	\$69.37	135.71	100.00%	\$97,036	1,085.71																		
Instrumentation Tech	1	\$69.24	135.71	100.00%	\$70,829	1,085.71																		
Tool Crib Attendant	1	\$59.27	135.71	100.00%	\$61,093	1,085.71																		
	13				\$1,209,290	14,114.29																		
1.2.2 Waste Packaging Crew					7,536										\$512,621								\$512,621	
Project duration =	190.00 135.71	days/days/week =	27.14	working days																				
Staff	Number	Rate	Duration, days	Use Factor	Cost	Man-hours																		
Laborers	1	\$68.24	150.71	100.00%	\$159,869	3,014.29																		
H.P. Tech.	1	\$51.00	150.71	100.00%	\$78,954	1,507.14																		
Lead Oper.	1	\$68.00	150.71	100.00%	\$130,070	1,507.14																		
Foreman	1	\$70.15	150.71	100.00%	\$106,122	1,507.14																		
	6				\$512,621	7,536.71																		
1.2.3 Equipment & Materials															\$624,885								\$624,885	
Equipment	Quantity	Rate	Cost																					
Rayonair	10	\$321	\$3,210																					
Reinforcing Bars	3	\$1,309	\$3,927																					
Powercutting chipping hammer	2	\$1,280	\$2,560																					
Chipping hammer blades	20	\$25	\$508																					
Pneumatic air compressor	2	\$1,368	\$2,736																					
Airhammer	2	\$1,233	\$2,466																					

