

**Monticello Nuclear Generating Plant  
Decommissioning Cost Analysis****Document X01-1775-002, Rev. 0  
Appendix B, Page 3 of 7****APPENDIX B****UNIT COST FACTOR LISTING  
(Power Block Structures Only)**

<b>Unit Cost Factor</b>	<b>Cost/Unit</b>
Removal of clean electrical equipment, <300 pound	179.21
Removal of clean electrical equipment, 300-1000 pound	621.10
Removal of clean electrical equipment, 1000-10,000 pound	1,242.20
Removal of clean electrical equipment, >10,000 pound	2,944.57
Removal of clean electrical transformer < 30 tons	2,044.97
Removal of clean electrical transformer > 30 tons	5,889.16
Removal of clean standby diesel generator, <100 kW	2,088.76
Removal of clean standby diesel generator, 100 kW to 1 MW	4,662.25
Removal of clean standby diesel generator, >1 MW	9,651.80
Removal of clean electrical cable tray, \$/linear foot	16.85
Removal of clean electrical conduit, \$/linear foot	7.36
Removal of clean mechanical equipment, <300 pound	179.21
Removal of clean mechanical equipment, 300-1000 pound	621.10
Removal of clean mechanical equipment, 1000-10,000 pound	1,242.20
Removal of clean mechanical equipment, >10,000 pound	2,944.57
Removal of clean HVAC equipment, <300 pound	216.70
Removal of clean HVAC equipment, 300-1000 pound	746.29
Removal of clean HVAC equipment, 1000-10,000 pound	1,487.38
Removal of clean HVAC equipment, >10,000 pound	2,944.57
Removal of clean HVAC ductwork, \$/pound	0.70
Removal of contaminated instrument and sampling tubing, \$/linear foot	1.95
Removal of contaminated pipe 0.25 to 2 inches diameter, \$/linear foot	27.83
Removal of contaminated pipe >2 to 4 inches diameter, \$/linear foot	47.82
Removal of contaminated pipe >4 to 8 inches diameter, \$/linear foot	74.96
Removal of contaminated pipe >8 to 14 inches diameter, \$/linear foot	148.03
Removal of contaminated pipe >14 to 20 inches diameter, \$/linear foot	177.89
Removal of contaminated pipe >20 to 36 inches diameter, \$/linear foot	246.18
Removal of contaminated pipe >36 inches diameter, \$/linear foot	290.94
Removal of contaminated valve >2 to 4 inches	566.42
Removal of contaminated valve >4 to 8 inches	683.47

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<b>Unit Cost Factor</b>	<b>Cost/Unit</b>
Removal of contaminated valve >8 to 14 inches	1,416.07
Removal of contaminated valve >14 to 20 inches	1,800.35
Removal of contaminated valve >20 to 36 inches	2,397.55
Removal of contaminated valve >36 inches	2,845.15
Removal of contaminated pipe hanger for small bore piping	185.78
Removal of contaminated pipe hanger for large bore piping	626.83
Removal of contaminated pump, <300 pound	1,220.05
Removal of contaminated pump, 300-1000 pound	2,838.23
Removal of contaminated pump, 1000-10,000 pound	9,385.29
Removal of contaminated pump, >10,000 pound	22,861.69
Removal of contaminated pump motor, 300-1000 pound	1,207.33
Removal of contaminated pump motor, 1000-10,000 pound	3,818.35
Removal of contaminated pump motor, >10,000 pound	8,572.65
Removal of contaminated heat exchanger <3000 pound	5,648.27
Removal of contaminated heat exchanger >3000 pound	16,376.90
Removal of contaminated feedwater heater/deaerator	40,348.66
Removal of contaminated moisture separator/reheater	88,508.97
Removal of contaminated tank, <300 gallons	2,028.12
Removal of contaminated tank, >300 gallons, \$/square foot	39.80
Removal of contaminated electrical equipment, <300 pound	945.59
Removal of contaminated electrical equipment, 300-1000 pound	2,314.13
Removal of contaminated electrical equipment, 1000-10,000 pound	4,457.30
Removal of contaminated electrical equipment, >10,000 pound	8,759.01
Removal of contaminated electrical cable tray, \$/linear foot	45.76
Removal of contaminated electrical conduit, \$/linear foot	22.38
Removal of contaminated mechanical equipment, <300 pound	1,051.94
Removal of contaminated mechanical equipment, 300-1000 pound	2,555.55
Removal of contaminated mechanical equipment, 1000-10,000 pound	4,914.24
Removal of contaminated mechanical equipment, >10,000 pound	8,759.01
Removal of contaminated HVAC equipment, <300 pound	1,051.94

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<b>Unit Cost Factor</b>	<b>Cost/Unit</b>
Removal of contaminated HVAC equipment, 300-1000 pound	2,555.55
Removal of contaminated HVAC equipment, 1000-10,000 pound	4,914.24
Removal of contaminated HVAC equipment, >10,000 pound	8,759.01
Removal of contaminated HVAC ductwork, \$/pound	2.68
Removal/plasma arc cut of contaminated thin metal components, \$/linear in.	5.11
Additional decontamination of surface by washing, \$/square foot	10.44
Additional decontamination of surfaces by hydrolasing, \$/square foot	45.11
Decontamination rig hook up and flush, \$/ 250 foot length	8,866.81
Chemical flush of components/systems, \$/gallon	21.45
Removal of clean standard reinforced concrete, \$/cubic yard	79.60
Removal of grade slab concrete, \$/cubic yard	90.54
Removal of clean concrete floors, \$/cubic yard	462.42
Removal of sections of clean concrete floors, \$/cubic yard	1,391.16
Removal of clean heavily rein concrete w/#9 rebar, \$/cubic yard	115.00
Removal of contaminated heavily rein concrete w/#9 rebar, \$/cubic yard	2,709.95
Removal of clean heavily rein concrete w/#18 rebar, \$/cubic yard	155.86
Removal of contaminated heavily rein concrete w/#18 rebar, \$/cubic yard	3,585.12
Removal heavily rein concrete w/#18 rebar & steel embedments, \$/cubic yard	568.99
Removal of below-grade suspended floors, \$/cubic yard	218.59
Removal of clean monolithic concrete structures, \$/cubic yard	1,160.31
Removal of contaminated monolithic concrete structures, \$/cubic yard	2,697.57
Removal of clean foundation concrete, \$/cubic yard	910.72
Removal of contaminated foundation concrete, \$/cubic yard	2,512.94
Explosive demolition of bulk concrete, \$/cubic yard	61.21
Removal of clean hollow masonry block wall, \$/cubic yard	27.85
Removal of contaminated hollow masonry block wall, \$/cubic yard	72.42
Removal of clean solid masonry block wall, \$/cubic yard	27.85
Removal of contaminated solid masonry block wall, \$/cubic yard	72.42
Backfill of below-grade voids, \$/cubic yard	36.73
Removal of subterranean tunnels/voids, \$/linear foot	143.27

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<b>Unit Cost Factor</b>	<b>Cost/Unit</b>
Placement of concrete for below-grade voids, \$/cubic yard	142.83
Excavation of clean material, \$/cubic yard	3.38
Excavation of contaminated material, \$/cubic yard	48.84
Removal of clean concrete rubble (tipping fee included), \$/cubic yard	28.05
Removal of contaminated concrete rubble, \$/cubic yard	30.62
Removal of building by volume, \$/cubic foot	0.35
Removal of clean building metal siding, \$/square foot	1.77
Removal of contaminated building metal siding, \$/square foot	5.62
Removal of standard asphalt roofing, \$/square foot	3.11
Removal of transite panels, \$/square foot	2.87
Scarifying contaminated concrete surfaces (drill & spall), \$/square foot	15.31
Scabbling contaminated concrete floors, \$/square foot	9.92
Scabbling contaminated concrete walls, \$/square foot	26.57
Scabbling contaminated ceilings, \$/square foot	91.52
Scabbling structural steel, \$/square foot	7.85
Removal of clean overhead crane/monorail < 10 ton capacity	863.54
Removal of contaminated overhead crane/monorail < 10 ton capacity	2,333.05
Removal of clean overhead crane/monorail >10-50 ton capacity	2,072.50
Removal of contaminated overhead crane/monorail >10-50 ton capacity	5,598.35
Removal of polar crane > 50 ton capacity	8,635.54
Removal of gantry crane > 50 ton capacity	32,881.12
Removal of structural steel, \$/pound	0.25
Removal of clean steel floor grating, \$/square foot	6.20
Removal of contaminated steel floor grating, \$/square foot	17.35
Removal of clean free standing steel liner, \$/square foot	16.80
Removal of contaminated free standing steel liner, \$/square foot	46.58
Removal of clean concrete-anchored steel liner, \$/square foot	8.40
Removal of contaminated concrete-anchored steel liner, \$/square foot	54.29
Placement of scaffolding in clean areas, \$/square foot	18.98
Placement of scaffolding in contaminated areas, \$/square foot	31.88



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**APPENDIX B**

**UNIT COST FACTOR LISTING  
 (Power Block Structures Only)**

<b>Unit Cost Factor</b>	<b>Cost/Unit</b>
Landscaping with topsoil, \$/acre	25,605.38
Cost of CPC B-88 LSA box & preparation for use	2,185.34
Cost of CPC B-25 LSA box & preparation for use	1,785.69
Cost of CPC B-12V 12 gauge LSA box & preparation for use	1,711.39
Cost of CPC B-144 LSA box & preparation for use	10,802.17
Cost of LSA drum & preparation for use	260.76
Cost of cask liner for CNSI 8 120A cask (resins)	12,914.97
Cost of cask liner for CNSI 8 120A cask (filters)	9,404.01
Decontamination of surfaces with vacuuming, \$/square foot	1.04

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**APPENDIX C**

**DETAILED COST ANALYSIS**

**SCENARIO 1: DECON with 42 Year DFS**

**Monticello Nuclear Generating Plant  
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**Table C  
 Monticello Nuclear Generating Plant  
 DECON Decommissioning Cost Estimate with DOE Pickup of Industry Fuel Starting in 2035**  
 (Thousands of 2030 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total	Lic. Term. Costs	NRC Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GFTCC Cu. Feet	Burial Volumes Cu. Feet	Burial / Processed Wt. Lbs.	Craft Manhours	Utility and Contractor Manhours	
<b>PERIOD Ia - Shutdown through Transition</b>																								
<b>Period Ia Direct Decommissioning Activities</b>																								
Ia.1.1	Prepare preliminary decommissioning cost estimate	-	-	-	-	-	-	167	25	192	192	192	-	-	-	-	-	-	-	-	-	-	-	1,300
Ia.1.2	Prepare preliminary decommissioning cost estimate	-	-	-	-	-	-	-	n/a	n/a	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ia.1.3	Remove fuel & source material	-	-	-	-	-	-	257	39	296	296	296	-	-	-	-	-	-	-	-	-	-	-	2,000
Ia.1.4	Notification of Permit, Defueling	-	-	-	-	-	-	-	89	680	680	680	-	-	-	-	-	-	-	-	-	-	-	4,600
Ia.1.5	Decontaminate plant systems	-	-	-	-	-	-	-	591	591	591	591	-	-	-	-	-	-	-	-	-	-	-	-
Ia.1.6	Review plant design & specs.	-	-	-	-	-	-	-	129	129	129	129	-	-	-	-	-	-	-	-	-	-	-	1,000
Ia.1.8	Perform detailed rad survey	-	-	-	-	-	-	129	15	144	144	144	-	-	-	-	-	-	-	-	-	-	-	1,000
Ia.1.9	Estimate in-product inventory	-	-	-	-	-	-	167	25	192	192	192	-	-	-	-	-	-	-	-	-	-	-	1,300
Ia.1.11	Detailed by-product inventory	-	-	-	-	-	-	964	145	1,108	1,108	1,108	-	-	-	-	-	-	-	-	-	-	-	7,500
Ia.1.12	Define major work sequence	-	-	-	-	-	-	308	140	448	448	448	-	-	-	-	-	-	-	-	-	-	-	2,100
Ia.1.13	Perform SRR and EA	-	-	-	-	-	-	643	96	739	739	739	-	-	-	-	-	-	-	-	-	-	-	5,000
Ia.1.15	Perform Site-Specific Cost Study	-	-	-	-	-	-	129	19	148	148	148	-	-	-	-	-	-	-	-	-	-	-	1,000
Ia.1.16	Prepare/submit irradiated Fuel Management Plan	-	-	-	-	-	-	-	95	727	654	654	-	-	-	-	-	-	-	-	-	-	-	4,920
Ia.1.17.1	Plant & temporary facilities	-	-	-	-	-	-	536	80	616	616	616	-	-	-	-	-	-	-	-	-	-	-	4,167
Ia.1.17.2	Plant systems	-	-	-	-	-	-	64	10	74	74	74	-	-	-	-	-	-	-	-	-	-	-	500
Ia.1.17.3	SSS decontamination flush	-	-	-	-	-	-	835	125	961	961	961	-	-	-	-	-	-	-	-	-	-	-	6,500
Ia.1.17.5	Reactors vessels	-	-	-	-	-	-	64	10	74	74	74	-	-	-	-	-	-	-	-	-	-	-	500
Ia.1.17.6	Sacrificial shield	-	-	-	-	-	-	129	19	148	148	148	-	-	-	-	-	-	-	-	-	-	-	1,000
Ia.1.17.7	Moisture separators/reheaters	-	-	-	-	-	-	208	40	248	248	248	-	-	-	-	-	-	-	-	-	-	-	2,088
Ia.1.17.8	Moisture separators/reheaters	-	-	-	-	-	-	208	40	248	248	248	-	-	-	-	-	-	-	-	-	-	-	2,088
Ia.1.17.9	Main Turbine	-	-	-	-	-	-	208	40	248	248	248	-	-	-	-	-	-	-	-	-	-	-	2,088
Ia.1.17.10	Main Condensers	-	-	-	-	-	-	208	40	248	248	248	-	-	-	-	-	-	-	-	-	-	-	2,088
Ia.1.17.11	Pressure suppression structure	-	-	-	-	-	-	208	40	248	248	248	-	-	-	-	-	-	-	-	-	-	-	2,088
Ia.1.17.12	Pressure suppression structure	-	-	-	-	-	-	208	40	248	248	248	-	-	-	-	-	-	-	-	-	-	-	2,088
Ia.1.17.13	Plant structures & buildings	-	-	-	-	-	-	401	60	461	461	461	-	-	-	-	-	-	-	-	-	-	-	3,120
Ia.1.17.14	Waste management	-	-	-	-	-	-	501	89	590	590	590	-	-	-	-	-	-	-	-	-	-	-	4,600
Ia.1.17.15	Facility & site closure	-	-	-	-	-	-	116	17	133	133	133	-	-	-	-	-	-	-	-	-	-	-	900
Ia.1.17	Total	-	-	-	-	-	-	5,486	823	6,309	6,309	6,309	-	-	-	-	-	-	-	-	-	-	-	42,583
<b>Planning &amp; Site Preparations</b>																								
Ia.1.18	Prepare dewatering sequence	-	-	-	-	-	-	308	46	354	354	354	-	-	-	-	-	-	-	-	-	-	-	2,400
Ia.1.19	Prepare dewatering sequence	-	-	-	-	-	-	308	46	354	354	354	-	-	-	-	-	-	-	-	-	-	-	2,400
Ia.1.20	Dewatering slurry system	-	-	-	-	-	-	180	27	207	207	207	-	-	-	-	-	-	-	-	-	-	-	1,400
Ia.1.21	Rigging/Cont. Crnt. Encapsulation/etc.	-	-	-	-	-	-	2,400	360	2,760	2,760	2,760	-	-	-	-	-	-	-	-	-	-	-	-
Ia.1.22	Power caskliners & containers	-	-	-	-	-	-	158	24	182	182	182	-	-	-	-	-	-	-	-	-	-	-	1,290
Ia.1	Subtotal Period Ia Activity Costs	-	-	-	-	-	-	10,560	2,485	13,045	13,045	13,045	-	-	-	-	-	-	-	-	-	-	-	80,013
<b>Period Ia Collateral Costs</b>																								
Ia.3.1	Spent Fuel Capital and Transfer	-	-	-	-	-	-	1,222	198	1,422	1,422	1,422	1,522	-	-	-	-	-	-	-	-	-	-	-
Ia.3.2	Spent Fuel Capital and Transfer	-	-	-	-	-	-	1,222	198	1,422	1,422	1,422	1,522	-	-	-	-	-	-	-	-	-	-	-
Ia.3	Subtotal Period Ia Collateral Costs	-	-	-	-	-	-	2,444	396	2,840	2,840	2,840	3,044	-	-	-	-	-	-	-	-	-	-	-
<b>Period Ia Period-Dependent Costs</b>																								
Ia.4.1	Insurance taxes	-	-	-	-	-	-	3,250	357	3,607	3,607	3,607	-	-	-	-	-	-	-	-	-	-	-	-
Ia.4.2	Health physics supplies	-	-	-	-	-	-	614	113	727	727	727	-	-	-	-	-	-	-	-	-	-	-	-
Ia.4.3	Heavy equipment rental	-	-	-	-	-	-	753	153	906	906	906	-	-	-	-	-	-	-	-	-	-	-	-
Ia.4.4	Heavy equipment rental	-	-	-	-	-	-	753	153	906	906	906	-	-	-	-	-	-	-	-	-	-	-	-
Ia.4.5	Disposal of DAW generated	-	-	-	-	-	-	90	27	117	117	117	-	-	-	-	-	-	-	-	-	-	-	20
Ia.4.6	Planning budgets	-	-	-	-	-	-	1,817	271	2,088	2,088	2,088	-	-	-	-	-	-	-	-	-	-	-	-
Ia.4.7	NRC Fees	-	-	-	-	-	-	1,137	114	1,251	1,251	1,251	-	-	-	-	-	-	-	-	-	-	-	-
Ia.4.8	Emergency Planning Fees	-	-	-	-	-	-	3,428	343	3,771	3,771	3,771	-	-	-	-	-	-	-	-	-	-	-	-
Ia.4.9	Fixed Cost/Infl. O&M	-	-	-	-	-	-	2,405	322	2,727	2,727	2,727	-	-	-	-	-	-	-	-	-	-	-	-
Ia.4.10	Fixed Cost/Infl. O&M	-	-	-	-	-	-	441	127	568	568	568	-	-	-	-	-	-	-	-	-	-	-	-
Ia.4.11	ISFSI Operating Costs	-	-	-	-	-	-	112	17	129	129	129	-	-	-	-	-	-	-	-	-	-	-	-
Ia.4.12	Railroad Track Maintenance	-	-	-	-	-	-	1,225	19	1,244	1,244	1,244	-	-	-	-	-	-	-	-	-	-	-	-
Ia.4.13	County Staff Cost	-	-	-	-	-	-	27,242	4,093	31,335	31,335	31,335	-	-	-	-	-	-	-	-	-	-	-	243,540
Ia.4	Subtotal Period Ia Period-Dependent Costs	-	-	-	-	-	-	27,242	4,093	31,335	31,335	31,335	-	-	-	-	-	-	-	-	-	-	-	243,540
Ia.4.1	Subtotal Period Ia Period-Dependent Costs	-	-	-	-	-	-	50	8,703	89,772	89,772	89,772	4,870	-	-	-	-	-	-	-	-	-	-	20

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**Table C  
 Monticello Nuclear Generating Plant  
 DECON Decommissioning Cost Estimate with DOE Pickup of Industry Fuel Starting in 2035**  
 (Thousands of 2020 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other	Total Contingency	Total	Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes			Borial / Processed Wt. Lbs.	Craft Manhours	Utility and Contractor Manhours	
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet				
Ib.0	TOTAL PERIOD 1a COST	-	1,357	-	6	-	50	87,418	12,871	101,724	94,793	6,302	550	-	-	-	-	12,100	20	750,693	
<b>PERIOD 1b - Decommissioning Preparations</b>																					
<b>Period 1b Direct Decommissioning Activities</b>																					
<b>Detailed Work Procedures</b>																					
Ib.1.1.1	Site systems	-	-	-	-	-	-	658	61	700	650	-	70	-	-	-	-	-	-	1,735	
Ib.1.1.2	NSSS systems	-	-	-	-	-	-	128	15	143	148	-	-	-	-	-	-	-	-	4,000	
Ib.1.1.3	Reactor internals	-	-	-	-	-	-	514	77	591	591	-	-	-	-	-	-	-	-	1,350	
Ib.1.1.4	Remaining buildings	-	-	-	-	-	-	174	26	200	174	-	190	-	-	-	-	-	-	1,000	
Ib.1.1.5	CRD housings & NAs	-	-	-	-	-	-	129	9	138	148	-	-	-	-	-	-	-	-	2,000	
Ib.1.1.6	Removal primary containment	-	-	-	-	-	-	257	39	296	296	-	-	-	-	-	-	-	-	3,630	
Ib.1.1.8	Reactor vessel	-	-	-	-	-	-	467	70	537	537	-	89	-	-	-	-	-	-	1,200	
Ib.1.1.9	Facility decont	-	-	-	-	-	-	154	23	177	177	-	-	-	-	-	-	-	-	1,000	
Ib.1.1.10	Reinforced concrete	-	-	-	-	-	-	129	19	148	148	-	74	-	-	-	-	-	-	2,080	
Ib.1.1.11	Main Turbine	-	-	-	-	-	-	207	40	247	247	-	74	-	-	-	-	-	-	2,088	
Ib.1.1.12	Main Condensers	-	-	-	-	-	-	208	40	248	248	-	-	-	-	-	-	-	-	2,730	
Ib.1.1.13	Steam generators & subheaters	-	-	-	-	-	-	353	53	406	363	-	40	-	-	-	-	-	-	3,711	
Ib.1.1.15	Rebarcast building	-	-	-	-	-	-	351	53	403	363	-	40	-	-	-	-	-	-	3,711	
Ib.1.1.16	Reactor building	-	-	-	-	-	-	4,336	650	4,987	4,524	-	463	-	-	-	-	-	-	33,711	
Ib.1.1	Total	-	-	-	-	-	-	4,336	650	4,987	4,524	-	463	-	-	-	-	-	-	33,711	
Ib.1.2	Decon NSSS	206	-	-	-	-	-	-	148	444	444	-	-	-	-	-	-	-	-	1,067	
Ib.1.3	Subtotal Period 1b Activity Costs	206	-	-	-	-	-	4,336	798	5,431	4,968	-	463	-	-	-	-	-	-	1,067	
<b>Period 1b Additional Costs</b>																					
Ib.2.1	Spent Fuel Pool Isolation	-	-	-	-	-	-	12,675	1,901	14,576	14,576	-	-	-	-	-	-	-	-	30,600	
Ib.2.2	Site Characterization	-	-	-	-	-	-	5,930	1,779	7,708	7,708	-	-	-	-	-	-	-	-	10,852	
Ib.2.3	Mixed & RCRA Waste	-	-	28	29	14	-	18,965	3,689	22,365	22,365	-	43	-	-	-	-	-	-	361	
Ib.2	Subtotal Period 1b Additional Costs	-	-	28	29	14	-	18,965	3,689	22,365	22,365	-	43	-	-	-	-	-	-	30,661	
<b>Period 1b Collateral Costs</b>																					
Ib.3.1	Decon equipment	1,055	-	-	-	-	-	1,254	168	1,213	1,213	-	-	-	-	-	-	-	-	-	
Ib.3.2	Decon equipment expenses	38	-	-	-	-	-	1,254	168	1,213	1,213	-	-	-	-	-	-	-	-	-	
Ib.3.3	Process decommissioning water waste	1	-	-	45	-	-	102	35	263	263	-	-	-	-	-	-	-	-	45	
Ib.3.4	Process decommissioning chemical flush waste	1	-	-	77	-	-	1,236	396	2,024	2,024	-	-	-	-	-	-	-	-	43	
Ib.3.5	Small tool allowance	-	1,200	-	-	-	-	-	360	1,560	1,560	-	-	-	-	-	-	-	-	-	
Ib.3.6	Process equipment	-	-	-	-	-	-	-	316	2,419	2,419	-	-	-	-	-	-	-	-	-	
Ib.3.7	Decon rig	2,104	-	-	-	-	-	391	59	450	450	-	-	-	-	-	-	-	-	-	
Ib.3.8	Spent Fuel Capital and Transfer	-	-	-	-	-	-	6,335	950	7,285	7,285	-	-	-	-	-	-	-	-	-	
Ib.3.9	Retention and Sovereignty	3,197	-	-	-	-	-	1,928	2,302	16,490	16,490	-	-	-	-	-	-	-	-	89	
Ib.3	Subtotal Period 1b Collateral Costs	3,197	-	-	-	-	-	1,928	2,302	16,490	16,490	-	-	-	-	-	-	-	-	89	
<b>Period 1b Period-Dependent Costs</b>																					
Ib.4.1	Decon supplies	39	-	-	-	-	-	1,151	10	48	48	-	-	-	-	-	-	-	-	-	
Ib.4.2	Decon materials	-	-	-	-	-	-	1,151	10	48	48	-	-	-	-	-	-	-	-	-	
Ib.4.3	Personnel taxes	-	-	-	-	-	-	1,700	171	1,869	1,869	-	-	-	-	-	-	-	-	-	
Ib.4.4	Health physics supplies	344	-	-	-	-	-	-	56	432	432	-	-	-	-	-	-	-	-	-	
Ib.4.5	Heavy equipment rental	-	-	-	-	-	-	-	56	432	432	-	-	-	-	-	-	-	-	-	
Ib.4.6	Disposal of DAW generated	-	-	-	-	-	-	-	29	2,083	2,083	-	-	-	-	-	-	-	-	-	
Ib.4.7	Phase-in Budgets	-	-	-	-	-	-	-	972	2,083	2,083	-	-	-	-	-	-	-	-	-	
Ib.4.8	NRC Fees	-	-	-	-	-	-	-	32	355	355	-	-	-	-	-	-	-	-	12	
Ib.4.9	Emergency Planning Fees	-	-	-	-	-	-	-	142	1,457	1,457	-	-	-	-	-	-	-	-	-	
Ib.4.10	Spent Fuel Pool O&M	-	-	-	-	-	-	-	65	1,500	1,500	-	-	-	-	-	-	-	-	-	
Ib.4.11	Spent Fuel Pool O&M	-	-	-	-	-	-	-	65	1,500	1,500	-	-	-	-	-	-	-	-	-	
Ib.4.12	ISFSI Operating Costs	-	-	-	-	-	-	-	8	64	64	-	-	-	-	-	-	-	-	-	
Ib.4.13	Railroad Track Maintenance	-	-	-	-	-	-	-	62	72	72	-	-	-	-	-	-	-	-	-	
Ib.4.14	DOE Staff Cost	-	-	-	-	-	-	-	63	1,979	1,979	-	-	-	-	-	-	-	-	-	
Ib.4.15	DOE Staff Cost	-	-	-	-	-	-	-	5,346	6,223	6,223	-	-	-	-	-	-	-	-	-	
Ib.4.16	Utility Staff Cost	39	719	-	-	-	-	-	20	33,970	33,970	-	-	-	-	-	-	-	-	-	
Ib.4	Subtotal Period 1b Period-Dependent Costs	3,331	1,921	84	154	14	-	1,657	66,886	12,113	83,313	-	463	-	-	-	-	-	-	50,964	
Ib.0	TOTAL PERIOD 1b COST	3,331	3,288	96	160	14	-	1,707	154,204	24,684	188,605	178,125	8,948	1,012	43	1,199	231	-	-	63,155	
<b>PERIOD 1 TOTALS</b>																					
Decon Cost: 3,331   Removal Cost: 3,288   Packaging Costs: 96   Transport Costs: 160   Off-Site Processing Costs: 14   LLRW Disposal Costs: 1,707   Other: 154,204   Total Contingency: 24,684   Total: 188,605   Lic. Term. Costs: 178,125   Spent Fuel Management Costs: 8,948   Site Restoration Costs: 1,012   Processed Volume Cu. Feet: 43   Craft Manhours: 1,199   Burial Volumes: Class A: 231, Class B: 231, Class C: 231   Borial / Processed Wt. Lbs.: 63,155   Utility and Contractor Manhours: 31,848																					

**Monticello Nuclear Generating Plant  
 Decommissioning Cost Analysis**

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**Table C  
 Monticello Nuclear Generating Plant  
 DECON Decommissioning Cost Estimate with DOE Pickup of Industry Fuel Starting in 2035**  
 (Thousands of 2030 Dollars)

Activity Index	Activity Description	Decom Cost	Removal Cost	Packaging Costs	Transport Costs	Offsite Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GFTCC Cu. Feet	Borial / Wt. Lbs.	Craft Manhours	Utility and Contractor Manhours
<b>PERIOD 2a - Large Component Removal</b>																					
Period 2a Direct Decommissioning Activities																					
Nuclear Steam Supply System Removal																					
2a.1.1.1	Recirculation System Piping & Valves	111	94	27	50	1,031	1,031	221	1,031	1,031	410	638	938	96	1,430	945	1,430	96,712	2,905	-	-
2a.1.1.2	Recirculation Pumps & Motors	40	63	16	51	42	539	186	539	539	838	838	838	96	945	945	945	112,200	1,563	-	-
2a.1.1.3	CHDMS & NMS Removal	394	1,030	15	15	2,698	2,698	364	2,698	2,698	3,211	3,211	3,211	1,031	1,031	1,031	1,031	243,500	3,748	-	-
2a.1.1.5	Reactor Vessel	113	9,121	2,672	1,167	-	5,861	364	10,842	30,140	76,274	76,274	76,274	-	16,169	1,761	898	1,105,210	30,515	1,379	-
2a.1.1	Totals	702	17,020	15,982	4,069	42	37,003	728	33,973	112,449	112,449	112,449	112,449	96	23,336	1,761	898	1,874,002	83,267	2,758	-
Removal of Major Equipment																					
2a.1.2	Main Turbine/Generator	-	385	1,326	521	6,139	439	-	1,341	10,182	10,182	10,182	10,182	24,835	1,383	727	-	1,577,959	5,438	-	-
2a.1.3	Main Condensers	-	1,347	360	194	3,225	244	-	947	6,317	6,317	6,317	6,317	17,396	727	-	-	828,855	18,831	-	-
Cremating Casks from Clean Building Demolition																					
2a.1.4.1	Reactor Building	-	332	-	-	-	-	-	50	381	381	381	-	-	-	-	-	-	-	2,217	-
2a.1.4.2	Radiation	-	25	-	-	-	-	-	4	28	28	28	-	-	-	-	-	-	-	127	-
2a.1.4.3	Turbine	-	127	-	-	-	-	-	19	146	146	146	-	-	-	-	-	-	-	1,251	-
2a.1.4	Totals	-	485	-	-	-	-	-	72	556	556	556	-	-	-	-	-	-	-	3,595	-
Disposal of Plant Systems																					
2a.1.5.1	Automatic Press Relief	-	118	7	12	134	70	-	70	410	410	410	-	803	206	-	-	48,852	1,666	-	-
2a.1.5.2	Chemical Sampling - Insulated	-	2	0	0	26	0	-	1	3	3	3	-	26	31	-	-	6,100	72	-	-
2a.1.5.3	Chemical Sampling - Insulated	-	2	0	0	26	0	-	1	3	3	3	-	26	31	-	-	6,100	72	-	-
2a.1.5.4	Circulating Water - RCA	-	207	14	62	1,114	-	-	230	1,626	1,626	1,626	-	6,696	-	-	-	270,307	2,860	-	-
2a.1.5.5	Condensate Gas Control - Insul - RCA	-	29	0	2	36	-	-	13	80	80	80	-	212	-	-	-	8,617	378	-	-
2a.1.5.6	Condensate Gas Control - Insul - RCA	-	987	183	329	3,337	2,464	-	1,431	8,731	8,731	8,731	-	10,947	7,319	-	-	1,273,810	14,106	-	-
2a.1.5.7	Condensate & Feedwater - Insulated	-	492	34	63	699	468	-	313	2,638	2,638	2,638	-	4,176	1,207	-	-	246,693	6,964	-	-
2a.1.5.8	Condensate & Feedwater - Insulated	-	545	30	51	596	339	-	316	1,840	1,840	1,840	-	3,366	1,000	-	-	308,036	7,618	-	-
2a.1.5.9	Condensate Drain	-	128	0	0	128	0	-	0	128	128	128	-	71,259	794	-	-	1,100,000	10,538	-	-
2a.1.5.11	Control Rod Drive	-	23	0	0	23	0	-	2	9	9	9	-	19	-	-	-	1,000	11	-	-
2a.1.5.12	Control Rod Drive Hydraulic	-	416	16	26	277	190	-	199	1,124	1,124	1,124	-	1,658	562	-	-	103,306	5,898	-	-
2a.1.5.13	Cooling Water - RCA	-	79	20	51	734	176	-	184	1,244	1,244	1,244	-	4,384	821	-	-	211,329	1,163	-	-
2a.1.5.14	Drain Water - Insulated	-	15	0	1	16	0	-	6	36	36	36	-	6	204	-	-	3,445	181	-	-
2a.1.5.15	Drain Water - Insulated - RCA	-	15	0	1	16	0	-	6	36	36	36	-	6	204	-	-	3,445	181	-	-
2a.1.5.16	Drain Water - Insulated - RCA	-	41	1	2	42	0	-	17	104	104	104	-	253	-	-	-	10,278	508	-	-
2a.1.5.17	Diesel Oil - RCA	-	2	0	0	4	0	-	1	7	7	7	-	23	-	-	-	931	25	-	-
2a.1.5.18	Emergency Services Water - Insul - RCA	-	0	0	0	0	0	-	0	19	19	19	-	54	-	-	-	22,881	56	-	-
2a.1.5.19	EDG Emergency Services Water - Insul - RCA	-	0	0	0	0	0	-	0	1	1	1	-	2	-	-	-	84	84	-	-
2a.1.5.20	Electrical - Clean	-	13	-	-	-	-	-	2	15	15	15	-	15	-	-	-	-	182	-	-
2a.1.5.21	Emergency Services Water - Insul - RCA	-	21	0	1	23	0	-	9	55	55	55	-	137	-	-	-	5,544	281	-	-
2a.1.5.22	Emergency Services Water - Insul - RCA	-	2	0	0	2	0	-	1	5	5	5	-	13	-	-	-	482	48	-	-
2a.1.5.23	EGZWP - RCA	-	0	1	1	17	-	-	4	25	25	25	-	103	-	-	-	4,184	48	-	-
2a.1.5.24	Generator Physical Design - RCA	-	5	0	0	5	-	-	2	12	12	12	-	31	-	-	-	1,250	67	-	-
2a.1.5.25	H2 O2 Control Analyzing	-	0	0	0	0	0	-	0	15	15	15	-	6	-	-	-	1,080	81	-	-
2a.1.5.26	High Pressure Coolant Injection - Insulated	-	67	0	0	67	0	-	61	381	381	381	-	972	206	-	-	52,792	966	-	-
2a.1.5.27	High Pressure Coolant Injection - Insul - RCA	-	67	0	0	67	0	-	61	381	381	381	-	972	206	-	-	52,792	966	-	-
2a.1.5.28	High Pressure Coolant Injection - Insul - RCA	-	210	14	24	257	163	-	141	830	830	830	-	1,598	481	-	-	95,733	3,079	-	-
2a.1.5.29	Hydrogen Cooling - RCA	-	8	-	-	-	-	-	1	10	10	10	-	10	-	-	-	-	118	-	-
2a.1.5.30	Hydrogen Cooling - RCA	-	7	0	0	7	0	-	5	29	29	29	-	59	-	-	-	1,500	118	-	-
2a.1.5.31	Hydrogen Cooling - RCA	-	17	0	2	32	0	-	7	60	60	60	-	140	-	-	-	7,690	312	-	-
2a.1.5.32	Hydrogen Water Chemistry - RCA	-	24	0	1	25	0	-	10	59	59	59	-	130	-	-	-	5,672	304	-	-
2a.1.5.33	Instrument & Service Air - RCA	-	225	14	17	296	159	-	103	644	644	644	-	1,768	-	-	-	71,810	2,733	-	-
2a.1.5.34	Instrument & Service Air - RCA	-	25	0	0	25	0	-	17	109	109	109	-	238	-	-	-	4,253	212	-	-
2a.1.5.35	Main Condenser	-	205	12	22	239	201	-	177	1,629	1,629	1,629	-	3,148	504	-	-	425,330	5,512	-	-
2a.1.5.36	Main Turbine - Insulated	-	1,012	205	353	3,396	2,921	-	1,553	9,350	9,350	9,350	-	10,750	8,057	-	-	1,354,661	14,733	-	-
2a.1.5.37	Main Turbine - Insulated	-	18	37	423	225	-	-	180	1,097	1,097	1,097	-	2,330	667	-	-	145,208	3,069	-	-
2a.1.5.38	Off Gas Recombiner	-	35	0	0	35	0	-	9	186	186	186	-	365	764	-	-	121,253	2,788	-	-
2a.1.5.39	Off Gas Recombiner	-	189	10	32	300	247	-	197	1,100	1,100	1,100	-	1,396	709	-	-	100,933	5,385	-	-
2a.1.5.40	Off Gas Recombiner - Insulated	-	357	19	27	229	240	-	111	58	58	58	-	53	-	-	-	4,318	345	-	-
2a.1.5.41	Post Accident Sampling - Insulated	-	25	1	1	9	11	-	11	58	58	58	-	37	-	-	-	60,316	1,312	-	-
2a.1.5.42	Post Accident Sampling - Insulated - RCA	-	83	3	3	14	13	-	8	40	40	40	-	145	-	-	-	60,316	1,312	-	-
2a.1.5.43	Reactor Feedwater - RCA	-	4	0	0	4	0	-	2	12	12	12	-	35	-	-	-	1,410	57	-	-
2a.1.5.44	Reactor Feedwater - RCA	-	56	2	4	32	33	-	28	155	155	155	-	193	96	-	-	14,009	773	-	-



**Monticello Nuclear Generating Plant  
 Decommissioning Cost Analysis**

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**Table C  
 Monticello Nuclear Generating Plant  
 DECON Decommissioning Cost Estimate with DOE Pickup of Industry Fuel Starting in 2035**  
 (Thousands of 2030 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal	Other Contingency	Total Contingency	Total	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu Feet	Class A Cu Feet	Class B Cu Feet	Class C Cu Feet	GFTCC Cu Feet	Borated / Processed Wt. Lbs.	Craft Manhours	Utility and Contractor Manhours
Disposal of Plant Systems (continued)																					
26.1.1.17	Rx BRK, Closed Cing Water - Insl - RCA	-	114	2	9	168	-	-	54	313	313	-	-	977	-	-	-	-	38,675	1,484	-
26.1.1.18	Rx BRK, Closed Cing Water - RCA	-	184	15	66	1,187	-	-	235	1,687	1,687	-	-	7,083	-	-	-	-	288,031	2,489	-
26.1.1.19	Compos Handling Equip	-	142	16	27	134	29	-	14	340	340	-	-	1,192	-	-	-	-	4,622	4,622	-
26.1.1.20	Rx Water Cleanup	-	147	16	13	221	-	-	14	221	221	-	-	1,192	-	-	-	-	17,843	2,489	-
26.1.1.21	Rx Water Cleanup	-	265	19	16	22	251	-	222	865	865	-	-	1,500	-	-	-	-	52,670	5,736	-
26.1.1.22	Secondary Containment	-	172	7	11	170	86	-	81	483	483	-	-	1,017	-	-	-	-	57,567	1,763	-
26.1.1.23	Service & Sewerage - Insulated - RCA	-	120	2	17	337	-	-	82	466	466	-	-	1,890	-	-	-	-	74,547	2,063	-
26.1.1.24	Service Air Blower - RCA	-	15	0	2	34	-	-	9	62	62	-	-	206	-	-	-	-	7,345	206	-
26.1.1.25	Service Air Blower - RCA	-	15	0	2	34	-	-	9	62	62	-	-	206	-	-	-	-	7,345	206	-
26.1.1.26	Solid Radwaste	338	404	36	40	390	467	-	480	2,261	2,261	-	-	2,387	-	-	-	-	185,221	10,820	-
26.1.1.27	Waterways & Buildings	-	76	2	5	60	29	-	37	210	210	-	-	357	-	-	-	-	13,053	1,128	-
26.1.1.28	Waterways & Buildings	-	76	2	5	60	29	-	37	210	210	-	-	357	-	-	-	-	13,053	1,128	-
26.1.1.29	Wells & Domestic Water - RCA	-	52	1	3	57	-	-	22	136	136	-	-	342	-	-	-	-	13,874	633	-
26.1.1	Totals	1,153	7,860	315	804	11,088	2,657	-	5,107	29,653	29,653	-	-	69,735	-	-	-	-	3,331,214	122,835	-
26.1.2	Scaffolding in support of decommissioning	-	2,831	28	16	230	38	-	758	3,009	3,009	-	-	1,387	-	-	-	-	65,139	26,305	-
Decommissionation of Site Buildings																					
26.1.3.1	Reactor Building	5,202	2,903	178	516	8,044	1,181	-	4,024	22,948	22,948	-	-	48,077	-	-	-	-	2,317,670	112,318	-
26.1.3.2	HPCI Room	29	28	1	3	20	14	-	29	123	123	-	-	118	-	-	-	-	10,759	789	-
26.1.3.3	HPCI Room	29	28	1	3	20	14	-	29	123	123	-	-	118	-	-	-	-	10,759	789	-
26.1.3.4	Hot Shop	17	4	0	2	11	11	-	12	46	46	-	-	31	-	-	-	-	4,880	286	-
26.1.3.5	LLRW Storage & Shipping	58	24	8	8	5	45	-	191	191	191	-	-	433	-	-	-	-	21,708	1,127	-
26.1.3.6	LLRW Storage & Shipping	58	24	8	8	5	45	-	191	191	191	-	-	433	-	-	-	-	21,708	1,127	-
26.1.3.7	Offgas Storage & Compressor	41	17	1	6	222	34	-	34	1,159	1,159	-	-	1,255	-	-	-	-	15,948	785	-
26.1.3.8	Radwaste	121	61	3	17	29	96	-	107	435	435	-	-	172	-	-	-	-	48,943	2,503	-
26.1.3.9	Radwaste Material Storage Warehouse	64	24	2	9	36	52	-	52	202	202	-	-	109	-	-	-	-	25,400	1,107	-
26.1.3.10	Radwaste Material Storage Warehouse	64	24	2	9	36	52	-	52	202	202	-	-	109	-	-	-	-	25,400	1,107	-
26.1.3.11	Turbine Building Addition	705	353	21	101	215	564	-	632	2,604	2,604	-	-	1,283	-	-	-	-	393,150	14,443	-
26.1.3.12	Turbine Building Addition	705	353	21	101	215	564	-	632	2,604	2,604	-	-	1,283	-	-	-	-	393,150	14,443	-
26.1.3	Totals	6,799	3,750	218	704	8,574	2,161	-	6,288	28,483	28,483	-	-	51,247	-	-	-	-	2,880,206	145,889	-
26.1.4	Prepare/submit License Termination Plan	-	-	-	-	-	-	526	79	605	605	-	-	-	-	-	-	-	-	-	4,096
26.1.5	Receive NRC approval of termination plan	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4,096
26.1	Subtotal Period 2b Activity Costs	7,852	14,427	500	1,524	20,483	4,839	526	12,252	62,561	62,561	-	-	122,269	241,322	-	-	-	6,273,859	296,929	4,096
Period 2b Additional Costs																					
26.2.1	Operational Equipment	-	-	23	82	1,211	-	-	198	1,224	1,224	-	-	11,760	-	-	-	-	294,000	22	-
26.2.2	Security Modifications	-	1,972	-	-	-	8,896	-	1,304	10,000	10,000	-	-	-	-	-	-	-	-	12,495	-
26.2	Subtotal Period 2b Additional Costs	-	1,972	23	82	1,211	9,072	-	2,052	14,422	14,422	-	-	11,760	-	-	-	-	294,000	12,525	-
Period 2b Subtotal Costs																					
26.3.1	Process decommissioning water waste	198	-	135	240	-	546	-	285	1,404	1,404	-	-	-	-	-	-	-	75,386	244	-
26.3.2	Process decommissioning chemical flush waste	1	364	-	138	-	319	-	105	607	607	-	-	-	-	-	-	-	43,978	77	-
26.3.3	Small tool allowance	-	-	-	-	-	-	117,354	17,945	134,818	134,818	-	-	-	-	-	-	-	-	-	-
26.3.4	Retention Services	-	-	-	-	-	-	6,299	945	7,244	7,244	-	-	-	-	-	-	-	-	-	-
26.3.5	Retention Services	-	-	-	-	-	-	6,299	945	7,244	7,244	-	-	-	-	-	-	-	-	-	-
26.3	Subtotal Period 2b Colateral Costs	199	364	178	378	-	865	123,554	18,978	144,516	144,516	-	-	51,247	-	-	-	-	119,165	322	-
Period 2b Period-Dependent Costs																					
26.4.1	Decommissioning	-	-	-	-	-	-	360	1,799	1,799	1,799	-	-	-	-	-	-	-	-	-	-
26.4.2	Insurance	-	-	-	-	-	-	742	816	816	816	-	-	-	-	-	-	-	-	-	-
26.4.3	Property taxes	-	-	-	-	-	-	2,703	2,974	2,974	2,974	-	-	-	-	-	-	-	-	-	-
26.4.4	Health physics supplies	-	2,211	-	-	-	-	-	3,117	3,117	3,117	-	-	-	-	-	-	-	-	-	-
26.4.5	Health physics supplies	-	2,211	-	-	-	-	-	3,117	3,117	3,117	-	-	-	-	-	-	-	-	-	-
26.4.6	Disposal of DAW generated	-	-	101	62	-	419	-	1,233	694	694	-	-	-	-	-	-	-	101,679	166	-
26.4.7	Plant energy budget	-	-	-	-	-	-	1,437	216	1,653	1,653	-	-	-	-	-	-	-	-	-	-
26.4.8	NRC Fees - Planning Fees	-	-	-	-	-	-	2,995	3,891	6,886	6,886	-	-	-	-	-	-	-	-	-	-
26.4.9	NRC Fees - Planning Fees	-	-	-	-	-	-	2,995	3,891	6,886	6,886	-	-	-	-	-	-	-	-	-	-
26.4.10	Fixed Overhead	-	-	-	-	-	-	2,235	305	2,570	2,570	-	-	-	-	-	-	-	-	-	-
26.4.11	Spent Fuel Pool O&M	-	-	-	-	-	-	801	1,024	1,825	1,825	-	-	-	-	-	-	-	-	-	-
26.4.12	ISRS Radwaste Processing Equipment/Services	-	-	-	-	-	-	224	314	538	538	-	-	-	-	-	-	-	-	-	-
26.4.13	ISRS Radwaste Processing Equipment/Services	-	-	-	-	-	-	224	314	538	538	-	-	-	-	-	-	-	-	-	-
26.4.14	Radwaste Processing Equipment/Services	-	-	-	-	-	-	458	627	1,085	1,085	-	-	-	-	-	-	-	-	-	-
26.4.15	Radwaste Processing Equipment/Services	-	-	-	-	-	-	458	627	1,085	1,085	-	-	-	-	-	-	-	-	-	-

**Monticello Nuclear Generating Plant  
 Decommissioning Cost Analysis**

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**Table C  
 Monticello Nuclear Generating Plant  
 DECON Decommissioning Cost Estimate with DOE Pickup of Industry Fuel Starting in 2035**  
 (Thousands of 2030 Dollars)

Activity Index	Activity Description	Decom Cost	Removal Cost	Packaging Costs	Transport Costs	Processing Costs	Off-Site Costs	LLRW Disposal Costs	Other Contingency	Total Contingency	Total Costs	Lic. Term. Costs	NRC Management Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu Feet	Class A Cu Feet	Class B Cu Feet	Class C Cu Feet	GFTCC Cu Feet	Borial / Processed Wt. Lbs.	Craft Manhours	Utility and Contractor Manhours
Period 2b Period-Dependent Costs (continued)																							
26.4.16	Security Staff Cost	-	-	-	-	-	-	-	15,925	15,925	18,314	18,314	18,314	-	-	-	-	-	-	-	-	-	236,949
26.4.17	DOE Staff Cost	-	-	-	-	-	-	-	14,772	14,772	16,988	16,988	16,988	-	-	-	-	-	-	-	-	-	100,100
26.4.18	Utility Staff Cost	-	-	-	-	-	-	-	19,412	19,412	22,458	22,458	22,458	-	-	-	-	-	-	-	-	-	460,383
26.4	Subtotal Period 2b Period-Dependent Costs	1,440	5,087	101	82	-	419	637,747	10,692	87,539	87,539	87,539	87,539	4,455	-	-	-	-	-	-	101,679	166	693,392
26.0	TOTAL PERIOD 2b COST	9,501	21,850	861	2,046	21,692	6,113	136,859	43,954	303,035	303,035	303,035	303,035	139,297	11	134,029	30,882	-	-	-	6,794,433	309,941	698,488
PERIOD 2d - Decommissionation Following Wet Fuel Storage																							
Period 2d Direct Decommissioning Activities																							
2d.1.1	Remove spent fuel racks	654	58	103	149	-	-	2,572	-	1,017	4,353	4,353	-	-	-	-	7,653	-	-	-	486,170	906	-
Disposal of Plant Systems																							
2d.1.2.1	Cross/Heavy Load/Rigging - RCA	-	3	0	1	17	-	-	-	4	25	25	-	-	-	103	-	-	-	-	4,184	48	-
2d.1.2.2	Electrical - Contaminated Fuel Pool	-	297	1	2	40	3	-	-	116	122	122	-	-	-	2,497	9	-	-	-	10,394	665	-
2d.1.2.3	Fire - RCA - Fuel Pool Area	-	11	0	1	10	-	-	-	4	26	26	-	-	-	62	-	-	-	-	2,499	113	-
2d.1.2.4	Fire - RCA - Fuel Pool Area	-	428	34	37	197	455	-	-	382	1,781	1,781	-	-	-	1,179	1,311	-	-	-	133,939	8,380	-
2d.1.2.5	Fuel Pool Cooling & Cleanup - Insulated	-	27	41	3	3	40	-	-	36	161	161	-	-	-	67	117	-	-	-	10,250	848	-
2d.1.2.6	Fuel Pool Cooling & Cleanup - Insulated	-	33	0	2	37	-	-	-	14	87	87	-	-	-	223	-	-	-	-	9,072	397	-
2d.1.2.8	HVAC/Chilled Water - RCA Fuel Pool Area	-	29	1	2	45	-	-	-	14	91	91	-	-	-	287	-	-	-	-	10,841	357	-
2d.1.2.9	Instrument & Service Air-RCA-Fuel Pool	-	273	45	75	819	502	-	-	631	3,268	3,268	-	-	-	4,894	1,479	-	-	-	295,606	15,385	-
2d.1.2	Totals	946	2,809	172	913	329	10,216	-	-	3,880	19,056	19,056	-	-	-	1,989	62,698	-	-	-	2,732,406	45,703	-
2d.1.3.1	Reactor (Post Fuel)	946	2,809	172	913	329	10,216	-	-	3,880	19,056	19,056	-	-	-	1,989	62,698	-	-	-	2,732,406	45,703	-
2d.1.3	Totals	946	2,809	172	913	329	10,216	-	-	3,880	19,056	19,056	-	-	-	1,989	62,698	-	-	-	2,732,406	45,703	-
2d.1.4	Scaffolding in support of decommissioning	-	506	6	3	48	8	-	-	152	782	782	-	-	-	257	23	-	-	-	13,028	5,611	-
2d.1	Subtotal Period 2d Activity Costs	1,872	4,147	326	1,139	1,196	13,298	-	-	5,080	27,059	27,059	-	-	-	7,120	71,852	-	-	-	3,323,210	67,635	-
Period 2d Additional Costs																							
2d.2.1	License Termination Survey Planning	-	-	-	-	-	-	-	1,458	1,458	1,806	1,806	-	-	-	-	-	-	-	-	-	-	12,480
2d.2	Subtotal Period 2d Additional Costs	-	-	-	-	-	-	-	1,458	1,458	1,806	1,806	-	-	-	-	-	-	-	-	-	-	12,480
Period 2d Collateral Costs																							
2d.3.1	Process decommissioning water waste	79	-	54	96	-	-	229	-	114	563	563	-	-	-	-	-	-	-	-	30,239	98	-
2d.3.2	Process decommissioning chemical flush waste	1	-	26	81	-	-	193	-	64	366	366	-	-	-	-	-	-	-	-	26,553	47	-
2d.3.3	Decommissioning Equipment Disposition	-	91	130	82	1,112	1,78	-	-	237	1,739	1,739	-	-	-	6,000	529	-	-	-	303,608	147	-
2d.3.4	Spent Fuel Capital and Transfer	-	-	-	-	-	-	-	27	4	32	32	-	-	-	6,000	1,282	-	-	-	-	292	-
2d.3	Subtotal Period 2d Collateral Costs	80	91	210	262	1,112	500	27	432	2,805	2,773	2,773	-	-	-	6,000	1,282	-	-	-	300,400	292	-
Period 2d Period-Dependent Costs																							
2d.4.1	Decom supplies	244	-	-	-	-	-	-	-	61	305	305	-	-	-	-	-	-	-	-	-	-	-
2d.4.2	Insurance	-	-	-	-	-	-	-	590	583	583	-	-	-	-	-	-	-	-	-	-	-	-
2d.4.3	Health physics supplies	-	-	-	-	-	-	-	1,604	1,604	1,604	-	-	-	-	-	-	-	-	-	-	-	-
2d.4.4	Heavy equipment rental	-	806	-	-	-	-	-	290	2,227	2,227	-	-	-	-	-	-	-	-	-	-	-	-
2d.4.5	Heavy equipment rental	-	1,836	-	-	-	-	-	49	277	277	-	-	-	-	-	-	-	-	-	-	-	-
2d.4.6	Disposal of DAW generated	-	40	40	21	-	-	167	-	42	469	469	-	-	-	-	-	-	-	-	-	-	-
2d.4.7	NRC emergency budget	-	-	-	-	-	-	-	424	468	468	-	-	-	-	-	-	-	-	-	-	-	-
2d.4.8	NRC emergency budget	-	-	-	-	-	-	-	424	468	468	-	-	-	-	-	-	-	-	-	-	-	-
2d.4.9	Emergency Planning Fees	-	-	-	-	-	-	-	112	111	123	123	-	-	-	-	-	-	-	-	-	-	-
2d.4.10	Fixed Overhead	-	-	-	-	-	-	-	1,597	1,836	1,836	-	-	-	-	-	-	-	-	-	-	-	-
2d.4.11	Business - Decommissioning Equipments/Services	-	-	-	-	-	-	-	380	368	368	-	-	-	-	-	-	-	-	-	-	-	-
2d.4.12	IS/IT Costs	-	-	-	-	-	-	-	97	97	97	-	-	-	-	-	-	-	-	-	-	-	-
2d.4.13	Railroad Track Maintenance	-	-	-	-	-	-	-	94	108	108	-	-	-	-	-	-	-	-	-	-	-	-
2d.4.14	Remedial Actions Surveys	-	-	-	-	-	-	-	844	127	971	971	-	-	-	-	-	-	-	-	-	-	-
2d.4.15	DOE Staff Cost	-	-	-	-	-	-	-	1,090	1,090	1,090	-	-	-	-	-	-	-	-	-	-	-	-
2d.4.16	DOE Staff Cost	-	-	-	-	-	-	-	7,311	7,311	7,311	-	-	-	-	-	-	-	-	-	-	-	-
2d.4.17	Utility Staff Cost	-	-	-	-	-	-	-	1,908	11,600	10,670	10,670	-	-	-	-	-	-	-	-	-	-	-
2d.4	Subtotal Period 2d Period-Dependent Costs	244	2,713	40	21	-	167	31,579	5,052	43,446	38,004	38,004	-	-	-	2,030	2,030	-	-	-	40,000	66	-
2d.0	TOTAL PERIOD 2d COST	2,196	6,981	576	1,422	2,308	14,055	36,905	13,292	75,896	70,932	70,932	-	-	-	13,120	75,164	-	-	-	3,926,210	67,993	403,177



**Monticello Nuclear Generating Plant  
 Decommissioning Cost Analysis**

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**Table C  
 Monticello Nuclear Generating Plant  
 DECON Decommissioning Cost Estimate with DOE Pickup of Industry Fuel Starting in 2035**  
 (Thousands of 2030 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Class A Cu. Feet	Class B Cu. Feet	Burial Volumes Class C Cu. Feet	Burial / Processed Wt. Lbs.	Craft Manhours	Utility and Contractor Manhours	
<b>PERIOD 2f - License Termination</b>																					
Period 2f Direct Decommissioning Activities																					
2f.1.1	ORISE preliminary survey	-	-	-	-	-	-	166	50	216	216	-	-	-	-	-	-	-	-	-	-
2f.1.2	Subtotal Period 2f Activity Costs	-	-	-	-	-	-	166	50	216	216	-	-	-	-	-	-	-	-	-	-
Period 2f Additional Costs																					
2f.2.1	ORISE Decommissioning Survey	-	-	-	-	-	-	6,920	2,075	8,995	8,995	-	-	-	-	-	-	-	-	95,048	6,240
2f.2.2	Subtotal Period 2f Additional Costs	-	-	-	-	-	-	6,920	2,075	8,995	8,995	-	-	-	-	-	-	-	-	95,048	6,240
Period 2f Collateral Costs																					
2f.3.1	DOE Decommission expenses	-	-	-	-	-	-	1,264	100	1,454	1,454	-	-	-	-	-	-	-	-	-	-
2f.3.2	Spent Fuel Capital and Transfer	-	-	-	-	-	-	526	79	605	605	-	-	-	-	-	-	-	-	-	-
2f.3.3	Subtotal Period 2f Collateral Costs	-	-	-	-	-	-	1,790	268	2,058	2,058	-	-	-	-	-	-	-	-	-	-
Period 2f Period-Dependent Costs																					
2f.4.1	Insurance	-	-	-	-	-	-	530	53	583	583	-	-	-	-	-	-	-	-	-	-
2f.4.2	Property taxes	-	-	-	-	-	-	1,470	147	1,617	1,617	-	-	-	-	-	-	-	-	-	-
2f.4.3	Health physics supplies	-	708	-	-	-	-	177	884	884	-	-	-	-	-	-	-	-	-	-	-
2f.4.4	Health physics equipment	-	-	-	4	-	-	29	41	315	315	-	-	-	-	-	-	-	-	12	-
2f.4.5	Plant energy budget	-	-	-	-	-	-	274	41	315	315	-	-	-	-	-	-	-	-	7,007	-
2f.4.6	NRC Fees	-	-	-	-	-	-	426	43	468	468	-	-	-	-	-	-	-	-	-	-
2f.4.7	Emergency Planning Fees	-	-	-	-	-	-	112	123	135	135	-	-	-	-	-	-	-	-	-	-
2f.4.8	RFI Fees	-	-	-	-	-	-	84	13	97	97	-	-	-	-	-	-	-	-	-	-
2f.4.9	RFSI Operating Costs	-	-	-	-	-	-	94	14	108	108	-	-	-	-	-	-	-	-	-	-
2f.4.10	Railroad Track Maintenance	-	-	-	-	-	-	10,950	1,650	12,600	12,600	-	-	-	-	-	-	-	-	-	-
2f.4.11	Security Staff Cost	-	-	-	-	-	-	5,762	864	6,626	6,626	-	-	-	-	-	-	-	-	-	-
2f.4.12	Security Staff Cost	-	-	-	-	-	-	5,762	864	6,626	6,626	-	-	-	-	-	-	-	-	-	-
2f.4.13	Utility Staff Cost	-	-	-	-	-	-	29	267	40	40	-	-	-	-	-	-	-	-	-	-
2f.4	Subtotal Period 2f Period-Dependent Costs	-	708	7	4	-	29	35,615	6,464	42,857	37,382	5,444	-	-	355	-	-	-	7,007	95,059	307,128
2f.9	TOTAL PERIOD 2f COST	-	708	7	4	-	29	35,615	6,464	42,857	37,382	5,444	-	-	355	-	-	-	7,007	95,059	307,128
<b>PERIOD 2 TOTALS</b>																					
13,731		65,566	20,473	10,731	49,937	72,677	386,033	128,758	747,896	576,287	171,445	73	288,160	174,123	1,761	898	-	21,052,390	727,310	2,393,046	
<b>PERIOD 3b - Site Restoration</b>																					
Period 3b Direct Decommissioning Activities																					
3b.1.1.1	Reactor Building	-	1,971	-	-	-	-	-	266	2,237	-	-	3,267	-	-	-	-	-	13,311	-	-
3b.1.1.2	Condensate Tanks Foundation	-	10	-	-	-	-	-	1	11	-	-	11	-	-	-	-	-	50	-	-
3b.1.1.3	Discharge Retention Basin	-	4	-	-	-	-	-	1	5	-	-	5	-	-	-	-	-	25	-	-
3b.1.1.4	Hot Room	-	0	-	-	-	-	-	2	2	-	-	2	-	-	-	-	-	7	-	-
3b.1.1.5	Hot Shop	-	16	-	-	-	-	-	5	19	-	-	19	-	-	-	-	-	177	-	-
3b.1.1.6	Hydrogen & Oxygen Storage	-	2	-	-	-	-	-	2	2	-	-	2	-	-	-	-	-	19	-	-
3b.1.1.7	LLRW Storage & Shipping	-	83	-	-	-	-	-	12	95	-	-	95	-	-	-	-	-	662	-	-
3b.1.1.8	LLRW Storage & Shipping	-	0	-	-	-	-	-	1	1	-	-	1	-	-	-	-	-	1	-	-
3b.1.1.9	Misc Structures 2017	-	1,410	-	-	-	-	-	212	1,622	-	-	1,622	-	-	-	-	-	13,042	-	-
3b.1.1.10	Offgas Stack	-	108	-	-	-	-	-	16	124	-	-	124	-	-	-	-	-	544	-	-
3b.1.1.11	Offgas Storage & Compressor	-	39	-	-	-	-	-	6	45	-	-	45	-	-	-	-	-	199	-	-
3b.1.1.12	Reactor Building	-	228	-	-	-	-	-	14	242	-	-	242	-	-	-	-	-	1,733	-	-
3b.1.1.13	Reactor Building	-	186	-	-	-	-	-	28	214	-	-	214	-	-	-	-	-	983	-	-
3b.1.1.14	Security Barrier	-	2,461	-	-	-	-	-	389	2,850	-	-	2,850	-	-	-	-	-	12,949	-	-
3b.1.1.15	Structures Greater than 3' Below Grade	-	1,293	-	-	-	-	-	180	1,473	-	-	1,473	-	-	-	-	-	13,026	-	-
3b.1.1.16	Tungsten	-	55	-	-	-	-	-	27	209	-	-	209	-	-	-	-	-	618	-	-
3b.1.1.17	Tungsten	-	182	-	-	-	-	-	27	209	-	-	209	-	-	-	-	-	596	-	-
3b.1.1.18	Turbine Building Addition	-	8,160	-	-	-	-	-	1,225	9,385	-	-	9,385	-	-	-	-	-	58,885	-	-
3b.1.1.19	Turbine Pedestal	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3b.1.1	Totals	-	806	-	-	-	-	200	1,330	10,659	231	-	10,425	-	-	-	-	-	1,841	-	-
<b>Site Cleanup Activities</b>																					
3b.1.2	Grade & Landscape site	-	-	-	-	-	-	200	134	1,031	-	-	-	-	-	-	-	-	-	-	-
3b.1.3	Final report to NRC	-	-	-	-	-	-	251	30	281	231	-	-	-	-	-	-	-	-	-	-
3b.1	Subtotal Period 3b Activity Costs	-	9,065	-	-	-	-	250	1,360	10,659	231	-	10,425	-	-	-	-	-	60,726	-	-

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**Table C  
 Monticello Nuclear Generating Plant  
 DECON Decommissioning Cost Estimate with DOE Pickup of Industry Fuel Starting in 2035**  
 (Thousands of 2020 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Offsite Processing Costs	LLRW Disposal Costs	Other	Total Contingency	Total	Lic. Term. Costs	NRC Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GFCC Cu. Feet	Burial / Processed Wt. Lbs.	Craft Manhours	Utility and Contractor Manhours	
<b>Period 3b Additional Costs</b>																							
3b.2.1	Clean Concrete Disposal	-	3,322	-	-	-	-	13	500	3,855	-	-	-	3,835	-	-	-	-	-	-	-	12	-
3b.2.2	Intake Structure Cofferdam	-	335	-	-	-	-	-	50	385	-	-	-	385	-	-	-	-	-	-	-	2,584	-
3b.2.3	Intake Structure Debris	-	5,883	-	-	-	-	1,170	875	7,933	-	-	-	7,933	-	-	-	-	-	-	-	5,522	-
3b.2.4	Boatlift	-	442	-	-	-	-	-	65	508	-	-	-	508	-	-	-	-	-	-	-	3,532	-
3b.2.5	Discharge Structure Cofferdam	-	9,682	-	-	-	-	1,183	1,630	12,495	-	-	-	12,495	-	-	-	-	-	-	-	11,570	-
3b.2	Subtotal Period 3b Additional Costs	-	10,782	-	-	-	-	2,471	2,120	15,373	-	-	-	15,373	-	-	-	-	-	-	-	23,708	-
<b>Period 3b Collateral Costs</b>																							
3b.3.1	Small tool allowance	-	110	-	-	-	-	-	17	127	-	-	-	127	-	-	-	-	-	-	-	-	-
3b.3.2	Spent Fuel Capital Land Transfer	-	-	-	-	-	-	5,601	840	6,442	-	-	-	6,442	-	-	-	-	-	-	-	-	-
3b.3	Subtotal Period 3b Collateral Costs	-	110	-	-	-	-	5,601	857	6,568	-	-	-	6,568	-	-	-	-	-	-	-	-	-
<b>Period 3b Period-Dependent Costs</b>																							
3b.4.1	Insurance	-	-	-	-	-	-	1,220	122	1,342	-	1,342	-	-	-	-	-	-	-	-	-	-	-
3b.4.2	Property taxes	-	-	-	-	-	-	2,540	274	2,814	-	-	-	2,794	-	-	-	-	-	-	-	-	-
3b.4.3	Plant energy	-	5,842	-	-	-	-	315	47	6,362	-	-	-	6,110	-	-	-	-	-	-	-	-	-
3b.4.4	Plant energy budget	-	-	-	-	-	-	356	36	391	-	-	-	391	-	-	-	-	-	-	-	-	-
3b.4.5	NRC ISFSI Fees	-	-	-	-	-	-	297	26	323	-	-	-	323	-	-	-	-	-	-	-	-	-
3b.4.6	Emergency Planning Fees	-	-	-	-	-	-	194	29	223	-	-	-	223	-	-	-	-	-	-	-	-	-
3b.4.7	ISFSI Operating Costs	-	-	-	-	-	-	194	29	223	-	-	-	223	-	-	-	-	-	-	-	-	-
3b.4.8	ISFSI Operating Costs	-	-	-	-	-	-	194	29	223	-	-	-	223	-	-	-	-	-	-	-	-	-
3b.4.9	Railroad Track Maintenance	-	-	-	-	-	-	545	81	624	-	249	-	375	-	-	-	-	-	-	-	-	-
3b.4.10	Security Staff Cost	-	-	-	-	-	-	25,219	3,798	29,017	-	0	-	29,017	-	-	-	-	-	-	-	-	373,132
3b.4.11	Security Staff Cost	-	-	-	-	-	-	1,031	103	1,134	-	-	-	1,134	-	-	-	-	-	-	-	-	18,297
3b.4.12	Utility Staff Cost	-	5,842	-	-	-	-	6,873	1,031	7,904	-	-	-	5,857	-	-	-	-	-	-	-	-	506,005
3b.4	Subtotal Period 3b Period-Dependent Costs	-	5,842	-	-	-	-	50,467	8,228	64,537	-	2,020	-	15,266	-	-	-	-	-	-	-	-	597,655
3b.0	TOTAL PERIOD 3b COST	-	24,700	-	-	-	-	57,452	12,104	94,255	-	2,351	-	22,367	-	-	-	-	-	-	-	72,296	-
<b>PERIOD 3c - Fuel Storage Operations/Shipping</b>																							
Period 3c Direct Decommissioning Activities																							
Period 3c Collateral Costs																							
3c.3.1	Spent Fuel Capital Land Transfer	-	-	-	-	-	-	35,783	5,397	41,180	-	-	-	41,180	-	-	-	-	-	-	-	-	-
3c.3	Subtotal Period 3c Collateral Costs	-	-	-	-	-	-	35,783	5,397	41,180	-	-	-	41,180	-	-	-	-	-	-	-	-	-
Period 3c Period-Dependent Costs																							
3c.4.1	Insurance	-	-	-	-	-	-	24,691	2,466	27,127	-	-	-	27,127	-	-	-	-	-	-	-	-	-
3c.4.2	Property taxes	-	-	-	-	-	-	10,652	3,659	14,311	-	-	-	14,311	-	-	-	-	-	-	-	-	-
3c.4.3	Plant energy	-	-	-	-	-	-	9,642	384	10,006	-	-	-	10,006	-	-	-	-	-	-	-	-	-
3c.4.4	NRC ISFSI Fees	-	-	-	-	-	-	5,199	520	5,718	-	-	-	5,718	-	-	-	-	-	-	-	-	-
3c.4.5	Emergency Planning Fees	-	-	-	-	-	-	7,552	1,133	8,685	-	-	-	8,685	-	-	-	-	-	-	-	-	-
3c.4.6	Fixed Overhead Costs	-	-	-	-	-	-	4,385	459	4,844	-	-	-	4,844	-	-	-	-	-	-	-	-	-
3c.4.7	Railroad Track Maintenance	-	-	-	-	-	-	4,384	659	5,043	-	-	-	5,043	-	-	-	-	-	-	-	-	-
3c.4.8	Railroad Track Maintenance	-	-	-	-	-	-	4,384	659	5,043	-	-	-	5,043	-	-	-	-	-	-	-	-	-
3c.4.9	Security Staff Cost	-	-	-	-	-	-	150,798	22,620	173,418	-	-	-	173,418	-	-	-	-	-	-	-	-	1,896,208
3c.4.10	Utility Staff Cost	-	-	-	-	-	-	36,023	5,403	41,427	-	-	-	41,427	-	-	-	-	-	-	-	-	492,285
3c.4	Subtotal Period 3c Period-Dependent Costs	-	-	-	-	-	-	274,051	31,539	311,590	-	-	-	311,590	-	-	-	-	-	-	-	-	2,388,493
3c.0	TOTAL PERIOD 3c COST	-	-	-	-	-	-	309,834	42,907	352,741	-	-	-	352,741	-	-	-	-	-	-	-	-	-
<b>PERIOD 3d - GTCC shipping</b>																							
Period 3d Direct Decommissioning Activities																							
Nuclear Storage System Removal																							
3d.1.1	Removal & Interim GTCC Disposal	-	-	1,083	-	-	-	4,313	918	6,314	-	-	-	-	-	-	-	-	-	-	-	-	-
3d.1.1	Removal & Interim GTCC Disposal	-	-	1,083	-	-	-	4,313	918	6,314	-	-	-	-	-	-	-	-	-	-	-	-	-
3d.1	Subtotal Period 3d Activity Costs	-	-	1,083	-	-	-	4,313	918	6,314	-	-	-	-	-	-	-	-	-	-	-	-	-
Period 3d Collateral Costs																							
3d.3.1	Spent Fuel Capital Land Transfer	-	-	-	-	-	-	55	8	64	-	-	-	64	-	-	-	-	-	-	-	-	-
3d.3	Subtotal Period 3d Collateral Costs	-	-	-	-	-	-	55	8	64	-	-	-	64	-	-	-	-	-	-	-	-	-

**Monticello Nuclear Generating Plant  
 Decommissioning Cost Analysis**

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**Table C  
 Monticello Nuclear Generating Plant  
 DECON Decommissioning Cost Estimate with DOE Pickup of Industry Fuel Starting in 2035**  
 (Thousands of 2030 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Contingency	Total Contingency	Total	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Class A Cu. Feet	Class B Cu. Feet	Burial Volumes Class C Cu. Feet	GFCC Cu. Feet	Borial / Processed Wt. Lbs.	Craft Manhours	Utility and Contractor Manhours
<b>Period 3d Period-Dependent Costs</b>																					
3d.4.1	Insurance	-	-	-	-	-	-	27	3	30	30	-	-	-	-	-	-	-	-	-	-
3d.4.2	Property taxes	-	-	-	-	-	-	35	3	38	38	-	-	-	-	-	-	-	-	-	-
3d.4.3	NRC ISFSI Fees	-	-	-	-	-	-	6	1	7	-	-	-	-	-	-	-	-	-	-	-
3d.4.4	Professional Planning Fees	-	-	-	-	-	-	6	1	7	-	-	-	-	-	-	-	-	-	-	-
3d.4.5	Fixed Overhead	-	-	-	-	-	-	8	1	10	10	-	-	-	-	-	-	-	-	-	-
3d.4.6	Railroad Track Maintenance	-	-	-	-	-	-	5	1	6	6	-	-	-	-	-	-	-	-	-	-
3d.4.7	Railroad Track Maintenance	-	-	-	-	-	-	5	1	6	6	-	-	-	-	-	-	-	-	-	-
3d.4.8	Security Staff Cost	-	-	-	-	-	-	185	25	210	190	-	-	-	-	-	-	-	-	-	-
3d.4.9	Security Staff Cost	-	-	-	-	-	-	185	25	210	190	-	-	-	-	-	-	-	-	-	-
3d.4	Subtotal Period 3d Period-Dependent Costs	-	-	-	-	-	-	293	40	333	318	15	-	-	-	-	-	-	-	-	-
3d.0	TOTAL PERIOD 3d COST	-	-	1,083	-	-	4,313	348	966	6,710	6,652	78	-	-	-	-	-	1,100	225,705	-	2,613
<b>PERIOD 3e - ISFSI Decommissionation</b>																					
Period 3e Direct Decommissioning Activities																					
Period 3e Additional Costs																					
3e.2.1	License Termination ISFSI	-	57	188	987	-	5,925	2,013	2,292	11,462	11,462	-	-	-	21,949	-	-	-	2,633,402	10,339	2,201
3e.2.2	Subtotal Period 3e Additional Costs	-	57	188	987	-	5,925	2,013	2,292	11,462	11,462	-	-	-	21,949	-	-	-	2,633,402	10,339	2,201
Period 3e Period-Dependent Costs																					
3e.4.1	Insurance	-	-	-	-	-	-	118	30	148	148	-	-	-	-	-	-	-	-	-	-
3e.4.2	Property taxes	-	-	-	-	-	-	249	62	312	312	-	-	-	-	-	-	-	-	-	-
3e.4.3	NRC ISFSI Fees	-	-	-	-	-	-	12	1	13	-	-	-	-	-	-	-	-	-	-	-
3e.4.4	Professional Planning Fees	-	-	-	-	-	-	12	1	13	-	-	-	-	-	-	-	-	-	-	-
3e.4.5	Fixed Overhead	-	-	-	-	-	-	71	18	89	89	-	-	-	-	-	-	-	-	-	-
3e.4.6	Railroad Track Maintenance	-	-	-	-	-	-	41	10	52	52	-	-	-	-	-	-	-	-	-	-
3e.4.7	Railroad Track Maintenance	-	-	-	-	-	-	352	88	440	440	-	-	-	-	-	-	-	-	-	-
3e.4.8	Security Staff Cost	-	-	-	-	-	-	1,105	273	1,381	1,381	-	-	-	-	-	-	-	-	-	-
3e.4.9	Security Staff Cost	-	-	-	-	-	-	1,105	273	1,381	1,381	-	-	-	-	-	-	-	-	-	-
3e.4	Subtotal Period 3e Period-Dependent Costs	-	-	-	-	-	-	1,405	273	1,381	1,381	-	-	-	-	-	-	-	-	-	-
3e.0	TOTAL PERIOD 3e COST	-	57	188	987	-	5,925	3,118	2,569	12,844	12,844	-	-	-	21,949	-	-	-	2,633,402	10,339	10,903
<b>PERIOD 3f - ISFSI Site Restoration</b>																					
Period 3f Direct Decommissioning Activities																					
Period 3f Additional Costs																					
3f.2.1	Demolition and Site Restoration of ISFSI	-	1,486	-	-	-	-	233	258	1,487	-	-	-	-	-	-	-	-	-	6,987	160
3f.2.2	Subtotal Period 3f Additional Costs	-	1,486	-	-	-	-	233	258	1,487	-	-	-	-	-	-	-	-	-	6,987	160
Period 3f Collateral Costs																					
3f.3.1	Small tool allowance	-	10	-	-	-	-	-	2	12	-	-	-	-	-	-	-	-	-	-	-
3f.3	Subtotal Period 3f Collateral Costs	-	10	-	-	-	-	-	2	12	-	-	-	-	-	-	-	-	-	-	-
Period 3f Period-Dependent Costs																					
3f.4.2	Property taxes	-	-	-	-	-	-	126	13	138	-	-	-	-	-	-	-	-	-	-	-
3f.4.3	Heavy equipment rental	-	-	-	-	-	-	134	17	151	-	-	-	-	-	-	-	-	-	-	-
3f.4.4	Heavy equipment rental	-	-	-	-	-	-	6	1	7	-	-	-	-	-	-	-	-	-	-	-
3f.4.5	Fixed Overhead	-	-	-	-	-	-	36	4	41	-	-	-	-	-	-	-	-	-	-	-
3f.4.6	Railroad Track Maintenance	-	-	-	-	-	-	21	3	24	-	-	-	-	-	-	-	-	-	-	-
3f.4.7	Railroad Track Maintenance	-	-	-	-	-	-	177	27	204	-	-	-	-	-	-	-	-	-	-	-
3f.4.8	Security Staff Cost	-	-	-	-	-	-	177	27	204	-	-	-	-	-	-	-	-	-	-	-
3f.4.9	Security Staff Cost	-	-	-	-	-	-	177	27	204	-	-	-	-	-	-	-	-	-	-	-
3f.4	Subtotal Period 3f Period-Dependent Costs	-	-	-	-	-	-	475	82	557	-	-	-	-	-	-	-	-	-	-	-
3f.0	TOTAL PERIOD 3f COST	-	1,613	-	-	-	-	709	342	2,663	-	-	-	-	-	-	-	-	-	6,987	4,214
<b>PERIOD 3g TOTALS</b>																					
TOTAL COST TO DECOMMISSION																					
17,263		26,380	1,271	987	-	10,528	371,460	58,888	469,213	21,726	373,186	72,301	-	21,949	-	-	-	1,100	2,851,167	80,992	3,003,998
17,263		95,223	21,839	11,878	49,052	84,623	911,757	212,629	1,405,104	776,139	555,579	73,386	288,303	197,270	1,592	898	-	1,100	2,417,450	848,750	6,836,008

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**Table C**  
**Monticello Nuclear Generating Plant**  
**DECON Decommissioning Cost Estimate with DOE Pickup of Industry Fuel Starting in 2035**  
 (Thousands of 2030 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes			Borial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours	
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet				GTCC Cu. Feet
<b>TOTAL COST TO DECOMMISSION WITH 17.83% CONTINGENCY:</b>																					
	TOTAL NRC LICENSE TERMINATION COST IS 52.24% OR:				\$1,405,101	thousands of 2030 dollars															
	SPENT FUEL MANAGEMENT COST IS 39.54% OR:				\$776,139	thousands of 2030 dollars															
	NON-NUCLEAR DEMOLITION COST IS 5.22% OR:				\$525,979	thousands of 2030 dollars															
	TOTAL LOW-LEVEL RADIOACTIVE WASTE BURIED (EXCLUDING GTCC):				\$73,388	thousands of 2030 dollars															
	TOTAL GREATER THAN CLASS C RADWASTE VOLUME GENERATED:				290,160	Cubic Feet															
	TOTAL SCRAP METAL REMOVED:				1,160	Cubic Feet															
	<b>TOTAL CRAFT LABOR REQUIREMENTS:</b>				23,123	Tons															
					\$48,750	Man-hours															

End Notes:  
 na - indicates that this activity not charged as decommissioning expense  
 0 - indicates that this activity performed by decommissioning staff  
 \* - indicates that this activity is not a direct cost  
 A cell containing "-" indicates a zero value

***Monticello Nuclear Generating Plant  
Decommissioning Cost Analysis***

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**APPENDIX D**

**DETAILED COST ANALYSIS**

**SCENARIO 2: DECON with 60 Year DFS**

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**Table D  
 Monticello Nuclear Generating Plant  
 DECON Decommissioning Cost Estimates with 60 Years of Spent Fuel Storage**  
 (Thousands of 2020 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LIRW Disposal Costs	Other Costs	Total Contingency	Total Lic. Term. Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu Feet	Burial Volumes			Burial/Processed Wt. Lbs.	Craft Manhours	Utility and Contractor Manhours	
															Class A Cu Feet	Class B Cu Feet	Class C Cu Feet				
<b>PERIOD 1a - Shutdown through Transition</b>																					
1a.1.1	Period 1a Direct Decommissioning Activities	-	-	-	-	-	-	167	25	192	192	-	-	-	-	-	-	-	-	-	1,300
1a.1.2	Prepare preliminary decommissioning cost estimates	-	-	-	-	-	-	-	n/a	-	-	-	-	-	-	-	-	-	-	-	-
1a.1.3	Remove fuel & source material	-	-	-	-	-	-	-	-	-	296	-	-	-	-	-	-	-	-	-	2,000
1a.1.4	Notification of Permanent Dismantling	-	-	-	-	-	-	-	-	-	680	-	-	-	-	-	-	-	-	-	4,600
1a.1.5	Deactivate plant systems & process waste	-	-	-	-	-	-	257	39	296	296	-	-	-	-	-	-	-	-	-	-
1a.1.6	Review plant design & specs.	-	-	-	-	-	-	-	501	89	680	-	-	-	-	-	-	-	-	-	-
1a.1.8	Perform detailed rad survey	-	-	-	-	-	-	-	129	19	148	-	-	-	-	-	-	-	-	-	1,000
1a.1.9	Estimate by-product inventory	-	-	-	-	-	-	122	15	102	102	-	-	-	-	-	-	-	-	-	1,300
1a.1.10	Detailed by-product inventory	-	-	-	-	-	-	964	145	1,108	1,108	-	-	-	-	-	-	-	-	-	7,500
1a.1.12	Define major work sequence	-	-	-	-	-	-	308	40	158	158	-	-	-	-	-	-	-	-	-	2,100
1a.1.13	Perform SER and EA	-	-	-	-	-	-	613	96	729	729	-	-	-	-	-	-	-	-	-	5,000
1a.1.14	Perform Site-Specific Cost Study	-	-	-	-	-	-	129	19	148	148	-	-	-	-	-	-	-	-	-	1,000
1a.1.15	Prepare/submit Irradiated Fuel Management Plan	-	-	-	-	-	-	-	95	727	654	-	-	-	-	-	-	-	-	-	4,920
<b>Activity Specifications</b>																					
1a.1.17.1	Plant & temporary facilities	-	-	-	-	-	-	536	80	616	554	-	-	-	-	-	-	-	-	-	4,167
1a.1.17.2	Plant systems	-	-	-	-	-	-	64	10	74	74	-	-	-	-	-	-	-	-	-	500
1a.1.17.3	SSSS Decommissionation Flush	-	-	-	-	-	-	835	132	1,067	961	-	-	-	-	-	-	-	-	-	6,500
1a.1.17.5	Reactor vessel	-	-	-	-	-	-	64	10	74	74	-	-	-	-	-	-	-	-	-	500
1a.1.17.6	Sacrificial shield	-	-	-	-	-	-	129	19	148	148	-	-	-	-	-	-	-	-	-	1,000
1a.1.17.7	Moisture separators/ventilators	-	-	-	-	-	-	208	40	300	300	-	-	-	-	-	-	-	-	-	2,088
1a.1.17.9	Main Turbine	-	-	-	-	-	-	257	39	296	296	-	-	-	-	-	-	-	-	-	2,000
1a.1.17.10	Main Condensers	-	-	-	-	-	-	401	60	461	461	-	-	-	-	-	-	-	-	-	3,120
1a.1.17.11	Pressure suppression structure	-	-	-	-	-	-	501	89	680	680	-	-	-	-	-	-	-	-	-	4,600
1a.1.17.13	Plant structures & buildings	-	-	-	-	-	-	116	17	133	67	-	-	-	-	-	-	-	-	-	900
1a.1.17.14	Waste management	-	-	-	-	-	-	466	823	6,306	5,739	-	-	-	-	-	-	-	-	-	42,583
1a.1.17.15	Facility & site closure	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1a.1.17	Total	-	-	-	-	-	-	308	46	355	355	-	-	-	-	-	-	-	-	-	2,400
1a.1.18	Prepare dismantling sequence	-	-	-	-	-	-	180	27	207	207	-	-	-	-	-	-	-	-	-	1,400
1a.1.20	Design water drain up system	-	-	-	-	-	-	2,400	360	2,760	2,760	-	-	-	-	-	-	-	-	-	-
1a.1.21	Rigging/Cont. Curt. EHV/switching/etc.	-	-	-	-	-	-	158	24	182	182	-	-	-	-	-	-	-	-	-	1,200
1a.1.22	Procure caseloaders & containers	-	-	-	-	-	-	16,369	2,465	13,054	18,505	-	-	-	-	-	-	-	-	-	83,013
1a.1	Subtotal Period 1a Activity Costs	-	-	-	-	-	-	1,323	198	1,522	1,522	-	-	-	-	-	-	-	-	-	-
1a.3.1	Spent Fuel Capital and Transfer	-	-	-	-	-	-	1,682	1,682	11,376	11,376	-	-	-	-	-	-	-	-	-	-
1a.3	Subtotal Period 1a Collateral Costs	-	-	-	-	-	-	1,682	1,682	12,958	12,958	-	-	-	-	-	-	-	-	-	-
<b>Period 1a Period-Dependent Costs</b>																					
1a.4	Insurance	-	-	-	-	-	-	5,298	693	9,641	9,641	-	-	-	-	-	-	-	-	-	-
1a.4.1	Health physics	-	-	-	-	-	-	3,370	327	3,927	3,927	-	-	-	-	-	-	-	-	-	-
1a.4.3	Health physics supplies	-	-	-	-	-	-	153	153	767	767	-	-	-	-	-	-	-	-	-	-
1a.4.4	Heavy equipment rental	-	-	-	-	-	-	113	896	886	886	-	-	-	-	-	-	-	-	-	-
1a.4.5	Deposit of DAW generated	-	-	-	-	-	-	50	85	85	85	-	-	-	-	-	-	-	-	-	20
1a.4.6	Procure engineering budgets	-	-	-	-	-	-	1,817	232	2,088	2,088	-	-	-	-	-	-	-	-	-	-
1a.4.7	NRC Fees	-	-	-	-	-	-	1,137	114	1,251	1,251	-	-	-	-	-	-	-	-	-	12,100
1a.4.8	Emergency Planning Fees	-	-	-	-	-	-	348	343	3,770	3,770	-	-	-	-	-	-	-	-	-	-
1a.4.9	Food Operations	-	-	-	-	-	-	2,015	3,000	3,000	3,000	-	-	-	-	-	-	-	-	-	-
1a.4.10	Food Operations O&M	-	-	-	-	-	-	112	127	129	129	-	-	-	-	-	-	-	-	-	-
1a.4.11	RFSS Operating Costs	-	-	-	-	-	-	125	19	144	144	-	-	-	-	-	-	-	-	-	-
1a.4.12	Railroad Track Maintenance	-	-	-	-	-	-	2,466	2,466	33,252	33,252	-	-	-	-	-	-	-	-	-	245,410
1a.4.13	Security Staff Cost	-	-	-	-	-	-	27,352	27,352	33,252	33,252	-	-	-	-	-	-	-	-	-	245,410
1a.4.14	Security Staff Cost	-	-	-	-	-	-	4,703	6,703	61,972	61,972	-	-	-	-	-	-	-	-	-	467,680
1a.4	Subtotal Period 1a Period-Dependent Costs	-	-	-	-	-	-	1,367	12	1,387	1,387	-	-	-	-	-	-	-	-	-	20

**Monticello Nuclear Generating Plant  
 Decommissioning Cost Analysis**

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**Table D  
 Monticello Nuclear Generating Plant  
 DECON Decommissioning Cost Estimates with 60 Years of Spent Fuel Storage**  
 (Thousands of 2020 Dollars)

Activity Index	Activity Description	Decom Cost	Removal Cost	Packaging Cost	Transport Cost	Off-Site Processing Cost	LLRW Disposal Cost	Other Cost	Total Contingency	Total	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu Feet	Class A Cu Feet	Class B Cu Feet	Class C Cu Feet	GTCC Cu Feet	Barial/Volumes	Barial/Processed Wt. Lbs.	Craft Manhours	Utility and Contractor Manhours
1b.0	TOTAL PERIOD 1b CONST	-	1,307	12	6	-	50	87,418	12,871	101,724	94,783	6,382	550	-	610	-	-	-	-	12,190	20	750,893
<b>Period 1b Direct Decommissioning Preparations</b>																						
<b>Period 1b Direct Decommissioning Activities</b>																						
<b>Detailed Work Procedures</b>																						
1b.1.1	Site systems	-	-	-	-	-	-	698	51	749	630	-	70	-	-	-	-	-	-	-	-	4,733
1b.1.1.1	NSSS systems	-	-	-	-	-	-	524	59	583	148	-	-	-	-	-	-	-	-	-	-	4,000
1b.1.1.2	NSSS decontamination flush	-	-	-	-	-	-	514	77	591	501	-	-	-	-	-	-	-	-	-	-	1,350
1b.1.1.3	Reactor internals	-	-	-	-	-	-	174	26	200	50	-	150	-	-	-	-	-	-	-	-	1,000
1b.1.1.4	Remaining buildings	-	-	-	-	-	-	129	19	148	148	-	-	-	-	-	-	-	-	-	-	2,000
1b.1.1.5	CRD housings & NPs	-	-	-	-	-	-	257	39	296	296	-	-	-	-	-	-	-	-	-	-	3,630
1b.1.1.7	Removal primary containment	-	-	-	-	-	-	467	70	537	537	-	-	-	-	-	-	-	-	-	-	1,200
1b.1.1.8	Reactor vessel	-	-	-	-	-	-	154	23	177	177	-	89	-	-	-	-	-	-	-	-	1,000
1b.1.1.9	Facility decont	-	-	-	-	-	-	129	19	148	148	-	-	-	-	-	-	-	-	-	-	2,080
1b.1.1.10	Reinforced concrete	-	-	-	-	-	-	207	40	307	307	-	74	-	-	-	-	-	-	-	-	2,688
1b.1.1.11	Main Turbine	-	-	-	-	-	-	268	40	308	308	-	-	-	-	-	-	-	-	-	-	2,730
1b.1.1.12	Main Condensers	-	-	-	-	-	-	351	53	403	363	-	40	-	-	-	-	-	-	-	-	3,571
1b.1.1.13	Man Containers	-	-	-	-	-	-	351	53	403	363	-	40	-	-	-	-	-	-	-	-	3,571
1b.1.1.15	Radwaste building	-	-	-	-	-	-	4,336	650	4,987	4,524	-	463	-	-	-	-	-	-	-	-	1,067
1b.1.1	Reactor building	-	-	-	-	-	-	4,336	650	4,987	4,524	-	463	-	-	-	-	-	-	-	-	1,067
1b.1.2	Decom NSSS	206	-	-	-	-	-	-	148	444	444	-	-	-	-	-	-	-	-	-	-	33,741
1b.1	Subtotal Period 1b Activity Costs	206	-	-	-	-	-	4,336	798	5,431	4,968	-	463	-	-	-	-	-	-	-	-	33,741
<b>Period 1b Additional Costs</b>																						
1b.2.1	Spent Fuel Pool Isolation	-	-	-	-	-	-	12,075	1,901	14,576	14,576	-	-	-	-	-	-	-	-	-	-	10,852
1b.2.2	Site Characterization	-	-	-	-	-	-	5,950	1,779	7,708	7,708	-	-	-	-	-	-	-	-	-	-	161
1b.2.3	Mixed & RCRA Waste	-	-	-	-	-	-	18,005	9	80	80	-	-	43	-	-	-	-	-	-	-	30,061
1b.2	Subtotal Period 1b Additional Costs	-	-	-	-	-	-	18,005	3,689	22,365	22,365	-	-	43	-	-	-	-	-	-	-	10,852
<b>Period 1b Collateral Costs</b>																						
1b.3.1	Decom equipment	1,055	-	-	-	-	-	1,264	168	1,213	1,213	-	-	-	-	-	-	-	-	-	-	-
1b.3.2	Travel and transportation expenses	38	-	-	-	-	-	1,264	53	283	283	-	-	-	-	-	-	-	-	-	-	-
1b.3.3	Process decommissioning water waste	1	-	-	-	-	-	1,264	396	2,024	2,024	-	-	-	233	-	-	-	-	-	-	45
1b.3.4	Process decommissioning chemical flush waste	1	-	-	-	-	-	1,264	0	0	0	-	-	-	-	-	-	-	-	-	-	43
1b.3.5	Small tool allowance	-	1,200	-	-	-	-	-	15	1,200	1,200	-	-	-	-	-	-	-	-	-	-	-
1b.3.6	Equipment	-	-	-	-	-	-	-	316	2,419	2,419	-	-	-	-	-	-	-	-	-	-	-
1b.3.7	Decont rig	-	-	-	-	-	-	-	59	450	450	-	-	-	-	-	-	-	-	-	-	-
1b.3.8	Spent Fuel Capital and Transfer	-	-	-	-	-	-	6,335	950	7,285	7,285	-	450	-	-	-	-	-	-	-	-	-
1b.3.9	Retention and Sovereignty	3,197	1,202	40	122	-	1,628	7,560	2,362	10,490	10,490	-	-	-	233	-	-	-	-	-	-	89
1b.3	Subtotal Period 1b Collateral Costs	3,197	1,202	40	122	-	1,628	7,560	2,362	10,490	10,490	-	450	-	233	-	-	-	-	-	-	89
<b>Period 1b Period-Dependent Costs</b>																						
1b.4.1	Decom supplies	30	-	-	-	-	-	1,551	10	48	48	-	-	-	-	-	-	-	-	-	-	-
1b.4.2	Insurance	-	-	-	-	-	-	1,709	171	1,880	1,880	-	-	-	-	-	-	-	-	-	-	-
1b.4.3	Property taxes	-	-	-	-	-	-	-	86	430	430	-	-	-	-	-	-	-	-	-	-	-
1b.4.4	Health physics supplies	-	-	-	-	-	-	-	56	432	432	-	-	-	-	-	-	-	-	-	-	-
1b.4.5	Heavy equipment rental	-	375	-	-	-	-	-	-	0	0	-	-	-	-	-	-	-	-	-	-	-
1b.4.6	Disposal of DAW generated	-	-	-	-	-	-	-	29	2,083	2,083	-	-	-	-	-	-	-	-	-	-	-
1b.4.7	Emergency Budgets	-	-	-	-	-	-	-	32	355	355	-	-	-	-	-	-	-	-	-	-	-
1b.4.8	NRC Fees	-	-	-	-	-	-	-	323	323	323	-	-	-	-	-	-	-	-	-	-	-
1b.4.9	Emergency Planning Fees	-	-	-	-	-	-	-	1,416	1,557	1,557	-	-	-	-	-	-	-	-	-	-	-
1b.4.10	Spent Fuel Pool O&M	-	-	-	-	-	-	-	63	484	484	-	-	-	-	-	-	-	-	-	-	-
1b.4.11	Spent Fuel Pool O&M	-	-	-	-	-	-	-	56	64	64	-	-	-	-	-	-	-	-	-	-	-
1b.4.12	RFSS Operating Costs	-	-	-	-	-	-	-	62	72	72	-	-	-	-	-	-	-	-	-	-	-
1b.4.13	Railroad Track Maintenance	-	-	-	-	-	-	-	1,657	6,368	6,368	-	-	-	-	-	-	-	-	-	-	-
1b.4.14	DOE-Site Cost	-	-	-	-	-	-	-	5,843	6,223	6,223	-	-	-	-	-	-	-	-	-	-	-
1b.4.15	DOE-Site Cost	-	-	-	-	-	-	-	2,052	15,734	15,734	-	-	-	-	-	-	-	-	-	-	-
1b.4.16	Utility Staff Cost	-	-	-	-	-	-	-	35,955	42,076	42,076	-	-	-	-	-	-	-	-	-	-	-
1b.4	Subtotal Period 1b Period-Dependent Costs	3,197	1,921	84	154	14	1,657	66,886	12,113	85,345	85,345	-	463	43	580	231	-	-	-	-	50,964	31,828
1b.0	TOTAL PERIOD 1b CONST	3,331	3,288	96	100	14	1,707	154,304	24,984	188,085	178,125	8,948	1,012	43	1,199	231	-	-	-	-	68,135	31,848
<b>PERIOD 1 TOTALS</b>																						

**Monticello Nuclear Generating Plant  
 Decommissioning Cost Analysis**

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**Table D  
 Monticello Nuclear Generating Plant  
 DECON Decommissioning Cost Estimates with 60 Years of Spent Fuel Storage**  
 (Thousands of 2020 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Cost	Transport Cost	Off-Site Processing Cost	LLRW Disposal Cost	Other Cost	Total Contingency	Total Cost	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu Feet	Class A Cu Feet	Class B Cu Feet	Class C Cu Feet	GTCC Cu Feet	Barrical/Processed Wt. Lbs.	Craft Manhours	Utility and Contractor Manhours
<b>PERIOD 2a - Large Component Removal</b>																					
Period 2a Direct Decommissioning Activities																					
Nuclear Steam Supply System Removal																					
2a.1.1.1	Automatic Press Relief	111								1,031					1,430				96,742	2,905	
2a.1.1.2	Recirculation System Piping & Valves	40								938					945				132,290	1,563	
2a.1.1.3	CRDMs & NAs Removal	24								2,590					11				6,750	3,105	
2a.1.1.4	CRDMs & NAs Removal	24								2,590					11				6,750	3,105	
2a.1.1.5	Reactor Vessel	113								30,140					16,169	1,761			1,105,210	30,515	1,379
2a.1.1	Totals	702							35,973	112,449				96	23,536	1,761			1,874,002	83,267	2,758
Removal of Major Equipment																					
2a.1.2	Main Turbine/Generator			385	1,356	521	6,139	439		1,311	10,182			24,835	1,383				1,577,959	5,438	
2a.1.3	Main Condensers			1,817	380	194	3,225	244		947	6,317			17,396	727				828,955	18,831	
Cascading Costs from Clean Building Demolition																					
2a.1.4.1	Reactor Building			332						50	381									2,217	
2a.1.4.2	Radiation			25						4	28									127	
2a.1.4.3	Turbine			127						146	146									1,251	
2a.1.4	Totals			485						72	556									3,598	
Disposal of Plant Systems																					
2a.1.5.1	Automatic Press Relief			118						70	410			803	206				45,852	1,656	
2a.1.5.2	Chemistry Sampling - Insulated			0						3	3			36	1				6,343	28	
2a.1.5.3	Chemistry Sampling - Insulated			2						0	0			1	1				72		
2a.1.5.4	Circulating Water - RCA			207						230	1,626			6,656	1				270,307	2,860	
2a.1.5.5	Combustible Gas Control - Insulated - RCA			29						13	80			212	2				8,617	378	
2a.1.5.6	Condensate & Feedwater - RCA			183						1,431	8,731			10,947	7,319				1,275,810	14,186	
2a.1.5.7	Condensate & Feedwater - Insulated			482						343	2,638			4,176	1,207				246,683	6,564	
2a.1.5.8	Condensate Drain			516						1,840	339			3,346	1,000				196,556	7,618	
2a.1.5.9	Condensate Drain			73						2,736	9			7,126	798				105,262	10,525	
2a.1.5.10	Control Rod Drive			3						2	9			19	4				1,009	41	
2a.1.5.11	Control Rod Drive Hydraulic			416						199	1,124			1,658	562				163,306	5,898	
2a.1.5.12	Core Spray - Insulated			79						184	1,244			4,384	521				211,359	1,163	
2a.1.5.13	Core Spray - Insulated			15						8	47			82	204				3,445	181	
2a.1.5.14	Drain Water - RCA			15						36	36			253	4				10,278	508	
2a.1.5.15	Drain Water - RCA			41						17	104			43	25				551	25	
2a.1.5.16	Diesel Oil - RCA			2						1	7			23	0				22	5	
2a.1.5.17	Diesel Oil - RCA			0						1	7			23	0				22	5	
2a.1.5.18	EDG Emergency Services Water - RCA			0						0	19			58	4				84	4	
2a.1.5.19	EDG Emergency Services Water - Insul. - RCA			0						2	15			2	2				84	182	
2a.1.5.20	Electrical - Clean			13						2	15			15	2				5,544	281	
2a.1.5.21	Emergency Services Water - Insul. - RCA			21						9	55			137	1				4,162	48	
2a.1.5.22	Emergency Services Water - Insul. - RCA			0						5	25			5	5				4,162	48	
2a.1.5.23	GEZEP - RCA			0						4	25			103	1				1,250	67	
2a.1.5.24	Generator Physical Design - RCA			5						2	12			31	1				1,080	81	
2a.1.5.25	R2-D2 Control Analyzing			6						3	15			6	13				52,760	965	
2a.1.5.26	R2-D2 Control Analyzing			0						0	0			0	0				52,760	965	
2a.1.5.27	High Pressure Coolant Injection			47						61	383			972	208				95,733	3,079	
2a.1.5.28	High Pressure Coolant Injection - Insula			219						141	839			1,598	481				1,354,661	14,733	
2a.1.5.29	Hydrogen Cooling - RCA			8						1	10			10	1				1,500	118	
2a.1.5.30	Hydrogen Cooling - RCA			17						9	67			189	17				7,669	212	
2a.1.5.31	Hydrogen Seal Oil - RCA			0						9	40			9	9				5,672	304	
2a.1.5.32	Hydrogen Water Chemistry - RCA			24						10	59			10	10				71,810	2,733	
2a.1.5.33	Instrument & Service Air - RCA			225						103	644			1,768	11				1,250	67	
2a.1.5.34	Instrument & Service Air - RCA			17						123	1,029			3,148	14				1,250	67	
2a.1.5.35	Main Condenser			249						335	2,007			1,533	9,350				1,354,661	14,733	
2a.1.5.36	Main Turbine			205						1,533	9,350			15,760	8,687				1,354,661	14,733	
2a.1.5.37	Main Turbine - Insulated			214						180	1,097			2,530	667				145,268	3,069	
2a.1.5.38	Main Turbine - Insulated			189						163	1,005			1,705	764				100,953	2,386	
2a.1.5.39	Off-Gas Recombiner			387						197	1,100			1,366	769				1,000,953	5,385	
2a.1.5.40	Off-Gas Recombiner - Insulated			19						33	33			33	33				4,318	345	
2a.1.5.41	Post-Accident Strapping			25						11	58			58	37				60,240	1,122	
2a.1.5.42	Post-Accident Strapping - Insulated			37						33	40			40	37				60,240	1,122	
2a.1.5.43	RHR Service Water - RCA			0						1	1			1	1				1,430	77	
2a.1.5.44	RHR Service Water - RCA			0						1	1			1	1				1,430	77	
2a.1.5.45	Reactor Feedwater Pump Seal			56						28	155			189	96				14,009	473	