Yankee Rowe ISFSI Decommissioning Cost Estimate Details

		Unexcavated Duration (No. of Hours)	Excav. Factor	Adjusted Duration	Man-hours	LSA Waste Disp. Vol (cu ft)	Removal Waste Vol (cu ft)	Ballast Volume (cu ft)	Mixed Waste Volume (cu ft)	Clean Waste Volume (cu ft)	Lead Waste Volume (cu ft)	Activated Waste Volume (cu ft)	Materials, Components, & Equipment	Labor Cost	LSA Waste Cost	Removal Waste Cost	Mixed Waste Cost	Clean Waste Cost	Lead Waste Cost	Activated Waste Cost	Total Cost	89.42% Radioisotopic Removal \$	10.58% Non-radioisotopic Removal \$	
Jackhammer Chisel	20	\$30		\$600																				
Safety glasses	100	\$12		\$1,198																				
Fall protection - harness	3	\$142		\$426																				
Fall protection - lanyard	3	\$116		\$348																				
Hardhat	20	\$43		\$1,278																				
Hard hat hearing protection	20	\$40		\$1,200																				
Trailer rental	2	\$840		\$11,684																				
Portable toilet	3	\$180		\$3,744																				
Trench Rental	2	\$280		\$871																				
Front end loader, wheeled	1	\$17,348		\$30,423																				
Hydraulic hammer for excavator	1	\$9,688		\$40,147																				
Excavator	1	\$25,888		\$108,343																				
Grapple for excavator	1	\$2,250		\$9,726																				
Hydraulic hammer for excavator	1	\$9,688		\$34,721																				
Excavator	1	\$25,888		\$81,004																				
Dump truck operation and hooklift	1	\$20,407		\$84,490																				
Water tank trailer	1	\$3,416		\$14,141																				
One Box DIE 60	1	\$650		\$3,810																				
One Box DIE 60 transport	1	\$3,000		\$3,000																				
Man lift	1	\$2,775		\$11,488																				
				\$487,218																				
Project duration =	128.00	days/days/week =	18.00	weeks	4.14	Months																		
	90.00	working days																						
Consumables	Quantity	Duration	# workers	quantity	Unit Qty	Unit Cost	Cost																	
Coveralls	2 /man/day	90.00 days	8.50	1,630	1	7	10,667																	
Shoe covers	4 /man/day	90.00 days	8.50	3,060	1	2	6,059																	
Lates gloves	4 /man/day	90.00 days	8.50	3,060	1	1	3,872																	
Rubber overboots	0.01 /man/day	90.00 days	8.50	8	1	272	272																	
Gloves	0.5 /man/day	90.00 days	8.50	383	1	2	623																	
Doormats	1 /man/year	0.35 year	27.20	9	1	188	1,831																	
TLGs	1 /man/year	4.14 month	27.20	112	1	280	3,464																	
Bioscience	2 /man/year	0.35 year	27.20	19	1	280	4,673																	
(Bioscience for aver. crew & management)							10,472																	
Small Tools - 2% of total labor costs =			\$4,790,014	labor costs x	2.00%	=	\$95,800																	
OSG OH & P on equipment and materials			\$842,487		8.00%	=	\$51,397																	
ACTIVITIES			2,178		2,178	13,034	64,427	0	0	0	648,352	0	0	\$68,979	\$968,369	\$1,922,657	\$0	\$0	\$190,331	\$0	\$0	\$3,138,306	\$2,712,151	\$426,154
1.3 Project Engineering			80		80	240	0	0	0	0	0	0	0	\$0	\$21,108	\$0	\$0	\$0	\$0	\$0	\$0	\$21,108	\$18,242	\$2,866
1.3.1 Procedure Development and Review - Office			40	1.00	40	120										\$10,554							\$10,554	
Staff	Number	Rate	Duration	PLF	Cost	Man-hours																		
Project Specialist	2	\$81.08	40	1.00	\$6,487	80																		
Project Manager	1	\$101.89	20	1.00	\$2,034	20																		
Certified Health Physicist	1	\$101.89	20	1.00	\$2,034	20																		
	4		40		\$10,554	120																		
1.3.2 Preparation of QA and Safety Documents - Office (in parallel with 1.3.1)			40	1.00	40	120										\$10,554							\$10,554	
Staff	Number	Rate	Duration	PLF	Cost	Man-hours																		
Project Specialist	2	\$81.08	40	1.00	\$6,487	80																		
Project Manager	1	\$101.89	20	1.00	\$2,034	20																		
Certified Health Physicist	1	\$101.89	20	1.00	\$2,034	20																		
	4		40		\$10,554	120																		
1.4 Site Mobilization and General Employee Training (OET)			72	1.00	72	963								\$37,075	\$59,894							\$106,969	\$92,184	\$14,485
1.4.1 Site Mobilization			24		24	312									\$4,008	\$23,196							\$27,198	
Crew		Rate, \$/hr	Cost, \$/hr																					
1 Project Superintendent		\$0.00	With Period Dependent costs																					
1 QA Auditor/Inspector		\$0.00	With Period Dependent costs																					
1 Health & Safety Supervisor		\$0.00	With Period Dependent costs																					
1 Practitioner/Student Specialist		\$0.00	With Period Dependent costs																					
1 Cost Control Accountant		\$0.00	With Period Dependent costs																					
1 Scheduler II		\$0.00	With Period Dependent costs																					
1 Demolition Specialist		\$0.00	With Period Dependent costs																					
1 Industrial Safety		\$0.00	With Period Dependent costs																					
1 Engineering Supervisor		\$0.00	With Period Dependent costs																					
1 Project Supervisor		\$0.00	With Period Dependent costs																					
2 Decontamination Tech		\$0.00	With Period Dependent costs																					
1 Instrumentation Tech		\$0.00	With Period Dependent costs																					
1 Tool Crib Attendant		\$0.00	With Period Dependent costs																					
2 Extra Crew		\$86.30	\$172.60																					
7 Laborer		\$96.34	\$644.37																					
2 Foreman		\$70.16	\$140.29																					
2 Craftsman		\$84.99	\$169.98																					
	27		\$866.58																					
Travel to site	6	hr																						
Repack of material and equipment	4	hr																						
Staging of equipment	4	hr																						
Set up office and amenities	4	hr																						
Familiarize staff with facility	4	hr																						
	24	hr																						
Labor Cost =	24	x	\$966.58		\$23,188.01																			

Yankee Rowe ISFSI Decommissioning Cost Estimate Details

[illegible]

Yankee Rowe ISFSI Decommissioning Cost Estimate Details

						Creek	Uncontaminated Duration (Qty. of Hours)	Prol. Factor	Adjusted Duration	Mech-hours	L&A Waste Dmp./Vol.(cu.ft.)	Hazardous Waste Vol.(cu.ft.)	Bullet Volume (cu.ft.)	Mixed Waste Volume (cu.ft.)	Clean Waste Volume (cu.ft.)	Lead Waste Volume (cu.ft.)	Activated Waste Volume (cu.ft.)	Materials, Consumables, & Equipment	Labor Cost	L&A Waste Cost	Hazardous Waste Cost	Mixed Waste Cost	Clean Waste Cost	Lead Waste Cost	Activated Waste Cost	Total Cost	86.42% Radiological Removal \$	13.58% Non-radiological Removal \$		
	Inventory	Number	Length, ft.	Area, sq. ft.	Volume, cu. Ft.	Weight, Lbs			factor	Volume, cu. ft.	bows			PLF																
	Clean Fence		620			\$16.67			0.00%	517	1	448	1/day	1.00	9.38	2012 RS Means 02 41 13.00 1700														
	Clean Poles	66				29.74			0.00%	30	0	0.00	hrs/wk	1.00	33.00	Estimated														
	Clean Foothills	66				155.43	23,314.50		0.00%	155	0	0.00	hrs/wk	1.00	33.00	Estimated														
										702	1				75.29															
	Waste Clean Contaminated	Weight, lbs	Volume	No. of containers	Container, \$	Transport, \$	Disposal, \$	Total, \$																						
			751.84	0.00	0.00	\$0.00	\$238.28	1,479.00																						
1.7.6	Remove Light Towers			A	20	1.00	19.86	138	0						105				\$0.850	\$0				\$260			\$10,109		\$10,100	
	Inventory	Number	Length, ft.	Area, sq. ft.	Volume, cu. Ft.	Weight, Lbs		Vol. Reduc. factor	Adjusted Volume, cu. ft.	# of boxes				PLF																
	Clean Ground Cable		1,220			1.41		0.00%	1	0	2200.00	L/F/day	1.00	0.55	2012 RS Means, p. 535 26 05 05 10 1940															
	Clean Excavate buried pipe					1,800		0.00%	0	0	700	cu. yd./day	1.00	2.67	2012 RS Means 31 23 16 13 0060															
	Clean Backfill					1,800		0.00%	0	0	1,225	cu. yd./day	1.00	0.44	2012 RS Means 31 23 23.14 3020															
	Clean IR tower	4				28.19		0.00%	28	0	2.00	hrs/wk	1.00	8.00	Estimated															
	Clean Tower base	4				75.36	11,304.00	0.00%	75	0	2.00	hrs/wk	1.00	8.00	Estimated															
									105	0				19.86																
	Waste Clean Contaminated	Weight, lbs	Volume	No. of containers	Container, \$	Transport, \$	Disposal, \$	Total, \$																						
			104.99	0.00	0.00	\$0.00	\$35.63	\$214.11	250.00																					
1.8	Remove outside security fence			A	318	1.00	318	2,047	0		0	0	0	\$48,181	0	0	\$0	\$150,276	\$0	\$0	\$0	\$184,636	\$0	\$0	\$334,315		\$334,316			
				A	138	1.00	137.87	964	0					623				\$88,987	\$0				\$1,497			\$70,495		\$70,495		
1.8.1	Remove Nuisance Fence																													
	Inventory	Number	Length, ft.	Area, sq. ft.	Volume, cu. Ft.	Weight, Lbs		Vol. Reduc. factor	Adjusted Volume, cu. ft.	# of boxes				PLF																
	Clean Fence		1,235			310.00		0.00%	310	0	446	1/day	1.00	5.67	2012 RS Means 02 41 13 00 1700															
	Clean Ground Cable		1,545			1.75		0.00%	2	0	2200.00	L/F/day	1.00	0.70	2012 RS Means, p. 535 26 05 05 10 1940															
	Clean Excavate buried pipe					3,708		0.00%	0	0	700	cu. yd./day	1.00	5.49	2012 RS Means 31 23 16 13 0060															
	Clean Backfill					3,708		0.00%	0	0	1,225	cu. yd./day	1.00	0.90	2012 RS Means 31 23 23.14 3020															
	Clean Poles	125				23.06		0.00%	23	0	0.50	hrs/wk	1.00	82.50	Estimated															
	Clean Foothills	125				284.38	44,159.25	0.00%	284	0	0.50	hrs/wk	1.00	82.50	Estimated															
									629	1				137.87																
	Waste Clean Contaminated	Weight, lbs	Volume	No. of containers	Container, \$	Transport, \$	Disposal, \$	Total, \$																						
			629.22	0.00	0.00	\$0.00	\$213.62	\$1,283.61	1,497.00																					
1.8.2	Retaining Wall			B	41	1.00	41.09	247	0					520,000				\$18,494	\$0				\$27,840			\$46,334		\$46,334		
	Inventory	Number	Length, ft.	Area, sq. ft.	Volume, cu. Ft.	Weight, Lbs		Vol. Reduc. factor	Adjusted Volume, cu. ft.	# of boxes				PLF																