**Monticello Nuclear Generating Plant  
 Decommissioning Cost Analysis**

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**Table D  
 Monticello Nuclear Generating Plant  
 DECON Decommissioning Cost Estimates with 60 Years of Spent Fuel Storage**  
 (Thousands of 2020 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Cost	Transport Cost	Off-Site Processing Cost	LWR Disposal Cost	Other Contingency	Total Contingency	Total	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu Feet	Barial Volumes			Borial/Processed Wt. Lbs.	Craft Manhours	Utility and Contractor Manhours	
															Class A Cu Feet	Class B Cu Feet	Class C Cu Feet				
2a.15.46	Residual Heat Removal - Insulated	362	232	172	178	1,072	2,051	-	962	5,049	5,049	-	-	6,406	6,012	-	-	617,941	4,135	-	
2a.15.47	Residual Heat Removal - Insulated	622	554	61	82	638	880	-	772	3,535	3,535	-	-	3,367	2,697	-	-	302,087	10,340	-	
2a.15.48	RC Core Isolation Cooling	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
2a.15.49	RC Core Isolation Cooling - Insulated	-	107	5	7	48	67	-	52	287	287	-	-	288	190	-	-	21,439	1,520	-	
2a.15.50	RS Recirculation	56	168	6	4	7	65	-	61	258	258	-	-	43	190	-	-	14,095	1,580	-	
2a.15.51	Shrubbers	-	-	-	5	63	30	-	60	331	331	-	-	377	90	-	-	21,009	2,548	-	
2a.15.52	Steamer Liquid Control - Insul - RCA	-	-	-	2	41	-	-	39	22	22	-	-	22	-	-	-	9,964	48	-	
2a.15.53	Steamer Liquid Control - RCA	-	-	-	1	21	-	-	15	35	35	-	-	126	-	-	-	5,135	98	-	
2a.15.54	Steamer Cooling - RCA	-	-	-	0	1	-	-	1	7	7	-	-	1	5	-	-	386	51	-	
2a.15.55	Traversing Incore Probe	1,040	8,221	924	1,572	10,330	11,425	-	8,269	47,730	47,730	-	24	97,064	33,808	-	-	61,255,515	1,094,943	-	
2a.15	Totals	-	2,205	22	12	101	31	-	607	3,127	3,127	-	24	14,100	53,545	1,761	898	-	22,561	-	2,758
2a.16	Subtotal Period 2a Activity Costs	1,742	29,721	18,645	6,388	25,937	50,042	728	47,148	180,380	180,336	-	24	141,010	535,45	1,761	898	-	10,438,540	233,040	2,758
2a.17	Subtotal Period 2a Activity Costs	85	57	216	702	-	232	-	122	508	508	-	-	-	532	-	-	-	31,942	104	-
2a.31	Process decommissioning water waste	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
2a.32	Process decommissioning chemical flush waste	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
2a.33	Spent Fuel Capital and Transfer	-	524	-	-	-	1,619	-	2,019	15,710	15,710	-	37	-	-	-	-	-	225,008	392	-
2a.34	Retention and Severance	-	-	-	-	-	-	13,621	13,621	15,097	15,097	-	-	-	-	-	-	-	-	-	
2a.35	On-site survey and release of 0.0 tons clean metallic waste	-	-	-	-	-	-	13,127	13,127	15,097	15,097	-	-	-	-	-	-	-	-	-	
2a.36	Subtotal Period 2a Collateral Costs	91	524	274	804	-	1,851	26,798	4,723	34,854	19,107	15,710	37	-	2,625	-	-	234,950	405	-	
2a.41	Decon supplies	112	-	-	-	-	-	1,019	28	140	140	-	-	-	-	-	-	-	-	-	
2a.42	Property taxes	-	-	-	-	-	-	4,377	498	4,814	4,814	-	-	-	-	-	-	-	-	-	
2a.43	Health physics supplies	-	2,036	-	-	-	-	-	580	2,645	2,645	-	-	-	-	-	-	-	-	-	
2a.44	Heavy equipment rental	-	3,627	-	-	-	-	-	544	4,171	4,171	-	-	-	-	-	-	-	-	-	
2a.45	Heavy equipment rental - Insulated	-	-	-	-	-	-	-	375	2,876	2,876	-	-	-	-	-	-	-	-	-	
2a.46	Plant energy budget	-	-	-	-	-	-	856	86	942	942	-	-	-	-	-	-	-	-	-	
2a.47	NRC Fees	-	-	-	-	-	-	4,115	412	4,527	4,527	-	-	-	-	-	-	-	-	-	
2a.48	Emergency Planning Fees	-	-	-	-	-	-	1,088	184	1,272	1,272	-	-	-	-	-	-	-	-	-	
2a.49	Spent Fuel Pool O&M	-	-	-	-	-	-	1,224	162	1,386	1,386	-	-	-	-	-	-	-	-	-	
2a.50	Spent Fuel Pool O&M	-	-	-	-	-	-	1,817	24	1,841	1,841	-	-	-	-	-	-	-	-	-	
2a.51	RFPSI Operating Costs	-	-	-	-	-	-	181	27	208	208	-	-	-	-	-	-	-	-	-	
2a.52	Railroad Track Maintenance	-	-	-	-	-	-	1,861	3,262	23,164	23,164	-	-	-	-	-	-	-	-	-	
2a.53	Spent Fuel Pool O&M - Surveys	-	-	-	-	-	-	21,861	3,153	24,174	24,174	-	-	-	-	-	-	-	-	-	
2a.54	Security Staff Cost	-	-	-	-	-	-	21,021	3,153	24,174	24,174	-	-	-	-	-	-	-	-	-	
2a.55	Utility Staff Cost	-	-	-	-	-	-	27,506	4,386	32,092	32,092	-	-	-	-	-	-	-	-	-	
2a.56	Subtotal Period 2a Period-Dependent Costs	112	5,982	110	57	-	457	83,308	14,387	110,924	104,805	61,21	-	-	5,551	-	-	111,023	181	98,124	
2a.0	TOTAL PERIOD 2a COST	1,945	36,028	19,028	7,230	25,937	52,530	117,455	66,138	326,139	304,246	21,831	62	141,010	677,222	1,761	898	-	10,824,520	234,317	84,002
<b>PERIOD 2b - Site Decommissionation</b>																					
Period 2b Direct Decommissioning Activities																					
2b.11.1	ALARA/Offsite/Integral	-	18	0	1	6	3	-	6	35	35	-	-	35	10	-	-	3,060	277	-	
2b.11.2	Alternate S2 - RCA	16	0	1	16	0	0	-	7	40	40	-	-	83	0	-	-	3,765	185	-	
2b.11.3	Decommissionation Projects	1	0	0	0	0	0	-	1,692	1,692	1,692	-	-	1,692	0	-	-	65,129	6,317	-	
2b.11.4	Electrical Contamination	4,688	46	218	3,906	30	30	-	1,208	8,107	8,107	-	-	23,384	90	-	-	945,033	37,107	-	
2b.11.5	Fire - RCA	305	7	27	446	31	31	-	162	976	976	-	-	614	100	-	-	24,917	1,324	-	
2b.11.6	HVAC Ductwork	305	7	27	446	31	31	-	162	976	976	-	-	614	100	-	-	114,588	4,111	-	
2b.11.7	HVAC Ductwork - Insulated - RCA	305	7	27	446	31	31	-	162	976	976	-	-	614	100	-	-	114,588	4,111	-	
2b.11.8	HVAC Ductwork - Insulated - RCA	305	7	27	446	31	31	-	162	976	976	-	-	614	100	-	-	114,588	4,111	-	
2b.11.9	Heating Boiler - Insulated - RCA	305	7	27	446	31	31	-	162	976	976	-	-	614	100	-	-	114,588	4,111	-	
2b.11.10	Heating Boiler - Insulated - RCA	305	7	27	446	31	31	-	162	976	976	-	-	614	100	-	-	114,588	4,111	-	
2b.11.11	Liquid Radwaste	305	7	27	446	31	31	-	162	976	976	-	-	614	100	-	-	114,588	4,111	-	
2b.11.12	Molten Dross - RCA	305	7	27	446	31	31	-	162	976	976	-	-	614	100	-	-	114,588	4,111	-	
2b.11.13	Molten Dross - RCA	305	7	27	446	31	31	-	162	976	976	-	-	614	100	-	-	114,588	4,111	-	
2b.11.14	Off Gas Holdup	312	21	28	342	21	21	-	216	1,291	1,291	-	-	2,755	630	-	-	152,277	4,769	-	
2b.11.15	Primary Containment	455	42	87	1,038	507	507	-	414	2,543	2,543	-	-	6,201	1,506	-	-	347,704	6,454	-	

**Monticello Nuclear Generating Plant  
 Decommissioning Cost Analysis**

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**Table D  
 Monticello Nuclear Generating Plant  
 DECON Decommissioning Cost Estimates with 60 Years of Spent Fuel Storage**  
 (Thousands of 2020 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Cost	Transport Cost	Off-Site Processing Cost	LWR Disposal Cost	Other Contingency	Total Contingency	Total Lic. Term. Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu Feet	Barial Volumes			Barrial/Processed Wt. Lbs.	Utility and Contractor Manhours	
															Class A Cu Feet	Class B Cu Feet	Class C Cu Feet			
	Disposal of Plant Systems (continued)																			
2b.1.1.16	Process Radiation Monitors	-	46	2	24	133	18	-	20	111	111	-	-	142	-	-	-	9,115	649	-
2b.1.1.17	Rx Bldg Closed Cng Water - Inval - RCA	-	134	2	9	133	-	-	54	843	343	-	-	977	-	-	-	39,675	1,484	-
2b.1.1.18	Rx Bldg Closed Cng Water - RCA	-	142	5	99	1,077	-	-	1,077	1,077	1,077	-	-	1,077	-	-	-	2,483	2,483	-
2b.1.1.19	Rx Bldg Closed Cng Water - Inval - RCA	-	142	15	29	134	279	-	15	849	849	-	-	1,158	-	-	-	49,730	1,682	-
2b.1.1.20	Rx Pressure Vessel	-	28	6	5	13	78	-	48	225	225	-	-	175	-	-	-	17,816	-	-
2b.1.1.21	Rx Water Cleanup	-	205	19	16	22	231	-	222	965	965	-	-	1,300	-	-	-	52,670	5,736	-
2b.1.1.22	Secondary Containment	-	120	7	14	170	86	-	62	483	483	-	-	1,019	-	-	-	17,465	1,765	-
2b.1.1.23	Service & Seal Water - RCA	-	150	4	17	333	-	-	88	570	570	-	-	1,809	-	-	-	73,453	2,016	-
2b.1.1.24	Service Air Blower - RCA	-	15	0	2	34	-	-	9	62	62	-	-	206	-	-	-	8,364	206	-
2b.1.1.25	Solid Residue Buildings	-	494	36	40	390	407	-	497	2,204	2,204	-	-	2,367	-	-	-	18,223	10,829	-
2b.1.1.26	Waste & Domestic Water - RCA	-	10	2	9	29	-	-	9	110	110	-	-	137	-	-	-	18,223	114	-
2b.1.1.27	Waste & Domestic Water - RCA	-	62	1	3	57	-	-	22	136	136	-	-	342	-	-	-	13,874	633	-
2b.1.1.28	Waste & Domestic Water - RCA	-	7,880	315	804	11,688	2,637	-	5,107	29,553	29,553	-	-	60,735	-	-	-	3,331,244	122,835	-
2b.1.1	Totals	-	2,831	28	16	239	38	-	758	3,069	3,069	-	-	1,287	-	-	-	65,139	28,205	-
2b.1.2	Scaffolding in support of decommissioning	-	2,831	28	16	239	38	-	758	3,069	3,069	-	-	1,287	-	-	-	65,139	28,205	-
	Decommissioning of Site Buildings																			
2b.1.3.2	Admin Building	5,292	2,092	178	516	8,044	1,181	-	4,924	22,948	22,948	-	-	48,077	-	-	-	2,317,670	119,518	-
2b.1.3.3	HPCI Room	106	6	0	3	3	15	-	59	189	189	-	-	118	-	-	-	6,840	1,000	-
2b.1.3.4	HPI Room	29	28	1	3	20	14	-	123	123	123	-	-	118	-	-	-	10,759	780	-
2b.1.3.5	Hot Shop	17	15	0	2	5	11	-	46	46	46	-	-	31	-	-	-	4,860	289	-
2b.1.3.6	Office Storage & Shipping	372	269	7	23	223	82	-	312	1,289	1,289	-	-	1,343	-	-	-	8,800	8,800	-
2b.1.3.7	Office Storage & Compressor	41	17	1	6	4	33	-	34	136	136	-	-	25	-	-	-	15,948	785	-
2b.1.3.8	Rawwater	121	61	3	17	20	96	-	107	435	435	-	-	172	-	-	-	49,943	2,503	-
2b.1.3.9	Rawwater	27	25	2	5	33	24	-	32	148	148	-	-	190	-	-	-	18,405	605	-
2b.1.3.10	Recombiner	705	333	21	104	213	564	-	632	2,504	2,504	-	-	1,283	-	-	-	303,150	14,443	-
2b.1.3.11	Turbine	58	21	1	8	8,371	2,164	-	6,288	28,483	28,483	-	-	51,247	-	-	-	20,478	1,067	-
2b.1.3.12	Turbine Building Addition	6,799	3,736	218	704	8,371	2,164	-	6,288	28,483	28,483	-	-	51,247	-	-	-	2,886,266	145,888	-
2b.1.3.13	Totals	-	-	-	-	-	-	526	79	605	605	-	-	-	-	-	-	-	-	4,666
2b.1.4	Prepare/submit License Termination Plan	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2b.1.5	Receive NRC approval of termination plan	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2b.1	Subtotal Period 2b Activity Costs	7,952	14,427	560	1,524	20,481	4,859	526	12,232	62,561	62,540	-	-	122,289	24,132	-	-	6,270,569	296,929	4,666
	Period 2b Additional Costs																			
2b.2.1	Inventory Management	-	1,972	-	92	1,211	-	742	198	1,524	1,524	-	-	11,700	-	-	-	294,000	82	-
2b.2.2	Excavation of Underground Services	-	1,972	-	-	-	376	-	550	2,898	2,898	-	-	-	-	-	-	-	-	-
2b.2.3	Security Modifications	-	1,972	-	-	-	8,696	-	1,304	10,000	10,000	-	-	-	-	-	-	-	-	-
2b.2	Subtotal Period 2b Additional Costs	-	1,972	-	92	1,211	9,072	-	2,052	14,422	14,422	-	-	11,700	-	-	-	294,000	12,483	-
	Period 2b Collateral Costs																			
2b.3.1	Process decommissioning water waste	198	-	135	240	-	546	-	285	1,404	1,404	-	-	-	-	-	-	76,186	244	-
2b.3.2	Process decommissioning chemical flush waste	1	-	43	138	-	319	-	105	607	607	-	-	-	-	-	-	45,978	77	-
2b.3.3	Process decommissioning chemical flush waste	-	304	-	-	-	-	-	17,588	134,843	134,843	-	-	-	-	-	-	-	-	-
2b.3.4	Spent Fuel Capital and Transfer	-	-	-	-	-	-	117,254	-	7,244	7,244	-	-	-	-	-	-	-	-	-
2b.3.5	Retention and Severance	-	-	-	-	-	-	6,259	945	7,244	7,244	-	-	-	-	-	-	-	-	-
2b.3	Subtotal Period 2b Collateral Costs	199	364	178	378	-	865	123,554	18,578	144,516	144,516	-	-	-	-	-	-	119,165	322	-
	Period 2b Periodic Dependent Costs																			
2b.4.1	Decon supplies	1,440	-	-	-	-	-	-	360	1,769	1,769	-	-	-	-	-	-	-	-	-
2b.4.2	Insurance	-	-	-	-	-	-	742	74	816	816	-	-	-	-	-	-	-	-	-
2b.4.3	Property taxes	-	-	-	-	-	-	2,063	504	2,567	2,567	-	-	-	-	-	-	-	-	-
2b.4.4	Heavy equipment rental	-	2,711	-	-	-	-	-	407	3,117	3,117	-	-	-	-	-	-	-	-	-
2b.4.5	Heavy equipment rental	-	-	-	-	-	419	-	123	694	694	-	-	-	-	-	-	-	-	-
2b.4.6	Disposal of DAW generated	-	-	-	-	-	-	-	462	1,633	1,633	-	-	-	-	-	-	-	-	-
2b.4.7	NRG Energy budget	-	-	-	-	-	-	-	2,995	3,294	3,294	-	-	-	-	-	-	-	-	-
2b.4.8	NRG Energy budget	-	-	-	-	-	-	-	3,294	3,294	3,294	-	-	-	-	-	-	-	-	-
2b.4.9	Emergency Planning Fees	-	-	-	-	-	-	-	2,570	2,570	2,570	-	-	-	-	-	-	-	-	-
2b.4.10	Fixed Overhead	-	-	-	-	-	-	-	335	1,024	1,024	-	-	-	-	-	-	-	-	-
2b.4.11	Spent Fuel Post O&M	-	-	-	-	-	-	-	118	136	136	-	-	-	-	-	-	-	-	-
2b.4.12	Spent Fuel Post O&M	-	-	-	-	-	-	-	118	136	136	-	-	-	-	-	-	-	-	-
2b.4.13	RFSSI Operating Costs	-	-	-	-	-	-	-	69	527	527	-	-	-	-	-	-	-	-	-
2b.4.14	Railroad Track Maintenance	-	-	-	-	-	-	458	-	-	-	-	-	-	-	-	-	-	-	-

**Monticello Nuclear Generating Plant  
 Decommissioning Cost Analysis**

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**Table D  
 Monticello Nuclear Generating Plant  
 DECON Decommissioning Cost Estimates with 60 Years of Spent Fuel Storage**  
 (Thousands of 2020 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Cost	Transport Cost	Off-Site Processing Cost	LIRW Disposal Cost	Other Contingency	Total Contingency	Total Lic. Term. Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu Feet	Class A Cu Feet	Class B Cu Feet	Class C Cu Feet	GTCC Cu Feet	Barrical/Processed Wt. Lbs.	Craft Manhours	Utility and Contractor Manhours
Period 20 Period-Dependent Costs (continued)																					
20	TOTAL PERIOD 20 COST	9,391	21,830	861	2,046	21,692	6,143	196,869	45,564	393,055	165,736	139,257	11	134,029	30,882	-	-	6,794,433	309,941	698,488	-
PERIOD 2d - Decontamination Following Wet Fuel Storage																					
Period 2d Direct Decommissioning Activities																					
2d.1.1	Remove spent fuel racks	654	58	103	149	-	2,572	-	1,017	4,553	4,553	-	-	-	7,653	-	-	486,170	906	-	-
Disposal of Plant Systems																					
2d.1.2.1	Crane/Heavy Loads/Rigging - RCA	-	3	0	1	17	-	-	1	25	25	-	-	105	-	-	-	5,134	68	-	-
2d.1.2.2	Electrical - Document Fuel Pool Area	-	47	5	23	411	3	-	19	172	172	-	-	2,437	0	-	-	10,333	608	-	-
2d.1.2.3	Fire - RCA - Fuel Pool Area	-	297	5	23	411	3	-	19	876	876	-	-	2,437	-	-	-	90,793	4,000	-	-
2d.1.2.4	Fire - RCA - Fuel Pool Area	-	11	0	1	10	-	-	4	26	26	-	-	62	-	-	-	2,489	143	-	-
2d.1.2.5	Fuel Pool Cooling & Cleanup	246	428	34	37	197	455	-	382	1,781	1,781	-	-	1,179	1,311	-	-	133,359	8,389	-	-
2d.1.2.6	Instrument & Service Air-RCA-Fuel Pool	-	27	1	1	3	4	-	1	108	108	-	-	296	11	-	-	12,733	457	-	-
2d.1.2.7	HVAC Ductwork - Fuel Pool Area	-	33	0	2	37	-	-	14	87	87	-	-	223	-	-	-	9,072	397	-	-
2d.1.2.8	HVAC/Chilled Water - RCA Fuel Pool Area	-	29	1	2	45	-	-	1	91	91	-	-	434	-	-	-	19,841	337	-	-
2d.1.2.9	Instrument & Service Air-RCA-Fuel Pool	273	924	45	75	919	562	-	631	3,298	3,298	-	-	4,934	1,179	-	-	236,966	15,385	-	-
Decommissionation of Site Buildings																					
2d.1.3.1	Reactor (Post Fuel)	946	2,599	172	913	320	10,216	-	3,880	19,096	19,096	-	-	1,969	62,698	-	-	2,732,406	45,703	-	-
2d.1.3	Totals	946	2,599	172	913	320	10,216	-	3,880	19,096	19,096	-	-	1,969	62,698	-	-	2,732,406	45,703	-	-
2d.1.4	Scaffolding in support of decommissioning	-	566	6	3	48	8	-	162	782	782	-	-	237	23	-	-	13,028	5,641	-	-
2d.1	Subtotal Period 2d Activity Costs	1,872	4,147	336	1,120	1,196	13,298	-	5,680	27,650	27,650	-	-	7,120	71,832	-	-	3,255,210	67,635	-	-
Period 2d Additional Costs																					
2d.2.1	License Termination Survey Planning	-	-	-	-	-	-	-	437	1,896	1,896	-	-	-	-	-	-	-	-	-	12,480
2d.2	Subtotal Period 2d Additional Costs	-	-	-	-	-	-	-	437	1,896	1,896	-	-	-	-	-	-	-	-	-	12,480
Period 2d Collateral Costs																					
2d.3.1	Process decommissioning water waste	79	-	54	96	-	220	-	114	563	563	-	-	-	-	-	-	-	-	98	-
2d.3.2	Process decommissioning chemical fluid waste	-	1	-	26	-	153	-	6	105	105	-	-	-	-	-	-	-	-	47	-
2d.3.3	Small and allowances	-	91	-	-	-	-	-	14	105	105	-	-	-	-	-	-	-	-	-	-
2d.3.4	Decommissioning Equipment Disposition	-	-	130	82	1,112	178	-	237	1,739	1,739	-	-	6,000	5,289	-	-	303,608	147	-	-
2d.3.5	Spent Fuel Capital and Transfer	-	-	-	-	-	167	-	4	32	32	-	-	-	-	-	-	-	-	66	-
2d.3	Subtotal Period 2d Collateral Costs	80	91	210	262	1,112	530	-	452	2,805	2,773	-	-	6,000	1,282	-	-	306,400	292	-	-
Period 2d Period-Dependent Costs																					
2d.4.1	Decon supplies	244	-	-	-	-	-	61	305	305	305	-	-	-	-	-	-	-	-	-	-
2d.4.2	Insurance	-	-	-	-	-	-	150	61	150	150	-	-	-	-	-	-	-	-	-	-
2d.4.3	Property taxes	-	-	-	-	-	-	1,624	166	1,820	1,820	-	-	-	-	-	-	-	-	-	-
2d.4.4	Health physics supplies	-	806	-	-	-	-	202	1,008	1,008	1,008	-	-	-	-	-	-	-	-	98	-
2d.4.5	Heavy equipment rental	-	1,936	-	-	-	-	290	2,227	2,227	2,227	-	-	-	-	-	-	-	-	-	-
2d.4.6	Disposal of DRY generated	-	-	40	21	-	167	-	82	639	639	-	-	-	-	-	-	-	-	-	-
2d.4.7	Emergency Planning	-	-	-	-	-	-	547	424	466	466	-	-	-	-	-	-	-	-	-	-
2d.4.8	NRC Fees	-	-	-	-	-	-	112	11	123	123	-	-	-	-	-	-	-	-	-	-
2d.4.9	Emergency Planning Fees	-	-	-	-	-	-	206	136	306	306	-	-	-	-	-	-	-	-	-	-
2d.4.10	License Termination Survey Planning	-	-	-	-	-	-	320	18	308	308	-	-	-	-	-	-	-	-	-	-
2d.4.11	Liquid Radioactive Processing Equipment/Services	-	-	-	-	-	-	84	13	97	97	-	-	-	-	-	-	-	-	-	-
2d.4.12	RFSS Operating Costs	-	-	-	-	-	-	84	14	108	108	-	-	-	-	-	-	-	-	-	-
2d.4.13	Railroad Track Maintenance	-	-	-	-	-	-	1,050	12,640	12,640	12,640	-	-	-	-	-	-	-	-	-	-
2d.4.14	Remedial Action Surveys	-	-	-	-	-	-	1,090	8,918	8,918	8,918	-	-	-	-	-	-	-	-	-	-
2d.4.15	Remedial Action Surveys	-	-	-	-	-	-	1,050	12,640	12,640	12,640	-	-	-	-	-	-	-	-	-	-
2d.4.16	DOC Staff Cost	-	-	-	-	-	-	7,311	1,097	8,408	8,408	-	-	-	-	-	-	-	-	-	-
2d.4.17	DOC Staff Cost	-	-	-	-	-	-	10,052	1,508	11,560	11,560	-	-	-	-	-	-	-	-	-	-
2d.4.18	Utility Staff Cost	-	-	-	-	-	-	107	3,579	3,686	3,686	-	-	-	-	-	-	-	-	-	-
2d.4.1	Subtotal Period 2d Period-Dependent Costs	244	2,743	40	21	-	167	3,579	5,652	43,146	48,812	-	-	13,120	74,164	-	-	34,926,210	67,393	403,477	-
2d.0	TOTAL PERIOD 2d COST	2,196	6,891	576	1,422	2,308	14,055	36,065	12,392	75,895	70,332	4,873	-	-	-	-	-	-	-	-	-

**Monticello Nuclear Generating Plant  
 Decommissioning Cost Analysis**

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**Table D  
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 DECON Decommissioning Cost Estimates with 60 Years of Spent Fuel Storage**  
 (Thousands of 2020 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LIRW Disposal Costs	Other Costs	Total Contingency	Total Costs	Total Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu Feet	Class A Cu Feet	Class B Cu Feet	Class C Cu Feet	GTCC Cu Feet	Burial/Processed Wt. Lbs.	Craft Manhours	Utility and Contractor Manhours
<b>PERIOD 2f- License Termination</b>																					
Period 2f Direct Decommissioning Activities																					
2F.1.1	ORISE preliminary survey	-	-	-	-	-	-	166	50	216	216	-	-	-	-	-	-	-	-	-	-
2F.1.2	Subtotal Period 2f Activity Costs	-	-	-	-	-	-	166	50	216	216	-	-	-	-	-	-	-	-	-	-
Period 2f Additional Costs																					
2F.2.1	Subtotal Period 2f Additional Costs	-	-	-	-	-	-	6,920	2,076	8,995	8,995	-	-	-	-	-	-	-	-	95,048	6,240
2F.2.2	Subtotal Period 2f Additional Costs	-	-	-	-	-	-	6,920	2,076	8,995	8,995	-	-	-	-	-	-	-	-	95,048	6,240
Period 2f Colateral Costs																					
2F.3.1	Spent Fuel Capital and Transfer	-	-	-	-	-	-	1,264	100	1,454	1,454	-	-	-	-	-	-	-	-	-	-
2F.3.2	Subtotal Period 2f Colateral Costs	-	-	-	-	-	-	1,311	197	1,508	1,454	54	-	-	-	-	-	-	-	-	-
Period 2f Period-Dependent Costs																					
2F.4.1	Insurance	-	-	-	-	-	-	630	53	683	683	-	-	-	-	-	-	-	-	-	-
2F.4.2	Property taxes	-	-	-	-	-	-	1,470	147	1,617	1,617	-	-	-	-	-	-	-	-	-	-
2F.4.3	Health physics supplies	-	708	-	-	-	-	177	884	884	-	-	-	-	-	-	-	-	-	-	-
2F.4.4	Health physics personnel	-	-	-	-	-	29	-	315	315	-	-	-	-	-	-	-	-	7,007	-	-
2F.4.5	Plant energy budget	-	-	-	-	-	-	274	41	315	315	-	-	-	-	-	-	-	-	-	-
2F.4.6	NRC Fees	-	-	-	-	-	-	426	43	468	468	-	-	-	-	-	-	-	-	-	-
2F.4.7	Emergency Planning Fees	-	-	-	-	-	-	112	123	135	135	-	-	-	-	-	-	-	-	-	-
2F.4.8	ES&S Operating Costs	-	-	-	-	-	-	84	13	97	97	-	-	-	-	-	-	-	-	-	-
2F.4.9	ES&S Operating Costs	-	-	-	-	-	-	94	14	108	108	-	-	-	-	-	-	-	-	-	-
2F.4.10	Railroad Track Maintenance	-	-	-	-	-	-	10,000	1,650	12,649	8,918	-	-	-	-	-	-	-	-	-	102,981
2F.4.11	Security Staff Cost	-	-	-	-	-	-	5,702	864	6,566	5,788	-	-	-	-	-	-	-	-	-	80,707
2F.4.12	Utility Staff Cost	-	-	-	-	-	-	5,702	864	6,566	5,788	-	-	-	-	-	-	-	-	-	80,707
2F.4.13	Subtotal Period 2f Period-Dependent Costs	-	708	-	-	-	29	26,740	4,070	31,577	26,718	4,859	-	-	-	-	-	-	7,007	12	300,888
2F.4	TOTAL PERIOD 2f COST	-	708	-	-	-	29	35,337	6,392	42,276	37,382	4,859	-	-	-	-	-	-	7,007	95,050	307,128
2F.0	TOTAL PERIOD 2f COST	13,731	65,666	20,473	10,731	49,837	72,277	385,554	128,686	747,255	576,287	170,895	73	288,160	174,123	1,761	898	-	21,562,290	727,310	2,383,646
<b>PERIOD 3b- Site Restoration</b>																					
Period 3b Direct Decommissioning Activities																					
Description of Activities, Site Buildings																					
3b.1.1.1	Beauregard Building	-	1,971	-	-	-	-	-	206	2,177	-	-	2,267	-	-	-	-	-	-	13,311	-
3b.1.1.2	Condensate Tanks Foundation	-	10	-	-	-	-	-	1	11	-	-	11	-	-	-	-	-	-	50	-
3b.1.1.3	Discharge Retention Basin	-	4	-	-	-	-	-	1	5	-	-	5	-	-	-	-	-	-	25	-
3b.1.1.4	Hot Cell	-	10	-	-	-	-	-	2	12	-	-	12	-	-	-	-	-	-	177	-
3b.1.1.5	H4 Storage	-	16	-	-	-	-	-	2	18	-	-	18	-	-	-	-	-	-	19	-
3b.1.1.6	Hydrogen & Oxygen Storage	-	2	-	-	-	-	-	0	2	-	-	2	-	-	-	-	-	-	62	-
3b.1.1.7	LIRW Storage & Shipping	-	83	-	-	-	-	-	12	95	-	-	95	-	-	-	-	-	-	19	-
3b.1.1.8	Miss Structures 2017	-	4	-	-	-	-	-	1	5	-	-	5	-	-	-	-	-	-	13,042	-
3b.1.1.9	Miss Structures 2017	-	1,410	-	-	-	-	-	212	1,622	-	-	1,622	-	-	-	-	-	-	514	-
3b.1.1.10	Offgas Stack	-	108	-	-	-	-	-	16	124	-	-	124	-	-	-	-	-	-	189	-
3b.1.1.11	Offgas Storage & Compressor	-	39	-	-	-	-	-	6	45	-	-	45	-	-	-	-	-	-	189	-
3b.1.1.12	Reactor	-	128	-	-	-	-	-	19	147	-	-	147	-	-	-	-	-	-	733	-
3b.1.1.13	Reactor	-	128	-	-	-	-	-	19	147	-	-	147	-	-	-	-	-	-	733	-
3b.1.1.14	Security Barrier	-	186	-	-	-	-	-	28	214	-	-	214	-	-	-	-	-	-	533	-
3b.1.1.15	Structures Greater than 2' Below Grade	-	2,461	-	-	-	-	-	369	2,830	-	-	2,830	-	-	-	-	-	-	12,649	-
3b.1.1.16	Truck Farm	-	1,290	-	-	-	-	-	189	1,479	-	-	1,479	-	-	-	-	-	-	618	-
3b.1.1.17	Turbine Building Addition	-	55	-	-	-	-	-	8	63	-	-	63	-	-	-	-	-	-	13,036	-
3b.1.1.18	Turbine Building Addition	-	182	-	-	-	-	-	27	209	-	-	209	-	-	-	-	-	-	926	-
3b.1.1.19	Turbine Pedestal	-	8,160	-	-	-	-	-	1,225	9,385	-	-	9,385	-	-	-	-	-	-	58,885	-
3b.1.1	Totals	-	896	-	-	-	-	-	134	1,031	-	-	1,031	-	-	-	-	-	-	1,841	-
Site Closeout Activities																					
3b.1.2	Grade & landscape site	-	-	-	-	-	-	200	30	231	231	-	-	-	-	-	-	-	-	1,590	-
3b.1.3	Final report to NRC	-	-	-	-	-	-	250	1,369	10,655	251	-	10,425	-	-	-	-	-	-	60,726	-
3b.1	Subtotal Period 3b Activity Costs	-	9,055	-	-	-	-	250	1,369	10,655	251	-	10,425	-	-	-	-	-	-	60,726	-

**Monticello Nuclear Generating Plant  
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**Table D  
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 DECON Decommissioning Cost Estimates with 60 Years of Spent Fuel Storage**  
 (Thousands of 2020 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LIRW Disposal Costs	Other Contingency Costs	Total Contingency Costs	Total Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu Feet	Class A Cu Feet	Class B Cu Feet	Class C Cu Feet	GTCC Cu Feet	Burial/Processed Wt. Lbs.	Craft Manhours	Utility and Contractor Manhours
<b>Period 3b Additional Costs</b>																				
3b.2.1	Clean Concrete Disposal	-	3,322	-	-	-	-	13	500	3,835	-	3,835	-	-	-	-	-	-	12	-
3b.2.2	Intake Structure Cofferdam	-	335	-	-	-	-	50	50	385	-	385	-	-	-	-	-	-	2,584	-
3b.2.3	Containment Ducts	-	5,883	-	-	-	-	1,170	837	6,431	-	6,431	-	-	-	-	-	-	5,422	-
3b.2.4	Discharge Structure Cofferdam	-	442	-	-	-	-	66	66	508	-	508	-	-	-	-	-	-	3,552	-
3b.2	Subtotal Period 3b Additional Costs	-	9,682	-	-	-	-	1,183	1,630	12,495	-	12,495	-	-	-	-	-	-	11,570	-
<b>Period 3b Collateral Costs</b>																				
3b.3.1	Small tool allowance	-	110	-	-	-	-	-	17	127	-	127	-	-	-	-	-	-	-	-
3b.3.2	Spent Fuel Capital and Transfer	-	-	-	-	-	-	108	108	125	-	125	-	-	-	-	-	-	-	-
3b.3	Subtotal Period 3b Collateral Costs	-	110	-	-	-	-	108	33	252	-	252	-	-	-	-	-	-	-	-
<b>Period 3b Period-Dependent Costs</b>																				
3b.4.1	Insurance	-	-	-	-	-	-	1,220	122	1,342	-	-	-	-	-	-	-	-	-	-
3b.4.2	Property taxes	-	-	-	-	-	-	2,510	251	2,761	-	-	-	-	-	-	-	-	-	-
3b.4.3	Plant equipment rental	-	-	-	-	-	-	354	35	389	-	-	-	-	-	-	-	-	-	-
3b.4.4	Plant energy budget	-	5,842	-	-	-	-	315	47	6,362	-	6,719	-	-	-	-	-	-	-	-
3b.4.5	NRC ISRS Fees	-	-	-	-	-	-	356	36	391	-	391	-	-	-	-	-	-	-	-
3b.4.6	Emergency Planning Fees	-	-	-	-	-	-	257	26	283	-	283	-	-	-	-	-	-	-	-
3b.4.7	ES/FSI Operating Costs	-	-	-	-	-	-	1,426	143	1,569	-	1,569	-	-	-	-	-	-	-	-
3b.4.8	ES/FSI Operating Costs	-	-	-	-	-	-	194	20	214	-	214	-	-	-	-	-	-	-	-
3b.4.9	Railroad Track Maintenance	-	-	-	-	-	-	543	81	624	-	624	-	-	-	-	-	-	-	-
3b.4.10	Security Staff Cost	-	-	-	-	-	-	25,319	2,798	28,117	-	28,117	-	-	-	-	-	-	-	373,102
3b.4.11	Security Staff Cost	-	-	-	-	-	-	1,426	143	1,569	-	1,569	-	-	-	-	-	-	-	19,297
3b.4.12	Utility Staff Cost	-	-	-	-	-	-	6,873	1,031	7,904	-	7,904	-	-	-	-	-	-	-	98,297
3b.4	Subtotal Period 3b Period-Dependent Costs	-	5,842	-	-	-	-	50,467	8,228	61,537	-	61,537	-	-	-	-	-	-	-	506,605
3b.0	TOTAL PERIOD 3b COST	-	24,700	-	-	-	-	51,959	11,280	87,939	2,251	89,638	-	-	-	-	-	-	72,286	307,635
<b>PERIOD 3c - Fuel Storage Operations/Shipping</b>																				
<b>Period 3c Direct Decommissioning Activities</b>																				
<b>Period 3c Collateral Costs</b>																				
3c.3.1	Spent Fuel Capital and Transfer	-	-	-	-	-	-	85,327	12,799	98,126	-	98,126	-	-	-	-	-	-	-	-
3c.3	Subtotal Period 3c Collateral Costs	-	-	-	-	-	-	85,327	12,799	98,126	-	98,126	-	-	-	-	-	-	-	-
<b>Period 3c Period-Dependent Costs</b>																				
3c.4.1	Insurance	-	-	-	-	-	-	37,329	3,733	41,062	-	41,062	-	-	-	-	-	-	-	-
3c.4.2	Property taxes	-	-	-	-	-	-	48,222	4,822	53,044	-	53,044	-	-	-	-	-	-	-	-
3c.4.3	Plant energy budget	-	-	-	-	-	-	12,360	1,236	13,596	-	13,596	-	-	-	-	-	-	-	-
3c.4.4	NRC ISRS Fees	-	-	-	-	-	-	787	80	867	-	867	-	-	-	-	-	-	-	-
3c.4.5	Emergency Planning Fees	-	-	-	-	-	-	1,426	143	1,569	-	1,569	-	-	-	-	-	-	-	-
3c.4.6	ES/FSI Operating Costs	-	-	-	-	-	-	801	81	882	-	882	-	-	-	-	-	-	-	-
3c.4.7	ES/FSI Operating Costs	-	-	-	-	-	-	6,636	995	7,632	-	7,632	-	-	-	-	-	-	-	-
3c.4.8	Railroad Track Maintenance	-	-	-	-	-	-	228,259	31,239	259,498	-	259,498	-	-	-	-	-	-	-	2,870,241
3c.4.9	Security Staff Cost	-	-	-	-	-	-	1,426	143	1,569	-	1,569	-	-	-	-	-	-	-	19,297
3c.4.10	Security Staff Cost	-	-	-	-	-	-	6,873	1,031	7,904	-	7,904	-	-	-	-	-	-	-	98,297
3c.4	Subtotal Period 3c Period-Dependent Costs	-	-	-	-	-	-	412,254	55,307	467,561	-	467,561	-	-	-	-	-	-	-	3,013,309
3c.0	TOTAL PERIOD 3c COST	-	-	-	-	-	-	497,502	68,386	567,298	-	567,298	-	-	-	-	-	-	-	3,613,309
<b>PERIOD 3d - GTCC shipping</b>																				
<b>Period 3d Direct Decommissioning Activities</b>																				
<b>Nuclear Steam Sample System Removal</b>																				
3d.1.1.1	Vessel & Internal GTCC Disposal	-	-	1,083	-	-	4,213	-	918	6,314	-	-	-	-	-	-	1,100	225,765	-	-
3d.1.1	Totals	-	-	1,083	-	-	4,213	-	918	6,314	-	-	-	-	-	-	1,100	225,765	-	-
3d.1	Subtotal Period 3d Activity Costs	-	-	1,083	-	-	4,213	-	918	6,314	-	-	-	-	-	-	1,100	225,765	-	-
<b>Period 3d Collateral Costs</b>																				
3d.3.1	Spent Fuel Capital and Transfer	-	-	-	-	-	-	28	4	32	-	32	-	-	-	-	-	-	-	-
3d.3	Subtotal Period 3d Collateral Costs	-	-	-	-	-	-	28	4	32	-	32	-	-	-	-	-	-	-	-

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**Table D  
 Monticello Nuclear Generating Plant  
 DECON Decommissioning Cost Estimates with 60 Years of Spent Fuel Storage**  
 (Thousands of 2020 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Cost	Transport Cost	Off-Site Processing Cost	LRW Disposal Cost	Other Contingency	Total Contingency	Total Lic. Term. Costs	NRC Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu Feet	Class A Cu Feet	Class B Cu Feet	Class C Cu Feet	GTCC Cu Feet	Barrial/Processed Wt. Lbs.	Craft Manhours	Utility and Contractor Manhours	
<b>Period 3d Period-Dependent Costs</b>																					
3d4.1.1	Insurance	-	-	-	-	-	-	27	3	30	30	-	-	-	-	-	-	-	-	-	-
3d4.1.2	Property taxes	-	-	-	-	-	-	35	3	38	38	-	-	-	-	-	-	-	-	-	-
3d4.1.3	NRC ISFSI Fees	-	-	-	-	-	-	6	1	7	6	-	-	-	-	-	-	-	-	-	-
3d4.1.4	Professional Fees	-	-	-	-	-	-	8	1	9	6	-	-	-	-	-	-	-	-	-	-
3d4.1.5	Fixed Overhead	-	-	-	-	-	-	8	1	9	10	6	-	-	-	-	-	-	-	-	-
3d4.1.6	Railroad Track Maintenance	-	-	-	-	-	-	165	1	166	-	-	-	-	-	-	-	-	-	-	-
3d4.1.7	Security Staff Cost	-	-	-	-	-	-	25	25	140	190	-	-	-	-	-	-	-	-	-	250
3d4.1.8	Utility Staff Cost	-	-	-	-	-	-	38	38	200	238	-	-	-	-	-	-	-	-	-	238
3d4.1	Subtotal Period 3d Period-Dependent Costs	-	-	-	-	-	-	293	40	333	318	15	-	-	-	-	-	-	-	-	2,613
3d4.0	TOTAL PERIOD 3d COST	-	-	1,083	-	-	4,213	321	962	6,678	6,632	47	-	-	-	-	1,160	225,765	-	-	2,613
<b>PERIOD 3e - ISFSI Decommissionation</b>																					
<b>Period 3e Direct Decommissioning Activities</b>																					
3e2.1	License Termination (ISFSI)	-	57	188	987	-	5,925	2,013	2,292	11,462	11,462	-	-	21,949	-	-	-	2,638,402	10,339	-	2,201
3e2.2	Subtotal Period 3e Additional Costs	-	57	188	987	-	5,925	2,013	2,292	11,462	11,462	-	-	21,949	-	-	-	2,638,402	10,339	-	2,201
<b>Period 3e Period-Dependent Costs</b>																					
3e4.1.1	Insurance	-	-	-	-	-	-	118	30	148	148	-	-	-	-	-	-	-	-	-	-
3e4.1.2	Property taxes	-	-	-	-	-	-	219	62	312	312	-	-	-	-	-	-	-	-	-	-
3e4.1.3	NRC ISFSI Fees	-	-	-	-	-	-	71	18	89	89	-	-	-	-	-	-	-	-	-	-
3e4.1.4	Professional Fees	-	-	-	-	-	-	71	18	89	89	-	-	-	-	-	-	-	-	-	-
3e4.1.5	Fixed Overhead	-	-	-	-	-	-	41	10	52	52	-	-	-	-	-	-	-	-	-	-
3e4.1.6	Railroad Track Maintenance	-	-	-	-	-	-	352	88	440	440	-	-	-	-	-	-	-	-	-	4,900
3e4.1.7	Security Staff Cost	-	-	-	-	-	-	30	30	160	190	-	-	-	-	-	-	-	-	-	1,900
3e4.1.8	Utility Staff Cost	-	-	-	-	-	-	43	43	230	273	-	-	-	-	-	-	-	-	-	2,700
3e4.1	Subtotal Period 3e Period-Dependent Costs	-	-	-	-	-	-	1,105	276	1,381	1,381	-	-	-	-	-	-	-	-	-	8,792
3e4.0	TOTAL PERIOD 3e COST	-	57	188	987	-	5,925	3,118	2,569	12,844	12,844	-	-	21,949	-	-	-	2,638,402	10,339	-	10,993
<b>PERIOD 3f - ISFSI Site Restoration</b>																					
<b>Period 3f Direct Decommissioning Activities</b>																					
3f2.1	Demolition and Site Restoration of ISFSI	-	1,486	-	-	-	-	233	268	1,977	-	-	-	-	-	-	-	-	-	-	6,957
3f2.2	Subtotal Period 3f Additional Costs	-	1,486	-	-	-	-	233	268	1,977	-	-	-	-	-	-	-	-	-	-	6,957
<b>Period 3f Collateral Costs</b>																					
3f3.1	Small tool allowance	-	10	-	-	-	-	-	2	12	-	-	-	-	-	-	-	-	-	-	-
3f3.2	Subtotal Period 3f Collateral Costs	-	10	-	-	-	-	-	2	12	-	-	-	-	-	-	-	-	-	-	-
<b>Period 3f Period-Dependent Costs</b>																					
3f4.2	Property taxes	-	-	-	-	-	-	126	13	138	-	-	-	-	-	-	-	-	-	-	-
3f4.3	Heavy equipment rental	-	-	-	-	-	-	134	17	151	-	-	-	-	-	-	-	-	-	-	-
3f4.4	Heavy equipment fuel	-	-	-	-	-	-	36	5	41	-	-	-	-	-	-	-	-	-	-	-
3f4.5	Fixed Overhead	-	-	-	-	-	-	21	3	24	-	-	-	-	-	-	-	-	-	-	-
3f4.6	Railroad Track Maintenance	-	-	-	-	-	-	177	27	204	-	-	-	-	-	-	-	-	-	-	2,220
3f4.7	Security Staff Cost	-	-	-	-	-	-	475	82	674	-	-	-	-	-	-	-	-	-	-	4,084
3f4.8	Utility Staff Cost	-	-	-	-	-	-	709	342	2,693	-	-	-	-	-	-	-	-	-	-	4,244
3f4.1	Subtotal Period 3f Period-Dependent Costs	-	-	-	-	-	-	709	342	2,693	-	-	-	-	-	-	-	-	-	-	6,957
3f4.0	TOTAL PERIOD 3f COST	-	1,613	-	-	-	10,238	554,007	81,519	677,422	21,726	585,305	-	21,949	-	-	1,160	2,850,167	80,292	-	4,230,004
<b>PERIOD 3 TOTALS</b>																					
<b>TOTAL COST TO DECOMMISSION</b>																					
TOTAL COST TO DECOMMISSION		17,263	95,223	21,839	11,878	49,052	84,223	1,063,866	238,219	1,612,762	776,139	768,237	288,203	197,270	1,092	898	1,160	24,471,580	848,750	-	7,816,514

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**Table D  
 Monticello Nuclear Generating Plant  
 DECON Decommissioning Cost Estimates with 60 Years of Spent Fuel Storage**  
 (Thousands of 2020 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LJRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu Feet	Burial Volumes			Burial/Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu Feet	Class B Cu Feet	Class C Cu Feet			
<b>TOTAL COST TO DECOMMISSION WITH 17.33% CONTINGENCY:</b>																				
	TOTAL NRC LICENSE TERMINATION COST IS 48.12%, OR:				\$1,614,762	thousands of 2020 dollars														
	SPENT FUEL MANAGEMENT COST IS 47.32%, OR:				\$776,139	thousands of 2020 dollars														
	NON-NUCLEAR DEMOLITION COST IS 4.55%, OR:				\$763,337	thousands of 2020 dollars														
	TOTAL LOW-LEVEL RADIOACTIVE WASTE BURIED (EXCLUDING GTCC):				\$73,386	thousands of 2020 dollars														
	TOTAL GREATER THAN CLASS C RADWASTE VOLUME GENERATED:				200,160	Cubic Feet														
	TOTAL SCRAP METAL REMOVED:				1,160	Cubic Feet														
	<b>TOTAL CRAFT LABOR REQUIREMENTS:</b>				33,123	Tons														
					848,750	Manhours														

End Notes:  
 n/a - indicates that this activity not charged as decommissioning expense  
 a - indicates that this activity performed by decommissioning staff  
 0 - indicates that this value is less than 0.5 but is non-zero  
 A cell containing "-" indicates a zero value

***Monticello Nuclear Generating Plant  
Decommissioning Cost Analysis***

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**APPENDIX E**  
**DETAILED COST ANALYSIS**  
**SCENARIO 3: DECON with 100 Year DFS**



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**Table E  
 Monticello Nuclear Generating Plant  
 DECON Decommissioning Cost Estimates with 100 Years of Spent Fuel Storage**  
 (Thousands of 2020 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LIRW Disposal Costs	Other Costs	Total Contingency Costs	Total Lic. Term. Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu Feet	Class A Cu Feet	Class B Cu Feet	Class C Cu Feet	GTCC Cu Feet	Burial/Processed Wt. Lbs.	Craft Manhours	Utility and Contractor Manhours	
<b>PERIOD 1a - Shutdown through Transition</b>																						
1a.1.1	Period 1a Direct Decommissioning Activities	-	-	-	-	-	-	167	25	192	192	-	-	-	-	-	-	-	-	-	1,300	
1a.1.2	Prepare preliminary decommissioning cost estimates	-	-	-	-	-	-	-	n/a	-	-	-	-	-	-	-	-	-	-	-	-	
1a.1.3	Remove fuel & source material	-	-	-	-	-	-	-	-	-	296	-	-	-	-	-	-	-	-	-	2,000	
1a.1.4	Notification of Permanent Dismantling	-	-	-	-	-	-	-	-	-	680	-	-	-	-	-	-	-	-	-	4,600	
1a.1.5	Deactivate plant systems & process waste	-	-	-	-	-	-	257	39	296	296	-	-	-	-	-	-	-	-	-	-	
1a.1.6	Review plant logs & spms.	-	-	-	-	-	-	-	501	680	680	-	-	-	-	-	-	-	-	-	-	
1a.1.8	Perform detailed rad survey	-	-	-	-	-	-	-	129	148	148	-	-	-	-	-	-	-	-	-	1,000	
1a.1.9	Estimate by-product inventory	-	-	-	-	-	-	122	25	192	192	-	-	-	-	-	-	-	-	-	1,300	
1a.1.11	Detailed by-product inventory	-	-	-	-	-	-	964	145	1,108	1,108	-	-	-	-	-	-	-	-	-	7,500	
1a.1.12	Define major work sequence	-	-	-	-	-	-	308	40	308	308	-	-	-	-	-	-	-	-	-	2,100	
1a.1.13	Perform SER and EA	-	-	-	-	-	-	613	14	1,729	1,729	-	-	-	-	-	-	-	-	-	5,000	
1a.1.15	Perform Site-Specific Cost Study	-	-	-	-	-	-	129	19	148	148	-	-	-	-	-	-	-	-	-	1,000	
1a.1.16	Prepare/submit Irradiated Fuel Management Plan	-	-	-	-	-	-	-	95	727	654	-	-	-	-	-	-	-	-	-	4,920	
1a.1.17.1	Plant & temporary facilities	-	-	-	-	-	-	536	80	616	554	-	73	-	-	-	-	-	-	-	4,167	
1a.1.17.2	Plant systems	-	-	-	-	-	-	64	10	71	71	-	62	-	-	-	-	-	-	-	500	
1a.1.17.3	SSSS Decommissionation Flush	-	-	-	-	-	-	835	125	961	961	-	-	-	-	-	-	-	-	-	6,500	
1a.1.17.5	Reactor vessel	-	-	-	-	-	-	64	10	74	74	-	-	-	-	-	-	-	-	-	500	
1a.1.17.6	Sacrificial shield	-	-	-	-	-	-	129	19	148	148	-	118	-	-	-	-	-	-	-	1,000	
1a.1.17.7	Moisture separators/whiters	-	-	-	-	-	-	208	40	308	308	-	-	-	-	-	-	-	-	-	2,088	
1a.1.17.9	Main Turbine	-	-	-	-	-	-	257	39	296	296	-	-	-	-	-	-	-	-	-	2,000	
1a.1.17.10	Main Condensers	-	-	-	-	-	-	401	60	461	461	-	231	-	-	-	-	-	-	-	3,120	
1a.1.17.11	Pressure suppression structure	-	-	-	-	-	-	501	80	680	680	-	-	-	-	-	-	-	-	-	4,600	
1a.1.17.13	Plant structures & buildings	-	-	-	-	-	-	116	17	133	67	-	67	-	-	-	-	-	-	-	900	
1a.1.17.15	Facility & site cleanup	-	-	-	-	-	-	4,566	823	6,388	5,759	-	550	-	-	-	-	-	-	-	42,583	
1a.1.17	Total	-	-	-	-	-	-	308	46	355	355	-	-	-	-	-	-	-	-	-	2,400	
1a.1.18	Prepare dismantling sequence	-	-	-	-	-	-	526	27	499	499	-	-	-	-	-	-	-	-	-	1,400	
1a.1.20	Design water drain up system	-	-	-	-	-	-	180	27	207	207	-	-	-	-	-	-	-	-	-	-	
1a.1.21	Rigging/Cont. Curt. Evp/s/boiling/etc.	-	-	-	-	-	-	2,400	360	2,760	2,760	-	-	-	-	-	-	-	-	-	-	
1a.1.22	Procure caskloaders & containers	-	-	-	-	-	-	158	24	182	182	-	-	-	-	-	-	-	-	-	1,250	
1a.1	Subtotal Period 1a Activity Costs	-	-	-	-	-	-	16,369	2,465	19,051	18,505	-	550	-	-	-	-	-	-	-	83,013	
<b>Period 1a Collateral Costs</b>																						
1a.3.1	Spent Fuel Capital and Transfer	-	-	-	-	-	-	1,323	198	1,522	1,522	-	-	-	-	-	-	-	-	-	-	
1a.3.2	Spent Fuel and Fuel Storage	-	-	-	-	-	-	1,176	182	1,358	1,358	-	-	-	-	-	-	-	-	-	-	
1a.3	Subtotal Period 1a Collateral Costs	-	-	-	-	-	-	11,215	1,682	12,887	12,887	-	-	-	-	-	-	-	-	-	-	
<b>Period 1a Period-Dependent Costs</b>																						
1a.4.1	Insurance Taxes	-	-	-	-	-	-	5,288	933	6,261	6,261	-	-	-	-	-	-	-	-	-	-	
1a.4.2	Health physics supplies	-	-	-	-	-	-	3,370	327	3,697	3,697	-	-	-	-	-	-	-	-	-	-	
1a.4.3	Health physics supplies	-	-	-	-	-	-	153	167	324	324	-	-	-	-	-	-	-	-	-	-	
1a.4.4	Heavy equipment rental	-	-	-	-	-	-	113	896	886	886	-	-	-	-	-	-	-	-	-	-	
1a.4.5	Deposit of DAW generated	-	-	-	-	-	-	50	85	135	135	-	-	-	-	-	-	-	-	-	20	
1a.4.6	Procure caskloaders & containers	-	-	-	-	-	-	1,817	272	2,088	2,088	-	-	-	-	-	-	-	-	-	-	
1a.4.7	NRC Fees	-	-	-	-	-	-	1,137	114	1,251	1,251	-	-	-	-	-	-	-	-	-	12,190	
1a.4.8	Emergency Planning Fees	-	-	-	-	-	-	343	343	3,770	3,770	-	-	-	-	-	-	-	-	-	-	
1a.4.9	Food Overhaul	-	-	-	-	-	-	2,015	325	3,000	3,000	-	-	-	-	-	-	-	-	-	-	
1a.4.10	Spent Fuel Pool O&M	-	-	-	-	-	-	112	17	129	129	-	-	-	-	-	-	-	-	-	-	
1a.4.11	RFSS Operating Costs	-	-	-	-	-	-	125	19	144	144	-	-	-	-	-	-	-	-	-	-	
1a.4.12	Railroad Track Maintenance	-	-	-	-	-	-	2,466	406	2,872	2,872	-	-	-	-	-	-	-	-	-	245,410	
1a.4.13	Utility Staff Cost	-	-	-	-	-	-	27,352	4,767	33,375	33,375	-	-	-	-	-	-	-	-	-	255,410	
1a.4.14	Utility Staff Cost	-	-	-	-	-	-	27,352	4,767	33,375	33,375	-	-	-	-	-	-	-	-	-	255,410	
1a.4	Subtotal Period 1a Period-Dependent Costs	-	-	-	-	-	-	50,654	6,703	63,722	64,902	-	4,870	-	-	-	-	-	-	-	12,190	20
1a.4	Subtotal Period 1a Period-Dependent Costs	-	-	-	-	-	-	50,654	6,703	63,722	64,902	-	4,870	-	-	-	-	-	-	-	-	20

**Monticello Nuclear Generating Plant  
 Decommissioning Cost Analysis**

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**Table E  
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 DECON Decommissioning Cost Estimates with 100 Years of Spent Fuel Storage**  
 (Thousands of 2020 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other	Total Contingency	Total	Lic. Term. Costs	NRC Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu Feet	Burial Volumes			Borial/Processed Wt. Lbs.	Craft Manhours	Utility and Contractor Manhours
																Class A Cu Feet	Class B Cu Feet	Class C Cu Feet			
1b.0	TOTAL PERIOD 1b CONST	-	1,307	12	6	-	50	87,418	12,871	101,724	94,783	6,382	610	-	-	-	-	-	12,190	20	750,893
<b>Period 1b Direct Decommissioning Activities</b>																					
<b>Detailed Work Procedures</b>																					
1b.1.1	Plant systems	-	-	-	-	-	-	698	51	749	630	-	-	-	-	-	-	-	-	-	4,733
1b.1.1.1	NSSS systems	-	-	-	-	-	-	524	77	601	501	-	-	-	-	-	-	-	-	-	4,000
1b.1.1.2	Reactor internals	-	-	-	-	-	-	514	77	591	501	-	-	-	-	-	-	-	-	-	1,350
1b.1.1.3	Reactor internal flush	-	-	-	-	-	-	174	26	200	50	-	-	-	-	-	-	-	-	-	1,000
1b.1.1.4	Remaining buildings	-	-	-	-	-	-	129	19	148	148	-	-	-	-	-	-	-	-	-	2,000
1b.1.1.5	CRD housings & NAs	-	-	-	-	-	-	257	39	296	296	-	-	-	-	-	-	-	-	-	3,630
1b.1.1.6	Removal primary containment	-	-	-	-	-	-	467	70	537	537	-	-	-	-	-	-	-	-	-	1,200
1b.1.1.8	Reactor vessel	-	-	-	-	-	-	154	23	177	177	-	-	-	-	-	-	-	-	-	1,000
1b.1.1.9	Facility decont	-	-	-	-	-	-	129	19	148	148	-	-	-	-	-	-	-	-	-	2,080
1b.1.1.10	Reactor vessel	-	-	-	-	-	-	207	40	307	307	-	-	-	-	-	-	-	-	-	2,688
1b.1.1.11	Reinforced concrete	-	-	-	-	-	-	268	40	308	308	-	-	-	-	-	-	-	-	-	2,730
1b.1.1.12	Main Turbine	-	-	-	-	-	-	351	53	403	363	-	-	-	-	-	-	-	-	-	33,711
1b.1.1.13	Main Condensers	-	-	-	-	-	-	351	53	403	363	-	-	-	-	-	-	-	-	-	1,067
1b.1.1.14	Steam generators & headers	-	-	-	-	-	-	436	69	505	454	-	-	-	-	-	-	-	-	-	1,067
1b.1.1.15	Refuse building	-	-	-	-	-	-	436	69	505	454	-	-	-	-	-	-	-	-	-	33,711
1b.1.1	Total	-	-	-	-	-	-	4,336	650	4,987	4,524	-	-	-	-	-	-	-	-	-	33,711
1b.1.2	Decon NSSS	206	-	-	-	-	-	-	148	444	444	-	-	-	-	-	-	-	-	-	1,067
1b.1	Subtotal Period 1b Activity Costs	206	-	-	-	-	-	4,336	798	5,134	4,968	-	-	-	-	-	-	-	-	-	33,711
<b>Period 1b Additional Costs</b>																					
1b.2.1	Spent Fuel Pool Isolation	-	-	-	-	-	-	12,075	1,770	14,776	14,776	-	-	-	-	-	-	-	-	-	10,852
1b.2.2	Site Characterization	-	-	-	-	-	-	5,950	80	6,030	6,030	-	-	-	-	-	-	-	-	-	161
1b.2.3	Mixed & RCRA Waste	-	-	28	29	-	-	9	80	89	89	-	-	-	-	-	-	-	-	-	161
1b.2	Subtotal Period 1b Additional Costs	-	-	28	29	-	-	18,005	3,669	22,365	22,365	-	-	-	-	-	-	-	-	-	10,852
<b>Period 1b Collateral Costs</b>																					
1b.3.1	Decon equipment	1,055	-	-	-	-	-	1,264	188	1,213	1,213	-	-	-	-	-	-	-	-	-	-
1b.3.2	Transportation expenses	38	-	-	-	-	-	1,264	53	283	283	-	-	-	-	-	-	-	-	-	-
1b.3.3	Process decommissioning water waste	1	-	35	45	-	-	1,02	396	2,024	2,024	-	-	-	-	-	-	-	-	-	45
1b.3.4	Process decommissioning chemical flush waste	1	-	24	77	-	-	1,236	0	2	2	-	-	-	-	-	-	-	-	-	43
1b.3.5	Small tool allowance	-	1,200	-	-	-	-	-	18	1,200	1,200	-	-	-	-	-	-	-	-	-	-
1b.3.6	Process decommissioning equipment	2,104	-	-	-	-	-	-	306	2,410	2,410	-	-	-	-	-	-	-	-	-	-
1b.3.7	Decon rig	-	-	-	-	-	-	-	410	3,145	3,145	-	-	-	-	-	-	-	-	-	-
1b.3.8	Spent Fuel Capital and Transfer	-	-	-	-	-	-	2,735	990	7,285	7,285	-	-	-	-	-	-	-	-	-	-
1b.3.9	Retention and Sovereignty	3,197	1,202	40	122	-	-	6,335	2,663	13,185	10,910	-	-	-	-	-	-	-	-	-	-
1b.3	Subtotal Period 1b Collateral Costs	3,197	1,202	40	122	-	-	10,334	2,663	13,185	10,910	-	-	-	-	-	-	-	-	-	89
<b>Period 1b Period-Dependent Costs</b>																					
1b.4.1	Decon supplies	30	-	-	-	-	-	1,511	10	48	48	-	-	-	-	-	-	-	-	-	-
1b.4.2	Insurance	-	-	-	-	-	-	1,071	171	1,889	1,889	-	-	-	-	-	-	-	-	-	-
1b.4.3	Property taxes	-	-	-	-	-	-	1,209	86	430	430	-	-	-	-	-	-	-	-	-	-
1b.4.4	Health physics supplies	-	-	-	-	-	-	-	56	432	432	-	-	-	-	-	-	-	-	-	-
1b.4.5	Heavy equipment rental	-	375	-	-	-	-	-	86	432	432	-	-	-	-	-	-	-	-	-	-
1b.4.6	Disposal of DAW generated	-	-	-	-	-	-	-	29	2,083	2,083	-	-	-	-	-	-	-	-	-	-
1b.4.7	Process decommissioning budget	-	-	-	-	-	-	-	32	355	355	-	-	-	-	-	-	-	-	-	-
1b.4.8	NRC Fees	-	-	-	-	-	-	323	32	355	355	-	-	-	-	-	-	-	-	-	-
1b.4.9	Emergency Planning Fees	-	-	-	-	-	-	1,416	142	1,557	1,557	-	-	-	-	-	-	-	-	-	-
1b.4.10	Spent Fuel Pool O&M	-	-	-	-	-	-	167	1,400	1,500	1,500	-	-	-	-	-	-	-	-	-	-
1b.4.11	Spent Fuel Pool O&M	-	-	-	-	-	-	42	63	84	84	-	-	-	-	-	-	-	-	-	-
1b.4.12	RFSS Operating Costs	-	-	-	-	-	-	62	9	72	72	-	-	-	-	-	-	-	-	-	-
1b.4.13	Railroad Track Maintenance	-	-	-	-	-	-	1,679	9	678	678	-	-	-	-	-	-	-	-	-	-
1b.4.14	Construction Period Cost	-	-	-	-	-	-	5,843	4,877	6,724	6,724	-	-	-	-	-	-	-	-	-	-
1b.4.15	DOE Staff Cost	-	-	-	-	-	-	2,032	2,032	15,734	15,734	-	-	-	-	-	-	-	-	-	-
1b.4.16	Utility Staff Cost	-	-	-	-	-	-	35,355	5,323	42,076	42,076	-	-	-	-	-	-	-	-	-	-
1b.4	Subtotal Period 1b Period-Dependent Costs	3,197	1,202	84	154	14	1,657	60,230	12,405	88,056	85,315	-	-	-	-	-	-	-	-	-	50,904
1b.0	TOTAL PERIOD 1b CONST	3,331	3,288	96	100	14	1,707	156,648	25,335	190,780	178,125	-	-	-	-	-	-	-	-	-	31,828
<b>PERIOD 1 TOTALS</b>																					
3,331    3,288    96    100    14    1,707    156,648    25,335    190,780    178,125    11,643    1,012    43    1,109    231    -    -    -    -    68,195    31,848    1,192,515																					

**Monticello Nuclear Generating Plant  
 Decommissioning Cost Analysis**

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**Table E  
 Monticello Nuclear Generating Plant  
 DECON Decommissioning Cost Estimates with 100 Years of Spent Fuel Storage**  
 (Thousands of 2020 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Cost	Transport Cost	Off-Site Processing Cost	LLRW Disposal Cost	Other Cost	Total Contingency	Total Lic. Term. Costs	NRC Management Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu Feet	Barial Volumes			Barril/Processed Wt. Lbs.	Craft Manhours	Utility and Contractor Manhours	
															Class A Cu Feet	Class B Cu Feet	Class C Cu Feet				
<b>PERIOD 2a - Large Component Removal</b>																					
Period 2a Direct Decommissioning Activities																					
Nuclear Steam Supply System Removal																					
2a.1.1.1	Recirculation System Piping & Valves	111	94	27	50	528	-	-	221	1,031	1,031	-	-	-	1,430	-	-	967.42	2,905	-	
2a.1.1.2	Recirculation Pumps & Motors	40	63	16	51	539	-	-	186	938	938	-	-	46	945	-	-	132.290	1,563	-	
2a.1.1.3	CRDMs & NAs Removal	24	1,179	35	55	670	-	-	200	2,000	2,000	-	-	-	1,111	-	-	3,100	3,100	-	
2a.1.1.4	CRDMs & NAs Internals	24	6,222	12,852	2,625	29,445	364	-	34,027	29,400	29,400	-	-	-	1,761	-	-	4,133.100	4,137	1,379	
2a.1.1.5	Reactor Vessel	113	9,121	4,672	1,167	-	5,861	364	10,842	30,140	30,140	-	-	-	16,169	-	-	1,105.210	30,515	1,379	
2a.1.1	Totals	702	17,020	15,982	4,069	42	37,803	728	35,973	112,449	112,449	-	-	46	23,536	1,761	-	1,874.002	88,267	2,758	
Removal of Major Equipment																					
2a.1.2	Main Turbine/Generator	-	385	1,356	521	6,139	439	-	1,341	10,182	10,182	-	-	24,835	1,383	-	-	1,577.959	5,438	-	
2a.1.3	Main Condensers	-	1,817	389	194	3,225	244	-	947	6,317	6,317	-	-	17,396	727	-	-	828.955	18,831	-	
Cascading Costs from Clean Building Demolition																					
2a.1.4.1	Reactor Building	-	332	-	-	-	-	-	70	381	381	-	-	-	-	-	-	-	2,217	-	
2a.1.4.2	Radiation	-	25	-	-	-	-	-	4	28	28	-	-	-	-	-	-	-	127	-	
2a.1.4.3	Turbine	-	127	-	-	-	-	-	19	146	146	-	-	-	-	-	-	-	1,251	-	
2a.1.4	Totals	-	485	-	-	-	-	-	92	556	556	-	-	-	-	-	-	-	3,508	-	
Disposal of Plant Systems																					
2a.1.5.1	Automatic Press Relief	-	118	7	12	134	70	-	70	410	410	-	-	803	206	-	-	45,852	1,656	-	
2a.1.5.2	Chemistry Sampling - Insulated	-	0	0	0	0	0	-	0	3	3	-	-	36	3	-	-	6.000	48	-	
2a.1.5.3	Chemistry Sampling - Insulated	-	2	0	0	2	0	-	0	0	0	-	-	1	1	-	-	72	280	-	
2a.1.5.4	Circulating Water - RCA	-	207	14	62	1,114	-	-	290	1,626	1,626	-	-	6,656	-	-	-	270,307	2,860	-	
2a.1.5.5	Combustible Gas Control - Insulated - RCA	-	29	0	2	38	-	-	13	80	80	-	-	232	-	-	-	8,617	378	-	
2a.1.5.6	Condensate & Feedwater - RCA	-	187	183	329	3,337	2,604	-	1,431	8,731	8,731	-	-	10,947	7,319	-	-	1,275,810	14,186	-	
2a.1.5.7	Condensate & Feedwater - Insulated	-	462	34	63	609	408	-	343	2,038	2,038	-	-	4,176	1,207	-	-	246,683	6,964	-	
2a.1.5.9	Condensate Drain	-	545	30	51	500	339	-	316	1,840	1,840	-	-	3,346	1,000	-	-	196,596	7,618	-	
2a.1.5.10	Control Rod Drive	-	74	0	0	113	21	-	44	276	276	-	-	719	79	-	-	10,529	105,290	-	
2a.1.5.11	Control Rod Drive	-	3	0	0	1	1	-	2	9	9	-	-	19	4	-	-	1,009	41	-	
2a.1.5.12	Control Rod Drive Hydraulic	-	416	16	26	277	190	-	199	1,124	1,124	-	-	1,658	562	-	-	103,306	5,898	-	
2a.1.5.13	Core Spray - Insulated	-	79	20	51	734	176	-	184	1,244	1,244	-	-	4,384	521	-	-	211,359	1,163	-	
2a.1.5.14	Drain Water - Insulated - RCA	-	15	6	1	14	40	-	8	474	474	-	-	826	204	-	-	3,445	181	-	
2a.1.5.15	Drain Water - RCA	-	15	6	1	14	40	-	8	36	36	-	-	253	43	-	-	3,445	181	-	
2a.1.5.16	Drain Water - RCA	-	41	1	2	42	-	-	17	104	104	-	-	25	25	-	-	10,278	508	-	
2a.1.5.17	Drain Oil - RCA	-	2	0	0	0	-	-	1	7	7	-	-	25	2	-	-	591	25	-	
2a.1.5.18	Emergency Services Water - Clean - RCA	-	0	0	0	0	-	-	0	19	19	-	-	54	4	-	-	22,884	54	-	
2a.1.5.19	Emergency Services Water - Insul. - RCA	-	0	0	0	0	-	-	0	1	1	-	-	2	2	-	-	84	182	-	
2a.1.5.20	Electrical - Clean	-	13	-	-	-	-	-	2	15	15	-	-	15	-	-	-	-	-	-	
2a.1.5.21	Emergency Services Water - Insul. - RCA	-	21	0	1	23	-	-	9	55	55	-	-	137	-	-	-	5,544	281	-	
2a.1.5.22	Emergency Services Water - Insul. - RCA	-	2	0	0	2	-	-	5	25	25	-	-	62	-	-	-	4,192	48	-	
2a.1.5.23	GEPIP - RCA	-	0	0	1	17	-	-	4	25	25	-	-	103	-	-	-	4,192	48	-	
2a.1.5.24	Generator Physical Design - RCA	-	5	0	0	5	-	-	2	12	12	-	-	31	-	-	-	1,250	67	-	
2a.1.5.25	R2 O2 Control Analyzing	-	6	0	0	6	-	-	3	15	15	-	-	6	-	-	-	1,080	81	-	
2a.1.5.26	R2 O2 Control Analyzing - Insulated	-	6	0	0	6	-	-	3	15	15	-	-	6	-	-	-	1,080	81	-	
2a.1.5.27	High Pressure Coolant Injection	-	47	6	13	163	70	-	61	383	383	-	-	972	206	-	-	52,702	986	-	
2a.1.5.28	High Pressure Coolant Injection - Insula	-	219	14	24	247	163	-	141	839	839	-	-	1,508	481	-	-	95,733	3,079	-	
2a.1.5.29	Hydrogen Cooling	-	8	-	-	-	-	-	1	10	10	-	-	10	-	-	-	-	118	-	
2a.1.5.30	Hydrogen Cooling - RCA	-	17	0	0	17	-	-	9	59	59	-	-	189	-	-	-	7,690	312	-	
2a.1.5.31	Hydrogen Seal Oil - RCA	-	17	0	0	17	-	-	9	59	59	-	-	189	-	-	-	7,690	312	-	
2a.1.5.32	Hydrogen Water Chemistry - RCA	-	24	0	1	23	-	-	10	59	59	-	-	140	-	-	-	5,672	304	-	
2a.1.5.33	Instrument & Service Air - RCA	-	225	4	17	249	159	-	103	644	644	-	-	1,768	-	-	-	71,810	2,733	-	
2a.1.5.34	Main Condenser	-	249	17	20	335	208	-	175	1,029	1,029	-	-	3,148	-	-	-	125,135	5,532	-	
2a.1.5.35	Main Condenser	-	249	17	20	335	208	-	175	1,029	1,029	-	-	3,148	-	-	-	125,135	5,532	-	
2a.1.5.36	Main Turbine	-	1,012	205	353	3,936	2,921	-	1,533	9,350	9,350	-	-	15,760	8,687	-	-	1,354,661	14,733	-	
2a.1.5.37	Main Turbine - Insulated	-	214	18	37	423	225	-	180	1,097	1,097	-	-	2,530	667	-	-	146,288	3,069	-	
2a.1.5.38	Main Turbine - Insulated	-	189	1	32	301	257	-	163	1,000	1,000	-	-	2,355	764	-	-	121,555	2,786	-	
2a.1.5.39	Off-Gas Recombiner	-	387	19	27	229	240	-	197	1,100	1,100	-	-	3,365	769	-	-	100,953	5,385	-	
2a.1.5.40	Off-Gas Recombiner - Insulated	-	1	1	1	9	11	-	11	58	58	-	-	33	-	-	-	4,318	345	-	
2a.1.5.41	Post-Accident Strapping - Insulated	-	25	1	1	26	3	-	6	40	40	-	-	13	-	-	-	60,240	1,222	-	
2a.1.5.42	Post-Accident Strapping - Insulated - RCA	-	37	3	11	24	13	-	14	85	85	-	-	25	-	-	-	1,112	57	-	
2a.1.5.43	RRR-Service Water - RCA	-	0	0	0	0	-	-	1,485	-	-	-	-	35	-	-	-	1,430	47	-	
2a.1.5.44	RRR-Service Water - RCA	-	0	0	0	0	-	-	2	12	12	-	-	139	-	-	-	14,009	773	-	
2a.1.5.45	Reactor Feedwater Pump Seal	-	56	2	4	32	33	-	28	155	155	-	-	4	-	-	-	-	-	-	

**Monticello Nuclear Generating Plant  
 Decommissioning Cost Analysis**

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**Table E  
 Monticello Nuclear Generating Plant  
 DECON Decommissioning Cost Estimates with 100 Years of Spent Fuel Storage**  
 (Thousands of 2020 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Cost	Transport Cost	Off-Site Processing Cost	LLRW Disposal Cost	Other Contingency	Total Contingency	Total	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu Feet	Barial Volumes			Borial/Processed Wt. Lbs.	Craft Manhours	Utility and Contractor Manhours	
															Class A Cu Feet	Class B Cu Feet	Class C Cu Feet				
2a.1.5.46	Residual Heat Removal	362	252	172	178	1,072	2,051	-	982	5,049	5,049	-	-	6,406	6,012	-	-	617,941	4,135	-	
2a.1.5.47	Residual Heat Removal - Insulated	622	554	61	82	638	880	-	772	3,535	3,535	-	-	3,367	2,607	-	-	303,087	10,340	-	
2a.1.5.48	RC Core Isolation Cooling	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
2a.1.5.49	RC Core Isolation Cooling - Insulated	-	107	-	7	48	67	-	52	287	287	-	-	288	190	-	-	24,456	1,470	-	
2a.1.5.50	RS Recirculation	56	168	6	4	7	65	-	61	258	258	-	-	43	190	-	-	14,095	1,580	-	
2a.1.5.51	Shrubbers	-	-	-	5	63	30	-	60	331	331	-	-	377	90	-	-	21,009	2,548	-	
2a.1.5.52	Stability Liquid Control - Insl - RCA	-	-	-	0	1	-	-	1	2	2	-	-	22	-	-	-	9,964	348	-	
2a.1.5.53	Stability Liquid Control - RCA	-	28	-	2	41	-	-	43	152	152	-	-	126	-	-	-	9,964	348	-	
2a.1.5.54	Stator Cooling - RCA	-	7	-	1	21	-	-	5	35	35	-	-	126	-	-	-	5,135	98	-	
2a.1.5.55	Traversing Incore Probe	-	4	-	0	-	2	-	1	7	7	-	-	1	5	-	-	6,126	386	-	
2a.1.5.55	Totals	1,040	8,221	924	1,572	16,339	11,425	-	4,369	47,739	47,739	-	24	97,054	33,808	-	-	61,265,515	1,193,431	-	
2a.1.6	Scuffing in support of decommissioning	-	2,205	22	12	101	31	-	607	3,127	3,127	-	-	1,030	91	-	-	62,111	22,561	-	
2a.1.7	Subtotal Period 2a Activity Costs	1,742	29,721	13,645	6,398	25,937	50,042	728	47,148	180,360	180,336	-	24	141,010	55,545	1,761	898	10,435,540	253,640	2,758	
2a.3.1	Period 2a Collateral Costs	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
2a.3.2	Process decommissioning water waste	85	-	57	102	-	232	-	122	508	508	-	-	-	-	-	-	-	-	104	
2a.3.3	Process decommissioning chemical flush waste	5	-	216	702	-	1,619	-	534	3,077	3,077	-	-	-	-	-	-	-	-	392	
2a.3.4	Spent Fuel Capital and Transfer	-	524	-	-	-	-	24,119	3,618	27,737	26	-	27,737	-	-	-	-	-	-	-	
2a.3.5	Retention and Severance	-	-	-	-	-	-	13,127	1,989	15,097	15,097	-	-	-	-	-	-	-	-	-	
2a.3	Subtotal Period 2a Collateral Costs	91	324	274	804	-	1,851	37,247	4,262	46,882	19,107	-	27,737	-	2,625	-	-	254,950	495	-	
2a.4.1	Decon supplies	112	-	-	-	-	-	1,019	28	140	140	-	-	-	-	-	-	-	-	-	
2a.4.2	Insurance	-	-	-	-	-	-	4,377	580	2,645	2,645	-	-	-	-	-	-	-	-	-	
2a.4.3	Health physics supplies	-	2,506	-	-	-	-	-	544	4,171	4,171	-	-	-	-	-	-	-	-	-	
2a.4.5	Heavy equipment rental	-	3,627	-	-	-	-	-	134	758	758	-	-	-	-	-	-	-	-	-	
2a.4.6	Disposal of DAW generated	-	-	110	57	-	407	-	134	758	758	-	-	-	-	-	-	-	-	181	
2a.4.8	NRC Fees	-	-	-	-	-	-	856	86	942	942	-	-	-	-	-	-	-	-	-	
2a.4.9	Emergency Planning Fees	-	-	-	-	-	-	4,115	412	4,527	4,527	-	-	-	-	-	-	-	-	-	
2a.4.10	Fixed Overhead	-	-	-	-	-	-	3,071	461	3,532	3,532	-	-	-	-	-	-	-	-	-	
2a.4.11	Remedial Action SAM	-	-	-	-	-	-	1,768	187	1,955	1,955	-	-	-	-	-	-	-	-	-	
2a.4.12	ESFSI Operating Costs	-	-	-	-	-	-	162	24	187	187	-	-	-	-	-	-	-	-	-	
2a.4.13	Railroad Track Maintenance	-	-	-	-	-	-	181	27	208	208	-	-	-	-	-	-	-	-	-	
2a.4.14	Remedial Action Surveys	-	445	-	24	1,867	30	-	244	1,867	1,867	-	-	-	-	-	-	-	-	-	
2a.4.15	DOCS Staff Cost	-	-	-	-	-	-	21,021	3,153	24,174	24,174	-	-	-	-	-	-	-	-	-	
2a.4.16	DOCS Staff Cost	-	-	-	-	-	-	27,006	4,186	32,092	32,092	-	-	-	-	-	-	-	-	-	
2a.4.17	Utility Staff Cost	112	5,892	110	57	-	457	893,938	11,207	110,924	110,803	-	-	-	5,551	-	-	111,023	181	981,214	
2a.4	Subtotal Period 2a Period-Dependent Costs	1,945	38,028	19,028	7,259	25,937	52,250	127,913	67,707	388,166	394,246	-	62	141,010	67,722	1,761	898	10,924,520	254,317	984,002	
2a.9	TOTAL PERIOD 2a CONST	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
<b>PERIOD 2b - Site Decommissioning</b>																					
Period 2b Direct Decommissioning Activities																					
2b.1.1.1	Deposits of Plant Systems	-	18	0	1	6	3	-	6	35	35	-	-	55	10	-	-	5,690	977	-	
2b.1.1.2	Aluminum S2 - RCA	-	16	0	1	16	0	-	7	40	40	-	-	82	0	-	-	3,705	185	-	
2b.1.1.3	Decommissioning Projects	-	1	0	0	0	0	-	2	2	2	-	-	2	0	-	-	129	17	-	
2b.1.1.4	Electrical - Contaminated	-	445	6	24	3,000	30	-	183	1,089	1,089	-	-	2,389	90	-	-	102,726	6,325	-	
2b.1.1.5	Electrical - Decontaminated	-	2,008	48	24	3,000	30	-	1,206	8,077	8,077	-	-	2,614	100	-	-	24,913	3,724	-	
2b.1.1.6	Electrical - RCA	-	103	6	16	66	-	-	6	253	253	-	-	814	-	-	-	24,913	3,724	-	
2b.1.1.7	HVAC Ductwork	-	395	7	27	446	34	-	106	975	975	-	-	2,605	100	-	-	114,568	4,111	-	
2b.1.1.8	HVAC Chilled Water - RCA	-	324	6	26	461	-	-	105	971	971	-	-	2,702	-	-	-	111,779	3,985	-	
2b.1.1.9	Heating & Ventilation	-	43	0	61	1,007	76	-	302	1,916	1,916	-	-	6,080	227	-	-	23,889	711	-	
2b.1.1.10	Liquid Backwaters - RCA	-	8	-	-	-	-	-	3	38	38	-	-	38	-	-	-	405	35	-	
2b.1.1.11	Liquid Backwaters	588	687	48	63	514	586	-	703	3,188	3,188	-	-	1,728	17,288	-	-	233,484	17,104	-	
2b.1.1.12	Makeup Domin - RCA	-	103	3	14	246	-	-	45	431	431	-	-	1,471	-	-	-	59,747	1,412	-	
2b.1.1.13	Non-Essential Dose Generator - RCA	-	3	13	238	-	-	-	65	327	327	-	-	327	-	-	-	152,522	4,606	-	
2b.1.1.14	Non-Essential Dose Generator - RCA	-	457	21	342	-	214	-	214	1,327	1,327	-	-	4,224	620	-	-	152,522	4,606	-	
2b.1.1.15	Primary Containment	-	457	42	87	1,038	507	-	414	2,543	2,543	-	-	6,201	1,566	-	-	347,704	6,454	-	
2b.1.1.16	Process Radiation Monitors	-	46	2	24	-	18	-	20	111	111	-	-	142	52	-	-	9,115	649	-	

**Monticello Nuclear Generating Plant  
 Decommissioning Cost Analysis**

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**Table E  
 Monticello Nuclear Generating Plant  
 DECON Decommissioning Cost Estimates with 100 Years of Spent Fuel Storage**  
 (Thousands of 2020 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Cost	Transport Cost	Off-Site Processing Cost	LWR Disposal Cost	Other Contingency Cost	Total Contingency Cost	Total Cost	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu Feet	Class A Cu Feet	Class B Cu Feet	Class C Cu Feet	GTCC Cu Feet	Barriall/Processed Wt. Lbs.	Craft Manhours	Utility and Contractor Manhours
Decommissioning of Plant Systems (continued)																					
2b.1.17	Rx Bldg Closed Cng Water - Insl - RCA	-	114	-	2	9	163	-	54	343	343	-	-	977	-	-	-	-	39,675	1,484	-
2b.1.18	Rx Bldg Closed Cng Water - RCA	184	-	15	15	66	1,187	-	235	1,687	1,687	-	-	7,093	-	-	-	-	288,031	2,489	-
2b.1.19	Rx Compensating Water - RCA	142	57	14	14	27	1,134	-	48	1,304	1,304	-	-	5,250	-	-	-	-	17,836	2,489	-
2b.1.20	Rx Water Handling Equip	25	-	6	6	13	28	-	48	225	225	-	-	1,250	-	-	-	-	15,836	2,489	-
2b.1.21	Rx Water Cleanup	172	205	19	16	22	231	-	222	905	905	-	-	1,300	-	-	-	-	52,670	5,736	-
2b.1.22	Secondary Containment	-	124	7	14	170	86	-	81	483	483	-	-	1,017	-	-	-	-	57,567	1,763	-
2b.1.23	Service & Seal Water - Insl - RCA	-	130	-	2	11	503	-	82	272	272	-	-	1,809	-	-	-	-	75,913	2,065	-
2b.1.24	Service Air Blower - RCA	-	15	0	2	34	-	-	9	62	62	-	-	206	-	-	-	-	8,364	206	-
2b.1.25	Service Air Blower - RCA	338	404	36	40	389	407	-	480	2,204	2,204	-	-	2,387	-	-	-	-	188,221	10,820	-
2b.1.26	Solid Radiowaste	-	10	-	2	5	60	29	37	210	210	-	-	307	-	-	-	-	19,933	1,128	-
2b.1.27	Structures & Buildings	-	62	-	3	57	-	-	22	136	136	-	-	342	-	-	-	-	13,874	633	-
2b.1.28	Structures & Buildings	1,153	7,880	315	894	11,608	2,657	-	5,107	29,563	29,562	-	-	69,735	-	-	-	-	3,331,244	122,835	-
2b.1.1	Totals	-	2,831	28	16	239	38	-	758	3,090	3,090	-	-	1,387	-	-	-	-	65,139	28,205	-
2b.1.2	Scaffolding in support of decommissioning	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Decommissioning of Site Buildings																					
2b.1.31	Reactor Building	5,202	2,903	178	516	8,044	1,181	-	4,524	22,948	22,948	-	-	48,077	-	-	-	-	2,317,670	112,318	-
2b.1.32	Reactor Building	29	6	0	3	20	14	-	29	123	123	-	-	118	-	-	-	-	10,759	789	-
2b.1.33	HP/CI Room	28	28	1	2	20	11	-	46	46	46	-	-	103	-	-	-	-	4,860	286	-
2b.1.34	Hot-Shop	17	4	0	2	12	11	-	12	46	46	-	-	31	-	-	-	-	2,708	1,127	-
2b.1.35	LWR Storage & Shipping	58	24	8	8	3	45	-	32	191	191	-	-	1,322	-	-	-	-	15,948	785	-
2b.1.36	Offgas Storage & Compressor	41	27	1	2	25	4	-	34	136	136	-	-	1,322	-	-	-	-	15,948	785	-
2b.1.37	Offgas Storage & Compressor	17	17	1	1	4	33	-	34	25	25	-	-	1,322	-	-	-	-	15,948	785	-
2b.1.38	Radiowaste	121	61	3	17	20	96	-	107	435	435	-	-	172	-	-	-	-	49,943	2,503	-
2b.1.39	Radiowaste Material Storage Warehouse	64	24	2	9	36	52	-	202	202	202	-	-	1,000	-	-	-	-	25,000	1,107	-
2b.1.40	Radiowaste Material Storage Warehouse	21	21	1	1	1	1	-	1	1	1	-	-	1	-	-	-	-	1,000	1,107	-
2b.1.31.1	Turbine Generator	705	353	21	104	213	564	-	632	2,504	2,504	-	-	1,283	-	-	-	-	303,100	14,443	-
2b.1.31.2	Turbine Building Addition	58	21	1	8	47	181	-	47	181	181	-	-	5,247	-	-	-	-	20,478	1,087	-
2b.1.3	Totals	6,709	3,736	218	704	8,574	2,164	-	4,288	28,483	28,483	-	-	51,247	-	-	-	-	2,890,206	145,889	-
2b.1.4	Prepare/submit License Termination Plan	-	-	-	-	-	-	-	605	605	605	-	-	-	-	-	-	-	-	-	4,066
2b.1.5	Receive NRC approval of termination plan	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4,066
2b.1	Subtotal Period 2b Activity Costs	7,852	14,427	560	1,524	20,481	4,529	506	12,232	62,561	62,560	-	-	122,269	-	-	-	-	6,279,589	296,929	-
Period 2b Additional Costs																					
2b.2.1	Operational Equipment	-	-	23	92	1,211	-	-	198	1,524	1,524	-	-	11,790	-	-	-	-	294,000	32	-
2b.2.2	Ground Services	-	1,972	-	-	-	-	8,696	1,304	10,000	10,000	-	-	-	-	-	-	-	-	12,405	-
2b.2.3	Security Modifications	-	-	-	-	-	-	-	2,062	14,422	14,422	-	-	11,790	-	-	-	-	294,000	12,525	-
2b.2	Subtotal Period 2b Additional Costs	-	1,972	23	92	1,211	-	9,072	2,062	14,422	14,422	-	-	11,790	-	-	-	-	294,000	12,525	-
Period 2b Call Item Costs																					
2b.3.1	Process decommissioning water waste	198	-	135	240	-	546	-	285	1,004	1,004	-	-	-	-	-	-	-	75,186	244	-
2b.3.2	Process decommissioning chemical flush waste	1	-	43	138	-	319	-	105	607	607	-	-	-	-	-	-	-	43,978	77	-
2b.3.3	Small tool allowance	-	364	-	-	-	-	-	117,254	117,254	117,254	-	-	-	-	-	-	-	-	-	-
2b.3.4	Small tool allowance	-	-	-	-	-	-	-	9,045	9,045	9,045	-	-	-	-	-	-	-	-	-	-
2b.3.5	Retention Seal	-	-	-	-	-	-	-	6,209	6,209	6,209	-	-	-	-	-	-	-	-	-	-
2b.3	Subtotal Period 2b Call Item Costs	199	364	178	378	-	865	123,554	18,978	144,516	144,516	-	-	1,666	-	-	-	-	119,165	322	-
Period 2b Project-Independent Costs																					
2b.4.1	Insurance	1,440	-	-	-	-	-	742	360	1,799	1,799	-	-	-	-	-	-	-	-	-	-
2b.4.2	Insurance	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2b.4.3	Property taxes	-	-	-	-	-	-	2,703	270	2,974	2,974	-	-	-	-	-	-	-	-	-	-
2b.4.4	Health physics supplies	-	2,216	-	-	-	-	-	407	3,023	3,023	-	-	-	-	-	-	-	-	-	-
2b.4.5	Health physics supplies	-	-	-	-	-	-	-	407	3,117	3,117	-	-	-	-	-	-	-	-	-	-
2b.4.6	Disposal of DAW generated	-	-	-	-	-	-	-	123	694	694	-	-	-	-	-	-	-	5,084	-	-
2b.4.7	Plant energy budget	-	-	101	52	-	419	-	1,437	1,653	1,653	-	-	-	-	-	-	-	101,679	166	-
2b.4.8	NRC Fees	-	-	-	-	-	-	-	216	1,653	1,653	-	-	-	-	-	-	-	-	-	-
2b.4.9	Permitting Fees	-	-	-	-	-	-	-	3,204	3,204	3,204	-	-	-	-	-	-	-	-	-	-
2b.4.10	Fixed Overhead	-	-	-	-	-	-	-	3,335	2,570	2,570	-	-	-	-	-	-	-	-	-	-
2b.4.11	Spent Fuel Post-OKM	-	-	-	-	-	-	891	134	1,024	1,024	-	-	-	-	-	-	-	-	-	-
2b.4.12	Liquid Radiowaste Processing Equipment/Services	-	-	-	-	-	-	-	34	238	238	-	-	-	-	-	-	-	-	-	-
2b.4.13	Liquid Radiowaste Processing Equipment/Services	-	-	-	-	-	-	-	178	136	136	-	-	-	-	-	-	-	-	-	-
2b.4.14	Railroad Track Maintenance	-	-	-	-	-	-	-	69	527	527	-	-	-	-	-	-	-	-	-	-
2b.4.15	Remedial Actions Surveys	-	-	-	-	-	-	-	177	1,359	1,359	-	-	-	-	-	-	-	-	-	-

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**Table E  
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 DECON Decommissioning Cost Estimates with 100 Years of Spent Fuel Storage**  
 (Thousands of 2020 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Cost	Transport Cost	Off-Site Processing Cost	LIRW Disposal	Other	Total Contingency	Total	Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu Feet	Barial Volumes			Barrical/Processed Wt. Lbs.	Craft Manhours	Utility and Contractor Manhours		
															Class A Cu Feet	Class B Cu Feet	Class C Cu Feet					
<b>Period 26 Period-Dependent Costs (continued)</b>																						
26.4.1.0	Security Staff Cost	-	-	-	-	-	-	15,925	2,380	18,314	18,314	-	-	-	-	-	-	-	-	236,949	-	
26.4.1.1	DOC Staff Cost	-	-	-	-	-	-	14,772	2,216	16,988	16,988	-	-	-	-	-	-	-	-	169,160	-	
26.4.1.8	Utility Staff Cost	-	-	-	-	-	-	14,412	2,136	16,548	16,548	-	-	-	-	-	-	-	-	169,160	-	
26.1	Subtotal Period 26 Period-Dependent Costs	1,440	5,087	101	52	-	419	63,717	10,692	81,258	81,258	4,455	-	-	-	-	-	-	-	694,283	-	
26.0	TOTAL PERIOD 26 COST	9,291	21,850	861	2,046	21,692	6,143	196,859	43,974	393,035	393,035	139,297	11	134,029	30,882	-	-	-	6,794,433	309,941	694,488	
<b>PERIOD 24 - Decommissionation Following Wet Fuel Storage</b>																						
Period 24 Direct Decommissioning Activities																						
24.1.1	Remove spent fuel racks	654	58	105	149	-	2,272	-	1,017	4,553	4,553	-	-	-	-	-	-	-	486,170	906	-	
<b>Disposal of Plant Systems</b>																						
24.1.2.1	Cranes/Heavy Loads/Rigging - RCA	-	3	0	1	17	-	-	4	25	25	-	-	103	-	-	-	-	4,184	48	-	
24.1.2.2	Electrical - Commenced Fuel Pool	-	27	1	2	40	3	-	10	112	112	-	-	2,407	9	-	-	-	10,354	665	-	
24.1.2.3	Electrical - Fuel Pool Area	-	207	5	2	47	10	-	14	273	273	-	-	2,407	9	-	-	-	10,354	665	-	
24.1.2.4	Fire - RCA - Fuel Pool Area	-	11	0	1	10	-	-	4	26	26	-	-	62	-	-	-	-	2,499	143	-	
24.1.2.5	Fuel Pool Cooling & Cleanup	246	428	34	37	197	455	-	382	1,781	1,781	-	-	1,179	1,341	-	-	-	133,359	8,380	-	
24.1.2.6	Fuel Pool Cooling & Cleanup - Insulated	-	27	41	3	3	40	-	36	161	161	-	-	67	117	-	-	-	10,250	848	-	
24.1.2.7	Fuel Pool Cooling & Cleanup - Uninsulated	-	41	3	3	3	11	-	36	161	161	-	-	67	117	-	-	-	10,250	848	-	
24.1.2.8	HVAC/Chilled Water - RCA Fuel Pool Area	-	33	0	2	37	4	-	14	87	87	-	-	223	11	-	-	-	9,072	397	-	
24.1.2.9	Instrument & Service Air-RCA Fuel Pool	-	29	1	2	45	-	-	14	91	91	-	-	287	-	-	-	-	10,841	357	-	
24.1.2	Totals	273	924	45	75	810	502	-	631	3,208	3,208	-	-	4,894	1,479	-	-	-	245,606	15,385	-	
<b>Decommissionation of Site Buildings</b>																						
24.1.3.1	Reactor (Post Fuel)	946	2,609	172	913	320	10,216	-	3,880	10,056	10,056	-	-	1,969	62,698	-	-	-	2,732,406	45,703	-	
24.1.3	Totals	946	2,609	172	913	320	10,216	-	3,880	10,056	10,056	-	-	1,969	62,698	-	-	-	2,732,406	45,703	-	
24.1.4	Scaffolding in support of decommissioning	-	508	6	3	48	8	-	102	782	782	-	-	237	23	-	-	-	13,028	5,641	-	
24.1	Subtotal Period 24 Activity Costs	1,872	4,147	326	1,129	1,196	13,298	-	5,680	27,659	27,659	-	-	7,120	71,852	-	-	-	3,255,210	67,635	-	
<b>Period 24 Additional Costs</b>																						
24.2.1	License Termination Survey Planning	-	-	-	-	-	-	1,458	437	1,896	1,896	-	-	-	-	-	-	-	-	-	12,480	
24.2	Subtotal Period 24 Additional Costs	-	-	-	-	-	-	1,458	437	1,896	1,896	-	-	-	-	-	-	-	-	-	12,480	
<b>Period 24 Collateral Costs</b>																						
24.3.1	Process decommissioning water waste	79	-	54	96	-	220	-	114	563	563	-	-	-	-	-	-	-	-	30,239	98	
24.3.2	Process decommissioning chemical flush waste	1	-	26	84	-	193	-	64	396	396	-	-	-	-	-	-	-	-	26,553	47	
24.3.3	Decommissioning Equipment Disposition	-	91	130	82	1,112	178	-	297	1,729	1,729	-	-	6,000	529	-	-	-	-	303,608	147	
24.3.5	Spent Fuel Capital and Transfer	-	-	-	-	-	-	27	4	32	32	-	-	-	-	-	-	-	-	-	292	
24.3	Subtotal Period 24 Collateral Costs	80	91	210	262	1,112	590	27	432	2,805	2,805	-	-	6,000	1,282	-	-	-	-	390,400	292	
<b>Period 24 Period-Dependent Costs</b>																						
24.4.1	Decon supplies	244	-	-	-	-	-	530	61	305	305	-	-	-	-	-	-	-	-	-	-	
24.4.2	Insurance	-	-	-	-	-	-	530	61	305	305	-	-	-	-	-	-	-	-	-	-	
24.4.3	Health physics	-	-	-	-	-	-	1,064	302	1,008	1,008	-	-	-	-	-	-	-	-	-	-	
24.4	Health physics supplies	-	-	-	-	-	-	1,064	302	1,008	1,008	-	-	-	-	-	-	-	-	-	-	
24.4.5	Heavy equipment rental	-	1,936	-	-	-	-	-	590	2,227	2,227	-	-	-	-	-	-	-	-	-	-	
24.4.6	Disposal of DAW generated	-	40	21	-	167	-	-	49	277	277	-	-	6,000	529	-	-	-	-	40,600	66	
24.4.7	Emergency Planning	-	-	-	-	-	-	17	42	69	69	-	-	-	-	-	-	-	-	-	-	
24.4.8	NRC Energy Budget	-	-	-	-	-	-	424	42	466	466	-	-	-	-	-	-	-	-	-	-	
24.4.9	Emergency Planning Fees	-	-	-	-	-	-	112	11	123	123	-	-	-	-	-	-	-	-	-	-	
24.4.10	Fixed Overhead	-	-	-	-	-	-	1,597	239	1,836	1,836	-	-	-	-	-	-	-	-	-	-	
24.4.11	Fixed Overhead - Processing Equipment/Services	-	-	-	-	-	-	80	13	93	93	-	-	-	-	-	-	-	-	-	-	
24.4.12	ESS/OS Costs	-	-	-	-	-	-	84	15	99	99	-	-	-	-	-	-	-	-	-	-	
24.4.13	Railroad Track Maintenance	-	-	-	-	-	-	94	14	108	108	-	-	-	-	-	-	-	-	-	-	
24.4.14	Remedial Actions Surveys	-	-	-	-	-	-	127	127	971	971	-	-	-	-	-	-	-	-	-	-	
24.4.15	Remedial Actions Surveys Cost	-	-	-	-	-	-	1,049	1,049	8,148	8,148	-	-	-	-	-	-	-	-	-	-	
24.4.16	DO/SG/SG Cost	-	-	-	-	-	-	1,333	1,097	8,148	8,148	-	-	-	-	-	-	-	-	-	-	
24.4.17	Utility Staff Cost	-	-	-	-	-	-	10,052	1,908	11,960	11,960	-	-	-	-	-	-	-	-	-	-	
24.4	Subtotal Period 24 Period-Dependent Costs	244	2,713	40	21	167	1,052	34,579	5,672	43,446	43,446	-	-	2,030	2,030	-	-	-	-	40,600	66	
24.0	TOTAL PERIOD 24 COST	2,196	6,861	576	1,422	2,308	14,055	36,065	12,232	75,806	75,806	4,873	-	13,120	74,164	-	-	-	-	3,293,210	67,933	403,477