	Clean Wall	1				2080.00		-30.00%	2,704	9	25.00	cu. yd./day	1	24.86	Use 2012 Means sec 50, 02 41 13.33 4320, 25 c. y. per day. This rate is for a slab on grade using hand tools, use the same rate for this work with hydraulic equipment.															
	Clean Footings	1				1398.67	209,000.00	-30.00%	1,803	8	25.00	cu. yd./day	1	18.43	Use 2012 Means sec 60, 02 41 13.33 4320, 25 c. y. per day. This rate is for a slab on grade using hand tools, use the same rate for this work with hydraulic equipment.															
									4,507	14				41.09																
	Waste Clean Contaminated	Weight, lbs	Volume	No. of containers	Container, \$	Transport, \$	Disposal, \$	Total, \$																						
			4,596.67	0.00	0.00	\$0.00	\$3,972.22	\$23,868.00	27,840.00																					
1.8.3	Control and valve - Instrument Enclosure to Utility Pole			B	51	1.00	51.49	309	0					14				\$23,175	\$0				\$33			\$23,208		\$23,208		
	Inventory	Feet	Number	Area, sq. ft.	Volume, cu. Ft.	Weight, Lbs		Vol. Reduc. factor	Adjusted Volume, cu. ft.	# of boxes				PLF																
	Clean Excavate buried pipe					630		0.00%	0	0	200	cu. yd./day	1.00	0.93	2012 RS Means 31 23 16 13 0090															
	Clean Buried pipe, clean Backfill		630			14		0.00%	14	0	100	L. F/day	1.00	50.4	2012 mean p-483, 22 08 5.10 2100															
						630		0.00%	0	0	1,225	cu. yd./day	1.00	0.15	2012 RS Means 31 23 23.14 3020															
									14	0				51.49																
	Waste Clean Contaminated	Weight, lbs	Volume	No. of containers	Container, \$	Transport, \$	Disposal, \$	Total, \$																						
			13,74	0.00	0.00	\$0.00	\$4.86	\$28.02	33.00																					
1.8.4	Remove road inside licensed area			B	63	1.00	62.67	498	0					25,389				\$37,210	\$0				\$153,705			\$190,915		\$190,915		
	Inventory	Number	Length, ft.	Area, sq. ft.	Volume, cu. Ft.	Weight, Lbs		Vol. Reduc. factor	Adjusted Volume, cu. ft.	# of boxes				PLF																
	Clean Pavement					2,870,910	39,060	-30.00%	25,389	80	420	S.Y./day	1.00	62.67	2012 RS Means 02 41 13.17 6050															
									25,389	80				62.67																
	Waste Clean Contaminated	Weight, lbs	Volume	No. of containers	Container, \$	Transport, \$	Disposal, \$	Total, \$																						
			25,389.00	0.00	0.00	\$0.00	\$21,930.56	\$151,774.77	153,705.00																					
1.8.5	Remove vehicle barriers			B	5	1.00	5.39	32						140				\$2,412					\$981			\$3,373		\$3,373		
	Inventory	Feet	Number	Area, sq. ft.	Volume, cu. Ft.	Weight, Lbs		Vol. Reduc. factor	Adjusted Volume, cu. ft.	# of boxes				PLF																
	Clean Foundation Gate assembly					114.64		-30.00%	149	0	25.00	cu. yd./day	1	1.38	Use 2012 Means on 50, 02 41 13.33 4320, 25 c. y. per day. This rate is for a slab on grade using hand tools, use the same rate for this work with hydraulic equipment.															
						762.00		0.00%	0	0	4.00	hrs	1.00	4.00	estimated															
									149	0				5.38																
	Waste Clean Contaminated	Weight, lbs	Volume	No. of containers	Container, \$	Transport, \$	Disposal, \$	Total, \$																						
			17,848.00	0.00	0.00	\$0.00	\$137.10	\$823.81	961.00																					
1.8.10	Miscellaneous																													
1.9	Final Site Survey Structure as per - by DGC Staff						184.00	1.00	184.00	0								\$26,000								\$25,000	\$21,605	\$3,395		
	Inventory	Number	Length, ft.	Area, sq. ft.	Volume, cu. Ft.	Weight, Lbs		Vol. Reduc. factor	Adjusted Volume, cu. ft.	# of boxes				PLF																
1.9.1	Prepare Final Status Survey Plan	45	days =				Work hours		Schedule duration, days																					
							360		5																					
1.9.2	Soil Sampling	5	days =				40		5																					
							hrs		days																					
1.9.3	Direct Survey	3	days =				24		3																					
							hrs		days																					
1.9.4	Sampling Analysis	10	days =				0		5																					
							hrs		days - 5 days in parallel to 1.16.2 & 1.16.3																					