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 (Thousands of 2020 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LIRW Disposal Costs	Other Costs	Total Contingency	Total Lic. Term. Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu Feet	Class A Cu Feet	Class B Cu Feet	Class C Cu Feet	GTCC Cu Feet	Burial/Processed Wt. Lbs.	Craft Manhours	Utility and Contractor Manhours
<b>PERIOD 2f- License Termination</b>																					
Period 2f Direct Decommissioning Activities																					
2F.1.1	ORISE preliminary survey	-	-	-	-	-	-	166	50	216	216	-	-	-	-	-	-	-	-	-	-
2F.1.2	Subtotal Period 2f Activity Costs	-	-	-	-	-	-	166	50	216	216	-	-	-	-	-	-	-	-	-	-
Period 2f Additional Costs																					
2F.2.1	Subtotal Period 2f Additional Costs	-	-	-	-	-	-	6,920	2,076	8,995	8,995	-	-	-	-	-	-	-	-	95,048	6,240
2F.2.2	Subtotal Period 2f Additional Costs	-	-	-	-	-	-	6,920	2,076	8,995	8,995	-	-	-	-	-	-	-	-	95,048	6,240
Period 2f Cultural Costs																					
2F.3.1	Spent Fuel Capital and Transfer	-	-	-	-	-	-	1,264	190	1,454	1,454	-	-	-	-	-	-	-	-	-	-
2F.3.2	Subtotal Period 2f Cultural Costs	-	-	-	-	-	-	1,264	190	1,454	1,454	-	-	-	-	-	-	-	-	-	-
Period 2f Period-Dependent Costs																					
2F.4.1	Insurance	-	-	-	-	-	-	530	53	583	583	-	-	-	-	-	-	-	-	-	-
2F.4.2	Property taxes	-	-	-	-	-	-	1,470	147	1,617	1,617	-	-	-	-	-	-	-	-	-	-
2F.4.3	Health physics supplies	-	708	-	-	-	-	177	884	884	-	-	-	-	-	-	-	-	-	-	-
2F.4.4	Health physics personnel	-	-	-	-	-	29	-	-	29	-	-	-	-	-	-	-	-	-	-	-
2F.4.5	Plant energy budget	-	-	-	-	-	-	274	41	315	315	-	-	-	-	-	-	-	7,007	-	-
2F.4.6	NRC Fees	-	-	-	-	-	-	426	43	468	468	-	-	-	-	-	-	-	-	-	-
2F.4.7	Emergency Planning Fees	-	-	-	-	-	-	112	11	123	123	-	-	-	-	-	-	-	-	-	-
2F.4.8	ES&S Operating Costs	-	-	-	-	-	-	84	13	97	97	-	-	-	-	-	-	-	-	-	-
2F.4.9	ES&S Operating Costs	-	-	-	-	-	-	94	14	108	108	-	-	-	-	-	-	-	-	-	-
2F.4.10	Railroad Track Maintenance	-	-	-	-	-	-	10,000	1,600	12,600	3,732	-	-	-	-	-	-	-	-	-	-
2F.4.11	Security Staff Cost	-	-	-	-	-	-	864	864	6,295	5,788	888	-	-	-	-	-	-	-	-	-
2F.4.12	Utility Staff Cost	-	-	-	-	-	-	5,702	864	6,295	5,788	888	-	-	-	-	-	-	-	-	-
2F.4.13	Subtotal Period 2f Period-Dependent Costs	-	708	-	-	-	29	25,740	4,070	31,557	26,718	4,830	-	-	-	-	-	-	7,007	12	300,888
2F.4	Subtotal Period 2f Period-Dependent Costs	-	708	-	-	-	29	35,337	6,392	42,276	37,382	4,893	-	-	-	-	-	-	7,007	95,059	307,128
2F.0	TOTAL PERIOD 2f COST	13,731	65,666	20,473	10,731	49,837	72,277	366,013	130,255	753,282	576,287	182,287	73	288,160	174,123	1,761	898	-	21,562,200	727,310	2,363,646
<b>PERIOD 3b- Site Restoration</b>																					
Period 3b Direct Decommissioning Activities																					
3b.1.1.1	Demolition of Buildings, Site Buildings	-	1,971	-	-	-	-	-	296	2,267	-	-	2,267	-	-	-	-	-	-	19,911	-
3b.1.1.2	Beacon Building	-	10	-	-	-	-	-	1	11	583	-	-	-	-	-	-	-	-	50	-
3b.1.1.3	Condensate Tanks Foundation	-	4	-	-	-	-	-	1	5	-	-	-	-	-	-	-	-	-	25	-
3b.1.1.4	Discharge Retention Basin	-	10	-	-	-	-	-	1	11	884	-	-	-	-	-	-	-	-	25	-
3b.1.1.5	Hot Shop	-	16	-	-	-	-	-	2	18	315	-	-	-	-	-	-	-	-	177	-
3b.1.1.6	Hydrogen & Oxygen Storage	-	2	-	-	-	-	-	0	2	-	-	-	-	-	-	-	-	-	19	-
3b.1.1.7	LIRW Storage & Shipping	-	83	-	-	-	-	-	12	95	468	-	-	-	-	-	-	-	-	602	-
3b.1.1.8	Miss Structures 2017	-	4	-	-	-	-	-	1	5	123	-	-	-	-	-	-	-	-	2	-
3b.1.1.9	Miss Structures 2017	-	1,410	-	-	-	-	-	212	1,622	1,236	-	-	-	-	-	-	-	-	19,042	-
3b.1.1.10	Offgas Stack	-	108	-	-	-	-	-	16	124	108	-	-	-	-	-	-	-	-	544	-
3b.1.1.11	Offgas Storage & Compressor	-	39	-	-	-	-	-	6	45	468	-	-	-	-	-	-	-	-	199	-
3b.1.1.12	Reactor	-	128	-	-	-	-	-	19	147	1,236	-	-	-	-	-	-	-	-	733	-
3b.1.1.13	Reactor	-	128	-	-	-	-	-	19	147	1,236	-	-	-	-	-	-	-	-	733	-
3b.1.1.14	Security Barrier	-	186	-	-	-	-	-	28	214	1,088	-	-	-	-	-	-	-	-	933	-
3b.1.1.15	Structures Greater than 2' Below Grade	-	2,461	-	-	-	-	-	369	2,830	-	-	2,830	-	-	-	-	-	-	12,949	-
3b.1.1.16	Truck Farm	-	1,200	-	-	-	-	-	180	1,448	-	-	-	-	-	-	-	-	-	19,036	-
3b.1.1.17	Turbine Building Addition	-	55	-	-	-	-	-	8	63	888	-	-	-	-	-	-	-	-	618	-
3b.1.1.18	Turbine Building Addition	-	182	-	-	-	-	-	27	209	4,830	-	-	-	-	-	-	-	-	926	-
3b.1.1.19	Turbine Pedestal	-	8,160	-	-	-	-	-	1,225	9,384	-	-	-	-	-	-	-	-	-	58,885	-
3b.1.1	Totals	-	896	-	-	-	-	-	134	1,031	-	-	1,031	-	-	-	-	-	-	1,841	-
Site Cleanup Activities																					
3b.1.2	Grade & landscape site	-	-	-	-	-	-	200	30	231	231	-	-	-	-	-	-	-	-	1,590	-
3b.1.3	Final report to NRC	-	-	-	-	-	-	250	1,336	10,659	251	-	-	-	-	-	-	-	-	6,726	-
3b.1	Subtotal Period 3b Activity Costs	-	9,065	-	-	-	-	250	1,336	10,659	251	-	-	-	-	-	-	-	-	6,726	-

**Monticello Nuclear Generating Plant  
 Decommissioning Cost Analysis**

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**Table E  
 Monticello Nuclear Generating Plant  
 DECON Decommissioning Cost Estimates with 100 Years of Spent Fuel Storage**  
 (Thousands of 2020 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LWR Disposal Costs	Other Costs	Total Contingency	Total Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu Feet	Class A Cu Feet	Class B Cu Feet	Class C Cu Feet	GTCC Cu Feet	Burial/Processed Wt. Lbs.	Craft Manhours	Utility and Contractor Manhours	
<b>Period 3b Additional Costs</b>																					
3b.2.1	Clean Concrete Disposal	-	3,322	-	-	-	-	13	500	3,855	-	3,855	-	-	-	-	-	-	-	12	-
3b.2.2	Intake Structure Cofferdam	-	335	-	-	-	-	-	50	1,385	-	1,385	-	-	-	-	-	-	-	2,584	-
3b.2.3	Containment Driers	-	5,883	-	-	-	-	1,170	837	6,243	-	6,243	-	-	-	-	-	-	-	5,422	-
3b.2.4	Containment Drying	-	442	-	-	-	-	-	66	508	-	508	-	-	-	-	-	-	-	3,532	-
3b.2.5	Discharge Structure Cofferdam	-	185	954	-	-	5,641	-	1,709	8,544	-	8,544	-	21,097	-	-	-	2,505,700	-	337	-
3b.2	Subtotal Period 3b Additional Costs	-	9,237	185	954	-	5,641	1,183	3,359	21,039	-	21,039	-	21,097	-	-	-	2,505,700	-	11,307	-
<b>Period 3b Collateral Costs</b>																					
3b.3.1	Small tool allowance	-	111	-	-	-	-	-	17	127	-	127	-	-	-	-	-	-	-	-	-
3b.3.2	Spent Fuel Capital and Transfer	-	-	-	-	-	-	108	16	125	-	125	-	-	-	-	-	-	-	-	-
3b.3	Subtotal Period 3b Collateral Costs	-	111	-	-	-	-	108	33	252	-	252	-	-	-	-	-	-	-	-	-
<b>Period 2b Period-Dependent Costs</b>																					
3b.4.1	Insurance	-	-	-	-	-	-	1,250	222	1,472	-	1,472	-	-	-	-	-	-	-	-	-
3b.4.2	Heavy equipment rental	-	-	-	-	-	-	2,260	276	2,536	-	2,536	-	-	-	-	-	-	-	-	-
3b.4.3	Heavy equipment rental	-	5,842	-	-	-	-	-	876	6,719	-	6,719	-	-	-	-	-	-	-	-	-
3b.4.4	Plant energy budget	-	-	-	-	-	-	315	362	362	-	362	-	-	-	-	-	-	-	-	-
3b.4.5	NRG ISFSI Fees	-	-	-	-	-	-	356	391	391	-	391	-	-	-	-	-	-	-	-	-
3b.4.6	ESFSI Operating Costs	-	-	-	-	-	-	1,122	1,688	1,688	-	1,688	-	-	-	-	-	-	-	-	-
3b.4.7	Fixed Overhead	-	-	-	-	-	-	194	229	223	-	223	-	-	-	-	-	-	-	-	-
3b.4.8	ISFSI Operating Costs	-	-	-	-	-	-	81	924	375	-	375	-	-	-	-	-	-	-	-	-
3b.4.9	Railroad Track Maintenance	-	-	-	-	-	-	379	392	240	-	240	-	-	-	-	-	-	-	-	-
3b.4.10	Railroad Track Maintenance	-	-	-	-	-	-	1,129	1,759	13,489	-	13,489	-	-	-	-	-	-	-	-	-
3b.4.11	DOCS Staff Cost	-	-	-	-	-	-	1,148	1,072	8,220	-	8,220	-	-	-	-	-	-	-	-	-
3b.4.12	Utility Staff Cost	-	5,842	-	-	-	-	50,742	8,389	64,854	-	64,854	-	-	-	-	-	-	-	-	-
3b.4	Subtotal Period 3b Period-Dependent Costs	-	24,755	185	954	-	5,641	52,234	13,030	90,800	-	90,800	-	21,097	-	-	-	2,505,700	-	72,633	801,362
3b.0	TOTAL PERIOD 3b COST	-	24,755	185	954	-	5,641	52,234	13,030	90,800	-	90,800	-	21,097	-	-	-	2,505,700	-	72,633	801,362
<b>PERIOD 3c - Fuel Storage Operations/Shipping</b>																					
<b>Period 3c Direct Decommissioning Activities</b>																					
3c.1	Period 3c Collateral Costs	-	-	-	-	-	-	553,074	89,901	638,035	-	638,035	-	-	-	-	-	-	-	-	-
3c.2	Spent Fuel Capital and Transfer	-	-	-	-	-	-	553,074	89,901	638,035	-	638,035	-	-	-	-	-	-	-	-	-
3c.3	Subtotal Period 3c Collateral Costs	-	-	-	-	-	-	553,074	89,901	638,035	-	638,035	-	-	-	-	-	-	-	-	-
<b>Period 3c Period-Dependent Costs</b>																					
3c.4.1	Property taxes	-	-	-	-	-	-	65,480	6,549	72,028	-	72,028	-	-	-	-	-	-	-	-	-
3c.4.2	Property taxes	-	-	-	-	-	-	84,567	8,457	93,024	-	93,024	-	-	-	-	-	-	-	-	-
3c.4.3	NRG ISFSI Fees	-	-	-	-	-	-	20,571	2,057	22,628	-	22,628	-	-	-	-	-	-	-	-	-
3c.4.4	Emergency Planning Fees	-	-	-	-	-	-	15,863	1,586	17,449	-	17,449	-	-	-	-	-	-	-	-	-
3c.4.5	ESFSI Operating Costs	-	-	-	-	-	-	1,903	1,903	11,983	-	11,983	-	-	-	-	-	-	-	-	-
3c.4.6	ESFSI Operating Costs	-	-	-	-	-	-	10,420	1,042	11,462	-	11,462	-	-	-	-	-	-	-	-	-
3c.4.7	Railroad Track Maintenance	-	-	-	-	-	-	11,641	1,164	13,387	-	13,387	-	-	-	-	-	-	-	-	-
3c.4.8	Railroad Track Maintenance	-	-	-	-	-	-	400,396	40,039	440,435	-	440,435	-	-	-	-	-	-	-	-	-
3c.4.9	Security Staff Cost	-	-	-	-	-	-	177,875	17,787	195,662	-	195,662	-	-	-	-	-	-	-	-	-
3c.4.10	Utility Staff Cost	-	-	-	-	-	-	30,681	3,068	33,749	-	33,749	-	-	-	-	-	-	-	-	-
3c.4.11	Utility Staff Cost	-	-	-	-	-	-	853,346	85,334	938,680	-	938,680	-	-	-	-	-	-	-	-	-
3c.4	Subtotal Period 3c Period-Dependent Costs	-	-	-	-	-	-	1,885,420	198,742	1,885,162	-	1,885,162	-	-	-	-	-	-	-	-	-
3c.0	TOTAL PERIOD 3c COST	-	-	-	-	-	-	1,885,420	198,742	1,885,162	-	1,885,162	-	-	-	-	-	-	-	-	-
<b>PERIOD 3d - GTCC shipping</b>																					
<b>Period 3d Direct Decommissioning Activities</b>																					
3d.1.1.1	Vessel & Internal GTCC Disposal	-	-	-	-	-	-	-	918	6,314	-	6,314	-	-	-	-	-	-	-	-	-
3d.1.1	Totals	-	-	-	-	-	-	-	918	6,314	-	6,314	-	-	-	-	-	-	-	-	-
3d.1	Subtotal Period 3d Activity Costs	-	-	-	-	-	-	-	918	6,314	-	6,314	-	-	-	-	-	-	-	-	-
<b>Period 3d Collateral Costs</b>																					
3d.3.1	Spent Fuel Capital and Transfer	-	-	-	-	-	-	28	4	32	-	32	-	-	-	-	-	-	-	-	-
3d.3	Subtotal Period 3d Collateral Costs	-	-	-	-	-	-	28	4	32	-	32	-	-	-	-	-	-	-	-	-



**Monticello Nuclear Generating Plant  
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**Table E  
 Monticello Nuclear Generating Plant  
 DECON Decommissioning Cost Estimates with 100 Years of Spent Fuel Storage**  
 (Thousands of 2020 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Cost	Transport Cost	Off-Site Processing Cost	LRW Disposal Cost	Other Contingency Cost	Total Contingency Cost	Total Lic. Term. Costs	NRC Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu Feet	Class A Cu Feet	Class B Cu Feet	Class C Cu Feet	GFTCC Cu Feet	Burial/Processed Wt. Lbs.	Craft Manhours	Utility and Contractor Manhours	
<b>Period 3d Period-Dependent Costs</b>																					
3d4.1	Insurance	-	-	-	-	-	-	27	3	30	30	-	-	-	-	-	-	-	-	-	
3d4.2	Property taxes	-	-	-	-	-	-	35	3	38	38	-	-	-	-	-	-	-	-	-	
3d4.3	NRC ISFSI Fees	-	-	-	-	-	-	6	1	7	7	-	-	-	-	-	-	-	-	-	
3d4.4	Professional Planning Fees	-	-	-	-	-	-	6	1	7	7	-	-	-	-	-	-	-	-	-	
3d4.5	Fixed Overhead	-	-	-	-	-	-	8	1	10	10	-	-	-	-	-	-	-	-	-	
3d4.6	Railroad Track Maintenance	-	-	-	-	-	-	16	1	17	17	-	-	-	-	-	-	-	-	-	
3d4.7	Security Staff Cost	-	-	-	-	-	-	165	1	166	166	-	-	-	-	-	-	-	-	-	
3d4.8	Utility Staff Cost	-	-	-	-	-	-	25	1	26	26	-	-	-	-	-	-	-	-	-	
3d4.9	Subtotal Period 3d Period-Dependent Costs	-	-	-	-	-	-	321	40	361	361	-	-	-	-	-	-	-	-	-	
3d4.10	TOTAL PERIOD 3d COST	-	-	-	-	-	-	321	40	361	361	-	-	-	-	-	-	-	-	-	
<b>PERIOD 3e - ISFSI Decommission</b>																					
<b>Period 3e Direct Decommissioning Activities</b>																					
3e2.1	License Termination (ISFSI)	-	0	3	33	-	283	2,086	602	3,008	3,008	-	-	-	-	-	-	-	-	-	-
3e2.2	Subtotal Period 3e Additional Costs	-	0	3	33	-	283	2,086	602	3,008	3,008	-	-	-	-	-	-	-	-	-	-
<b>Period 3e Period-Dependent Costs</b>																					
3e4.1	Insurance	-	-	-	-	-	-	118	30	148	148	-	-	-	-	-	-	-	-	-	-
3e4.2	Property taxes	-	-	-	-	-	-	219	62	281	281	-	-	-	-	-	-	-	-	-	-
3e4.3	NRC ISFSI Fees	-	-	-	-	-	-	14	1	15	15	-	-	-	-	-	-	-	-	-	-
3e4.4	Fixed Overhead	-	-	-	-	-	-	71	18	89	89	-	-	-	-	-	-	-	-	-	-
3e4.5	Railroad Track Maintenance	-	-	-	-	-	-	41	10	52	52	-	-	-	-	-	-	-	-	-	-
3e4.6	Security Staff Cost	-	-	-	-	-	-	352	88	440	440	-	-	-	-	-	-	-	-	-	-
3e4.7	Utility Staff Cost	-	-	-	-	-	-	103	26	129	129	-	-	-	-	-	-	-	-	-	-
3e4.8	Subtotal Period 3e Period-Dependent Costs	-	-	-	-	-	-	1,105	270	1,375	1,375	-	-	-	-	-	-	-	-	-	-
3e4.9	TOTAL PERIOD 3e COST	-	0	3	33	-	283	3,191	878	4,380	4,380	-	-	-	-	-	-	-	-	-	-
<b>PERIOD 3f - ISFSI Site Restoration</b>																					
<b>Period 3f Direct Decommissioning Activities</b>																					
3f2.1	Demolition and Site Restoration of ISFSI	-	1,564	-	-	-	-	256	273	2,003	-	-	-	-	-	-	-	-	-	-	-
3f2.2	Subtotal Period 3f Additional Costs	-	1,564	-	-	-	-	256	273	2,003	-	-	-	-	-	-	-	-	-	-	-
<b>Period 3f Collateral Costs</b>																					
3f3.1	Small tool allowance	-	11	-	-	-	-	-	2	12	-	-	-	-	-	-	-	-	-	-	-
3f3.2	Subtotal Period 3f Collateral Costs	-	11	-	-	-	-	-	2	12	-	-	-	-	-	-	-	-	-	-	-
<b>Period 3f Period-Dependent Costs</b>																					
3f4.2	Property taxes	-	-	-	-	-	-	126	13	138	-	-	-	-	-	-	-	-	-	-	-
3f4.3	Heavy equipment rental	-	117	-	-	-	-	134	17	151	-	-	-	-	-	-	-	-	-	-	-
3f4.4	Heavy equipment budget	-	-	-	-	-	-	36	5	41	-	-	-	-	-	-	-	-	-	-	-
3f4.5	Fixed Overhead	-	-	-	-	-	-	21	5	26	-	-	-	-	-	-	-	-	-	-	-
3f4.6	Railroad Track Maintenance	-	-	-	-	-	-	24	24	48	-	-	-	-	-	-	-	-	-	-	-
3f4.7	Security Staff Cost	-	-	-	-	-	-	177	27	204	-	-	-	-	-	-	-	-	-	-	-
3f4.8	Utility Staff Cost	-	-	-	-	-	-	165	26	191	-	-	-	-	-	-	-	-	-	-	-
3f4.9	Subtotal Period 3f Period-Dependent Costs	-	-	-	-	-	-	479	82	561	-	-	-	-	-	-	-	-	-	-	-
3f4.10	TOTAL PERIOD 3f COST	-	1,691	-	-	-	-	751	357	2,779	-	-	-	-	-	-	-	-	-	-	-
<b>PERIOD 3g TOTALS</b>																					
<b>TOTAL COST TO DECOMMISSION</b>																					
TOTAL COST TO DECOMMISSION		17,263	95,300	21,839	11,878	49,052	84,222	1,966,558	360,559	2,616,871	776,228	1,796,506	288,203	197,266	1,892	898	1,100	244,763,380	849,601	11,969,960	8,413,353

**Monticello Nuclear Generating Plant  
 Decommissioning Cost Analysis**

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**Table E  
 Monticello Nuclear Generating Plant  
 DECON Decommissioning Cost Estimates with 100 Years of Spent Fuel Storage**  
 (Thousands of 2020 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LIRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet	Burial/Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
<b>TOTAL COST TO DECOMMISSION WITH 100-YEAR CONTINGENCY:</b>																					
	TOTAL NRC LICENSE TERMINATION COST IS 29.31%, OR:				\$256,837																
	SPENT FUEL MANAGEMENT COST IS 67.88%, OR:				\$76,228																
	NON-NUCLEAR DEMOLITION COST IS 2.79%, OR:				\$1,795,906																
	TOTAL LOW-LEVEL RADIOACTIVE WASTE VOLUME BURIED (EXCLUDING GTCC):				\$73,737																
	TOTAL GREATER THAN CLASS C RADWASTE VOLUME GENERATED:				200,155																
	TOTAL SCRAP METAL REMOVED:				1,160																
	TOTAL CRAFT LABOR REQUIREMENTS:				23,123																
	TOTAL CRAFT LABOR REQUIREMENTS:				849,601																

Blank cells indicate that this activity not charged as decommissioning expense  
 a - indicates that this activity performed by decommissioning staff  
 0 - indicates that this value is less than 0.5 but is non-zero  
 A cell containing "-" indicates a zero value

***Monticello Nuclear Generating Plant  
Decommissioning Cost Analysis***

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**APPENDIX F**

**DETAILED COST ANALYSIS**

**SCENARIO 4: DECON with 200 Year DFS**

**Monticello Nuclear Generating Plant  
 Decommissioning Cost Analysis**

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**Table F  
 Monticello Nuclear Generating Plant  
 DECON Decommissioning Cost Estimates with 200 Years of Spent Fuel Storage**  
 (Thousands of 2020 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Cost	Transport Cost	Off-Site Processing Cost	LLRW Disposal Cost	Other Cost	Total Contingency Cost	Total Lic. Term. Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu Feet	Class A Cu Feet	Class B Cu Feet	Class C Cu Feet	GTCC Cu Feet	Burial/Processed Wt. Lbs.	Craft Manhours	Utility and Contractor Manhours
<b>PERIOD 1a - Shutdown through Transition</b>																					
1a.1.1	Period 1a Direct Decommissioning Activities	-	-	-	-	-	-	167	25	192	192	-	-	-	-	-	-	-	-	-	1,300
1a.1.2	Prepare preliminary decommissioning cost estimates	-	-	-	-	-	-	-	n/a	n/a	-	-	-	-	-	-	-	-	-	-	-
1a.1.3	Remove fuel & source material	-	-	-	-	-	-	-	-	-	296	-	-	-	-	-	-	-	-	-	2,000
1a.1.4	Notification of Permanent Dismantling	-	-	-	-	-	-	-	-	-	680	-	-	-	-	-	-	-	-	-	4,600
1a.1.5	Decontaminate plant systems & process waste	-	-	-	-	-	-	257	39	296	296	-	-	-	-	-	-	-	-	-	-
1a.1.6	Review plant design & specs.	-	-	-	-	-	-	-	501	89	680	-	-	-	-	-	-	-	-	-	-
1a.1.8	Perform detailed rad survey	-	-	-	-	-	-	-	129	19	148	-	-	-	-	-	-	-	-	-	1,000
1a.1.9	Estimate by-product inventory	-	-	-	-	-	-	122	15	148	148	-	-	-	-	-	-	-	-	-	1,300
1a.1.10	Estimate by-product inventory	-	-	-	-	-	-	167	25	192	192	-	-	-	-	-	-	-	-	-	7,500
1a.1.11	Detailed by-product inventory	-	-	-	-	-	-	964	145	1,108	1,108	-	-	-	-	-	-	-	-	-	2,100
1a.1.12	Define major work sequence	-	-	-	-	-	-	308	40	308	308	-	-	-	-	-	-	-	-	-	5,000
1a.1.13	Perform SER and EA	-	-	-	-	-	-	613	96	729	729	-	-	-	-	-	-	-	-	-	1,000
1a.1.14	Perform Site-Specific Cost Study	-	-	-	-	-	-	129	19	148	148	-	-	-	-	-	-	-	-	-	4,600
1a.1.15	Prepare/submit Irradiated Fuel Management Plan	-	-	-	-	-	-	-	95	727	654	-	-	-	-	-	-	-	-	-	4,600
1a.1.16	Activity Specifications	-	-	-	-	-	-	-	536	80	616	-	-	-	-	-	-	-	-	-	4,167
1a.1.17.1	Plant & temporary facilities	-	-	-	-	-	-	64	10	74	74	-	-	-	-	-	-	-	-	-	500
1a.1.17.2	Plant systems	-	-	-	-	-	-	835	132	1,067	961	-	-	-	-	-	-	-	-	-	6,500
1a.1.17.3	SSSS Decommissionation Flush	-	-	-	-	-	-	64	10	74	74	-	-	-	-	-	-	-	-	-	500
1a.1.17.4	Removal of equipment	-	-	-	-	-	-	64	10	74	74	-	-	-	-	-	-	-	-	-	500
1a.1.17.5	Reactor vessel	-	-	-	-	-	-	129	19	148	148	-	-	-	-	-	-	-	-	-	1,000
1a.1.17.6	Sacrificial shield	-	-	-	-	-	-	208	40	308	308	-	-	-	-	-	-	-	-	-	2,088
1a.1.17.7	Moisture separators/ventilators	-	-	-	-	-	-	257	39	296	296	-	-	-	-	-	-	-	-	-	2,000
1a.1.17.8	Moisture separators/ventilators	-	-	-	-	-	-	401	60	461	461	-	-	-	-	-	-	-	-	-	3,120
1a.1.17.9	Main Turbine	-	-	-	-	-	-	501	89	680	680	-	-	-	-	-	-	-	-	-	4,600
1a.1.17.10	Main Condensers	-	-	-	-	-	-	116	17	133	133	-	-	-	-	-	-	-	-	-	900
1a.1.17.11	Pressure suppression structure	-	-	-	-	-	-	456	823	6,308	5,750	-	-	-	-	-	-	-	-	-	42,583
1a.1.17.12	Pressure suppression structure	-	-	-	-	-	-	308	46	355	355	-	-	-	-	-	-	-	-	-	2,400
1a.1.17.13	Plant structures & buildings	-	-	-	-	-	-	180	27	207	207	-	-	-	-	-	-	-	-	-	1,400
1a.1.17.14	Waste management	-	-	-	-	-	-	2,400	360	2,760	2,760	-	-	-	-	-	-	-	-	-	1,200
1a.1.17.15	Facility & site closure	-	-	-	-	-	-	158	24	182	182	-	-	-	-	-	-	-	-	-	8,013
1a.1.17	Total	-	-	-	-	-	-	16,369	2,465	13,054	18,505	-	-	-	-	-	-	-	-	-	-
<b>Planning &amp; Site Preparations</b>																					
1a.1.18	Prepare dismantling sequence	-	-	-	-	-	-	308	46	355	355	-	-	-	-	-	-	-	-	-	2,400
1a.1.19	Design and construct system	-	-	-	-	-	-	180	27	207	207	-	-	-	-	-	-	-	-	-	1,400
1a.1.20	Design water clean up system	-	-	-	-	-	-	2,400	360	2,760	2,760	-	-	-	-	-	-	-	-	-	1,200
1a.1.21	Rigging/Cont. Curt. EHV/switching/etc.	-	-	-	-	-	-	158	24	182	182	-	-	-	-	-	-	-	-	-	8,013
1a.1.22	Procure caseloaders & containers	-	-	-	-	-	-	16,369	2,465	13,054	18,505	-	-	-	-	-	-	-	-	-	-
1a.1	Subtotal Period 1a Activity Costs	-	-	-	-	-	-	16,369	2,465	13,054	18,505	-	-	-	-	-	-	-	-	-	-
<b>Period 1a Collateral Costs</b>																					
1a.3.1	Spent Fuel Capital and Transfer	-	-	-	-	-	-	1,323	198	1,522	1,522	-	-	-	-	-	-	-	-	-	-
1a.3.2	Spent Fuel and Fuel Storage	-	-	-	-	-	-	1,682	1,682	11,376	11,376	-	-	-	-	-	-	-	-	-	-
1a.3	Subtotal Period 1a Collateral Costs	-	-	-	-	-	-	11,376	1,880	12,897	15,222	-	-	-	-	-	-	-	-	-	-
<b>Period 1a Period-Dependent Costs</b>																					
1a.4.1	Insurance	-	-	-	-	-	-	5,288	693	6,451	6,451	-	-	-	-	-	-	-	-	-	-
1a.4.2	Health physics supplies	-	-	-	-	-	-	327	327	3,927	3,927	-	-	-	-	-	-	-	-	-	-
1a.4.3	Health physics supplies	-	-	-	-	-	-	153	153	767	767	-	-	-	-	-	-	-	-	-	-
1a.4.4	Heavy equipment rental	-	-	-	-	-	-	614	113	896	896	-	-	-	-	-	-	-	-	-	-
1a.4.5	Deposit of DAV generated	-	-	-	-	-	-	50	232	2,088	2,088	-	-	-	-	-	-	-	-	-	20
1a.4.6	Procure engineering budgets	-	-	-	-	-	-	1,817	114	1,251	1,251	-	-	-	-	-	-	-	-	-	-
1a.4.7	NRC Fees	-	-	-	-	-	-	1,337	114	1,251	1,251	-	-	-	-	-	-	-	-	-	-
1a.4.8	Emergency Planning Fees	-	-	-	-	-	-	343	343	3,770	3,770	-	-	-	-	-	-	-	-	-	-
1a.4.9	Food Overhaul	-	-	-	-	-	-	2,015	327	3,000	3,000	-	-	-	-	-	-	-	-	-	-
1a.4.10	Food Overhaul O&M	-	-	-	-	-	-	112	17	129	129	-	-	-	-	-	-	-	-	-	-
1a.4.11	RFSS Operating Costs	-	-	-	-	-	-	125	19	144	144	-	-	-	-	-	-	-	-	-	-
1a.4.12	Railroad Track Maintenance	-	-	-	-	-	-	2,466	2,466	33,272	33,272	-	-	-	-	-	-	-	-	-	-
1a.4.13	Utility Staff Cost	-	-	-	-	-	-	27,352	4,703	31,757	31,757	-	-	-	-	-	-	-	-	-	-
1a.4.14	Utility Staff Cost	-	-	-	-	-	-	50,634	6,703	61,972	61,972	-	-	-	-	-	-	-	-	-	-
1a.4	Subtotal Period 1a Period-Dependent Costs	-	-	-	-	-	-	50,634	6,703	61,972	64,902	-	-	-	-	-	-	-	-	-	20
1a.1	Subtotal Period 1a Activity Costs	-	-	-	-	-	-	16,369	2,465	13,054	18,505	-	-	-	-	-	-	-	-	-	-

**Monticello Nuclear Generating Plant  
 Decommissioning Cost Analysis**

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**Table F  
 Monticello Nuclear Generating Plant  
 DECON Decommissioning Cost Estimates with 200 Years of Spent Fuel Storage**  
 (Thousands of 2020 Dollars)

Activity Index	Activity Description	Decom Cost	Removal Cost	Packaging Cost	Transport Cost	Off-Site Processing Cost	LLRW Disposal Cost	Other Cost	Total Contingency	Total	Lic. Term. Costs	NRC Management Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu Feet	Burial Volumes			Borial/Processed Wt. Lbs.	Craft Manhours	Utility and Contractor Manhours
																Class A Cu Feet	Class B Cu Feet	Class C Cu Feet			
1b.0	TOTAL PERIOD 1b CONST	-	1,307	12	6	-	50	87,418	12,871	101,724	94,783	6,382	550	-	-	610	-	-	12,190	20	750,093
<b>Period 1b Direct Decommissioning Activities</b>																					
<b>Detailed Work Procedures</b>																					
1b.1.1	Site systems	-	-	-	-	-	-	698	51	749	630	-	-	-	-	-	-	-	-	-	4,733
1b.1.2	NSSS systems	-	-	-	-	-	-	524	59	583	148	-	-	-	-	-	-	-	-	-	4,000
1b.1.3	Reactor internals	-	-	-	-	-	-	514	77	591	501	-	-	-	-	-	-	-	-	-	1,350
1b.1.4	Remaining buildings	-	-	-	-	-	-	174	26	200	50	-	-	-	-	-	-	-	-	-	1,000
1b.1.5	CRD housings & NAs	-	-	-	-	-	-	329	19	348	148	-	-	-	-	-	-	-	-	-	2,000
1b.1.6	Removal primary containment	-	-	-	-	-	-	257	39	296	296	-	-	-	-	-	-	-	-	-	3,630
1b.1.8	Reactor vessel	-	-	-	-	-	-	467	70	537	537	-	-	-	-	-	-	-	-	-	1,200
1b.1.9	Facility decont	-	-	-	-	-	-	154	23	177	89	-	-	-	-	-	-	-	-	-	1,000
1b.1.10	Reactor vessel	-	-	-	-	-	-	129	19	148	74	-	-	-	-	-	-	-	-	-	2,080
1b.1.11	Reinforced concrete	-	-	-	-	-	-	207	40	307	307	-	-	-	-	-	-	-	-	-	2,688
1b.1.12	Main Turbine	-	-	-	-	-	-	268	40	309	309	-	-	-	-	-	-	-	-	-	2,730
1b.1.13	Main Condensers	-	-	-	-	-	-	351	53	403	363	-	-	-	-	-	-	-	-	-	3,571
1b.1.15	Rawwater building & mixsters	-	-	-	-	-	-	351	53	403	363	-	-	-	-	-	-	-	-	-	3,571
1b.1.16	Rawwater building	-	-	-	-	-	-	436	650	4,957	4,524	-	-	-	-	-	-	-	-	-	1,067
1b.1.1	Total	-	-	-	-	-	-	4,336	798	5,134	4,968	-	-	-	-	-	-	-	-	-	33,741
1b.1.2	Decom NSSS	206	-	-	-	-	-	-	148	444	444	-	-	-	-	-	-	-	-	-	1,067
1b.1	Subtotal Period 1b Activity Costs	206	-	-	-	-	-	4,336	798	5,134	4,968	-	-	-	-	-	-	-	-	-	33,741
<b>Period 1b Additional Costs</b>																					
1b.2.1	Spent Fuel Pool Isolation	-	-	-	-	-	-	12,075	1,901	14,576	14,576	-	-	-	-	-	-	-	-	-	39,500
1b.2.2	Site Characterization	-	-	-	-	-	-	5,950	1,779	7,708	7,708	-	-	-	-	-	-	-	-	-	10,852
1b.2.3	Mixed & RCRA Waste	-	-	28	29	-	-	80	9	89	89	-	-	-	-	-	-	-	-	-	161
1b.2	Subtotal Period 1b Additional Costs	-	-	28	29	-	-	18,005	3,689	22,365	22,365	-	-	-	43	-	-	-	-	-	50,601
<b>Period 1b Collateral Costs</b>																					
1b.3.1	Decom equipment	1,055	-	-	-	-	-	1,264	168	1,213	1,213	-	-	-	-	-	-	-	-	-	-
1b.3.2	Process decontamination expenses	38	-	-	-	-	-	1,264	53	283	283	-	-	-	-	-	-	-	-	-	-
1b.3.3	Process decontaminating water waste	1	-	-	-	-	-	1,028	396	2,024	2,024	-	-	-	-	-	-	-	-	-	45
1b.3.5	Small tool allowance	-	1,200	-	-	-	-	-	0	1,200	1,200	-	-	-	-	-	-	-	-	-	43
1b.3.6	Process equipment	2,104	-	-	-	-	-	2,735	316	2,419	2,419	-	-	-	-	-	-	-	-	-	-
1b.3.7	Decom rig	-	-	-	-	-	-	635	410	3,145	2,735	-	-	-	-	-	-	-	-	-	-
1b.3.8	Spent Fuel Capital and Transfer	-	-	-	-	-	-	6,335	950	7,285	7,285	-	-	-	-	-	-	-	-	-	-
1b.3.9	Retention and Sovereignty	3,197	1,202	-	-	-	-	10,334	2,663	13,185	10,910	-	-	-	-	-	-	-	-	-	89
1b.3	Subtotal Period 1b Collateral Costs	6,654	2,402	-	-	-	-	20,331	4,486	25,217	25,217	-	-	-	-	-	-	-	-	-	139
<b>Period 1b Period-Dependent Costs</b>																					
1b.4.1	Decom supplies	30	-	-	-	-	-	1,551	10	48	48	-	-	-	-	-	-	-	-	-	-
1b.4.2	Insurance	-	-	-	-	-	-	1,709	171	1,880	1,880	-	-	-	-	-	-	-	-	-	-
1b.4.3	Property taxes	-	-	-	-	-	-	1,200	86	430	430	-	-	-	-	-	-	-	-	-	-
1b.4.4	Health physics supplies	-	-	-	-	-	-	56	432	432	-	-	-	-	-	-	-	-	-	-	-
1b.4.5	Heavy equipment rental	-	375	-	-	-	-	-	56	432	432	-	-	-	-	-	-	-	-	-	-
1b.4.6	Disposal of DAW generated	-	-	-	-	-	-	29	272	2,083	2,083	-	-	-	-	-	-	-	-	-	12
1b.4.7	Process equipment budgets	-	-	-	-	-	-	1,812	32	3,925	3,925	-	-	-	-	-	-	-	-	-	-
1b.4.8	NRC Fees	-	-	-	-	-	-	323	32	355	355	-	-	-	-	-	-	-	-	-	-
1b.4.9	Emergency Planning Fees	-	-	-	-	-	-	1,416	142	1,557	1,557	-	-	-	-	-	-	-	-	-	-
1b.4.10	Spent Fuel Pool O&M	-	-	-	-	-	-	421	63	484	484	-	-	-	-	-	-	-	-	-	-
1b.4.11	Spent Fuel Pool O&M	-	-	-	-	-	-	56	64	64	64	-	-	-	-	-	-	-	-	-	-
1b.4.12	RFSS Operating Costs	-	-	-	-	-	-	62	9	72	72	-	-	-	-	-	-	-	-	-	-
1b.4.13	Railroad Track Maintenance	-	-	-	-	-	-	1,659	9	678	678	-	-	-	-	-	-	-	-	-	-
1b.4.14	DOE-Site Cost	-	-	-	-	-	-	5,843	1,877	6,223	6,223	-	-	-	-	-	-	-	-	-	-
1b.4.15	DOE-Site Cost	-	-	-	-	-	-	15,682	2,052	15,734	15,734	-	-	-	-	-	-	-	-	-	-
1b.4.16	Utility Staff Cost	-	719	-	-	-	-	35,955	5,323	42,076	21,066	-	-	-	-	-	-	-	-	-	-
1b.4	Subtotal Period 1b Period-Dependent Costs	3,331	1,021	84	154	14	1,657	60,230	12,465	80,056	85,315	-	-	-	-	-	-	-	-	-	50,964
1b.0	TOTAL PERIOD 1b CONST	3,331	3,298	96	100	14	1,707	156,648	25,335	190,789	178,125	11,643	1,012	-	43	1,199	231	-	-	68,135	31,848
<b>PERIOD 1 TOTALS</b>																					

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Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Cost	Transport Cost	Off-Site Processing Cost	LLRW Disposal Cost	Other Cost	Total Contingency	Total Lic. Term. Costs	NRC Management Costs	Spent Fuel Restoration Costs	Site Restoration Costs	Processed Volume Cu Feet	Class A Cu Feet	Class B Cu Feet	Class C Cu Feet	GTCC Cu Feet	Barrical/Processed Wt. Lbs.	Craft Manhours	Utility and Contractor Manhours
<b>PERIOD 2a - Large Component Removal</b>																					
Period 2a Direct Decommissioning Activities																					
Nuclear Steam Supply System Removal																					
2a.1.1.1	Recirculation System Piping & Valves	111	94	27	50	528	-	-	221	1,031	1,031	-	-	-	1,430	-	-	-	96,742	2,905	-
2a.1.1.2	Recirculation Pumps & Motors	40	63	16	51	539	-	-	186	938	938	-	-	46	945	-	-	-	132,290	1,563	-
2a.1.1.3	CRDMs & NAs Removal	24	1,929	35	35	-	-	-	30,627	2,000	2,000	-	-	-	11	-	-	-	6,750	3,108	-
2a.1.1.4	CRDMs & NAs Internals	113	9,121	8,572	1,167	-	5,861	364	10,842	30,140	36,982	-	-	-	16,169	1,761	-	-	1,105,210	30,515	1,379
2a.1.1	Totals	702	17,020	15,982	4,099	42	37,803	728	35,573	112,449	112,449	-	-	46	23,536	1,761	-	-	1,874,002	88,297	2,758
Removal of Major Equipment																					
2a.1.2	Main Turbine/Generator	-	385	1,356	521	6,139	439	-	1,311	10,182	10,182	-	-	24,835	1,383	-	-	-	1,577,959	5,438	-
2a.1.3	Main Condensers	-	1,817	389	194	3,225	244	-	947	6,317	6,317	-	-	17,396	727	-	-	-	828,955	18,831	-
Cascading Costs from Clean Building Demolition																					
2a.1.4.1	Reactor Building	-	332	-	-	-	-	-	50	381	381	-	-	-	-	-	-	-	-	2,217	-
2a.1.4.2	Radiation	-	25	-	-	-	-	-	4	28	28	-	-	-	-	-	-	-	-	127	-
2a.1.4.3	Turbine	-	127	-	-	-	-	-	19	146	146	-	-	-	-	-	-	-	-	1,251	-
2a.1.4	Totals	-	485	-	-	-	-	-	72	556	556	-	-	-	-	-	-	-	-	3,598	-
Disposal of Plant Systems																					
2a.1.5.1	Automatic Press Relief	-	118	7	12	134	70	-	1	410	410	-	-	803	206	-	-	-	45,852	1,656	-
2a.1.5.2	Chemistry Storage	-	0	0	0	0	0	-	1	3	3	-	-	36	3	-	-	-	6,340	28	-
2a.1.5.3	Chemistry Sampling - Insulated	-	2	0	0	1,114	0	-	230	1,626	1,626	-	-	6,656	1	-	-	-	270,307	2,860	-
2a.1.5.4	Circulating Water - RCA	-	207	14	62	2,114	-	-	13	80	80	-	-	232	22	-	-	-	8,617	378	-
2a.1.5.5	Combustible Gas Control - Insulated	-	29	0	2	38	-	-	1	13	13	-	-	10,947	7,319	-	-	-	1,275,810	14,186	-
2a.1.5.6	Condensate & Feedwater - RCA	-	197	183	329	3,337	2,064	-	1,431	8,731	8,731	-	-	33,466	4,176	1,207	-	-	246,683	6,564	-
2a.1.5.7	Condensate & Feedwater - Insulated	-	462	34	63	609	408	-	316	1,840	1,840	-	-	3,346	1,000	-	-	-	196,556	7,618	-
2a.1.5.8	Condensate Drain	-	515	30	51	500	339	-	44	2,736	2,736	-	-	7,126	798	-	-	-	109,529	10,529	-
2a.1.5.9	Condensate Drain	-	73	0	0	1,133	21	-	2	9	9	-	-	19	4	-	-	-	1,009	41	-
2a.1.5.10	Control Rod Drive	-	0	0	0	0	0	-	0	0	0	-	-	15	1	-	-	-	168,568	5,898	-
2a.1.5.11	Control Rod Drive Hydraulic	-	416	16	26	277	190	-	199	1,124	1,124	-	-	1,658	562	-	-	-	211,359	1,163	-
2a.1.5.12	Core Spray - Insulated	-	79	20	51	734	176	-	184	1,244	1,244	-	-	4,384	521	-	-	-	211,359	1,163	-
2a.1.5.13	Core Spray - Insulated	-	105	15	15	147	40	-	14	84	84	-	-	8,242	204	-	-	-	3,445	181	-
2a.1.5.14	Drain Water - RCA	-	15	0	1	14	-	-	6	36	36	-	-	25	3	-	-	-	3,445	181	-
2a.1.5.15	Drain Water - Insulated - RCA	-	41	1	2	42	-	-	17	104	104	-	-	25	3	-	-	-	10,278	568	-
2a.1.5.16	Drain Water - RCA	-	2	0	0	0	-	-	1	7	7	-	-	25	1	-	-	-	551	25	-
2a.1.5.17	Diesel Oil - RCA	-	38	1	0	37	-	-	2	130	130	-	-	54	0	-	-	-	22,848	56	-
2a.1.5.18	EDG Emergency Services Water - RCA	-	0	0	0	0	-	-	0	1	1	-	-	2	0	-	-	-	84	182	-
2a.1.5.19	EDG Emergency Services Water - Insul. - RCA	-	13	0	0	0	-	-	2	15	15	-	-	15	0	-	-	-	5,544	281	-
2a.1.5.20	Electrical - Clean	-	21	0	1	23	-	-	9	55	55	-	-	137	1	-	-	-	4,162	48	-
2a.1.5.21	Emergency Services Water - Insul. - RCA	-	0	0	0	0	-	-	4	25	25	-	-	103	3	-	-	-	4,162	48	-
2a.1.5.22	Generator - RCA	-	0	1	1	17	-	-	2	12	12	-	-	31	1	-	-	-	1,250	67	-
2a.1.5.23	Generator Physical Design - RCA	-	5	0	0	5	-	-	2	12	12	-	-	13	0	-	-	-	1,080	81	-
2a.1.5.24	Generator Physical Design - RCA	-	6	0	0	6	-	-	3	15	15	-	-	6	0	-	-	-	52,702	966	-
2a.1.5.25	R2-D2 Control Analyzing	-	0	0	0	0	-	-	61	381	381	-	-	972	206	-	-	-	95,733	3,079	-
2a.1.5.26	R2-D2 Control Analyzing - Insulated	-	47	0	0	163	70	-	141	839	839	-	-	1,508	481	-	-	-	1,554,661	14,733	-
2a.1.5.27	High Pressure Coolant Injection	-	219	14	24	247	163	-	10	10	10	-	-	10	0	-	-	-	1,554,661	14,733	-
2a.1.5.28	High Pressure Coolant Injection - Insula	-	8	0	0	8	-	-	1	10	10	-	-	10	0	-	-	-	1,554,661	14,733	-
2a.1.5.29	Hydrogen Cooling - RCA	-	0	0	0	0	-	-	9	59	59	-	-	189	17	-	-	-	7,669	212	-
2a.1.5.30	Hydrogen Cooling - RCA	-	17	0	2	32	-	-	9	60	60	-	-	189	17	-	-	-	7,669	212	-
2a.1.5.31	Hydrogen Seal Oil - RCA	-	0	0	0	0	-	-	10	59	59	-	-	10	0	-	-	-	5,672	304	-
2a.1.5.32	Hydrogen Water Chemistry - RCA	-	24	0	1	23	-	-	103	644	644	-	-	1,768	11	-	-	-	71,810	2,733	-
2a.1.5.33	Instrument & Service Air - RCA	-	225	4	17	246	159	-	11	62	62	-	-	1,768	11	-	-	-	71,810	2,733	-
2a.1.5.34	Instrument & Service Air - RCA	-	17	0	0	17	-	-	173	1,029	1,029	-	-	3,148	50	-	-	-	1,554,661	14,733	-
2a.1.5.35	Main Condenser	-	249	17	20	335	207	-	1,533	9,350	9,350	-	-	15,760	8,687	-	-	-	1,554,661	14,733	-
2a.1.5.36	Main Turbine	-	205	205	353	3,936	2,921	-	1,533	9,350	9,350	-	-	15,760	8,687	-	-	-	1,554,661	14,733	-
2a.1.5.37	Main Turbine - Insulated	-	214	18	37	423	225	-	180	1,097	1,097	-	-	2,530	667	-	-	-	1,452,368	3,069	-
2a.1.5.38	Main Turbine - Insulated	-	189	0	0	189	0	-	163	1,003	1,003	-	-	1,705	764	-	-	-	1,452,368	3,069	-
2a.1.5.39	Off-Gas Accumulator	-	33	1	32	34	-	-	10	65	65	-	-	100	53	-	-	-	100,953	2,786	-
2a.1.5.40	Off-Gas Accumulator - Insulated	-	387	19	27	229	240	-	197	1,100	1,100	-	-	1,366	769	-	-	-	1,000,953	5,385	-
2a.1.5.41	Off-Gas Accumulator - Insulated	-	25	1	1	9	11	-	58	58	58	-	-	33	3	-	-	-	4,318	345	-
2a.1.5.42	Post-Accident Strapping - Insulated	-	37	0	0	37	-	-	3	33	33	-	-	37	0	-	-	-	60,246	1,122	-
2a.1.5.43	Post-Accident Strapping - Insulated - RCA	-	3	0	0	3	-	-	60	409	409	-	-	1,445	1	-	-	-	60,246	1,122	-
2a.1.5.44	RHR Service Water - RCA	-	0	0	0	0	-	-	2	12	12	-	-	35	0	-	-	-	1,430	47	-
2a.1.5.45	Reactor Feedwater Pump Seal	-	56	2	4	32	33	-	28	155	155	-	-	139	96	-	-	-	14,009	773	-