Yankee Rowe ISFSI Decommissioning Cost Estimate Details

[illegible]

ENCLOSURE 2

CERTIFICATION OF FINANCIAL ASSURANCE

CERTIFICATION OF FINANCIAL ASSURANCE

NRC Licensee:

Yankee Atomic Electric Company
Yankee Rowe Independent Spent Fuel Storage Installation
NRC License No. DPR-3 (NRC Docket Nos. 50-029 and 72-31)
49 Yankee Road
Rowe, MA 01367

Issued to: U.S. Nuclear Regulatory Commission

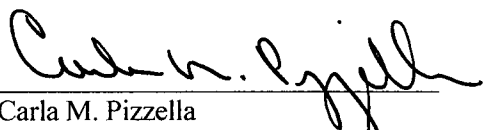
Certification:

I hereby certify that Yankee Atomic Electric Company (YAEC) is the licensee for the Yankee Rowe Independent Spent Fuel Storage Installation (Yankee Rowe ISFSI) and that I, the undersigned, am authorized to provide this Certification of Financial Assurance with respect to the radiological decommissioning of the Yankee Rowe ISFSI.

During the operation of this ISFSI, spent nuclear fuel and Greater than Class C waste will be stored at the Yankee Rowe ISFSI in storage casks licensed under 10 CFR 72. Pursuant to contracts with the Department of Energy the spent fuel and associated casks will ultimately be removed from the ISFSI location, and YAEC will dispose of other radiological waste in accordance with NRC regulations, at which time the Yankee Rowe ISFSI will be decommissioned in accordance with NRC regulations.

I further certify that financial assurance in an amount sufficient to fund Yankee Rowe ISFSI radiological decommissioning at the time of such decommissioning has been provided, pursuant to 10 CFR 72.30, as described in the letter to which this Certification is attached. That radiological decommissioning funding assurance is premised on a site-specific decommissioning cost estimate and funding methodology described therein, in the amount of:

Yankee Rowe ISFSI \$ 8.5 million (inclusive of contingency)



Carla M. Pizzella
Yankee Atomic Electric Company
Vice President, Chief Financial Officer, and Treasurer
Phone (860) 267-6426 x304

Corporate Seal

Date 12/17/12

ENCLOSURE 3

TOTAL COSTS ASSOCIATED WITH THE YANKEE ROWE ISFSI, INCLUDING COST ESTIMATE
FOR MANAGING IRRADIATED FUEL AND GTCC WASTE

Yankee Atomic Electric Company
Irradiated Fuel & GTCC Waste Management and ISFSI Decom Estimate
Represented in 2013 Dollars

	Data										
FERC Summary	Sum of 2013	Sum of 2014	Sum of 2015	Sum of 2016	Sum of 2017	Sum of 2018	Sum of 2019	Sum of 2020	Sum of 2021	Sum of 2022	2013 - 2022
Contingency	\$357,690	\$343,148	\$353,128	\$375,690	\$375,315	\$325,315	\$727,380	\$747,630	\$0	\$514,798	\$4,120,094
Insurance	\$431,000	\$537,667	\$431,000	\$431,000	\$431,000	\$431,000	\$431,000	\$431,000	\$0	\$1,054,000	\$4,608,667
Labor - Non-Manual	\$1,600,750	\$1,600,750	\$1,600,750	\$1,600,750	\$1,600,750	\$1,600,750	\$1,600,750	\$1,620,750	\$0	\$1,024,750	\$13,850,750
Labor - Security	\$2,380,000	\$2,380,000	\$2,380,000	\$2,380,000	\$2,380,000	\$2,380,000	\$2,380,000	\$2,380,000	\$0	\$0	\$19,040,000
Materials & Supplies	\$75,000	\$75,000	\$75,000	\$75,000	\$75,000	\$75,000	\$75,000	\$75,000	\$0	\$20,000	\$620,000
Miscellaneous	\$80,950	\$80,950	\$80,950	\$80,950	\$80,950	\$80,950	\$80,950	\$80,950	\$0	\$38,700	\$686,300
Outside Services - A&G	\$528,100	\$720,600	\$776,850	\$1,478,100	\$1,470,600	\$470,600	\$478,100	\$470,600	\$0	\$577,530	\$6,971,080
Outside Services - Fuel Loading	\$0	\$0	\$0	\$0	\$0	\$0	\$260,000	\$700,000	\$0	\$0	\$960,000
Outside Services - ISFSI OP's	\$438,000	\$548,000	\$548,000	\$548,000	\$548,000	\$548,000	\$548,000	\$548,000	\$0	\$75,000	\$4,349,000
Outside Services - Legal	\$900,000	\$200,000	\$450,000	\$200,000	\$200,000	\$200,000	\$700,000	\$450,000	\$0	\$1,600,000	\$4,900,000
Outside Services - NON-RAD D&D of ISFSI	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$1,370,719	\$0	\$1,370,719
Outside Services - RAD D&D of ISFSI	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$8,723,604	\$0	\$8,723,604
Property Taxes	\$260,000	\$260,000	\$260,000	\$260,000	\$260,000	\$260,000	\$260,000	\$260,000	\$0	\$100,000	\$2,180,000
Regulatory Fees	\$390,000	\$390,000	\$390,000	\$390,000	\$390,000	\$390,000	\$390,000	\$390,000	\$0	\$598,000	\$3,718,000
Utilities	\$70,000	\$70,000	\$70,000	\$70,000	\$70,000	\$70,000	\$70,000	\$70,000	\$0	\$60,000	\$620,000
Grand Total	\$7,511,490	\$7,206,115	\$7,415,678	\$7,889,490	\$7,881,615	\$6,831,615	\$8,001,180	\$8,223,930	\$10,094,323	\$5,662,778	\$76,718,214

Note 1: The cost of management of irradiated fuel and GTCC waste is calculated as follows:

\$76,718,214 Grand Total from Above
 (\$1,370,719) Non-Rad D&D ISFSI
(\$8,723,604) Rad D&D ISFSI
\$66,623,891 Management of Irradiated Fuel and GTCC Waste

Note 2: The cost of RAD and NON-RAD D&D of the ISFSI in 2013 dollars as provided in the column labeled "Sum of 2021" is derived by escalating the value of the cost estimates provided in Enclosure 1 by 2.5%.