**Monticello Nuclear Generating Plant  
 Decommissioning Cost Analysis**

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**Table F  
 Monticello Nuclear Generating Plant  
 DECON Decommissioning Cost Estimates with 200 Years of Spent Fuel Storage**  
 (Thousands of 2020 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LWR Disposal Costs	Other Contingency	Total Contingency	Total	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu Feet	Barial Volumes			Borial/Processed Wt. Lbs.	Craft Manhours	Utility and Contractor Manhours	
															Class A Cu Feet	Class B Cu Feet	Class C Cu Feet				
Decommissioning of Plant Systems (continued)																					
2a.15.46	Residual Heat Removal	362	232	172	178	1,072	2,051	-	962	5,049	5,049	-	-	6,406	6,012	-	-	617,941	4,135	-	
2a.15.47	Residual Heat Removal - Insulated	622	554	61	82	638	880	-	772	3,535	3,535	-	-	3,367	2,697	-	-	302,087	10,340	-	
2a.15.48	RC Core Isolation Cooling	-	-	7	7	48	67	-	52	287	287	-	-	288	190	-	-	21,439	1,570	-	
2a.15.49	RC Core Isolation Cooling - Insulated	-	107	5	7	48	67	-	61	258	258	-	-	43	190	-	-	14,095	1,580	-	
2a.15.50	RS Recirculation	56	169	2	5	63	30	-	60	331	331	-	-	377	90	-	-	21,009	2,548	-	
2a.15.51	Shrubbers	-	-	0	2	41	-	-	12	22	22	-	-	22	22	-	-	9,964	348	-	
2a.15.52	Steam Liquid Control - Insul - RCA	-	28	0	2	41	-	-	15	35	35	-	-	126	5	-	-	5,135	98	-	
2a.15.53	Steam Liquid Control - RCA	-	7	0	1	21	-	-	1	7	7	-	-	1	5	-	-	386	51	-	
2a.15.54	Stator Cooling - RCA	-	0	0	0	0	2	-	1	7	7	-	-	4	5	-	-	386	51	-	
2a.15.55	Traversing Incore Probe	1,040	8,221	924	1,572	10,330	11,425	-	8,209	47,730	47,730	-	24	97,054	33,808	-	-	61,255,515	1,934	-	
2a.15	Totals	-	2,205	22	12	101	31	-	607	3,127	3,127	-	24	14,100	55,545	1,761	898	-	22,561	-	-
2a.16	Scaffolding in support of decommissioning	1,742	29,721	18,645	6,388	25,937	50,042	728	47,148	180,390	180,390	-	24	141,010	553,545	1,761	898	-	10,438,540	253,040	2,758
2a.17	Subtotal Period 2a Activity Costs	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Period 2a Collateral Costs																					
2a.3.1	Process decommissioning water waste	85	-	57	102	-	232	-	122	508	508	-	-	-	532	-	-	31,942	104	-	
2a.3.2	Process decommissioning chemical flush waste	5	524	-	216	-	1,619	-	534	3,077	3,077	-	-	-	2,093	-	-	225,008	392	-	
2a.3.3	Spent Fuel Capital and Transfer	-	-	-	-	-	-	23,119	3,618	27,737	27,737	-	37	-	-	-	-	-	-	-	-
2a.3.4	Retention and Severance	-	-	-	-	-	-	13,127	1,969	15,097	15,097	-	-	-	-	-	-	-	-	-	-
2a.3.5	On-site survey and release of 0.0 tons clean metallic waste	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2a.3.6	Subtotal Period 2a Collateral Costs	91	524	274	804	-	1,851	37,247	6,292	46,882	46,882	-	37	-	2,625	-	-	354,950	405	-	
Period 2a Period-Dependent Costs																					
2a.4.1	Decon supplies	112	-	-	-	-	-	1,019	28	140	140	-	-	-	-	-	-	-	-	-	-
2a.4.2	Property taxes	-	-	-	-	-	-	4,377	498	4,814	4,814	-	-	-	-	-	-	-	-	-	-
2a.4.3	Health physics supplies	-	2,036	-	-	-	-	-	589	2,645	2,645	-	-	-	-	-	-	-	-	-	-
2a.4.4	Heavy equipment rental	-	3,627	-	-	-	-	-	544	4,171	4,171	-	-	-	-	-	-	-	-	-	-
2a.4.5	Heavy equipment rental - Insulated	-	-	-	-	-	-	-	375	2,876	2,876	-	-	-	5,551	-	-	111,023	181	-	
2a.4.6	Plant energy budget	-	-	-	-	-	-	856	86	942	942	-	-	-	-	-	-	-	-	-	-
2a.4.8	NRC Fees	-	-	-	-	-	-	4,115	412	4,527	4,527	-	-	-	-	-	-	-	-	-	-
2a.4.9	Emergency Planning Fees	-	-	-	-	-	-	1,224	184	1,408	1,408	-	-	-	-	-	-	-	-	-	-
2a.4.10	Spent Fuel Pool O&M	-	-	-	-	-	-	162	24	187	187	-	-	-	-	-	-	-	-	-	-
2a.4.12	RSFSI Operating Costs	-	-	-	-	-	-	181	27	208	208	-	-	-	-	-	-	-	-	-	-
2a.4.13	Railroad Track Maintenance	-	-	-	-	-	-	1,181	27	1,208	1,208	-	-	-	-	-	-	-	-	-	-
2a.4.14	Spent Fuel Pool O&M - Surveys	-	-	-	-	-	-	22,088	3,313	25,401	25,401	-	-	-	-	-	-	-	-	-	-
2a.4.15	Security Staff Cost	-	-	-	-	-	-	21,021	3,153	24,174	24,174	-	-	-	-	-	-	-	-	-	-
2a.4.16	DOG Staff Cost	-	-	-	-	-	-	27,506	4,386	32,092	32,092	-	-	-	-	-	-	-	-	-	-
2a.4.17	Utility Staff Cost	112	5,982	110	57	-	457	50,115	14,298	111,162	110,911	-	61,21	-	5,551	-	-	111,023	181	38,124	
2a.1	Subtotal Period 2a Period-Dependent Costs	1915	36,028	10,028	7,250	25,937	52,550	128,150	67,738	338,404	338,484	-	62	141,010	677,222	1,761	898	-	10,824,520	274,317	84,002
2a.0	TOTAL PERIOD 2a COST	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PERIOD 2b - Site Decommissionation																					
Period 2b Direct Decommissioning Activities																					
Decommissioning of Plant Systems																					
2b.1.1.1	ALARA/Offsite/Integral	-	18	0	1	6	3	-	6	35	35	-	-	35	10	-	-	3,060	277	-	
2b.1.1.2	Alternate S2 - RCA	-	16	0	1	16	0	-	7	40	40	-	-	83	-	-	-	3,765	185	-	
2b.1.1.3	Decommissionation Projects	-	1	0	0	0	0	-	1,692	1,692	1,692	-	-	1,692	0	-	-	6,317	6,317	-	
2b.1.1.4	Electrical Contamination	-	455	6	6	3,906	30	-	1,208	8,107	8,107	-	-	23,384	90	-	-	945,013	37,107	-	
2b.1.1.5	Electrical Contamination - Decommissioned	-	2,488	46	218	3,906	30	-	1,208	8,107	8,107	-	-	23,384	90	-	-	945,013	37,107	-	
2b.1.1.6	Fire - RCA	-	305	7	27	446	31	-	162	976	976	-	-	2,965	100	-	-	114,588	4,111	-	
2b.1.1.7	HVAC Ductwork	-	305	7	27	446	31	-	162	976	976	-	-	2,965	100	-	-	114,588	4,111	-	
2b.1.1.8	HVAC Ductwork - Insul - RCA	-	305	7	27	446	31	-	162	976	976	-	-	2,965	100	-	-	114,588	4,111	-	
2b.1.1.9	HVAC Ductwork - Insul - RCA	-	305	7	27	446	31	-	162	976	976	-	-	2,965	100	-	-	114,588	4,111	-	
2b.1.1.10	Heating Boiler - Insulated - RCA	-	3	0	4	1,007	76	-	30	1,945	1,945	-	-	2,738	227	-	-	238,759	2,908	-	
2b.1.1.11	Liquid Radwaste	-	3	0	4	1,007	76	-	30	1,945	1,945	-	-	2,738	227	-	-	238,759	2,908	-	
2b.1.1.12	Liquid Radwaste - Insulated - RCA	-	3	0	4	1,007	76	-	30	1,945	1,945	-	-	2,738	227	-	-	238,759	2,908	-	
2b.1.1.13	Molten Slag	288	687	48	63	514	586	-	703	3,188	3,188	-	-	3,073	1,728	-	-	238,484	17,104	-	
2b.1.1.14	Molten Slag - RCA	-	197	3	14	246	31	-	4	1,471	1,471	-	-	1,471	0	-	-	57,837	1,432	-	
2b.1.1.15	Off Gas Holdup - Primary Containment Generator - RCA	-	197	3	14	246	31	-	4	1,471	1,471	-	-	1,471	0	-	-	57,837	1,432	-	
2b.1.1.16	Off Gas Holdup - Primary Containment	-	342	21	28	342	214	-	216	1,291	1,291	-	-	2,755	630	-	-	152,277	4,769	-	
2b.1.1.17	Primary Containment	-	455	42	87	1,038	507	-	414	2,543	2,543	-	-	6,201	1,506	-	-	347,704	6,454	-	

**Monticello Nuclear Generating Plant  
 Decommissioning Cost Analysis**

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**Table F  
 Monticello Nuclear Generating Plant  
 DECON Decommissioning Cost Estimates with 200 Years of Spent Fuel Storage**  
 (Thousands of 2020 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Cost	Transport Cost	Off-Site Processing Cost	LWR Disposal Cost	Other Cost	Total Contingency	Total	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu Feet	Barial Volumes			Barrial/Processed Wt. Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu Feet	Class B Cu Feet	Class C Cu Feet			
	Decommissioning of Plant Systems (continued)																			
2b.1.1.16	Process Radiation Monitors	-	46	2	2	24	18	-	20	111	111	-	-	142	52	-	-	9,115	649	-
2b.1.1.17	Rx Bldg Closed Cng Water - Inval - RCA	-	134	2	5	133	-	-	54	843	343	-	-	977	-	-	-	39,675	1,484	-
2b.1.1.18	Rx Bldg Closed Cng Water - RCA	-	142	5	99	1,077	-	-	1,077	1,607	1,607	-	-	1,077	-	-	-	2,418	2,418	-
2b.1.1.19	Rx Bldg Closed Cng Water - Equip	27	142	15	29	134	279	-	45	849	849	-	-	1,158	829	-	-	49,730	1,682	-
2b.1.1.20	Rx Pressure Vessel	28	47	6	5	13	79	-	48	225	225	-	-	175	230	-	-	17,816	1,051	-
2b.1.1.21	Rx Water Cleanup	172	205	19	16	22	231	-	222	905	905	-	-	1,300	727	-	-	52,670	5,736	-
2b.1.1.22	Secondary Containment	-	120	1	14	170	86	-	62	383	383	-	-	1,013	235	-	-	47,907	1,465	-
2b.1.1.23	Spent Fuel Pool	-	150	4	17	333	-	-	88	570	570	-	-	1,800	-	-	-	73,453	2,016	-
2b.1.1.24	Service & Seal Water - RCA	-	15	0	2	34	-	-	9	62	62	-	-	206	1,380	-	-	8,364	206	-
2b.1.1.25	Service Air Blower - RCA	338	494	36	40	390	407	-	497	2,204	2,204	-	-	2,367	35	-	-	18,223	10,929	-
2b.1.1.26	Solid Residue Buildings	-	10	-	9	-	29	-	9	40	40	-	-	137	85	-	-	10,253	144	-
2b.1.1.28	Waste & Domestic Water - RCA	-	58	2	3	57	-	-	22	136	136	-	-	342	342	-	-	13,874	633	-
2b.1.1	Totals	1,153	7,880	315	804	11,608	2,637	-	5,107	29,553	29,552	-	11	60,735	7,859	-	-	3,331,244	122,835	-
2b.1.2	Scaffolding in support of decommissioning	-	2,831	28	16	239	38	-	708	3,069	3,069	-	-	1,287	114	-	-	65,139	29,205	-
	Decommissioning of Site Buildings																			
2b.1.3.2	Admin Building	5,292	2,092	178	516	8,044	1,181	-	4,924	22,948	22,948	-	-	48,077	7,014	-	-	2,317,670	119,518	-
2b.1.3.3	HPCI Room	106	6	0	3	20	15	-	59	189	189	-	-	118	145	-	-	6,840	1,600	-
2b.1.3.4	Hot Shop	29	28	1	3	20	14	-	29	123	123	-	-	118	125	-	-	10,759	780	-
2b.1.3.5	Office	17	15	0	2	5	11	-	4	46	46	-	-	31	103	-	-	4,860	289	-
2b.1.3.6	Office Storage & Shipping	372	269	7	23	223	82	-	312	1,289	1,289	-	-	1,343	689	-	-	8,860	8,860	-
2b.1.3.7	Office Storage & Compressor	41	17	1	6	4	33	-	34	136	136	-	-	25	316	-	-	15,948	785	-
2b.1.3.8	Radiation Material Storage Warehouse	121	61	3	17	20	96	-	107	435	435	-	-	172	910	-	-	49,943	2,503	-
2b.1.3.9	Recycling	27	24	2	5	33	24	-	32	148	148	-	-	190	216	-	-	18,405	605	-
2b.1.3.10	Recombiner	705	333	21	104	213	564	-	632	2,504	2,504	-	-	1,283	5,209	-	-	303,150	14,443	-
2b.1.3.12	Turbine Building Addition	58	21	1	8	8,371	2,164	-	47	181	181	-	-	51,247	16,100	-	-	20,478	1,087	-
2b.1.3	Totals	6,799	3,736	218	704	8,371	2,164	-	6,288	28,483	28,483	-	-	51,247	16,100	-	-	2,886,266	145,889	-
2b.1.4	Prepare/submit License Termination Plan	-	-	-	-	-	-	526	79	605	605	-	-	-	-	-	-	-	-	4,666
2b.1.5	Receive NRC approval of termination plan	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2b.1	Subtotal Period 2b Activity Costs	7,952	14,427	560	1,524	20,481	4,859	526	12,232	62,561	62,540	-	11	122,289	24,132	-	-	6,270,569	296,929	4,666
	Period 2b Additional Costs																			
2b.2.2	Excavation of Underground Services	-	1,972	-	25	1,211	-	376	198	1,524	1,524	-	-	11,700	-	-	-	294,000	82	-
2b.2.3	Security Modifications	-	1,972	-	-	-	-	8,696	1,394	10,000	10,000	-	-	-	-	-	-	-	-	12,483
2b.2	Subtotal Period 2b Additional Costs	-	1,972	-	25	1,211	-	9,072	2,062	14,422	14,422	-	-	11,700	-	-	-	294,000	12,525	-
	Period 2b Collateral Costs																			
2b.3.1	Process decommissioning water waste	198	-	135	240	-	546	-	285	1,404	1,404	-	-	-	1,253	-	-	76,186	244	-
2b.3.2	Process decommissioning chemical flush waste	1	-	-	-	-	319	-	105	607	607	-	-	-	413	-	-	45,978	77	-
2b.3.3	Process decommissioning chemical flush waste	-	304	-	-	-	-	117,254	17,588	134,843	134,843	-	-	-	-	-	-	-	-	-
2b.3.4	Spent Fuel Criticality Transfer	-	-	-	-	-	-	6,259	945	7,244	7,244	-	-	-	-	-	-	-	-	-
2b.3.5	Retention and Severance	199	364	178	378	-	865	123,554	18,978	144,516	9,573	134,843	-	-	1,696	-	-	119,165	322	-
2b.3	Subtotal Period 2b Collateral Costs	1,440	-	-	-	-	-	742	360	1,799	1,799	-	-	-	-	-	-	-	-	-
	Period 2b Periodic Dependent Costs																			
2b.4.2	Insurance	-	-	-	-	-	-	742	816	1,558	1,558	-	-	-	-	-	-	-	-	-
2b.4.3	Property taxes	-	-	-	-	-	-	2,063	504	2,567	2,567	-	-	-	-	-	-	-	-	-
2b.4.5	Heavy equipment rental	-	2,711	-	-	-	-	-	407	3,117	3,117	-	-	-	-	-	-	-	-	-
2b.4.6	Disposal of DAW generated	-	-	101	52	-	419	-	123	694	694	-	-	-	-	-	-	-	-	-
2b.4.8	NRC Energy Budget	-	-	-	-	-	-	623	1,633	1,633	1,633	-	-	-	-	-	-	-	-	-
2b.4.9	Emergency Planning Fees	-	-	-	-	-	-	2,995	299	3,294	3,294	-	-	-	-	-	-	-	-	-
2b.4.10	Fixed Overhead	-	-	-	-	-	-	2,255	335	2,570	2,570	-	-	-	-	-	-	-	-	-
2b.4.11	Spent Fuel Post O&M	-	-	-	-	-	-	891	334	1,224	1,224	-	-	-	-	-	-	-	-	-
2b.4.12	RFSS Operating Costs	-	-	-	-	-	-	118	18	136	136	-	-	-	-	-	-	-	-	-
2b.4.13	RFSS Operating Costs	-	-	-	-	-	-	458	69	527	527	-	-	-	-	-	-	-	-	-
2b.4.14	Railroad Track Maintenance	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



**Monticello Nuclear Generating Plant  
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**Table F  
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 DECON Decommissioning Cost Estimates with 200 Years of Spent Fuel Storage  
 (Thousands of 2020 Dollars)**

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LIRW Disposal Costs	Other	Total Contingency	Total Lic. Term. Costs	NRC Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu Feet	Barial Volumes			Borial/Processed Wt. Lbs.	Craft Manhours	Utility and Contractor Manhours
														Class A Cu Feet	Class B Cu Feet	Class C Cu Feet			
Period 20 Period-Dependent Costs (continued)																			
20.0	TOTAL PERIOD 20 COST	9,391	21,830	861	2,046	21,692	6,143	196,692	45,523	392,797	165,188	139,297	11	134,029	30,882	-	6,794,433	309,941	698,488
PERIOD 2d - Decontamination Following Wet Fuel Storage																			
Period 2d Direct Decommissioning Activities																			
2d.1.1	Remove spent fuel racks	654	58	103	149	-	2,572	-	1,017	4,553	4,553	-	-	-	7,653	-	486,170	906	-
Disposal of Plant Systems																			
2d.1.2.1	Crane/Heavy Loads/Rigging - RCA	-	3	0	1	17	-	-	1	25	25	-	105	-	-	-	5,134	648	-
2d.1.2.2	Electrical - Document Fuel Pool Area	-	297	5	23	411	3	-	110	876	876	-	2,437	0	-	-	10,333	605	-
2d.1.2.3	Fire - RCA - Fuel Pool Area	-	11	0	1	10	-	-	4	26	26	-	62	-	-	-	90,793	143	-
2d.1.2.4	Fuel Pool Cooling & Cleanup	246	428	34	37	197	455	-	382	1,781	1,781	-	1,179	1,311	-	-	2,489	5,880	-
2d.1.2.5	HVAC Chilled Water - RCA Fuel Pool Area	-	27	1	3	50	4	-	17	108	108	-	296	11	-	-	133,359	4,389	-
2d.1.2.6	HVAC Chilled Water - RCA Fuel Pool Area	-	33	0	2	37	-	-	14	87	87	-	223	-	-	-	12,733	437	-
2d.1.2.7	Instrument & Service Air-RCA-Fuel Pool	-	29	1	2	45	-	-	1	45	45	-	327	-	-	-	10,841	357	-
2d.1.2.8	Instrument & Service Air-RCA-Fuel Pool	273	924	45	75	919	562	-	631	3,296	3,296	-	4,934	1,170	-	-	236,000	15,385	-
Decommissionation of Site Buildings																			
2d.1.3.1	Reactor (Post Fuel)	946	2,590	172	913	320	10,216	-	3,880	13,006	13,006	-	1,969	62,698	-	-	2,732,406	45,703	-
2d.1.3	Totals	946	2,590	172	913	320	10,216	-	3,880	13,006	13,006	-	1,969	62,698	-	-	2,732,406	45,703	-
2d.1.4	Scaffolding in support of decommissioning	-	506	6	3	48	8	-	162	782	782	-	237	23	-	-	13,028	5,641	-
2d.1	Subtotal Period 2d Activity Costs	1,872	4,147	336	1,120	1,196	13,298	-	5,680	27,650	27,650	-	7,120	71,832	-	-	3,255,210	67,935	-
Period 2d Additional Costs																			
2d.2.1	License Termination Survey Planning	-	-	-	-	-	-	1,458	437	1,896	1,896	-	-	-	-	-	-	-	12,480
2d.2	Subtotal Period 2d Additional Costs	-	-	-	-	-	-	1,458	437	1,896	1,896	-	-	-	-	-	-	-	12,480
Period 2d Collateral Costs																			
2d.3.1	Process decommissioning water waste	79	-	54	96	-	220	-	114	563	563	-	-	-	-	-	-	-	98
2d.3.2	Process decommissioning chemical fluid waste	-	1	26	81	-	153	-	61	241	241	-	-	-	-	-	-	-	47
2d.3.3	Small and allowances	-	91	-	-	-	-	-	14	105	105	-	-	-	-	-	-	-	-
2d.3.4	Decommissioning Equipment Disposition	-	-	130	82	1,112	178	-	237	1,739	1,739	-	6,000	5,29	-	-	303,608	147	-
2d.3.5	Spent Fuel Capital and Transfer	-	-	-	-	-	167	-	4	32	32	-	-	-	-	-	-	-	66
2d.3	Subtotal Period 2d Collateral Costs	80	91	210	262	1,112	530	27	452	2,805	2,773	-	6,000	1,282	-	-	306,400	292	-
Period 2d Period-Dependent Costs																			
2d.4.1	Decon supplies	244	-	-	-	-	-	1,500	61	305	305	-	-	-	-	-	-	-	-
2d.4.2	Insurance	-	-	-	-	-	-	1,500	61	305	305	-	-	-	-	-	-	-	-
2d.4.3	Property taxes	-	-	-	-	-	-	1,624	166	1,829	1,829	-	-	-	-	-	-	-	-
2d.4.4	Health physics supplies	-	806	-	-	-	-	-	202	1,008	1,008	-	-	-	-	-	-	-	98
2d.4.5	Heavy equipment rental	-	1,936	-	-	-	-	-	290	2,227	2,227	-	-	-	-	-	-	-	47
2d.4.6	Disposal of DRY generated	-	-	40	21	-	167	-	83	477	477	-	-	-	-	-	-	-	147
2d.4.7	Emergency Planning	-	-	-	-	-	-	547	82	629	629	-	-	-	-	-	-	-	-
2d.4.8	NRC Fees	-	-	-	-	-	-	424	42	466	466	-	-	-	-	-	-	-	-
2d.4.9	Emergency Planning Fees	-	-	-	-	-	-	112	11	123	123	-	-	-	-	-	-	-	-
2d.4.10	Process Decommissioning Equipment/Services	-	-	-	-	-	-	1,366	206	1,568	1,568	-	-	-	-	-	-	-	-
2d.4.11	Liquid Radioactive Processing Equipment/Services	-	-	-	-	-	-	320	18	338	338	-	-	-	-	-	-	-	-
2d.4.12	RFSS Operating Costs	-	-	-	-	-	-	84	13	97	97	-	-	-	-	-	-	-	-
2d.4.13	Railroad/Track Maintenance	-	-	-	-	-	-	94	14	108	108	-	-	-	-	-	-	-	-
2d.4.14	Remedial Action Surveys	-	-	-	-	-	-	10,990	1,650	12,640	12,640	-	-	-	-	-	-	-	162,981
2d.4.15	DOC Staff Cost	-	-	-	-	-	-	7,311	1,097	8,408	8,408	-	-	-	-	-	-	-	78,356
2d.4.16	DOC Staff Cost	-	-	-	-	-	-	10,052	1,508	11,560	11,560	-	-	-	-	-	-	-	149,660
2d.4.17	Utility Staff Cost	-	-	-	-	-	-	107	3,579	3,686	3,686	-	-	-	-	-	-	-	303,097
2d.4.1	Subtotal Period 2d Period-Dependent Costs	244	2,743	40	21	-	167	3,579	5,662	43,146	48,814	-	-	-	2,030	-	40,000	66	-
2d.0	TOTAL PERIOD 2d COST	2,196	6,891	576	1,422	2,308	14,055	36,065	12,332	75,896	70,532	-	13,120	74,164	-	-	3,295,210	67,935	403,477

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**Table F  
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 DECON Decommissioning Cost Estimates with 200 Years of Spent Fuel Storage**  
 (Thousands of 2020 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LIRW Disposal Costs	Other Costs	Total Contingency	Total Lic. Term. Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu Feet	Class A Cu Feet	Class B Cu Feet	Class C Cu Feet	GTCC Cu Feet	Burial/Processed Wt. Lbs.	Craft Manhours	Utility and Contractor Manhours
<b>PERIOD 2f - License Termination</b>																					
Period 2f Direct Decommissioning Activities																					
2F.1.1	ORISE preliminary survey	-	-	-	-	-	-	166	50	216	216	-	-	-	-	-	-	-	-	-	-
2F.1.2	Subtotal Period 2f Activity Costs	-	-	-	-	-	-	166	50	216	216	-	-	-	-	-	-	-	-	-	-
Period 2f Additional Costs																					
2F.2.1	Environmental Remediation Survey	-	-	-	-	-	-	6,920	2,076	8,995	8,995	-	-	-	-	-	-	-	-	95,048	6,240
2F.2.2	Subtotal Period 2f Additional Costs	-	-	-	-	-	-	6,920	2,076	8,995	8,995	-	-	-	-	-	-	-	-	95,048	6,240
Period 2f Cultural Costs																					
2F.3.1	Spent Fuel Capital and Transfer	-	-	-	-	-	-	1,264	100	1,454	1,454	-	-	-	-	-	-	-	-	-	-
2F.3.2	Subtotal Period 2f Cultural Costs	-	-	-	-	-	-	1,264	100	1,454	1,454	-	-	-	-	-	-	-	-	-	-
Period 2f Period-Dependent Costs																					
2F.4.1	Insurance	-	-	-	-	-	-	630	53	683	683	-	-	-	-	-	-	-	-	-	-
2F.4.2	Property taxes	-	-	-	-	-	-	1,470	147	1,617	1,617	-	-	-	-	-	-	-	-	-	-
2F.4.3	Health physics supplies	708	-	-	-	-	-	177	884	884	-	-	-	-	-	-	-	-	-	-	-
2F.4.4	Health physics personnel	-	4	-	-	-	29	-	335	315	-	-	-	-	-	-	-	-	7,007	-	12
2F.4.5	Plant energy budget	-	-	-	-	-	-	274	41	315	315	-	-	-	-	-	-	-	-	-	-
2F.4.6	NRC Fees	-	-	-	-	-	-	426	43	468	468	-	-	-	-	-	-	-	-	-	-
2F.4.7	Emergency Planning Fees	-	-	-	-	-	-	112	123	123	123	-	-	-	-	-	-	-	-	-	-
2F.4.8	ES&S Operating Costs	-	-	-	-	-	-	84	13	97	97	-	-	-	-	-	-	-	-	-	-
2F.4.9	ES&S Operating Costs	-	-	-	-	-	-	94	14	108	108	-	-	-	-	-	-	-	-	-	-
2F.4.10	Railroad Track Maintenance	-	-	-	-	-	-	10,000	1,650	12,640	3,732	-	-	-	-	-	-	-	-	-	102,981
2F.4.11	Security Staff Cost	-	-	-	-	-	-	5,702	864	6,525	5,788	-	-	-	-	-	-	-	-	-	80,707
2F.4.12	Utility Staff Cost	-	-	-	-	-	-	5,702	864	6,525	5,788	-	-	-	-	-	-	-	-	-	80,707
2F.4.13	Subtotal Period 2f Period-Dependent Costs	708	-	-	-	-	29	25,740	4,070	31,557	26,718	4,830	-	-	-	-	-	-	7,007	12	300,888
2F.4	Subtotal Period 2f Period-Dependent Costs	708	-	-	-	-	29	25,740	4,070	31,557	26,718	4,830	-	-	-	-	-	-	7,007	12	300,888
2F.0	TOTAL PERIOD 2f COST	13,731	65,666	20,473	10,731	49,837	72,277	366,013	130,255	753,282	576,287	182,922	73	288,160	174,123	1,761	898	-	21,562,260	727,310	2,363,646
<b>PERIOD 3b - Site Restoration</b>																					
Period 3b Direct Decommissioning Activities																					
Description of Activities, Site Buildings																					
3b.1.1.1	Basement Building	-	1,971	-	-	-	-	-	206	2,207	-	-	2,207	-	-	-	-	-	-	19,911	-
3b.1.1.2	Condensate Tanks Foundation	-	10	-	-	-	-	-	1	11	-	-	11	-	-	-	-	-	-	50	-
3b.1.1.3	Discharge Retention Basin	-	4	-	-	-	-	-	1	5	-	-	5	-	-	-	-	-	-	25	-
3b.1.1.4	Hot Cell	-	10	-	-	-	-	-	2	20	-	-	20	-	-	-	-	-	-	177	-
3b.1.1.5	H4 Storage	-	16	-	-	-	-	-	2	10	-	-	10	-	-	-	-	-	-	19	-
3b.1.1.6	Hydrogen & Oxygen Storage	-	83	-	-	-	-	-	0	2	-	-	2	-	-	-	-	-	-	682	-
3b.1.1.7	LIRW Storage & Shipping	-	83	-	-	-	-	-	12	95	-	-	95	-	-	-	-	-	-	19	-
3b.1.1.8	Miscellaneous Buildings	-	4	-	-	-	-	-	1	4	-	-	4	-	-	-	-	-	-	2	-
3b.1.1.9	Misc Structures 2017	-	1,410	-	-	-	-	-	212	1,622	-	-	1,622	-	-	-	-	-	-	19,042	-
3b.1.1.10	Off Gas Stack	-	108	-	-	-	-	-	16	124	-	-	124	-	-	-	-	-	-	514	-
3b.1.1.11	Off Gas Storage & Compressor	-	39	-	-	-	-	-	6	45	-	-	45	-	-	-	-	-	-	189	-
3b.1.1.12	Reactor	-	128	-	-	-	-	-	19	147	-	-	147	-	-	-	-	-	-	733	-
3b.1.1.13	Reactor	-	128	-	-	-	-	-	19	147	-	-	147	-	-	-	-	-	-	733	-
3b.1.1.14	Security Barrier	-	186	-	-	-	-	-	28	214	-	-	214	-	-	-	-	-	-	533	-
3b.1.1.15	Structures Greater than 3' Below Grade	-	2,461	-	-	-	-	-	369	2,830	-	-	2,830	-	-	-	-	-	-	12,949	-
3b.1.1.16	Tank Farm	-	1,200	-	-	-	-	-	189	1,448	-	-	1,448	-	-	-	-	-	-	19,036	-
3b.1.1.17	Turbine Building Addition	-	55	-	-	-	-	-	8	63	-	-	63	-	-	-	-	-	-	618	-
3b.1.1.18	Turbine Building Addition	-	182	-	-	-	-	-	27	209	-	-	209	-	-	-	-	-	-	926	-
3b.1.1.19	Turbine Pedestal	-	8,160	-	-	-	-	-	1,225	9,391	-	-	9,391	-	-	-	-	-	-	58,885	-
3b.1.1	Totals	-	8,866	-	-	-	-	-	134	1,031	-	-	1,031	-	-	-	-	-	-	1,841	-
Site Cleanup Activities																					
3b.1.2	Grade & landscape site	-	806	-	-	-	-	-	300	2,231	2,231	-	-	-	-	-	-	-	-	6,726	-
3b.1.3	Final report to NRC	-	-	-	-	-	-	250	-	-	-	-	-	-	-	-	-	-	-	-	-
3b.1	Subtotal Period 3b Activity Costs	-	9,005	-	-	-	-	250	1,309	10,655	2,231	-	10,425	-	-	-	-	-	-	6,726	-

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 (Thousands of 2020 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LWR Disposal Costs	Other	Total Contingency	Total	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu Feet	Class A Cu Feet	Class B Cu Feet	Class C Cu Feet	GTCC Cu Feet	Burial/Processed Wt. Lbs.	Craft Manhours	Utility and Contractor Manhours
<b>Period 3a Additional Costs</b>																					
3b.2.1	Clean Concrete Disposal	-	3,322	-	-	-	-	13	500	3,855	-	-	3,855	-	-	-	-	-	-	-	12
3b.2.2	Intake Structure Cofferdam	-	335	-	-	-	-	-	50	385	-	-	385	-	-	-	-	-	-	-	2,584
3b.2.3	Concrete Debris	-	5,883	-	-	-	-	1,170	837	6,243	-	-	6,243	-	-	-	-	-	-	-	5,422
3b.2.4	Concrete Debris	-	442	-	-	-	-	-	66	508	-	-	508	-	-	-	-	-	-	-	3,352
3b.2.5	Discharge Structure Cofferdam	-	185	954	-	-	5,641	-	1,709	8,544	8,544	-	21,097	-	-	-	-	-	2,505,700	-	307
3b.2	Subtotal Period 3a Additional Costs	-	9,737	185	954	-	5,641	1,183	3,339	21,039	8,544	-	21,097	-	-	-	-	-	2,505,700	-	11,907
<b>Period 3b Collateral Costs</b>																					
3b.3.1	Small tool allowance	-	111	-	-	-	-	-	17	127	-	-	127	-	-	-	-	-	-	-	-
3b.3.2	Spent Fuel Capital and Transfer	-	-	-	-	-	-	108	16	125	-	-	125	-	-	-	-	-	-	-	-
3b.3	Subtotal Period 3b Collateral Costs	-	111	-	-	-	-	108	33	242	-	-	242	-	-	-	-	-	-	-	-
<b>Period 2b Period-Dependent Costs</b>																					
3b.4.1	Insurance	-	-	-	-	-	-	1,250	322	1,572	-	-	1,572	-	-	-	-	-	-	-	-
3b.4.2	Heavy equipment rental	-	-	-	-	-	-	2,260	375	2,635	-	-	2,635	-	-	-	-	-	-	-	-
3b.4.3	Plant energy budget	-	5,842	-	-	-	-	-	876	6,719	-	2,704	6,719	-	-	-	-	-	-	-	-
3b.4.4	NRC ISRS Fees	-	-	-	-	-	-	315	362	362	-	-	362	-	-	-	-	-	-	-	-
3b.4.5	ESFS Operating Costs	-	-	-	-	-	-	356	391	391	-	-	391	-	-	-	-	-	-	-	-
3b.4.6	Fixed Overhead	-	-	-	-	-	-	1,122	1,698	1,698	4,289	-	860	-	-	-	-	-	-	-	-
3b.4.7	ESFS Operating Costs	-	-	-	-	-	-	194	229	223	-	-	223	-	-	-	-	-	-	-	-
3b.4.8	Railroad Track Maintenance	-	-	-	-	-	-	81	379	460	240	-	375	-	-	-	-	-	-	-	371,152
3b.4.9	Railroad Track Maintenance	-	-	-	-	-	-	513	1,709	13,489	0	-	13,489	-	-	-	-	-	-	-	122,646
3b.4.10	DOC Staff Cost	-	-	-	-	-	-	11,729	1,072	13,189	-	-	13,189	-	-	-	-	-	-	-	101,904
3b.4.11	DOC Staff Cost	-	-	-	-	-	-	7,148	1,072	8,220	-	-	8,220	-	-	-	-	-	-	-	260,702
3b.4.12	Utility Staff Cost	-	5,842	-	-	-	-	56,742	8,369	64,854	2,020	-	16,007	-	-	-	-	-	-	-	-
3b.4	Subtotal Period 3b Period-Dependent Costs	-	24,735	185	954	-	5,641	52,234	13,030	96,800	10,795	16,132	80,873	-	-	-	-	-	2,505,700	72,633	801,262
3b.0	TOTAL PERIOD 3b COST	-	24,735	185	954	-	5,641	52,234	13,030	96,800	10,795	16,132	80,873	-	-	-	-	-	2,505,700	72,633	801,262
<b>PERIOD 3c - Fuel Storage Operations/Shipping</b>																					
<b>Period 3c Direct Decommissioning Activities</b>																					
3c.1	Period 3c Collateral Costs	-	-	-	-	-	-	-	1,452,497	1,452,497	-	-	1,452,497	-	-	-	-	-	-	-	-
3c.3	Subtotal Period 3c Collateral Costs	-	-	-	-	-	-	-	1,452,497	1,452,497	-	-	1,452,497	-	-	-	-	-	-	-	-
<b>Period 3c Period-Dependent Costs</b>																					
3c.4.2	Property taxes	-	-	-	-	-	-	135,690	13,505	149,145	-	-	149,145	-	-	-	-	-	-	-	-
3c.4.3	ESFS Operating Costs	-	-	-	-	-	-	175,431	17,543	192,974	-	-	192,974	-	-	-	-	-	-	-	-
3c.4.4	NRC ISRS Fees	-	-	-	-	-	-	41,069	4,110	45,209	-	-	45,209	-	-	-	-	-	-	-	-
3c.4.5	Emergency Planning Fees	-	-	-	-	-	-	28,039	2,804	31,503	-	-	31,503	-	-	-	-	-	-	-	-
3c.4.6	ESFS Operating Costs	-	-	-	-	-	-	1,461	146	1,607	-	-	1,607	-	-	-	-	-	-	-	-
3c.4.7	ESFS Operating Costs	-	-	-	-	-	-	2,621	323	2,488	-	-	2,488	-	-	-	-	-	-	-	-
3c.4.8	Railroad Track Maintenance	-	-	-	-	-	-	24,154	3,623	27,777	-	-	27,777	-	-	-	-	-	-	-	-
3c.4.9	Security Staff Cost	-	-	-	-	-	-	890,756	124,613	955,389	-	-	955,389	-	-	-	-	-	-	-	10,446,330
3c.4.10	Security Staff Cost	-	-	-	-	-	-	1,461,041	167,129	1,628,170	-	-	1,628,170	-	-	-	-	-	-	-	-
3c.4.11	Utility Staff Cost	-	-	-	-	-	-	360,061	55,359	415,420	-	-	415,420	-	-	-	-	-	-	-	5,323,612
3c.4	Subtotal Period 3c Period-Dependent Costs	-	-	-	-	-	-	1,727,443	240,065	1,967,508	-	-	1,967,508	-	-	-	-	-	-	-	16,171,720
3c.0	TOTAL PERIOD 3c COST	-	-	-	-	-	-	3,179,970	457,529	3,637,500	-	-	3,637,500	-	-	-	-	-	-	-	-
<b>PERIOD 3d - GTCC shipping</b>																					
<b>Period 3d Direct Decommissioning Activities</b>																					
3d.1.1.1	Vessel & Internal GTCC Disposal	-	-	-	-	-	-	-	-	-	6,314	-	-	-	-	-	-	-	-	-	1,100
3d.1.1	Subtotal Period 3d Activity Costs	-	-	-	-	-	-	-	-	-	6,314	-	-	-	-	-	-	-	-	-	1,100
3d.1	Subtotal Period 3d Activity Costs	-	-	-	-	-	-	-	-	-	6,314	-	-	-	-	-	-	-	-	-	1,100
<b>Period 3d Collateral Costs</b>																					
3d.3.1	Spent Fuel Capital and Transfer	-	-	-	-	-	-	98	4	102	-	-	102	-	-	-	-	-	-	-	-
3d.3	Subtotal Period 3d Collateral Costs	-	-	-	-	-	-	98	4	102	-	-	102	-	-	-	-	-	-	-	-

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 Decommissioning Cost Analysis**

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**Table F  
 Monticello Nuclear Generating Plant  
 DECON Decommissioning Cost Estimates with 200 Years of Spent Fuel Storage**  
 (Thousands of 2020 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Cost	Transport Cost	Off-Site Processing Cost	LRW Disposal Cost	Other Contingency Cost	Total Contingency Cost	Total Lic. Term. Costs	NRC Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu Feet	Class A Cu Feet	Class B Cu Feet	Class C Cu Feet	GTCC Cu Feet	Borial/Processed Wt. Lbs.	Craft Manhours	Utility and Contractor Manhours
<b>Period 26 Period-Dependent Costs</b>																				
3d4.1.1	Insurance	-	-	-	-	-	-	27	3	30	30	-	-	-	-	-	-	-	-	-
3d4.1.2	Property taxes	-	-	-	-	-	-	35	3	38	38	-	-	-	-	-	-	-	-	-
3d4.1.3	Plant energy budget	-	-	-	-	-	-	8	1	9	9	-	-	-	-	-	-	-	-	-
3d4.1.4	NRC ISFSI	-	-	-	-	-	-	6	1	7	7	-	-	-	-	-	-	-	-	-
3d4.1.5	Emergency Planning Fees	-	-	-	-	-	-	6	1	7	7	-	-	-	-	-	-	-	-	-
3d4.1.6	Fixed Overhead	-	-	-	-	-	-	10	1	11	11	-	-	-	-	-	-	-	-	-
3d4.1.7	Railroad Track Maintenance	-	-	-	-	-	-	6	1	7	7	-	-	-	-	-	-	-	-	-
3d4.1.8	Utility Staff Cost	-	-	-	-	-	-	165	25	190	190	-	-	-	-	-	-	-	-	2,074
3d4.1.9	Utility Staff Cost	-	-	-	-	-	-	39	6	45	45	-	-	-	-	-	-	-	-	639
3d4.1	Subtotal Period 26 Period-Dependent Costs	-	-	-	-	-	-	293	40	333	318	-	-	-	-	-	-	-	-	2,613
3d4.0	TOTAL PERIOD 26 COST	-	-	1,083	-	-	4,313	321	962	6,678	6,632	47	-	-	-	-	1,100	235,705	-	2,613
<b>PERIOD 26 - ISFSI Decommissioning</b>																				
Period 26 Direct Decommissioning Activities																				
3e2.1	Additional Costs	-	0	3	33	-	283	2,086	602	3,008	3,008	-	-	-	-	-	-	848	-	10,502
3e2.2	License Termination ISFSI	-	0	3	23	-	253	2,066	602	3,008	3,008	-	-	-	-	-	-	848	-	10,502
3e2.3	Subtotal Period 26 Additional Costs	-	0	3	23	-	253	2,066	602	3,008	3,008	-	-	-	-	-	-	848	-	10,502
<b>Period 26 Period-Dependent Costs</b>																				
3e4.1.1	Insurance	-	-	-	-	-	-	118	30	148	148	-	-	-	-	-	-	-	-	-
3e4.1.2	Property taxes	-	-	-	-	-	-	148	3	152	152	-	-	-	-	-	-	-	-	-
3e4.1.3	Plant energy budget	-	-	-	-	-	-	12	3	15	15	-	-	-	-	-	-	-	-	-
3e4.1.4	Fixed Overhead	-	-	-	-	-	-	71	18	89	89	-	-	-	-	-	-	-	-	-
3e4.1.5	Railroad Track Maintenance	-	-	-	-	-	-	52	10	62	62	-	-	-	-	-	-	-	-	-
3e4.1.6	Utility Staff Cost	-	-	-	-	-	-	320	65	385	385	-	-	-	-	-	-	-	-	4,900
3e4.1.7	Utility Staff Cost	-	-	-	-	-	-	291	65	356	356	-	-	-	-	-	-	-	-	3,792
3e4.1	Subtotal Period 26 Period-Dependent Costs	-	-	-	-	-	-	1,105	276	1,381	1,381	-	-	-	-	-	-	-	-	8,792
3e4.0	TOTAL PERIOD 26 COST	-	0	3	23	-	283	3,191	878	4,380	4,380	-	-	-	-	-	-	848	-	11,017
<b>PERIOD 26 - ISFSI Site Restoration</b>																				
Period 26 Direct Decommissioning Activities																				
3f2.1	Additional Costs	-	1,564	-	-	-	256	2,56	273	2,093	-	2,093	-	-	-	-	-	-	-	7,369
3f2.2	Demolition and Site Restoration of ISFSI	-	1,564	-	-	-	256	2,56	273	2,093	-	2,093	-	-	-	-	-	-	-	7,369
3f2.3	Subtotal Period 26 Additional Costs	-	1,564	-	-	-	256	2,56	273	2,093	-	2,093	-	-	-	-	-	-	-	7,369
<b>Period 26 Collateral Costs</b>																				
3f3.1	Small tool allowance	-	11	-	-	-	-	-	2	12	-	12	-	-	-	-	-	-	-	-
3f3.2	Subtotal Period 26 Collateral Costs	-	11	-	-	-	-	-	2	12	-	12	-	-	-	-	-	-	-	-
<b>Period 26 Period-Dependent Costs</b>																				
3f4.1.2	Property taxes	-	-	-	-	-	-	126	13	138	138	-	-	-	-	-	-	-	-	-
3f4.1.3	Plant energy budget	-	-	-	-	-	-	14	1	15	15	-	-	-	-	-	-	-	-	-
3f4.1.4	Fixed Overhead	-	-	-	-	-	-	6	1	7	7	-	-	-	-	-	-	-	-	-
3f4.1.5	Railroad Track Maintenance	-	-	-	-	-	-	36	5	41	41	-	-	-	-	-	-	-	-	-
3f4.1.6	Utility Staff Cost	-	-	-	-	-	-	24	3	27	27	-	-	-	-	-	-	-	-	350
3f4.1.7	Utility Staff Cost	-	-	-	-	-	-	109	16	125	125	-	-	-	-	-	-	-	-	1,260
3f4.1.8	Utility Staff Cost	-	-	-	-	-	-	109	16	125	125	-	-	-	-	-	-	-	-	1,260
3f4.1	Subtotal Period 26 Period-Dependent Costs	-	-	-	-	-	-	475	82	557	557	-	-	-	-	-	-	-	-	4,084
3f4.0	TOTAL PERIOD 26 COST	-	1,691	-	-	-	731	3,871	387	2,779	-	2,779	-	-	-	-	-	-	-	4,214
<b>PERIOD 26 TOTALS</b>																				
TOTAL COST TO DECOMMISSION		17,263	95,300	21,839	11,878	49,952	81,222	3,783,008	628,716	4,698,506	776,228	3,816,543	258,203	197,266	1,392	898	1,100	24,175,380	8,650	203,784,470

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**Table F  
 Monticello Nuclear Generating Plant  
 DECON Decommissioning Cost Estimates with 200 Years of Spent Fuel Storage**  
 (Thousands of 2020 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LIRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu Feet	Class A Cu Feet	Class B Cu Feet	Class C Cu Feet	GTCC Cu Feet	Burial/Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
<b>TOTAL COST TO DECOMMISSION WITH 15.45% CONTINGENCY:</b>																					
	TOTAL NRC LICENSE TERMINATION COST IS 16.32%, OR:				\$1,698,599	thousands of 2020 dollars															
	SPENT FUEL MANAGEMENT COST IS 1.91%, OR:				\$76,328	thousands of 2020 dollars															
	NON-NUCLEAR DEMOLITION COST IS 1.57%, OR:				\$3,845,543	thousands of 2020 dollars															
	TOTAL LOW-LEVEL RADIOACTIVE WASTE VOLUME BURIED (EXCLUDING GTCC):				\$73,737	thousands of 2020 dollars															
	TOTAL GREATER THAN CLASS C RADWASTE VOLUME GENERATED:				200,135	Cubic Feet															
	TOTAL SCRAP METAL REMOVED:				1,160	Cubic Feet															
	TOTAL CRAFT LABOR REQUIREMENTS:				23,123	Tons															
	TOTAL CRAFT LABOR REQUIREMENTS:				849,601	Man-hours															

Blank cells indicate that this activity not charged as decommissioning expense  
 a - indicates that this activity performed by decommissioning staff  
 0 - indicates that this value is less than 0.5 but is non-zero  
 A cell containing "-" indicates a zero value

***Monticello Nuclear Generating Plant  
Decommissioning Cost Analysis***

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**APPENDIX G**

**DETAILED COST ANALYSIS**

**SCENARIO 5: SAFSTOR with 42 Year DFS**



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**Table G  
 Monticello Nuclear Generating Plant  
 SAFSTOR Decommissioning Cost Estimate with DOE Pickup of Industry Fuel Starting in 2035**  
 (Thousands of 2020 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LIRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu Feet	Barial Volumes			Processed Wt. Lbs.	Craft Manhours	Utility and Contractor Manhours	
															Class A Cu Feet	Class B Cu Feet	Class C Cu Feet				
<b>PERIOD 1b- SAFSTOR Limited DECON Activities</b>																					
Period 1b Direct Decommissioning Activities																					
Decommissioning of Site Buildings																					
Bb.1.1.1	Reactor Building	5,135	-	-	-	-	-	-	2,977	7,732	7,732	-	-	-	-	-	-	-	70,157	-	-
Bb.1.1.2	Admin	106	-	-	-	-	-	-	-	106	159	-	-	-	-	-	-	-	1,526	-	-
Bb.1.1.3	HR Room	8	-	-	-	-	-	-	-	8	12	-	-	-	-	-	-	-	284	-	-
Bb.1.1.4	HR Shaft	36	-	-	-	-	-	-	8	32	32	-	-	-	-	-	-	-	384	-	-
Bb.1.1.5	LLRW Storage & Shipping	54	-	-	-	-	-	-	27	82	82	-	-	-	-	-	-	-	788	-	-
Bb.1.1.6	Offgas Stack	382	-	-	-	-	-	-	181	542	542	-	-	-	-	-	-	-	5,112	-	-
Bb.1.1.7	Offgas Storage & Compressor	138	-	-	-	-	-	-	57	177	177	-	-	-	-	-	-	-	1,407	-	-
Bb.1.1.8	Offgas Stack	131	-	-	-	-	-	-	47	177	177	-	-	-	-	-	-	-	1,407	-	-
Bb.1.1.9	Radwaste Material Storage Warehouse	60	-	-	-	-	-	-	30	90	90	-	-	-	-	-	-	-	864	-	-
Bb.1.1.10	Recombiner	25	-	-	-	-	-	-	13	38	38	-	-	-	-	-	-	-	383	-	-
Bb.1.1.11	Turbine	44	-	-	-	-	-	-	22	66	66	-	-	-	-	-	-	-	9,000	-	-
Bb.1.1.12	Building Addition	45	-	-	-	-	-	-	22	66	66	-	-	-	-	-	-	-	9,000	-	-
Bb.1.1.13	Reactor (Post Fuel)	924	-	-	-	-	-	-	462	1,386	1,386	-	-	-	-	-	-	-	12,653	-	-
Bb.1.1	Totals	7,601	-	-	-	-	-	-	3,800	11,401	11,401	-	-	-	-	-	-	-	104,679	-	-
Bb.1	Subtotal Period 1b Activity Costs	7,601	-	-	-	-	-	-	3,800	11,401	11,401	-	-	-	-	-	-	-	104,679	-	-
Period 1b Additional Costs																					
Bb.2.1	Spent Fuel Pool Isolation	-	-	-	-	-	-	12,675	1,901	14,576	14,576	-	-	-	-	-	-	-	-	-	-
Bb.2	Subtotal Period 1b Additional Costs	-	-	-	-	-	-	12,675	1,901	14,576	14,576	-	-	-	-	-	-	-	-	-	-
Period 1b Collateral Costs																					
Bb.3.1	Decon equipment	1,055	-	-	-	-	-	-	158	1,213	1,213	-	-	-	-	-	-	-	-	-	-
Bb.3.2	Water treatment and desalinating water waste	220	-	-	-	-	549	-	20	150	150	-	-	-	-	-	-	-	81,127	264	-
Bb.3.4	Small tool allowance	180	-	-	-	-	-	-	29	225	225	-	-	-	-	-	-	-	-	-	-
Bb.3.5	Spent Fuel Capital and Transfer	-	-	-	-	-	-	186	540	4,141	4,141	-	-	-	-	-	-	-	-	-	-
Bb.3.6	Retention and Severance	-	-	-	-	-	-	3,601	540	4,141	4,141	-	-	-	-	-	-	-	-	-	-
Bb.3	Subtotal Period 1b Collateral Costs	1,275	130	146	259	589	5796	-	1,068	7,262	7,262	-	-	-	-	-	-	-	81,127	264	-
Period 1b Period-Dependent Costs																					
Bb.4.1	Decon supplies	1,262	-	-	-	-	-	589	391	1,953	1,953	-	-	-	-	-	-	-	-	-	-
Bb.4.2	Property taxes	-	-	-	-	-	-	890	89	979	979	-	-	-	-	-	-	-	-	-	-
Bb.4.3	Health physics	-	-	-	-	-	-	890	89	979	979	-	-	-	-	-	-	-	-	-	-
Bb.4.4	Health physics supplies	750	-	-	-	-	-	-	187	937	937	-	-	-	-	-	-	-	-	-	-
Bb.4.5	Heavy equipment rental	188	-	-	-	-	-	-	28	216	216	-	-	-	-	-	-	-	-	-	-
Bb.4.6	Heavy equipment generated	-	-	-	-	-	-	-	28	216	216	-	-	-	-	-	-	-	-	-	-
Bb.4.7	Plant energy budget	-	-	12	6	-	48	-	68	824	824	-	-	-	-	-	-	-	11,709	19	-
Bb.4.8	NRC Fees	-	-	-	-	-	-	453	68	521	521	-	-	-	-	-	-	-	-	-	-
Bb.4.9	Emergency Planning Fees	-	-	-	-	-	-	161	16	177	177	-	-	-	-	-	-	-	-	-	-
Bb.4.10	Spent Fuel Pool O&M	-	-	-	-	-	-	708	71	779	779	-	-	-	-	-	-	-	-	-	-
Bb.4.11	Spent Fuel Pool O&M	-	-	-	-	-	-	213	32	242	242	-	-	-	-	-	-	-	-	-	-
Bb.4.12	RFPS Operating Costs	-	-	-	-	-	-	28	4	32	32	-	-	-	-	-	-	-	-	-	-
Bb.4.13	Railroad Track Maintenance	-	-	-	-	-	-	31	5	36	36	-	-	-	-	-	-	-	-	-	-
Bb.4.14	Utility Staff Cost	-	-	-	-	-	-	4,803	1,020	4,803	4,803	-	-	-	-	-	-	-	-	-	-
Bb.4.15	Utility Staff Cost	-	-	-	-	-	-	4,803	1,020	4,803	4,803	-	-	-	-	-	-	-	-	-	-
Bb.4	Subtotal Period 1b Period-Dependent Costs	1,262	938	12	6	48	14,599	2,693	2,693	19,858	19,858	-	-	-	-	-	-	-	11,709	19	-
Bb.0	TOTAL PERIOD 1b COST	10,438	1,088	157	285	637	31,070	9,453	53,988	51,810	51,810	1,278	-	-	-	-	-	-	92,896	104,592	166,463
<b>PERIOD 1c- Preparations for SAFSTOR Dormancy</b>																					
Period 1c Direct Decommissioning Activities																					
Ic.1.1	Prepare support equipment for storage	-	-	-	-	-	-	-	79	606	606	-	-	-	-	-	-	-	-	3,000	-
Ic.1.2	Install containment pressure equal lines	-	527	-	-	-	-	-	8	62	62	-	-	-	-	-	-	-	-	700	-
Ic.1.3	Interim survey prior to dormancy	-	54	-	-	-	723	-	220	953	953	-	-	-	-	-	-	-	-	12,801	-
Ic.1.4	Prepare & submit interim report	-	-	-	-	-	-	75	11	86	86	-	-	-	-	-	-	-	-	-	583
Ic.1.5	Prepare & submit interim report	-	-	-	-	-	-	75	11	86	86	-	-	-	-	-	-	-	-	-	583
Ic.1	Subtotal Period 1c Activity Costs	-	581	-	-	-	808	-	318	1,767	1,767	-	-	-	-	-	-	-	-	16,001	583
Period 1c Collateral Costs																					
Ic.3.1	Process decommissioning water waste	161	-	107	190	-	433	-	228	1,120	1,120	-	-	-	-	-	-	-	59,053	194	-



**Monticello Nuclear Generating Plant  
 Decommissioning Cost Analysis**

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**Table G  
 Monticello Nuclear Generating Plant  
 SAFSTOR Decommissioning Cost Estimate with DOE Pickup of Industry Fuel Starting in 2035**  
 (Thousands of 2020 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LWR Disposal Costs	Other Contingency Costs	Total Contingency Costs	Total Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu Feet	Burial Volumes			Burial/Processed Wt. Lbs.	Craft Manhours	Utility and Contractor Manhours
														Class A Cu Feet	Class B Cu Feet	Class C Cu Feet			
1e.3.3	Collateral Costs (continued)	-	-	-	-	-	-	-	-	6	-	-	-	-	-	-	-	-	-
1e.3.4	Small tool allowances	-	5	-	-	-	-	195	29	225	-	-	-	-	-	-	-	-	-
1e.3.5	Spent Fuel Capital and Transfer	-	-	-	-	-	-	534	294	3,145	315	225	-	-	-	-	-	-	-
1e.3.6	Retention and Severance	-	-	-	-	-	-	534	294	3,145	315	225	-	-	-	-	-	-	-
1e.3	Subtotal Period 1e: Collateral Costs	161	5	107	190	433	433	2,530	668	4,145	4,270	225	-	-	-	50,653	-	194	-
1e.4	Period 1e: Period-Dependent Costs	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1e.4.1	Insurance	-	-	-	-	-	-	580	55	638	-	-	-	-	-	-	-	-	-
1e.4.2	Health physics supplies	-	-	-	-	-	-	880	89	970	-	-	-	-	-	-	-	-	-
1e.4.3	Heavy equipment rental	-	-	-	-	-	-	285	62	310	310	-	-	-	-	-	-	-	-
1e.4.4	Heavy equipment rental	-	188	-	-	-	-	-	28	216	-	-	-	-	-	-	-	-	-
1e.4.5	Disposal of DAW generated	-	-	3	-	13	-	-	68	521	11	-	-	-	-	3,009	-	5	-
1e.4.6	Plant energy budget	-	-	-	-	-	-	453	68	521	82	-	-	-	-	-	-	-	-
1e.4.7	NRC Fees	-	-	-	-	-	-	161	161	177	177	-	-	-	-	-	-	-	-
1e.4.8	Emergency Planning Fees	-	-	-	-	-	-	708	71	779	-	-	-	-	-	-	-	-	-
1e.4.9	Fixed Overhead	-	-	-	-	-	-	692	98	790	790	-	-	-	-	-	-	-	-
1e.4.10	Spent Fuel Pool O&M	-	-	-	-	-	-	39	39	42	42	-	-	-	-	-	-	-	-
1e.4.11	SF/SI Operating Costs	-	-	-	-	-	-	28	4	32	32	-	-	-	-	-	-	-	-
1e.4.12	Railroad Track Maintenance	-	-	-	-	-	-	31	5	36	36	-	-	-	-	-	-	-	-
1e.4.13	Railroad Track Maintenance	-	-	-	-	-	-	4,082	612	4,694	4,694	-	-	-	-	-	-	-	-
1e.4.14	Security Staff Cost	-	-	-	-	-	-	1	1	2	2	-	-	-	-	-	-	-	-
1e.4	Subtotal Period 1e: Period-Dependent Costs	-	438	3	2	13	14,557	2,166	23,783	17,216	16,163	1,053	-	-	-	3,039	5	61,192	186,463
1e.0	TOTAL PERIOD 1e: COST	161	1,021	110	192	-	446	18,335	3,163	23,418	22,140	1,278	-	-	-	62,692	10,700	167,046	1,037,079
1e.0	TOTAL PERIOD 1e: COST	10,569	3,456	279	463	-	1,133	125,036	23,783	164,750	155,802	8,948	-	-	-	3,696	16,779	121,681	1,037,079
2a.0	PERIOD 2a: SAFSTOR Dormancy with Wet Spent Fuel Storage	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2a.1	Period 2a: Direct Decommissioning Activities	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2a.1.1	Quarterly Inspection	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2a.1.2	Semi-annual environmental survey	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2a.1.3	Biannual roof replacement	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2a.1.4	Biannual roof replacement	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2a.1.5	Maintenance supplies	-	-	-	-	-	-	155	23	178	-	-	-	-	-	-	-	-	-
2a.1	Subtotal Period 2a: Activity Costs	-	-	-	-	-	-	504	111	615	615	-	-	-	-	-	-	-	-
2a.2	Period 2a: Additional Costs	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2a.2.1	Security Modifications	-	-	-	-	-	-	8,686	1,304	10,000	10,000	-	-	-	-	-	-	-	-
2a.2	Subtotal Period 2a: Additional Costs	-	-	-	-	-	-	8,686	1,304	10,000	10,000	-	-	-	-	-	-	-	-
2a.3	Period 2a: Collateral Costs	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2a.3.1	Spent Fuel Capital and Transfer	-	-	-	-	-	-	130,915	13,637	150,553	-	-	-	-	-	-	-	-	-
2a.3.2	Retention and Severance	-	-	-	-	-	-	2,914	2,914	22,341	22,341	-	-	-	-	-	-	-	-
2a.3	Subtotal Period 2a: Collateral Costs	-	-	-	-	-	-	133,829	16,551	172,894	172,894	-	-	-	-	-	-	-	-
2a.0	PERIOD 2a: SAFSTOR Dormancy with Wet Spent Fuel Storage	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2a.4.1	Insurance	-	-	-	-	-	-	1,761	176	1,937	-	-	-	-	-	-	-	-	-
2a.4.2	Health physics supplies	-	-	-	-	-	-	6,502	676	7,178	-	-	-	-	-	-	-	-	-
2a.4.3	Health physics supplies	-	-	-	-	-	-	154	154	77	77	-	-	-	-	-	-	-	-
2a.4.4	Disposal of DAW generated	-	-	11	6	47	-	-	14	79	79	-	-	-	-	-	-	-	-
2a.4.5	Plant energy budget	-	-	-	-	-	-	910	136	1,046	1,046	-	-	-	-	-	-	-	-
2a.4.6	NRC Fees	-	-	-	-	-	-	611	71	682	671	-	-	-	-	-	-	-	-
2a.4.7	Spent Fuel Pool O&M	-	-	-	-	-	-	2,110	71	781	-	-	-	-	-	-	-	-	-
2a.4.8	Fixed Overhead	-	-	-	-	-	-	5,306	796	6,102	6,102	-	-	-	-	-	-	-	-
2a.4.9	Spent Fuel Pool O&M	-	-	-	-	-	-	2,115	317	2,432	-	-	-	-	-	-	-	-	-
2a.4.10	Spent Fuel Pool O&M	-	-	-	-	-	-	680	96	776	-	-	-	-	-	-	-	-	-
2a.4.11	Radiation Protection	-	-	-	-	-	-	680	96	776	-	-	-	-	-	-	-	-	-
2a.4.12	Security Staff Cost	-	-	-	-	-	-	37,806	5,671	43,477	43,477	-	-	-	-	-	-	-	-
2a.4.13	Utility Staff Cost	-	-	-	-	-	-	13,543	2,041	15,574	15,574	-	-	-	-	-	-	-	-
2a.4	Subtotal Period 2a: Period-Dependent Costs	-	617	11	6	47	79,012	11,069	90,750	64,868	25,525	-	-	-	-	11,523	19	768,261	19
2a.0	TOTAL PERIOD 2a: COST	-	617	11	6	47	238,554	35,065	274,301	97,823	176,478	-	-	-	-	11,523	19	768,261	19

Monticello Nuclear Generating Plant
Decommissioning Cost Analysis

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Table G
Monticello Nuclear Generating Plant
SAFSTOR Decommissioning Cost Estimate with DOE Pickup of Industry Fuel Starting in 2035
(Thousands of 2020 Dollars)

Table with 28 columns: Activity Index, Activity Description, Decon Cost, Removal Cost, Packaging Costs, Transport Costs, Off-Site Processing Costs, LIRW Disposal Costs, Other Costs, Total Contingency, Total Costs, NRC Lic. Term. Costs, Site Restoration Costs, Spent Fuel Management Costs, Class A, B, C Volumes (Cu Feet), Class C GFTCC (Cu Feet), Burial/Processed (Wt. Lbs.), Craft Manhours, Utility and Contractor Manhours. The table is divided into four main periods: Period 2b (SAFSTOR Dormancy with Dry Spent Fuel Storage), Period 2c (SAFSTOR Dormancy without Spent Fuel Storage), Period 3a (Reactivate Site Following SAFSTOR Dormancy), and Period 3b (Reactivate Site Following SAFSTOR Dormancy). Each period contains numerous sub-activities such as Quarterly Inspection, Site environmental survey, Health physics supplies, and various administrative and operational tasks. The table concludes with a 'TOTALS' row for each period.



**Monticello Nuclear Generating Plant  
 Decommissioning Cost Analysis**

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**Table G  
 Monticello Nuclear Generating Plant  
 SAFSTOR Decommissioning Cost Estimate with DOE Pickup of Industry Fuel Starting in 2035**  
 (Thousands of 2020 Dollars)

Activity Index	Activity Description	Decom Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LWR Disposal Costs	Other Costs	Total Contingency	Total	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu Feet	Barial Volumes			Processed Wt. Lbs.	Utility and Contractor Manhours
															Class A Cu Feet	Class B Cu Feet	Class C Cu Feet		
<b>Detailed Work Procedures (continued)</b>																			
38.1.1.13	Mixtures separators & reheaters	-	-	-	-	-	-	257	39	296	-	296	-	-	-	-	-	-	2,000
38.1.1.14	Radiation building	-	-	-	-	-	-	351	53	403	-	403	-	-	-	-	-	-	2,750
38.1.1.15	Reactor building	-	-	-	-	-	-	4,208	623	4,831	-	4,831	-	-	-	-	-	-	27,800
38.1	Subtotal Period 38 Activity Costs	-	-	-	-	-	-	4,208	691	4,899	-	4,899	-	-	-	-	-	-	32,741
<b>Period 38 Collateral Costs</b>																			
38.3	DOE staff relocation expenses	1,055	-	-	-	-	-	-	158	1,213	-	-	-	-	-	-	-	-	-
38.3.2	DOE staff relocation expenses	-	-	-	-	-	-	1,261	190	1,451	-	-	-	-	-	-	-	-	-
38.3.3	Pipe cutting equipment	1,200	-	-	-	-	-	-	180	1,380	-	-	-	-	-	-	-	-	-
38.3	Subtotal Period 38 Collateral Costs	1,055	-	-	-	-	-	1,261	528	1,789	-	-	-	-	-	-	-	-	-
<b>Period 38 Period-Dependent Costs</b>																			
38.4.1	Decom supplies	39	-	-	-	-	-	-	10	48	-	48	-	-	-	-	-	-	-
38.4.2	Insurance	-	-	-	-	-	-	351	35	386	-	386	-	-	-	-	-	-	-
38.4.3	Health physics	-	-	-	-	-	-	1,246	126	1,372	-	1,372	-	-	-	-	-	-	-
38.4.4	Health physics supplies	-	-	-	-	-	-	74	289	363	-	363	-	-	-	-	-	-	-
38.4.5	Heavy equipment rental	-	-	-	-	-	-	295	56	351	-	351	-	-	-	-	-	-	-
38.4.6	Disposal of DAW generated	-	-	-	-	-	-	375	56	432	-	432	-	-	-	-	-	-	-
38.4.7	Disposal of DAW generated	-	-	-	-	-	-	24	906	930	-	930	-	-	-	-	-	-	-
38.4.8	NRC Fees	-	-	-	-	-	-	167	137	304	-	304	-	-	-	-	-	-	9
38.4.9	Fixed Overhead	-	-	-	-	-	-	1,305	196	1,500	-	1,500	-	-	-	-	-	-	-
38.4.10	Railroad Track Maintenance	-	-	-	-	-	-	62	32	94	-	94	-	-	-	-	-	-	-
38.4.11	DOE Staff Cost	-	-	-	-	-	-	2,722	32	2,754	-	2,754	-	-	-	-	-	-	-
38.4.12	DOE Staff Cost	-	-	-	-	-	-	5,344	802	6,146	-	6,146	-	-	-	-	-	-	32,411
38.4.13	Utility Staff Cost	-	-	-	-	-	-	8,274	1,241	9,515	-	9,515	-	-	-	-	-	-	58,080
38.4	Subtotal Period 38 Period-Dependent Costs	39	470	6	3	24	19,971	3,019	23,762	25,762	-	25,762	-	-	-	-	-	-	128,607
38.0	TOTAL PERIOD 38 COST	1,093	1,470	6	3	24	25,443	4,308	32,647	32,185	-	32,185	-	-	-	-	-	-	243,830
1.003	TOTALS	3,161	44	37	14	66	77,981	12,628	94,424	95,375	-	95,375	-	-	-	-	-	-	300,888
<b>PERIOD 48 - Large Component Removal</b>																			
<b>Period 48 Direct Decommissioning Activities</b>																			
<b>Nuclear Steam Supply System Removal</b>																			
48.1.1.1	Recirculation System Piping & Valves	23	85	27	32	185	264	-	134	750	-	750	-	-	-	-	-	-	1,584
48.1.1.2	Recirculation Pumps & Motors	8	56	16	37	252	470	-	131	771	-	771	-	-	-	-	-	-	1,049
48.1.1.3	Reactor Vessel Internals	138	6,098	8,236	1,020	278	25,657	-	18,800	61,288	-	61,288	-	-	-	-	-	-	1,005
48.1.1.5	Vessel & Internals GTCC Disposal	-	8,498	1,818	837	-	4,313	-	647	4,960	-	4,960	-	-	-	-	-	-	1,005
48.1.1.6	Reactor Vessel	211	15,238	10,512	2,684	458	57,353	557	3,330	98,755	-	98,755	-	-	-	-	-	-	1,005
48.1.1	Totals	-	340	1,356	521	6,139	459	-	1,380	10,126	-	10,126	-	-	-	-	-	-	2,110
48.1.2	Main Turbine/Generator	-	1,207	360	194	3,225	244	-	912	6,112	-	6,112	-	-	-	-	-	-	16,823
48.1.3	Main Condensers	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<b>Cascading Costs from Clean Building Demolition</b>																			
48.1.4.1	Reactor Building	-	332	-	-	-	-	-	50	381	-	381	-	-	-	-	-	-	2,217
48.1.4.2	Package	-	127	-	-	-	-	-	19	146	-	146	-	-	-	-	-	-	1,572
48.1.4.3	Thermostat	-	-	-	-	-	-	-	72	556	-	556	-	-	-	-	-	-	3,254
48.1.4	Totals	-	483	-	-	-	-	-	141	1,083	-	1,083	-	-	-	-	-	-	5,343
<b>Period 48 Indirect Decommissioning Activities</b>																			
<b>Period 48 Indirect Decommissioning Activities</b>																			
48.1.5.1	Chemistry Sampling	-	106	2	10	183	-	-	56	356	-	356	-	-	-	-	-	-	1,468
48.1.5.2	Chemistry Sampling	-	24	0	2	35	-	-	12	73	-	73	-	-	-	-	-	-	356
48.1.5.3	Chemistry Sampling - Insulated	-	0	0	0	0	-	-	0	0	-	0	-	-	-	-	-	-	61
48.1.5.4	Condensate & Feedwater - RCA	-	29	14	62	114	-	-	25	1,626	-	1,626	-	-	-	-	-	-	2,826
48.1.5.5	Condensate & Feedwater - Insulated - RCA	-	29	14	62	114	-	-	13	837	-	837	-	-	-	-	-	-	2,826
48.1.5.6	Combustible Gas Control - RCA	-	18	1	3	48	-	-	12	81	-	81	-	-	-	-	-	-	245
48.1.5.7	Condensate & Feedwater - RCA	-	888	60	281	5,046	-	-	1,027	7,303	-	7,303	-	-	-	-	-	-	11,577
48.1.5.8	Condensate & Feedwater - Insulated	-	441	12	45	290	-	-	367	1,707	-	1,707	-	-	-	-	-	-	6,184
48.1.5.9	Condensate & Feedwater - Insulated	-	657	16	77	1,375	-	-	384	2,512	-	2,512	-	-	-	-	-	-	3,543
48.1.5.10	Condensate Storage	-	657	16	77	1,375	-	-	384	2,512	-	2,512	-	-	-	-	-	-	3,543
48.1.5.11	Control Rod Drive	-	3	0	0	4	-	-	1	8	-	8	-	-	-	-	-	-	36

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 Decommissioning Cost Analysis**

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**Table G  
 Monticello Nuclear Generating Plant  
 SAFSTOR Decommissioning Cost Estimate with DOE Pickup of Industry Fuel Starting in 2035**  
 (Thousands of 2020 Dollars)

Activity Index	Activity Description	Decom Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LWR Disposal Costs	Other Costs	Total Contingency	Total	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu Feet	Class A Cu Feet	Class B Cu Feet	Class C Cu Feet	GFTCC Cu Feet	Burnt/Processed Wt. Lbs.	Craft Manhours	Utility and Contractor Manhours	
46.1.5.12	Control Rod Drive Hydraulic	-	374	-	5	23	408	-	159	908	968	-	-	2,440	-	-	-	-	99,094	5,255	-	
46.1.5.13	Control Rod Drive Hydraulic	-	71	10	48	855	1,138	-	154	1,382	1,382	-	-	5,109	-	-	-	-	297,487	1,028	-	
46.1.5.14	Control Rod Drive Hydraulic	-	13	2	11	194	266	-	64	477	477	-	-	1,118	-	-	-	-	3,876	138	-	
46.1.5.15	Control Rod Drive Hydraulic	-	35	1	1	42	36	-	6	85	85	-	-	345	-	-	-	-	3,435	81	-	
46.1.5.16	Control Rod Drive Hydraulic	-	41	1	2	44	104	-	17	161	161	-	-	253	-	-	-	-	10,278	508	-	
46.1.5.17	Control Rod Drive Hydraulic	-	2	0	0	4	7	-	0	11	11	-	-	23	-	-	-	-	931	25	-	
46.1.5.18	Control Rod Drive Hydraulic	-	9	1	5	92	24	-	24	150	150	-	-	548	-	-	-	-	22,294	500	-	
46.1.5.19	Control Rod Drive Hydraulic	-	33	0	0	0	0	-	2	33	33	-	-	2	-	-	-	-	74	182	-	
46.1.5.20	Control Rod Drive Hydraulic	-	21	0	1	23	55	-	9	89	89	-	-	137	-	-	-	-	5,544	281	-	
46.1.5.21	Control Rod Drive Hydraulic	-	0	0	0	0	5	-	5	5	5	-	-	13	-	-	-	-	432	22	-	
46.1.5.22	Control Rod Drive Hydraulic	-	3	0	0	17	13	-	1	33	33	-	-	103	-	-	-	-	434	22	-	
46.1.5.23	Control Rod Drive Hydraulic	-	5	0	0	5	12	-	2	17	17	-	-	31	-	-	-	-	1,250	67	-	
46.1.5.24	Control Rod Drive Hydraulic	-	6	0	0	4	12	-	2	12	12	-	-	23	-	-	-	-	948	72	-	
46.1.5.25	Control Rod Drive Hydraulic	-	6	0	0	4	12	-	2	12	12	-	-	23	-	-	-	-	948	72	-	
46.1.5.26	Control Rod Drive Hydraulic	-	69	0	12	291	423	-	42	522	522	-	-	1,222	-	-	-	-	51,258	822	-	
46.1.5.27	Control Rod Drive Hydraulic	-	108	4	21	379	533	-	110	713	713	-	-	2,266	-	-	-	-	92,018	2,734	-	
46.1.5.28	Control Rod Drive Hydraulic	-	8	-	0	7	10	-	3	17	17	-	-	39	-	-	-	-	1,690	118	-	
46.1.5.29	Control Rod Drive Hydraulic	-	17	0	9	32	59	-	10	69	69	-	-	79	-	-	-	-	2,797	190	-	
46.1.5.30	Control Rod Drive Hydraulic	-	24	0	1	25	50	-	10	60	60	-	-	138	-	-	-	-	5,672	304	-	
46.1.5.31	Control Rod Drive Hydraulic	-	24	0	1	25	50	-	10	60	60	-	-	138	-	-	-	-	5,672	304	-	
46.1.5.32	Control Rod Drive Hydraulic	-	225	4	17	266	444	-	103	644	644	-	-	1,768	-	-	-	-	71,810	2,733	-	
46.1.5.33	Control Rod Drive Hydraulic	-	4	18	3	33	61	-	13	95	95	-	-	130	-	-	-	-	77,301	2,433	-	
46.1.5.34	Control Rod Drive Hydraulic	-	177	4	18	209	338	-	45	633	633	-	-	1,903	-	-	-	-	77,301	2,433	-	
46.1.5.35	Control Rod Drive Hydraulic	-	177	4	18	209	338	-	45	633	633	-	-	1,903	-	-	-	-	77,301	2,433	-	
46.1.5.36	Control Rod Drive Hydraulic	-	609	63	298	533	1,079	-	1,079	7,684	7,684	-	-	31,855	-	-	-	-	129,486	12,652	-	
46.1.5.37	Control Rod Drive Hydraulic	-	183	7	32	222	444	-	141	662	662	-	-	3,460	-	-	-	-	140,506	2,725	-	
46.1.5.38	Control Rod Drive Hydraulic	-	38	1	3	42	84	-	18	100	100	-	-	302	-	-	-	-	12,283	550	-	
46.1.5.39	Control Rod Drive Hydraulic	-	33	0	1	34	67	-	13	80	80	-	-	230	-	-	-	-	12,283	550	-	
46.1.5.40	Control Rod Drive Hydraulic	-	33	0	1	34	67	-	13	80	80	-	-	230	-	-	-	-	12,283	550	-	
46.1.5.41	Control Rod Drive Hydraulic	-	33	0	1	34	67	-	13	80	80	-	-	230	-	-	-	-	12,283	550	-	
46.1.5.42	Control Rod Drive Hydraulic	-	15	0	1	16	33	-	6	39	39	-	-	90	-	-	-	-	4,004	306	-	
46.1.5.43	Control Rod Drive Hydraulic	-	15	0	1	16	33	-	6	39	39	-	-	90	-	-	-	-	4,004	306	-	
46.1.5.44	Control Rod Drive Hydraulic	-	15	0	1	16	33	-	6	39	39	-	-	90	-	-	-	-	4,004	306	-	
46.1.5.45	Control Rod Drive Hydraulic	-	15	0	1	16	33	-	6	39	39	-	-	90	-	-	-	-	4,004	306	-	
46.1.5.46	Control Rod Drive Hydraulic	-	15	0	1	16	33	-	6	39	39	-	-	90	-	-	-	-	4,004	306	-	
46.1.5.47	Control Rod Drive Hydraulic	-	15	0	1	16	33	-	6	39	39	-	-	90	-	-	-	-	4,004	306	-	
46.1.5.48	Control Rod Drive Hydraulic	-	15	0	1	16	33	-	6	39	39	-	-	90	-	-	-	-	4,004	306	-	
46.1.5.49	Control Rod Drive Hydraulic	-	15	0	1	16	33	-	6	39	39	-	-	90	-	-	-	-	4,004	306	-	
46.1.5.50	Control Rod Drive Hydraulic	-	15	0	1	16	33	-	6	39	39	-	-	90	-	-	-	-	4,004	306	-	
46.1.5.51	Control Rod Drive Hydraulic	-	15	0	1	16	33	-	6	39	39	-	-	90	-	-	-	-	4,004	306	-	
46.1.5.52	Control Rod Drive Hydraulic	-	15	0	1	16	33	-	6	39	39	-	-	90	-	-	-	-	4,004	306	-	
46.1.5.53	Control Rod Drive Hydraulic	-	15	0	1	16	33	-	6	39	39	-	-	90	-	-	-	-	4,004	306	-	
46.1.5.54	Control Rod Drive Hydraulic	-	7	0	1	21	35	-	5	35	35	-	-	126	-	-	-	-	5,135	98	-	
46.1.5.55	Control Rod Drive Hydraulic	-	7	0	1	21	35	-	5	35	35	-	-	126	-	-	-	-	5,135	98	-	
46.1.5	Totals	-	7,400	347	1,370	23,700	39,610	-	5,804	39,610	39,610	-	-	140,426	3,000	-	-	-	5,803,167	104,227	-	
46.1.6	Setholding in support of decommissioning	-	2,100	22	12	101	31	-	567	2,929	2,929	-	-	1,030	91	-	-	-	52,111	19,968	-	
46.1	Subtotal Period in Activity Costs	211	27,105	12,508	4,132	33,404	39,680	557	40,305	158,142	158,142	-	-	24	184,983	30,945	1,628	600	11,600	10,452,330	209,462	2,110
Period in Collateral Costs	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
46.3.3	Supporting decommissioning water waste	4	207	-	7	12	28	-	12	63	63	-	-	-	-	-	-	-	-	3,856	13	-
46.3	Subtotal Period in Collateral Costs	4	207	-	7	12	28	-	12	63	63	-	-	-	-	-	-	-	-	3,856	13	-
Period in Period-Dependent Costs	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
46.4.2	Insurance	87	-	-	-	-	-	790	32	100	100	-	-	-	-	-	-	-	-	-	-	-
46.4.3	Property taxes	-	-	-	-	-	-	2,905	299	3,204	3,204	-	-	-	-	-	-	-	-	-	-	-
46.4.4	Health physics supplies	-	-	-	-	-	-	429	429	858	858	-	-	-	-	-	-	-	-	-	-	-
46.4.5	Disposal of DAW generated	-	-	-	-	-	-	369	108	612	612	-	-	-	-	-	-	-	-	-	-	-
46.4.7	Plant energy budget	-	-	89	46	-	-	1,938	291	2,229	2,229	-	-	-	-	-	-	-	-	-	-	-
46.4.8	NRC Costs	-	-	-	-	-	-	354	354	708	708	-	-	-	-	-	-	-	-	-	-	-
46.4.10	Liquid Radwaste Processing Equipment/Services	-	-	-	-	-	-	477	72	549	549	-	-	-	-	-	-	-	-	-	-	-
46.4.11	Railroad Track Maintenance	-	-	-	-	-	-	140	21	162	162	-	-	-	-	-	-	-	-	-	-	-

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**Table G  
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 SAFSTOR Decommissioning Cost Estimate with DOE Pickup of Industry Fuel Starting in 2035**  
 (Thousands of 2030 Dollars)

Activity Index	Activity Description	Decom Cost	Removal Cost	Packaging Cost	Transport Cost	Off-Site Processing Cost	LLRW Disposal Cost	Other	Total Contingency	Total	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu Feet	Class A Cu Feet	Class B Cu Feet	Class C Cu Feet	GFTCC Cu Feet	Bural/Processed Wt. Lbs.	Craft Manhours	Utility and Contractor Manhours	
46.4.12	Remedial Actions Surveys	-	-	-	-	-	-	1,258	189	1,447	1,447	-	-	-	-	-	-	-	-	-	-	75,014
46.4.13	Security Staff Cost	-	-	-	-	-	-	4,988	748	5,736	5,736	-	-	-	-	-	-	-	-	-	-	292,055
46.4.14	Off-Site Storage	-	-	-	-	-	-	18,801	2,854	21,655	21,655	-	-	-	-	-	-	-	-	-	-	292,055
46.4.15	Off-Site Staff Cost	-	-	-	-	-	-	18,801	2,854	21,655	21,655	-	-	-	-	-	-	-	-	-	-	292,055
46.4	Subtotal Period in Period-Dependent Costs	87	4,682	89	46	-	269	49,006	8,154	62,433	62,433	-	-	-	-	-	-	-	89,676	146	-	526,283
46.0	TOTAL PERIOD in COST	302	32,113	12,694	4,180	33,494	40,075	49,563	45,510	220,941	220,941	-	55	184,963	35,193	1,928	600	1,160	10,515,860	200,621	-	925,358
<b>PERIOD 4b - Site Decommissionation</b>																						
Period 4b: Direct Decommissioning Activities																						
4b.1.1	Remove spent fuel racks	501	58	103	149	-	2,572	-	986	4,150	4,150	-	-	-	-	-	-	-	486,170	906	-	-
Disposal of Plant Systems																						
4b.1.2.1	ALARA/Radiological	-	16	0	0	6	-	-	7	30	30	-	-	-	-	-	-	-	1,987	247	-	-
4b.1.2.3	Cross/Heavy Load/Loggins - RCA	-	3	0	1	17	-	-	4	25	25	-	-	-	-	-	-	-	4,184	48	-	-
4b.1.2.4	Decommissionation Projects	-	1	0	0	1	-	-	0	2	2	-	-	-	-	-	-	-	125	15	-	-
4b.1.2.5	Electrical - Contaminated	-	400	5	23	423	-	-	107	1,016	1,016	-	-	-	-	-	-	-	104,112	5,633	-	-
4b.1.2.6	Electrical - Contaminated Fuel Pool	-	297	5	23	325	-	-	140	876	876	-	-	-	-	-	-	-	99,783	4,000	-	-
4b.1.2.7	Electrical - Decomman Fuel Pool Area	-	2,698	48	218	3,064	-	-	1,298	8,167	8,167	-	-	-	-	-	-	-	948,013	37,107	-	-
4b.1.2.9	Fire - RCA Fuel Pool Area	-	101	1	6	108	-	-	42	253	253	-	-	-	-	-	-	-	24,917	1,324	-	-
4b.1.2.10	Fuel Pool Cooling & Cleanup	-	387	20	33	343	211	-	216	1,241	1,241	-	-	-	-	-	-	-	128,918	5,363	-	-
4b.1.2.12	Fuel Pool Cooling & Cleanup - Insulated	-	37	2	3	22	24	-	19	107	107	-	-	-	-	-	-	-	9,890	514	-	-
4b.1.2.13	HVAC Ductwork	-	278	6	26	460	-	-	144	921	921	-	-	-	-	-	-	-	113,913	3,339	-	-
4b.1.2.14	HVAC Chilled Water - RCA Fuel Pool Area	-	324	6	26	460	-	-	144	921	921	-	-	-	-	-	-	-	113,913	3,339	-	-
4b.1.2.15	HVAC Chilled Water - RCA Fuel Pool Area	-	33	0	2	37	-	-	105	971	971	-	-	-	-	-	-	-	111,779	3,985	-	-
4b.1.2.17	Heating & Ventilation	-	433	13	59	1,060	-	-	277	1,812	1,812	-	-	-	-	-	-	-	257,243	6,340	-	-
4b.1.2.19	Instrument & Services Air - RCA Fuel Pool	-	29	0	2	45	-	-	14	91	91	-	-	-	-	-	-	-	10,811	327	-	-
4b.1.2.20	Liquid Radwaste	621	31	57	703	311	-	-	350	2,072	2,072	-	-	-	-	-	-	-	229,422	8,500	-	-
4b.1.2.21	Milneup Demin - RCA	-	103	3	14	246	-	-	65	431	431	-	-	-	-	-	-	-	59,747	1,412	-	-
4b.1.2.22	Milneup Demin - RCA	-	103	3	14	246	-	-	65	431	431	-	-	-	-	-	-	-	59,747	1,412	-	-
4b.1.2.25	Off Gas Holdup	-	310	7	34	407	-	-	174	1,133	1,133	-	-	-	-	-	-	-	147,395	4,256	-	-
4b.1.2.24	Primary Containment	-	411	16	77	1,369	-	-	324	2,218	2,218	-	-	-	-	-	-	-	337,148	5,729	-	-
4b.1.2.25	Process Radiation Monitors	-	41	0	2	36	-	-	16	95	95	-	-	-	-	-	-	-	8,997	577	-	-
4b.1.2.26	Process Radiation Monitors	-	184	7	35	226	-	-	205	1,687	1,687	-	-	-	-	-	-	-	288,031	2,489	-	-
4b.1.2.27	Process Radiation Monitors	-	184	7	35	226	-	-	205	1,687	1,687	-	-	-	-	-	-	-	288,031	2,489	-	-
4b.1.2.28	Rx Component Handling Equip	127	11	24	24	139	-	-	115	708	708	-	-	-	-	-	-	-	96,901	1,839	-	-
4b.1.2.29	Rx Pressure Vessel	49	5	5	27	57	-	-	30	167	167	-	-	-	-	-	-	-	161	169	-	-
4b.1.2.30	Rx Pressure Vessel	49	5	5	27	57	-	-	30	167	167	-	-	-	-	-	-	-	161	169	-	-
4b.1.2.31	Secondary Containment	-	112	3	13	223	214	-	65	421	421	-	-	-	-	-	-	-	55,702	1,069	-	-
4b.1.2.32	Service & Seal Water - Insulated - RCA	120	2	11	197	-	-	-	42	392	392	-	-	-	-	-	-	-	47,917	1,665	-	-
4b.1.2.33	Service & Seal Water - RCA	150	4	17	303	-	-	-	88	570	570	-	-	-	-	-	-	-	1,809	2,016	-	-
4b.1.2.34	Service & Seal Water - RCA	150	4	17	303	-	-	-	88	570	570	-	-	-	-	-	-	-	1,809	2,016	-	-
4b.1.2.35	Solid Radwaste - RCA	446	21	4	471	223	-	-	261	1,655	1,655	-	-	-	-	-	-	-	33,900	659	-	-
4b.1.2.36	Structures & Buildings	-	70	1	4	80	-	-	30	185	185	-	-	-	-	-	-	-	477	-	-	-
4b.1.2.37	Wells & Domestic Water - RCA	-	10	-	-	17	-	-	11	11	11	-	-	-	-	-	-	-	59	144	-	-
4b.1.2.38	Wells & Domestic Water - RCA	-	10	-	-	17	-	-	11	11	11	-	-	-	-	-	-	-	59	144	-	-
4b.1.2	Subtotal	8,932	240	841	1,387	1,210	-	-	4,633	29,085	29,085	-	11	82,824	3,571	-	-	-	3,588,374	114,290	-	-
4b.1.3	Scaffolding in support of decommissioning	-	3,150	33	19	286	46	-	860	4,394	4,394	-	-	-	-	-	-	-	78,166	29,653	-	-
Decommissionation of Site Buildings																						
4b.1.4.1	Reactor Building	4,688	2,096	178	516	8,044	1,181	-	4,580	21,764	21,764	-	-	-	-	-	-	-	48,077	7,014	-	-
4b.1.4.2	Admin	56	5	5	3	20	15	-	53	172	172	-	-	-	-	-	-	-	6,840	100,718	-	-
4b.1.4.3	Off-Site Storage	15	1	1	1	5	11	-	18	25	25	-	-	-	-	-	-	-	1,735	578	-	-
4b.1.4.4	Off-Site Storage	15	1	1	1	5	11	-	18	25	25	-	-	-	-	-	-	-	1,735	578	-	-
4b.1.4.5	LLRW Storage & Shipping	52	22	2	8	5	45	-	45	179	179	-	-	-	-	-	-	-	10,600	204	-	-
4b.1.4.6	Off-Gas Stack	336	241	7	23	225	82	-	286	1,109	1,109	-	-	-	-	-	-	-	21,708	1,003	-	-
4b.1.4.7	Off-Gas Storage & Compressor	100	15	3	17	125	116	-	132	128	128	-	-	-	-	-	-	-	87,045	7,624	-	-
4b.1.4.8	Off-Gas Storage & Compressor	100	15	3	17	125	116	-	132	128	128	-	-	-	-	-	-	-	87,045	7,624	-	-
4b.1.4.9	Radwaste Material Storage Warehouse	57	21	2	9	48	189	-	48	189	189	-	-	-	-	-	-	-	45,048	606	-	-
4b.1.4.10	Recombiner	24	21	1	5	33	24	-	30	140	140	-	-	-	-	-	-	-	23,400	1,062	-	-

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Table G
Monticello Nuclear Generating Plant
SAFSTOR Decommissioning Cost Estimate with DOE Pickup of Industry Fuel Starting in 2035
(Thousands of 2020 Dollars)

Table with 31 columns: Activity Index, Activity Description, Decom Cost, Removal Cost, Packaging Costs, Transport Costs, Off-Site Processing Costs, LIRW Disposal, Other Contingency, Total Contingency, Total Lic. Term. Costs, Site Restoration Costs, Spent Fuel Management Costs, NRC Lic. Term. Costs, Processed Volume, Class A, B, C Cu Feet, Barial Volumes, Class A, B, C Cu Feet, GFCU Cu Feet, Bural/Processed Wt. Lbs., Craft Manhours, Utility and Contractor Manhours.

**Monticello Nuclear Generating Plant  
 Decommissioning Cost Analysis**

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**Table G  
 Monticello Nuclear Generating Plant  
 SAFSTOR Decommissioning Cost Estimate with DOE Pickup of Industry Fuel Starting in 2035**  
 (Thousands of 2020 Dollars)

Activity Index	Activity Description	Decom Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LWR Disposal Costs	Other Contingency	Total Contingency	Total Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu Feet	Class A Cu Feet	Class B Cu Feet	Class C Cu Feet	GTCC Cu Feet	Burial/Processed Wt. Lbs.	Craft Manhours	Utility and Contractor Manhours
<b>Period of Period-Dependent Costs (continued)</b>																				
4E.1.0	DOE Staff Cost	-	-	-	-	-	-	5,393	809	6,201	-	-	-	-	-	-	-	-	-	57,200
4E.1.1	Utility Staff Cost	-	-	-	-	-	-	5,275	791	6,066	-	-	-	-	-	-	-	-	-	74,438
4E.1	Subtotal Period of Period-Dependent Costs	-	-	-	-	-	-	10,668	1,599	12,267	-	-	-	-	-	-	-	-	-	131,638
4E.0	TOTAL PERIOD of COST	-	-	-	-	-	-	24,563	4,821	30,128	-	-	-	-	-	-	-	-	-	136,684
<b>PERIOD - TOTALS</b>																				
		9,566	60,813	13,566	8,079	58,857	58,076	165,111	86,898	461,237	-	66	3,801,138	142,540	1,928	600	1,160	25,415,330	644,379	1,655,290
<b>PERIOD 3b - Site Restoration</b>																				
<b>Period 3b Direct Decommissioning Activities</b>																				
<b>Demolition of Remaining Site Buildings</b>																				
5b.1.1.1	Reactor Building	-	1,971	-	-	-	-	-	296	2,267	-	2,267	-	-	-	-	-	-	-	13,911
5b.1.1.2	Condensate Tanks Foundation	-	10	-	-	-	-	-	1	11	-	11	-	-	-	-	-	-	-	50
5b.1.1.3	Containment Duct	-	19	-	-	-	-	-	3	22	-	22	-	-	-	-	-	-	-	97
5b.1.1.4	HPV Room	-	16	-	-	-	-	-	2	19	-	19	-	-	-	-	-	-	-	177
5b.1.1.5	Hot Shop	-	2	-	-	-	-	-	0	2	-	2	-	-	-	-	-	-	-	19
5b.1.1.6	Hydrogen & Oxygen Storage	-	4	-	-	-	-	-	1	5	-	5	-	-	-	-	-	-	-	62
5b.1.1.7	Storage & Shipping	-	4	-	-	-	-	-	1	4	-	4	-	-	-	-	-	-	-	42
5b.1.1.8	MSV	-	1,410	-	-	-	-	-	212	1,622	-	1,622	-	-	-	-	-	-	-	13,042
5b.1.1.9	Misc-Structures 2017	-	108	-	-	-	-	-	16	124	-	124	-	-	-	-	-	-	-	544
5b.1.1.10	Offgas Stack	-	16	-	-	-	-	-	3	19	-	19	-	-	-	-	-	-	-	54
5b.1.1.11	Offgas Stack & Compressor	-	228	-	-	-	-	-	34	262	-	262	-	-	-	-	-	-	-	1,220
5b.1.1.12	Redwaste	-	128	-	-	-	-	-	19	147	-	147	-	-	-	-	-	-	-	713
5b.1.1.13	Recombiner	-	180	-	-	-	-	-	28	214	-	214	-	-	-	-	-	-	-	933
5b.1.1.14	Security Barrier	-	2,414	-	-	-	-	-	36	2,450	-	2,450	-	-	-	-	-	-	-	15,764
5b.1.1.15	Structure Greater than 8' Below Grade	-	4	-	-	-	-	-	1	5	-	5	-	-	-	-	-	-	-	21
5b.1.1.16	Tank Farm	-	1,220	-	-	-	-	-	189	1,448	-	1,448	-	-	-	-	-	-	-	13,088
5b.1.1.17	Turbine	-	55	-	-	-	-	-	8	63	-	63	-	-	-	-	-	-	-	618
5b.1.1.18	Turbine Building Addition	-	1,125	-	-	-	-	-	9	1,134	-	1,134	-	-	-	-	-	-	-	8,525
5b.1.1.19	Water Pedestal	-	1,165	-	-	-	-	-	1,225	9,394	-	9,394	-	-	-	-	-	-	-	58,885
5b.1.1	Totals	-	8,189	-	-	-	-	-	134	1,031	-	1,031	-	-	-	-	-	-	-	1,841
<b>Site Classen Activities</b>																				
5b.1.2	Final report/DOE site	-	596	-	-	-	-	-	130	726	-	726	-	-	-	-	-	-	-	1,560
5b.1.3	Final report/NERC	-	9,055	-	-	-	-	-	300	9,355	-	9,355	-	-	-	-	-	-	-	60,726
5b.1	Subtotal Period 3b Activity Costs	-	9,784	-	-	-	-	200	1,300	10,655	231	10,425	-	-	-	-	-	-	-	67,287
<b>Period 3b Additional Costs</b>																				
5b.2.1	Claim Concrete Disposal	-	3,322	-	-	-	-	13	500	3,835	-	3,835	-	-	-	-	-	-	-	12
5b.2.2	Intake Structure Cofferdam	-	335	-	-	-	-	-	50	385	-	385	-	-	-	-	-	-	-	2,584
5b.2.3	Construction Dibs	-	5,735	-	-	-	-	1,170	176	1,346	-	1,346	-	-	-	-	-	-	-	8,709
5b.2.4	Discharge Structures Cofferdam	-	442	-	-	-	-	-	66	508	-	508	-	-	-	-	-	-	-	3,532
5b.2.5	Demolition and Site Restoration of RFSI	-	11,068	-	-	-	-	233	258	1,177	-	1,435	-	-	-	-	-	-	-	6,957
5b.2	Subtotal Period 3b Additional Costs	-	21,882	-	-	-	-	1,416	1,888	14,472	-	14,472	-	-	-	-	-	-	-	18,927
<b>Period 3b Collateral Costs</b>																				
5b.3.1	Small tool allowances	-	121	-	-	-	-	-	18	139	-	139	-	-	-	-	-	-	-	-
5b.3	Subtotal Period 3b Collateral Costs	-	121	-	-	-	-	-	18	139	-	139	-	-	-	-	-	-	-	-
<b>Period 3b Period-Dependent Costs</b>																				
5b.4.2	Property taxes	-	-	-	-	-	-	4,602	460	5,062	-	5,062	-	-	-	-	-	-	-	-
5b.4.3	Heavy equipment rental	-	5,812	-	-	-	-	-	876	6,719	-	6,719	-	-	-	-	-	-	-	-
5b.4.4	Energy budget	-	-	-	-	-	-	-	168	1,206	-	1,206	-	-	-	-	-	-	-	-
5b.4.5	Final O&M	-	-	-	-	-	-	-	33	249	-	249	-	-	-	-	-	-	-	-
5b.4.6	Railroad Track Maintenance	-	-	-	-	-	-	-	3,001	3,001	-	3,001	-	-	-	-	-	-	-	-
5b.4.7	Security Staff Cost	-	-	-	-	-	-	-	1,429	1,429	-	1,429	-	-	-	-	-	-	-	-
5b.4.8	Off-Site Staff Cost	-	-	-	-	-	-	-	4,553	4,553	-	4,553	-	-	-	-	-	-	-	-
5b.4.9	DOE Staff Cost	-	-	-	-	-	-	-	26,047	26,047	-	26,047	-	-	-	-	-	-	-	-
5b.4	Subtotal Period 3b Period-Dependent Costs	-	5,812	-	-	-	-	27,664	7,849	61,766	231	61,478	-	-	-	-	-	-	-	-
5b.0	TOTAL PERIOD 3b COST	-	26,196	-	-	-	-	27,664	7,849	61,766	231	61,478	-	-	-	-	-	-	-	-



**Monticello Nuclear Generating Plant  
 Decommissioning Cost Analysis**

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**Table G  
 Monticello Nuclear Generating Plant  
 SAFSTOR Decommissioning Cost Estimate with DOE Pickup of Industry Fuel Starting in 2035**  
 (Thousands of 2020 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LIRW Disposal Costs	Other Costs	Total Contingency	Total	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu Feet	Burial Volumes			Burial/Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours	
															Class A Cu Feet	Class B Cu Feet	Class C Cu Feet				
<b>PERIOD 5 TOTALS</b>			26,106					27,684	7,819	61,709	231			340,180	600	1,100	23,725,350	79,263	232,904	9,098,058	
TOTAL COST TO DECOMMISSION		21,259	100,203	14,309	8,640	56,852	50,715	1,282,791	253,109	1,801,028	1,236,086	479,749	62,293	340,180	600	1,100	23,725,350	79,263	232,904	9,098,058	
<b>TOTAL COST TO DECOMMISSION WITH 16.5% CONTINGENCY:</b>					\$1,801,028	thousands of 2020 dollars															
TOTAL NRC LICENSE TERMINATION COST IS 69.89% OR:					\$1,236,086	thousands of 2020 dollars															
SPENT FUEL MANAGEMENT COST IS 26.64% OR:					\$479,749	thousands of 2020 dollars															
NON-NUCLEAR DEMOLITION COST IS 3.48% OR:					\$62,293	thousands of 2020 dollars															
TOTAL LOW-LEVEL RADIOACTIVE WASTE VOLUME BURIED (EXCLUDING GTCC):					16,332	Cubic Feet															
TOTAL GREATER THAN CLASS C RADWASTE VOLUME GENERATED:					1,160	Cubic Feet															
TOTAL SCRAP METAL REMOVED:					23,123	Tons															
<b>TOTAL CRAFT LABOR REQUIREMENTS:</b>					876,199	Man-hours															

End Notes:  
 a - indicates that this activity not charged as decommissioning expense  
 0 - indicates that this activity performed by decommissioning staff  
 - - - indicates that this value is less than 0.5 but is non-zero  
 A cell containing "-" indicates a zero value

***Monticello Nuclear Generating Plant  
Decommissioning Cost Analysis***

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**APPENDIX H**

**DETAILED COST ANALYSIS**

**SCENARIO 6: SAFSTOR with 60 Year DFS**

**Monticello Nuclear Generating Plant  
 Decommissioning Cost Analysis**

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**Table H  
 Monticello Nuclear Generating Plant  
 SAFSTOR Decommissioning Cost Estimates with 60 Years of Spent Fuel Storage**  
 (Thousands of 2020 Dollars)

Activity Index	Activity Description	Decom Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu Feet	Burial Volumes			Burial/Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours		
															Class A Cu Feet	Class B Cu Feet	Class C Cu Feet					
<b>Period In - Shutdown through Transition</b>																						
<b>Period In Direct Decommissioning Activities</b>																						
1a.1.1	SAFSTOR site characterization survey	-	-	-	-	-	-	415	124	539	539	-	-	-	-	-	-	-	-	-	1,300	
1a.1.2	Prepare preliminary decommissioning cost	-	-	-	-	-	-	167	25	192	192	-	-	-	-	-	-	-	-	-	-	
1a.1.3	Notification of cessation of operations	-	-	-	-	-	-	-	na	na	-	-	-	-	-	-	-	-	-	-	-	
1a.1.4	Remove fuel and source material	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
1a.1.5	Remove fuel and source material building	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
1a.1.6	Deactivate plant systems & process waste	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
1a.1.7	Prepare and submit FSDAR	-	-	-	-	-	-	257	39	296	296	-	-	-	-	-	-	-	-	-	2,000	
1a.1.8	Review plant logs & specs.	-	-	-	-	-	-	167	25	192	192	-	-	-	-	-	-	-	-	-	1,300	
1a.1.9	Remove spent fuel	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
1a.1.10	Estimate by product inventory	-	-	-	-	-	-	129	19	148	148	-	-	-	-	-	-	-	-	-	1,000	
1a.1.11	End product description	-	-	-	-	-	-	129	19	148	148	-	-	-	-	-	-	-	-	-	1,000	
1a.1.12	Detailed by-product inventory	-	-	-	-	-	-	193	29	222	222	-	-	-	-	-	-	-	-	-	1,500	
1a.1.13	Final by-product inventory	-	-	-	-	-	-	193	29	222	222	-	-	-	-	-	-	-	-	-	1,500	
1a.1.14	Perform SER and EA	-	-	-	-	-	-	358	60	418	418	-	-	-	-	-	-	-	-	-	3,100	
1a.1.15	Perform Site-Specific Cost Study	-	-	-	-	-	-	643	96	739	739	-	-	-	-	-	-	-	-	-	5,000	
<b>Activity Specifications</b>																						
1a.1.16.1	Prepare plant and facilities for SAFSTOR	-	-	-	-	-	-	632	95	727	727	-	-	-	-	-	-	-	-	-	4,920	
1a.1.16.2	Plant systems	-	-	-	-	-	-	536	80	616	616	-	-	-	-	-	-	-	-	-	4,167	
1a.1.16.3	Plant structures and buildings	-	-	-	-	-	-	401	60	461	461	-	-	-	-	-	-	-	-	-	3,130	
1a.1.16.4	Plant equipment	-	-	-	-	-	-	277	39	296	296	-	-	-	-	-	-	-	-	-	2,000	
1a.1.16.5	Facility and site dormancy	-	-	-	-	-	-	257	39	296	296	-	-	-	-	-	-	-	-	-	2,000	
1a.1.16	Total	-	-	-	-	-	-	2,083	312	2,395	2,395	-	-	-	-	-	-	-	-	-	16,207	
<b>Detailed Work Procedures</b>																						
1a.1.17.1	Plant systems	-	-	-	-	-	-	152	23	175	175	-	-	-	-	-	-	-	-	-	1,183	
1a.1.17.2	Facility closeout & dormancy	-	-	-	-	-	-	154	23	177	177	-	-	-	-	-	-	-	-	-	1,200	
1a.1.17	Total	-	-	-	-	-	-	306	46	352	352	-	-	-	-	-	-	-	-	-	2,383	
1a.1.18	Process vacuum drying system	-	-	-	-	-	-	13	2	15	15	-	-	-	-	-	-	-	-	-	100	
1a.1.19	Drain/de-energize non-cont. systems	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
1a.1.20	Drain & dry NSSS	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
1a.1.21	Drain/de-energize non-cont. systems	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
1a.1.22	Decontaminate contaminated systems	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
1a.1	Subtotal Period In Activity Costs	-	-	-	-	-	-	5,027	816	5,844	5,844	-	-	-	-	-	-	-	-	-	35,890	
<b>Period In Collateral Costs</b>																						
1a.3.1	Spent Fuel Capital and Transfer	-	-	-	-	-	-	1,323	198	1,522	-	-	1,522	-	-	-	-	-	-	-	-	
1a.3.2	Retention and Sovereignty	-	-	-	-	-	-	9,892	1,484	11,376	11,376	-	-	-	-	-	-	-	-	-	-	
1a.3	Subtotal Period In Collateral Costs	-	-	-	-	-	-	11,215	1,682	12,897	12,897	-	1,522	-	-	-	-	-	-	-	-	
<b>Period In Period-Dependent Costs</b>																						
1a.4.1	Insurance	-	-	-	-	-	-	2,328	233	2,561	2,561	-	-	-	-	-	-	-	-	-	-	
1a.4.2	Property taxes	-	-	-	-	-	-	3,570	357	3,927	3,927	-	-	-	-	-	-	-	-	-	-	
1a.4.3	Health philosophy	-	-	-	-	-	-	1,133	113	1,246	1,246	-	-	-	-	-	-	-	-	-	-	
1a.4.4	Health philosophy building	-	-	-	-	-	-	733	73	806	806	-	-	-	-	-	-	-	-	-	-	
1a.4.5	Disposal of DAW generated	-	-	-	-	-	-	50	15	65	65	-	-	-	-	-	-	-	-	-	20	
1a.4.6	Plant energy budget	-	-	-	-	-	-	1,817	272	2,089	2,089	-	-	-	-	-	-	-	-	-	-	
1a.4.7	SGR Fuel Cycle	-	-	-	-	-	-	3,428	343	3,771	3,771	-	-	-	-	-	-	-	-	-	-	
1a.4.8	SGR Fuel Cycle Planning Fees	-	-	-	-	-	-	2,616	392	3,008	3,009	-	-	-	-	-	-	-	-	-	-	
1a.4.9	Fixed Overhead	-	-	-	-	-	-	845	127	972	971	-	-	-	-	-	-	-	-	-	-	
1a.4.10	Spent Fuel Pool O&M	-	-	-	-	-	-	1,637	246	1,883	1,882	-	-	-	-	-	-	-	-	-	-	
1a.4.11	SGR Fuel Cycle O&M	-	-	-	-	-	-	1,125	119	1,244	1,244	-	-	-	-	-	-	-	-	-	-	
1a.4.12	Radwaste Packaging Costs	-	-	-	-	-	-	125	19	144	144	-	-	-	-	-	-	-	-	-	-	
1a.4.13	Security Staff Cost	-	-	-	-	-	-	27,285	2,456	29,741	29,740	-	-	-	-	-	-	-	-	-	-	
1a.4.14	Utility Staff Cost	-	-	-	-	-	-	1,387	12	1,400	1,400	-	-	-	-	-	-	-	-	-	-	
1a.4	Subtotal Period In Period-Dependent Costs	-	-	-	-	-	-	55,289	5,679	60,968	60,967	-	4,870	-	-	-	-	-	-	-	-	422,240
1a.9	TOTAL PERIOD IN COST	-	-	-	-	-	-	75,631	11,177	86,808	86,807	6,392	-	-	-	-	-	-	-	-	-	703,570

**Monticello Nuclear Generating Plant  
 Decommissioning Cost Analysis**

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**Table H  
 Monticello Nuclear Generating Plant  
 SAFSTOR Decommissioning Cost Estimates with 60 Years of Spent Fuel Storage**  
 (Thousands of 2020 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Cost	Transport Cost	Off-Site Processing Cost	LLRW Disposal Cost	Other Cost	Total Contingency	Total Cost	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu Feet	Burial Volumes			Burial/Processed Wt. Lbs.	Craft Manhours	Utility and Contractor Manhours	
															Class A Cu Feet	Class B Cu Feet	Class C Cu Feet				
<b>PERIOD 1b- SAFSTOR Limited DECON Activities</b>																					
Period 1b Direct Decommissioning Activities																					
Decommissioning of Site Buildings																					
B.1.1.1	Reactor Building	5,135	-	-	-	-	-	-	2,577	7,732	7,732	-	-	-	-	-	-	-	70,157	-	-
B.1.1.2	Admin	106	-	-	-	-	-	-	-	106	159	-	-	-	-	-	-	-	1,526	-	-
B.1.1.3	HRSG	88	-	-	-	-	-	-	-	88	32	-	-	-	-	-	-	-	384	-	-
B.1.1.4	HRSG Room	36	-	-	-	-	-	-	8	32	32	-	-	-	-	-	-	-	384	-	-
B.1.1.5	LLRW Storage & Shipping	54	-	-	-	-	-	-	27	82	82	-	-	-	-	-	-	-	788	-	-
B.1.1.6	Offgas Stack	382	-	-	-	-	-	-	181	542	542	-	-	-	-	-	-	-	5,112	-	-
B.1.1.7	Offgas Storage & Compressor	138	-	-	-	-	-	-	57	177	177	-	-	-	-	-	-	-	1,407	-	-
B.1.1.8	Offgas Stack	131	-	-	-	-	-	-	47	177	177	-	-	-	-	-	-	-	1,407	-	-
B.1.1.9	Radwaste Material Storage Warehouse	60	-	-	-	-	-	-	30	90	90	-	-	-	-	-	-	-	864	-	-
B.1.1.10	Recombiner	25	-	-	-	-	-	-	13	38	38	-	-	-	-	-	-	-	383	-	-
B.1.1.11	Turbine	44	-	-	-	-	-	-	22	90	90	-	-	-	-	-	-	-	9,000	-	-
B.1.1.12	Building Addition	45	-	-	-	-	-	-	22	90	90	-	-	-	-	-	-	-	9,000	-	-
B.1.1.13	Reactor (Post Fuel)	924	-	-	-	-	-	-	462	1,386	1,386	-	-	-	-	-	-	-	12,653	-	-
B.1.1	Totals	7,601	-	-	-	-	-	-	3,800	11,401	11,401	-	-	-	-	-	-	-	104,679	-	-
B.1	Subtotal Period 1b Activity Costs	7,601	-	-	-	-	-	-	3,800	11,401	11,401	-	-	-	-	-	-	-	104,679	-	-
Period 1b Additional Costs																					
B.2.1	Spent Fuel Pool Isolation	-	-	-	-	-	-	12,675	1,901	14,576	14,576	-	-	-	-	-	-	-	-	-	-
B.2	Subtotal Period 1b Additional Costs	-	-	-	-	-	-	12,675	1,901	14,576	14,576	-	-	-	-	-	-	-	-	-	-
Period 1b Collateral Costs																					
B.3.1	Decon equipment	1,055	-	-	-	-	-	-	158	1,213	1,213	-	-	-	-	-	-	-	-	-	-
B.3.2	Heavy equipment rental	220	-	-	-	-	-	-	20	150	150	-	-	-	-	-	-	-	-	-	-
B.3.4	Small tool allowance	-	-	-	-	-	-	-	20	150	150	-	-	-	-	-	-	-	81,127	-	264
B.3.5	Spent Fuel Capital and Transfer	-	-	-	-	-	-	186	29	225	-	-	-	-	-	-	-	-	-	-	-
B.3.6	Retention and Severance	-	-	-	-	-	-	3,601	540	4,141	4,141	-	-	-	-	-	-	-	-	-	-
B.3	Subtotal Period 1b Collateral Costs	1,275	-	-	-	-	-	5,796	1,068	7,262	7,262	-	-	-	-	-	-	-	81,127	-	264
Period 1b Period-Dependent Costs																					
B.4.1	Decon supplies	1,262	-	-	-	-	-	-	391	1,653	1,653	-	-	-	-	-	-	-	-	-	-
B.4.2	Property taxes	-	-	-	-	-	-	599	89	688	688	-	-	-	-	-	-	-	-	-	-
B.4.3	Property taxes	-	-	-	-	-	-	890	89	979	979	-	-	-	-	-	-	-	-	-	-
B.4.4	Health physics supplies	750	-	-	-	-	-	-	187	937	937	-	-	-	-	-	-	-	-	-	-
B.4.5	Heavy equipment rental	188	-	-	-	-	-	-	28	216	216	-	-	-	-	-	-	-	-	-	-
B.4.6	Heavy equipment rental generated	-	-	-	-	-	-	-	28	216	216	-	-	-	-	-	-	-	-	-	-
B.4.7	Plant energy budget	-	-	-	6	-	-	-	68	824	824	-	-	-	-	-	-	-	11,709	-	19
B.4.8	NRC Fees	-	-	-	-	-	-	453	68	521	521	-	-	-	-	-	-	-	-	-	-
B.4.9	Emergency Planning Fees	-	-	-	-	-	-	161	16	177	177	-	-	-	-	-	-	-	-	-	-
B.4.10	Spent Fuel Pool O&M	-	-	-	-	-	-	708	71	779	779	-	-	-	-	-	-	-	-	-	-
B.4.11	Spent Fuel Pool O&M	-	-	-	-	-	-	213	32	242	242	-	-	-	-	-	-	-	-	-	-
B.4.12	RFPSI Operating Costs	-	-	-	-	-	-	28	4	32	32	-	-	-	-	-	-	-	-	-	-
B.4.13	Railroad Track Maintenance	-	-	-	-	-	-	31	5	36	36	-	-	-	-	-	-	-	-	-	-
B.4.14	Spent Fuel Pool O&M	-	-	-	-	-	-	4,803	1,020	5,823	5,823	-	-	-	-	-	-	-	-	-	-
B.4.15	Utility Staff Cost	-	-	-	-	-	-	6,803	1,020	7,823	7,823	-	-	-	-	-	-	-	-	-	-
B.4	Subtotal Period 1b Period-Dependent Costs	1,262	-	-	6	-	48	14,599	2,693	19,858	18,805	1,053	-	-	-	-	-	-	11,709	19	196,463
B.0	TOTAL PERIOD 1b COST	10,438	1,088	157	285	-	637	31,070	9,453	53,088	51,810	1,278	-	-	-	-	-	-	92,896	104,582	166,463
<b>PERIOD 1c- Preparations for SAFSTOR Dormancy</b>																					
Period 1c Direct Decommissioning Activities																					
Ic.1.1	Prepare support equipment for storage	-	-	-	-	-	-	-	79	606	606	-	-	-	-	-	-	-	-	-	3,000
Ic.1.2	Install containment pressure equal lines	-	54	-	-	-	-	723	220	953	953	-	-	-	-	-	-	-	-	-	700
Ic.1.3	Submit survey prior to dormancy	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	12,801
Ic.1.5	Prepare & submit interim report	-	-	-	-	-	-	75	11	86	86	-	-	-	-	-	-	-	-	-	583
Ic.1	Subtotal Period 1c Activity Costs	-	54	-	-	-	-	808	318	1,707	1,707	-	-	-	-	-	-	-	-	-	16,001

**Monticello Nuclear Generating Plant  
 Decommissioning Cost Analysis**

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**Table H  
 Monticello Nuclear Generating Plant  
 SAFSTOR Decommissioning Cost Estimates with 60 Years of Spent Fuel Storage**  
 (Thousands of 2020 Dollars)

Activity Index	Activity Description	Decom Cost	Removal Cost	Packaging Cost	Transport Cost	Off-Site Processing Cost	LWR Disposal Cost	Other Cost	Total Contingency	Total	Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu Feet	Class A Cu Feet	Class B Cu Feet	Class C Cu Feet	GTCC Cu Feet	Burial/Processed Wt. Lbs.	Craft Manhours	Utility and Contractor Manhours
1e.3.1	Process decommissioning water waste	161	-	107	190	-	433	-	228	1,120	1,120	-	-	-	994	-	-	-	59,653	194	-
1e.3.3	Small tool allowance	-	5	-	-	-	-	-	1	6	6	-	-	-	-	-	-	-	-	-	-
1e.3.4	Spent Fuel Capital and Transfer	-	-	-	-	-	-	2,754	41	3,145	3,145	225	-	-	-	-	-	-	-	-	-
1e.3.5	Removal of spent fuel	-	-	-	-	-	-	-	668	4,145	4,145	225	-	-	994	-	-	-	59,653	194	-
1e.3	Subtotal Period 1e Collateral Costs	161	5	107	190	-	433	2,930	668	4,145	4,145	225	-	-	994	-	-	-	59,653	194	-
Period 1e Period-Dependent Costs																					
1e.4.1	Property taxes	-	-	-	-	-	-	580	58	638	638	-	-	-	-	-	-	-	-	-	-
1e.4.2	Health physics supplies	-	248	-	-	-	-	888	89	977	977	-	-	-	-	-	-	-	-	-	-
1e.4.3	Heavy equipment rental	-	188	-	-	-	-	216	28	216	216	-	-	-	-	-	-	-	-	-	-
1e.4.4	Plant energy budget	-	-	3	2	-	13	453	68	421	421	-	-	-	182	-	-	-	3,039	5	-
1e.4.6	Plant energy budget	-	-	-	-	-	-	453	68	421	421	-	-	-	-	-	-	-	-	-	-
1e.4.7	Emergency Planning Fees	-	-	-	-	-	-	161	16	177	177	-	-	-	-	-	-	-	-	-	-
1e.4.8	Spent Fuel Pool O&M	-	-	-	-	-	-	79	32	242	242	-	-	-	-	-	-	-	-	-	-
1e.4.10	Spent Fuel Pool O&M	-	-	-	-	-	-	211	32	242	242	-	-	-	-	-	-	-	-	-	-
1e.4.11	ISFSI Operating Costs	-	-	-	-	-	-	28	4	32	32	-	-	-	-	-	-	-	-	-	-
1e.4.12	Railroad Track Maintenance	-	-	-	-	-	-	31	5	36	36	-	-	-	-	-	-	-	-	-	-
1e.4.13	Utility Staff Cost	-	-	-	-	-	-	4,083	615	4,698	4,698	-	-	-	-	-	-	-	-	-	-
1e.4.14	Subtotal Period 1e Period-Dependent Costs	-	436	3	2	-	13	14,597	2,166	17,216	16,163	1,063	-	-	182	-	-	-	3,039	5	61,192
1e.9	TOTAL PERIOD 1e COST	161	1,021	110	192	-	446	15,325	3,153	23,118	22,140	1,278	-	-	1,186	-	-	-	62,692	16,700	167,916
10.5.69	3,436	279	463	-	1,133	125,636	23,783	161,750	155,802	8,948	-	-	-	-	3,696	-	-	-	167,779	121,681	1,037,979
<b>PERIOD 1 TOTALS</b>																					
<b>PERIOD 2a - SAFSTOR Dormancy with Wet Spent Fuel Storage</b>																					
Period 2a Direct Decommissioning Activities																					
2a.1.1	Quarterly Inspection	-	-	-	-	-	-	1,501	176	1,677	1,677	-	-	-	-	-	-	-	-	-	-
2a.1.2	Environmental monitoring	-	-	-	-	-	-	803	803	9,825	9,825	-	-	-	-	-	-	-	-	-	-
2a.1.3	Permit reports	-	-	-	-	-	-	154	154	771	771	-	-	-	-	-	-	-	-	-	-
2a.1.4	Bituminous roof replacement	-	-	-	-	-	-	14	14	79	79	-	-	-	-	-	-	-	-	-	-
2a.1.5	Maintenance supplies	-	-	-	-	-	-	610	610	1,016	1,016	-	-	-	-	-	-	-	-	-	-
2a.1	Subtotal Period 2a Activity Costs	-	-	-	-	-	-	610	610	427	427	-	-	-	-	-	-	-	-	-	-
Period 2a Additional Costs																					
2a.2.1	Security Modifications	-	-	-	-	-	-	6,686	1,304	10,000	10,000	-	-	-	-	-	-	-	-	-	-
2a.2	Subtotal Period 2a Additional Costs	-	-	-	-	-	-	6,686	1,304	10,000	10,000	-	-	-	-	-	-	-	-	-	-
Period 2a Collateral Costs																					
2a.3.1	Spent Fuel Capital and Transfer	-	-	-	-	-	-	130,915	19,687	150,603	150,603	-	-	-	-	-	-	-	-	-	-
2a.3.2	Removal of spent fuel	-	-	-	-	-	-	25,311	25,311	25,311	25,311	-	-	-	-	-	-	-	-	-	-
2a.3	Subtotal Period 2a Collateral Costs	-	-	-	-	-	-	156,226	44,998	175,914	175,914	-	-	-	-	-	-	-	-	-	-
Period 2a Period-Dependent Costs																					
2a.4.2	Property taxes	-	-	-	-	-	-	8,932	803	9,825	9,825	-	-	-	-	-	-	-	-	-	-
2a.4.3	Health physics supplies	-	617	-	-	-	-	2,791	154	771	771	-	-	-	-	-	-	-	-	-	-
2a.4.4	Disposal of DAW generated	-	-	11	6	-	47	14	14	79	79	-	-	-	-	-	-	-	-	-	19
2a.4.5	Plant energy budget	-	-	-	-	-	-	610	610	1,016	1,016	-	-	-	-	-	-	-	-	-	-
2a.4.6	Emergency Planning Fees	-	-	-	-	-	-	7,110	711	7,821	7,821	-	-	-	-	-	-	-	-	-	-
2a.4.7	Emergency Planning Fees	-	-	-	-	-	-	5,306	796	6,102	6,102	-	-	-	-	-	-	-	-	-	-
2a.4.8	Fixed Overhead	-	-	-	-	-	-	2,890	312	2,822	2,822	-	-	-	-	-	-	-	-	-	-
2a.4.9	Spent Fuel Pool O&M	-	-	-	-	-	-	79	32	242	242	-	-	-	-	-	-	-	-	-	-
2a.4.10	ISFSI Operating Costs	-	-	-	-	-	-	28	4	32	32	-	-	-	-	-	-	-	-	-	-
2a.4.11	Railroad Track Maintenance	-	-	-	-	-	-	31	5	36	36	-	-	-	-	-	-	-	-	-	-
2a.4.12	Security Staff Cost	-	-	-	-	-	-	37,806	6,671	44,477	44,477	-	-	-	-	-	-	-	-	-	-
2a.4.13	Utility Staff Cost	-	-	-	-	-	-	2,061	10,273	12,334	12,334	-	-	-	-	-	-	-	-	-	-
2a.4	Subtotal Period 2a Period-Dependent Costs	-	617	-	6	-	47	79,912	13,669	93,581	93,581	-	-	-	576	-	-	-	11,523	19	786,261
2a.0	TOTAL PERIOD 2a COST	-	617	11	6	-	47	236,554	35,065	271,301	97,823	176,478	-	-	576	-	-	-	11,523	19	786,261

**Monticello Nuclear Generating Plant  
 Decommissioning Cost Analysis**

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**Table H  
 Monticello Nuclear Generating Plant  
 SAFSTOR Decommissioning Cost Estimates with 60 Years of Spent Fuel Storage**  
 (Thousands of 2020 Dollars)

Activity Index	Activity Description	Decom Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LIRW Disposal Costs	Other Costs	Total Contingency	Total Lic. Term. Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu Feet	Burial Volumes			Burial/Processed Wt. Lbs.	Craft Manhours	Utility and Contractor Manhours	
															Class A Cu Feet	Class B Cu Feet	Class C Cu Feet				
<b>PERIOD 2b - SAFSTOR Dormancy with Dry Spent Fuel Storage</b>																					
Period 2b Direct Decommissioning Activities																					
2b.1.1	Quarterly inspection	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2b.1.2	Quarterly environmental survey	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2b.1.3	Prepare reports	-	-	-	-	-	-	3,127	469	3,596	3,596	-	-	-	-	-	-	-	-	-	-
2b.1.4	Bituminous roof replacement	-	-	-	-	-	-	7,065	1,786	8,851	8,851	-	-	-	-	-	-	-	-	-	-
2b.1.5	Maintenance supplies	-	-	-	-	-	-	10,152	2,533	12,685	12,685	-	-	-	-	-	-	-	-	-	-
2b.1	Subtotal Period 2b Activity Costs	-	-	-	-	-	-	20,434	5,257	25,691	25,691	-	-	-	-	-	-	-	-	-	-
Period 2b Collateral Costs																					
2b.3.1	Spent Fuel Capital and Transfer	-	-	-	-	-	-	73,422	11,013	84,435	-	84,435	-	-	-	-	-	-	-	-	-
2b.3	Subtotal Period 2b Collateral Costs	-	-	-	-	-	-	73,422	11,013	84,435	-	84,435	-	-	-	-	-	-	-	-	-
Period 2b Period-Dependent Costs																					
2b.4.1	Insurance	-	-	-	-	-	-	385,006	3,861	388,867	388,867	-	-	-	-	-	-	-	-	-	-
2b.4.2	Health physics supplies	-	-	-	-	-	-	18,803	1,512	20,315	20,315	-	-	-	-	-	-	-	-	-	-
2b.4.3	Health physics supplies	-	-	-	-	-	-	1,512	7,559	7,559	7,559	-	-	-	-	-	-	-	-	-	-
2b.4.4	Disposal of DAW generated	-	6,017	-	-	-	461	-	135	764	764	-	-	-	-	-	-	-	-	-	-
2b.4.5	Plant energy budget	-	-	-	-	-	-	9,196	1,379	10,575	10,575	-	-	-	-	-	-	-	-	-	-
2b.4.6	Plant energy budget	-	-	-	-	-	-	7,506	771	8,277	8,277	-	-	-	-	-	-	-	-	-	-
2b.4.7	Emergency Planning Fees	-	-	-	-	-	-	7,506	771	8,277	8,277	-	-	-	-	-	-	-	-	-	-
2b.4.8	Fixed Overhead	-	-	-	-	-	-	10,904	1,636	12,540	12,540	-	-	-	-	-	-	-	-	-	-
2b.4.9	RFSI Operating Costs	-	-	-	-	-	-	5,696	850	6,546	6,546	-	-	-	-	-	-	-	-	-	-
2b.4.10	Security Staff	-	-	-	-	-	-	288,802	43,120	322,922	322,922	-	-	-	-	-	-	-	-	-	-
2b.4.11	Security Staff	-	-	-	-	-	-	114,547	17,182	131,729	131,729	-	-	-	-	-	-	-	-	-	-
2b.4.12	Utility Staff Cost	-	6,017	-	-	-	461	652,696	89,288	738,650	738,650	-	-	-	-	-	-	-	-	-	-
2b.4	Subtotal Period 2b Period-Dependent Costs	-	6,017	-	-	-	461	746,280	103,536	855,512	855,512	440,278	-	-	-	-	-	-	-	-	-
2b.0	TOTAL PERIOD 2b COST	-	6,017	-	63	-	509	984,854	137,602	1,129,813	544,057	586,756	-	-	-	-	-	-	-	-	-
<b>PERIOD 2b TOTALS</b>																					
<b>PERIOD 3a - Reactivate Site Following SAFSTOR Dormancy</b>																					
Period 3a Direct Decommissioning Activities																					
3a.1.1	Review plant drawings & specs.	-	-	-	-	-	-	167	95	169	169	-	-	-	-	-	-	-	-	-	-
3a.1.2	Review plant drawings & specs.	-	-	-	-	-	-	501	89	680	680	-	-	-	-	-	-	-	-	-	-
3a.1.3	Perform detailed rad survey	-	-	-	-	-	-	129	19	148	148	-	-	-	-	-	-	-	-	-	-
3a.1.4	End product description	-	-	-	-	-	-	964	145	1,108	1,108	-	-	-	-	-	-	-	-	-	-
3a.1.5	Define major work sequence	-	-	-	-	-	-	388	60	458	458	-	-	-	-	-	-	-	-	-	-
3a.1.6	Define major work sequence	-	-	-	-	-	-	964	145	1,108	1,108	-	-	-	-	-	-	-	-	-	-
3a.1.7	Perform SFR and EA	-	-	-	-	-	-	129	19	148	148	-	-	-	-	-	-	-	-	-	-
3a.1.8	Prepare/submit Detailed Technical Specifications	-	-	-	-	-	-	917	145	1,062	1,062	-	-	-	-	-	-	-	-	-	-
3a.1.9	Perform Shop Drawings	-	-	-	-	-	-	536	80	616	616	-	-	-	-	-	-	-	-	-	-
3a.1.10	Preparation of Final Fuel Management Plan	-	-	-	-	-	-	501	89	680	680	-	-	-	-	-	-	-	-	-	-
Activity Specifications																					
3a.1.11.1	Plant site plan & temporary facilities	-	-	-	-	-	-	85	15	100	100	-	-	-	-	-	-	-	-	-	-
3a.1.11.2	Plant site plan & temporary facilities	-	-	-	-	-	-	85	15	100	100	-	-	-	-	-	-	-	-	-	-
3a.1.11.3	Reactor internals	-	-	-	-	-	-	85	15	100	100	-	-	-	-	-	-	-	-	-	-
3a.1.11.4	Reactor vessel	-	-	-	-	-	-	85	15	100	100	-	-	-	-	-	-	-	-	-	-
3a.1.11.5	Vertical shield	-	-	-	-	-	-	85	15	100	100	-	-	-	-	-	-	-	-	-	-
3a.1.11.6	Major structures/containers	-	-	-	-	-	-	85	15	100	100	-	-	-	-	-	-	-	-	-	-
3a.1.11.7	Reinforced concrete	-	-	-	-	-	-	85	15	100	100	-	-	-	-	-	-	-	-	-	-
3a.1.11.8	Minor Turbine	-	-	-	-	-	-	85	15	100	100	-	-	-	-	-	-	-	-	-	-
3a.1.11.9	Minor Condensers	-	-	-	-	-	-	85	15	100	100	-	-	-	-	-	-	-	-	-	-
3a.1.11.10	Minor Condensers	-	-	-	-	-	-	85	15	100	100	-	-	-	-	-	-	-	-	-	-
3a.1.11.11	Drywell	-	-	-	-	-	-	85	15	100	100	-	-	-	-	-	-	-	-	-	-
3a.1.11.12	Plant structures & buildings	-	-	-	-	-	-	85	15	100	100	-	-	-	-	-	-	-	-	-	-
3a.1.11.13	Waste management	-	-	-	-	-	-	85	15	100	100	-	-	-	-	-	-	-	-	-	-
3a.1.11.14	Plant site plan & site consent	-	-	-	-	-	-	85	15	100	100	-	-	-	-	-	-	-	-	-	-
3a.1.11	Total	-	-	-	-	-	-	5,736	860	6,596	6,596	-	-	-	-	-	-	-	-	-	-
Planning & Site Preparation																					
3a.1.12	Plant prep. & comp. access	-	-	-	-	-	-	308	46	355	355	-	-	-	-	-	-	-	-	-	-
3a.1.13	Plant prep. & comp. access	-	-	-	-	-	-	308	46	355	355	-	-	-	-	-	-	-	-	-	-
3a.1.14	Design water clean-up system	-	-	-	-	-	-	180	27	207	207	-	-	-	-	-	-	-	-	-	-

**Monticello Nuclear Generating Plant  
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**Table H  
 Monticello Nuclear Generating Plant  
 SAFSTOR Decommissioning Cost Estimates with 60 Years of Spent Fuel Storage**  
 (Thousands of 2020 Dollars)

Activity Index	Activity Description	Decom Cost	Removal Cost	Packaging Cost	Transport Cost	Off-Site Processing Cost	LIRW Disposal	Other Contingency	Total Contingency	Total Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu Feet	Class A Cu Feet	Class B Cu Feet	Class C Cu Feet	GTCC Cu Feet	Burial/Processed Wt. Lbs.	Craft Manhours	Utility and Contractor Manhours	
38.1.15	Planning & Site Preparation (continued)	-	-	-	-	-	-	2,400	360	2,760	2,760	-	-	-	-	-	-	-	-	-	-
38.1.16	Procure canisters/lines & containers	-	-	-	-	-	-	158	24	182	182	-	-	-	-	-	-	-	-	-	1,250
38.1	Subtotal Period 3a: Activity Costs	-	-	-	-	-	-	16,454	2,465	18,919	18,919	586	-	-	-	-	-	-	-	-	81,963
38.2.1	Site Characterization	-	-	-	-	-	-	5,930	1,779	7,708	7,708	-	-	-	-	-	-	-	-	-	-
38.2.2	Mixed & RCRA Waste	-	-	-	-	-	-	890	890	890	-	-	-	-	-	-	-	-	-	-	30,900
38.2	Subtotal Period 3a: Additional Costs	-	-	-	-	-	-	5,930	1,768	7,738	7,738	-	-	-	-	-	-	5,253	61	-	10,852
38.3.1	Collateral Costs	-	-	-	-	-	-	1,805	271	2,076	-	-	-	-	-	-	-	-	-	-	-
38.3	Subtotal Period 3a: Collateral Costs	-	-	-	-	-	-	1,805	271	2,076	-	-	-	-	-	-	-	-	-	-	-
38.4.1	Period-Dependent Costs	-	-	-	-	-	-	705	51	756	112	582	-	-	-	-	-	-	-	-	-
38.4.2	Insurance	-	-	-	-	-	-	3,475	331	3,846	356	-	-	-	-	-	-	-	-	-	-
38.4.3	Health physics supplies	-	-	-	-	-	-	538	135	673	673	-	-	-	-	-	-	-	-	-	-
38.4.4	Heavy equipment rental	-	-	-	-	-	-	753	113	866	866	-	-	-	-	-	-	-	-	-	-
38.4.5	Disposal of DAW generated	-	-	-	-	-	-	10	12	22	22	-	-	-	-	-	-	-	-	-	17
38.4.6	Engineering budget	-	-	-	-	-	-	1,817	327	2,098	2,098	-	-	-	-	-	-	-	-	-	-
38.4.7	NRG Fees	-	-	-	-	-	-	335	33	368	368	-	-	-	-	-	-	-	-	-	-
38.4.8	Emergency Planning Fees	-	-	-	-	-	-	148	15	163	163	-	-	-	-	-	-	-	-	-	-
38.4.9	Fixed Overhead Costs	-	-	-	-	-	-	392	3,009	3,401	129	-	-	-	-	-	-	-	-	-	-
38.4.10	Construction Costs	-	-	-	-	-	-	1,111	114	1,225	114	-	-	-	-	-	-	-	-	-	-
38.4.11	Railroad Track Maintenance	-	-	-	-	-	-	125	19	144	144	-	-	-	-	-	-	-	-	-	-
38.4.12	Security Staff Cost	-	-	-	-	-	-	4,690	703	5,393	5,107	286	-	-	-	-	-	-	-	-	69,100
38.4.13	Utility Staff Cost	-	-	-	-	-	-	18,817	2,523	19,339	18,100	1,180	-	-	-	-	-	-	-	-	290,000
38.4	Subtotal Period 3a: Period-Dependent Costs	-	1,291	10	5	-	42	36,942	4,055	36,841	34,169	2,675	-	-	-	-	-	10,311	17	-	325,100
38.0	TOTAL PERIOD 3a: COST	-	1,291	38	34	14	42	55,010	9,177	60,271	4,751	586	43	516	-	-	-	15,565	30,078	-	421,975
<b>PERIOD 3b - Decommissioning Preparations</b>																					
Period 3b: Direct Decommissioning Activities																					
Detailed Work Breakdowns																					
38.1.1.1	Plant systems	-	-	-	-	-	-	608	91	700	630	-	-	-	-	-	-	-	-	-	4,753
38.1.1.2	Reactor internals	-	-	-	-	-	-	514	77	591	591	-	-	-	-	-	-	-	-	-	4,000
38.1.1.3	Remaining buildings	-	-	-	-	-	-	174	56	200	50	-	-	-	-	-	-	-	-	-	1,350
38.1.1.4	Remaining equipment	-	-	-	-	-	-	1,200	190	1,390	1,390	-	-	-	-	-	-	-	-	-	1,000
38.1.1.5	License instrumentation	-	-	-	-	-	-	1,250	19	1,468	148	-	-	-	-	-	-	-	-	-	1,000
38.1.1.6	Remove primary containment	-	-	-	-	-	-	257	39	296	296	-	-	-	-	-	-	-	-	-	2,000
38.1.1.7	Reactor vessel	-	-	-	-	-	-	467	70	537	537	-	-	-	-	-	-	-	-	-	3,650
38.1.1.8	Reactor vessel support structure	-	-	-	-	-	-	1,075	177	1,252	1,252	-	-	-	-	-	-	-	-	-	1,200
38.1.1.9	Sacrificial shield	-	-	-	-	-	-	154	23	177	177	-	-	-	-	-	-	-	-	-	1,200
38.1.1.10	Reinforced concrete	-	-	-	-	-	-	1,250	19	1,468	148	-	-	-	-	-	-	-	-	-	1,000
38.1.1.11	Mini Turbine	-	-	-	-	-	-	267	40	307	307	-	-	-	-	-	-	-	-	-	2,080
38.1.1.12	Steam generators	-	-	-	-	-	-	1,000	150	1,150	1,150	-	-	-	-	-	-	-	-	-	2,000
38.1.1.13	Manpower	-	-	-	-	-	-	257	39	296	296	-	-	-	-	-	-	-	-	-	2,000
38.1.1.14	Maintenance & rebar	-	-	-	-	-	-	351	53	403	363	-	-	-	-	-	-	-	-	-	2,750
38.1.1.15	Reactor building	-	-	-	-	-	-	351	53	403	363	-	-	-	-	-	-	-	-	-	2,750
38.1.1	Subtotal Period 3b: Activity Costs	-	-	-	-	-	-	4,208	651	4,859	4,376	-	-	-	-	-	-	-	-	-	32,711
38.1	Subtotal Period 3b: Activity Costs	-	-	-	-	-	-	4,208	651	4,859	4,376	-	-	-	-	-	-	-	-	-	32,711
38.2	Collateral Costs	-	-	-	-	-	-	1,055	155	1,210	1,210	-	-	-	-	-	-	-	-	-	-
38.3	DOE equipment	-	-	-	-	-	-	1,264	190	1,454	1,454	-	-	-	-	-	-	-	-	-	-
38.3.3	Pipe cutting equipment	-	-	-	-	-	-	1,200	180	1,380	1,380	-	-	-	-	-	-	-	-	-	-
38.3.4	Spent Fuel Capital and Transfer	-	-	-	-	-	-	900	135	1,035	-	1,035	-	-	-	-	-	-	-	-	-
38.3	Subtotal Period 3b: Collateral Costs	-	-	-	-	-	-	2,164	663	5,052	4,017	-	-	-	-	-	-	-	-	-	-
38.0	TOTAL PERIOD 3b: COST	-	-	-	-	-	-	1,055	816	1,871	1,871	-	-	-	-	-	-	-	-	-	-
38.4.1	Decom supplies	-	-	-	-	-	-	51	48	99	48	-	-	-	-	-	-	-	-	-	-
38.4.2	Insurance	-	-	-	-	-	-	1,014	105	1,119	1,119	-	-	-	-	-	-	-	-	-	-
38.4.3	Health physics supplies	-	-	-	-	-	-	295	74	369	369	-	-	-	-	-	-	-	-	-	-
38.4.4	Health physics supplies	-	-	-	-	-	-	375	56	431	431	-	-	-	-	-	-	-	-	-	-
38.4.5	Heavy equipment rental	-	-	-	-	-	-	375	56	431	431	-	-	-	-	-	-	-	-	-	-

**Monticello Nuclear Generating Plant  
 Decommissioning Cost Analysis**

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**Table H  
 Monticello Nuclear Generating Plant  
 SAFSTOR Decommissioning Cost Estimates with 60 Years of Spent Fuel Storage**  
 (Thousands of 2020 Dollars)

Activity Index	Activity Description	Decom Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LWR Disposal Costs	Other Costs	Total Contingency	Total	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu Feet	Burial Volumes			Burial/Processed Wt. Lbs.	Utility and Contractor Manhours	
															Class A Cu Feet	Class B Cu Feet	Class C Cu Feet			
38.4.6	Period 38 Period-Dependent Costs (continued)																			
38.4.7	Plant energy budget	-	-	6	3	-	24	-	7	40	40	-	-	-	-	-	-	5,814	9	-
38.4.8	NRC Fees	-	-	-	-	906	-	-	136	1,042	1,042	-	-	-	-	-	-	-	-	-
38.4.9	Professional Planning Fees	-	-	-	-	67	-	-	17	183	183	-	-	-	-	-	-	-	-	-
38.4.10	Fixed Overhead	-	-	-	-	1,305	-	-	196	1,500	1,500	-	-	-	-	-	-	-	-	-
38.4.11	EFSS Operating Costs	-	-	-	-	96	-	-	8	64	64	-	-	-	-	-	-	-	-	-
38.4.12	Structural Maintenance	-	-	-	-	52	-	-	33	2,542	2,542	-	-	-	-	-	-	-	-	34,885
38.4.13	Railroad Freight	-	-	-	-	52	-	-	33	2,542	2,542	-	-	-	-	-	-	-	-	58,980
38.4.14	DOC Staff Cost	-	-	-	-	5,314	-	-	802	6,116	6,116	-	-	-	-	-	-	-	-	129,644
38.4.15	Utility Staff Cost	39	671	-	3	-	24	8,385	3,127	24,171	25,302	-	-	-	-	-	-	5,814	9	222,210
38.4.16	Subtotal Period 38 Period-Dependent Costs	1,093	1,871	6	3	6,421	24	26,974	4,421	34,392	31,725	2,394	463	-	-	-	-	5,814	9	254,951
38.9	TOTAL PERIOD 38 COST	1,093	3,162	44	37	14	66	81,984	13,308	99,999	91,695	6,055	1,049	43	806	-	-	21,379	30,688	676,925
<b>PERIOD 38 TOTALS</b>																				
<b>PERIOD 38 - Large Component Removal</b>																				
Period 38 Direct Decommissioning Activities																				
Nuclear Steam Supply System Removal																				
48.1.1.1	Recirculation System Piping & Valves	23	85	27	32	185	264	-	134	750	750	-	-	676	715	-	-	94,867	1,584	-
48.1.1.2	Recirculation Pumps & Motors	8	56	16	37	252	1,170	-	131	1,771	1,771	-	-	568	473	-	-	112,200	1,049	-
48.1.1.3	Recirculation Pumps & Motors	4	27	7	16	107	463	-	53	616	616	-	-	207	169	-	-	27,876	257	-
48.1.1.4	Reactor Vessel Internals	139	6,098	8,236	1,029	-	25,857	278	19,830	61,258	61,258	-	-	3,243	2,943	1,628	600	337,343	22,415	1,055
48.1.1.5	Vessel & Internal GTCC Disposal	-	-	-	-	-	-	4,313	647	4,960	4,960	-	-	-	-	-	-	225,765	-	-
48.1.1.6	Reactor Vessel	8,498	1,818	837	-	-	6,301	278	10,229	27,901	27,901	-	-	17,823	17,823	-	-	1,110,300	22,415	1,055
48.1.1	Totals	13,228	10,312	2,684	2,684	438	37,859	557	31,330	98,756	98,756	-	-	1,244	25,695	1,628	600	1,110,300	22,415	1,055
Removal of Major Equipment																				
48.1.2	Main Turbine/Generator	-	340	1,356	521	6,139	439	-	1,330	10,136	10,136	-	-	24,835	1,283	-	-	1,377,559	4,796	-
48.1.3	Main Containers	-	1,207	360	194	3,225	214	-	912	6,142	6,142	-	-	17,396	727	-	-	828,565	16,823	-
Cascading Costs from Clean Building Demolition																				
48.1.4.1	Reactor Building	-	532	-	-	-	-	-	50	381	381	-	-	-	-	-	-	-	-	2,217
48.1.4.2	Reactor Building	-	127	-	-	-	-	-	19	146	146	-	-	-	-	-	-	-	-	1,254
48.1.4.3	Turbine	-	483	-	-	-	-	-	72	556	556	-	-	-	-	-	-	-	-	3,588
48.1.4	Totals	-	1,142	-	-	-	-	-	141	1,073	1,073	-	-	-	-	-	-	-	-	5,059
Disposal of Plant Systems																				
48.1.5.1	Automatic Press Relief	106	2	10	182	-	-	-	56	356	356	-	-	1,088	-	-	-	44,184	1,468	-
48.1.5.2	Chemistry Sampling	24	0	2	35	-	-	-	12	73	73	-	-	207	-	-	-	8,422	356	-
48.1.5.3	Chemistry Sampling - Insulated	2	0	0	1	-	-	-	0	1,692	1,692	-	-	6,652	1	-	-	27,876	257	-
48.1.5.4	Comminution System	29	0	0	62	1,144	-	-	253	1,458	1,458	-	-	212	-	-	-	8,617	278	-
48.1.5.5	Combustible Gas Control - Inad - RCA	-	-	-	-	36	-	-	13	80	80	-	-	285	-	-	-	11,577	245	-
48.1.5.6	Combustible Gas Control - RCA	18	1	3	48	-	-	-	12	81	81	-	-	39,107	-	-	-	1,224,704	12,501	-
48.1.5.7	Condensate & Rawwater	888	60	281	5,046	-	-	-	1,027	7,203	7,203	-	-	4,735	-	-	-	192,203	6,784	-
48.1.5.8	Condensate & Rawwater - Insulated	404	25	104	793	-	-	-	250	1,500	1,500	-	-	8,327	-	-	-	334,489	9,265	-
48.1.5.9	Condensate Storage	657	16	77	1,378	-	-	-	384	2,512	2,512	-	-	3,241	-	-	-	98,576	38	-
48.1.5.10	Condensate Storage	3	0	0	6	-	-	-	15	108	108	-	-	5,109	-	-	-	207,487	1,626	-
48.1.5.11	Control Rod Drive	54	1	1	85	-	-	-	154	1,138	1,138	-	-	1,184	-	-	-	48,981	1,806	-
48.1.5.12	Control Rod Drive Hydraulic	71	12	12	118	-	-	-	64	407	407	-	-	85	-	-	-	3,445	181	-
48.1.5.13	Core Spray - Insulated	15	0	1	14	-	-	-	6	36	36	-	-	233	-	-	-	1,078	98	-
48.1.5.14	Core Spray - RCA	1	0	0	42	-	-	-	1	41	41	-	-	2	-	-	-	463	25	-
48.1.5.15	Domain Water - Insulated - RCA	1	0	0	2	-	-	-	1	1	1	-	-	1	-	-	-	22,244	550	-
48.1.5.16	Domain Water - RCA	38	1	5	92	-	-	-	24	159	159	-	-	548	-	-	-	84	4	-
48.1.5.17	Drywell Atmosphere Cooling - RCA	0	0	0	0	-	-	-	0	0	0	-	-	0	-	-	-	0	0	-
48.1.5.18	EDG Emerg Services Water - Inad - RCA	3	0	0	2	-	-	-	1	5	5	-	-	15	-	-	-	5,544	281	-
48.1.5.19	EDG Emerg Services Water - Inad - RCA	33	0	0	2	-	-	-	3	35	35	-	-	137	-	-	-	512	22	-
48.1.5.20	Emergency Services Water - Inad - RCA	21	0	0	2	-	-	-	1	5	5	-	-	13	-	-	-	512	22	-
48.1.5.21	Emergency Services Water - RCA	3	0	0	2	-	-	-	1	5	5	-	-	13	-	-	-	512	22	-
48.1.5.22	Generator Physical Design - RCA	0	0	0	0	-	-	-	0	0	0	-	-	0	-	-	-	1,384	48	-
48.1.5.23	Generator Physical Design - RCA	6	0	0	0	-	-	-	2	12	12	-	-	31	-	-	-	1,384	48	-
48.1.5.24	Generator Physical Design - RCA	6	0	0	0	-	-	-	2	12	12	-	-	31	-	-	-	1,384	48	-
48.1.5.25	H2/O2 Control Analyzing - Insulated	0	0	0	4	-	-	-	0	4	4	-	-	23	-	-	-	948	72	-
48.1.5.26	H2/O2 Control Analyzing - Insulated	0	0	0	4	-	-	-	0	4	4	-	-	23	-	-	-	948	72	-
48.1.5.27	High Pressure Coolant Injection	60	3	3	12	-	-	-	49	334	334	-	-	1,262	-	-	-	51,237	850	-



**Monticello Nuclear Generating Plant  
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**Table H  
 Monticello Nuclear Generating Plant  
 SAFSTOR Decommissioning Cost Estimates with 60 Years of Spent Fuel Storage**  
 (Thousands of 2020 Dollars)

Activity Index	Activity Description	Decom Cost	Removal Cost	Packaging Cost	Transport Cost	Off-Site Processing Cost	LLRW Disposal Cost	Other Contingency	Total Contingency	Total Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu Feet	Burial Volumes			Burial/Processed Wt. Lbs.	Craft Manhours	Utility and Contractor Manhours		
														Class A Cu Feet	Class B Cu Feet	Class C Cu Feet					
Deposal of Plant Systems (continued)																					
46.1.5.28	High Pressure Coolant Injection - Install	-	198	-	4	21	379	-	110	713	713	-	2,266	-	-	-	92,018	2,734	-		
46.1.5.29	Hydrogen Cooling - RCA	-	8	-	0	0	7	-	1	10	10	-	-	-	-	-	118	118	-		
46.1.5.30	Hydrogen Cooling - RCA	-	17	-	0	3	7	-	9	60	60	-	180	-	-	-	7,659	212	-		
46.1.5.32	Hydrogen Water Chemistry - RCA	-	24	-	0	23	-	-	103	59	59	-	1,768	-	-	-	5,672	304	-		
46.1.5.33	Instrument & Service Air - RCA	-	225	-	4	17	206	-	103	644	644	-	1,768	-	-	-	71,810	2,733	-		
46.1.5.34	Main Condenser	-	225	-	4	18	248	-	106	802	802	-	2,325	-	-	-	2,143,806	1,102	-		
46.1.5.35	Main Turbine	-	609	-	63	298	5,335	-	1,079	7,684	7,684	-	31,885	-	-	-	1,294,866	12,652	-		
46.1.5.37	Main Turbine - Insulated	-	133	-	7	32	479	-	141	952	952	-	3,469	-	-	-	140,566	2,725	-		
46.1.5.38	Mechanical Room	-	189	-	1	18	210	-	11	70	70	-	2,802	-	-	-	112,293	575	-		
46.1.5.40	Off Gas Recombiner - Insulated	-	351	-	5	22	393	-	100	921	921	-	2,320	-	-	-	95,441	4,785	-		
46.1.5.41	Res Accident Sampling - Insulated	-	23	-	0	1	16	-	8	48	48	-	49	-	-	-	4,004	306	-		
46.1.5.42	Res Accident Sampling - Insulated	-	13	-	0	1	13	-	6	33	33	-	1,457	-	-	-	62,297	100	-		
46.1.5.43	Res Accident Sampling - Insulated	-	15	-	0	1	15	-	6	33	33	-	1,457	-	-	-	62,297	100	-		
46.1.5.44	RHR Service Water - RCA	-	4	-	0	0	6	-	2	12	12	-	35	-	-	-	1,410	17	-		
46.1.5.45	Reactor Feedwater Pump Seal	-	50	-	1	3	55	-	21	130	130	-	327	-	-	-	13,295	687	-		
46.1.5.46	Residual Heat Removal - Insulated	-	228	-	58	147	2,110	-	529	3,284	3,284	-	12,609	-	-	-	603,174	3,282	-		
46.1.5.48	RK Core Isolation Cooling - Insulated	-	43	-	3	7	61	-	21	129	129	-	364	-	-	-	14,781	609	-		
46.1.5.49	RK Core Isolation Cooling - Insulated	-	97	-	1	5	94	-	39	237	237	-	563	-	-	-	22,843	1,315	-		
46.1.5.50	RK Decarburization	-	153	-	5	4	16	-	30	161	161	-	96	-	-	-	13,794	691	-		
46.1.5.52	Stability Liquid Control - Insul. - RCA	-	14	-	0	0	4	-	2	9	9	-	22	-	-	-	904	2,448	-		
46.1.5.53	Stability Liquid Control - RCA	-	26	-	1	2	41	-	13	83	83	-	245	-	-	-	9,969	341	-		
46.1.5.54	Stator Cooling - RCA	-	7	-	0	1	21	-	5	35	35	-	129	-	-	-	5,135	98	-		
46.1.5.55	Stator Cooling - Insulating Incore Probe	-	7	-	0	0	2	-	1	5	5	-	2	-	-	-	5,800,107	104,297	-		
46.1.5	Totals	-	7,400	-	347	1,370	23,201	-	5,894	39,634	39,610	-	140,430	-	-	-	5,893,107	104,297	-		
46.1.6	Scrubbing in support of decommissioning	-	2,106	-	22	12	191	-	567	2,929	2,929	-	1,030	-	-	-	52,111	10,668	-		
46.1	Subtotal Period 4a Activity Costs	211	27,105	12,608	4,132	33,404	39,680	557	40,305	158,142	158,117	-	24	184,963	30,945	1,628	600	11,600	10,452,330	209,462	2,110
Period 4a Collateral Costs																					
46.3.3	Small and allowable	-	4	-	7	12	-	-	12	63	63	-	-	-	-	-	-	-	-	13	
46.3.4	Spent Fuel Capital and Transfer	-	-	-	-	-	-	2,351	353	2,704	276	-	2,307	-	-	-	-	-	-	-	
46.3	Subtotal Period 4a Collateral Costs	-	-	-	-	-	-	2,351	404	3,073	339	-	2,307	-	-	-	-	-	-	-	
Period 4a Period Dependent Costs																					
46.4.1	Decom supplies	87	-	-	-	-	-	-	22	109	869	-	-	-	-	-	-	-	-	-	
46.4.2	Insurance	-	-	-	-	-	-	780	79	859	869	-	-	-	-	-	-	-	-	-	
46.4.3	Health physics supplies	-	-	-	-	-	-	3,594	468	2,340	2,340	-	-	-	-	-	-	-	-	-	
46.4.5	Heavy equipment rental	-	1,872	-	-	-	-	-	422	3,232	3,232	-	-	-	-	-	-	-	-	-	
46.4.6	Disposal of DAW generated	-	2,811	-	-	-	-	-	108	612	612	-	-	-	-	-	-	-	-	-	
46.4.7	Emergency Planning Fees	-	-	89	46	-	370	-	1,288	1,767	1,767	-	-	-	-	-	-	-	-	-	
46.4.8	NR Energy Budget	-	-	-	-	-	-	5,44	54	248	208	-	-	-	-	-	-	-	-	-	
46.4.9	Emergency Planning Fees	-	-	-	-	-	-	1,67	17	183	183	-	-	-	-	-	-	-	-	-	
46.4.10	Fixed Overhead	-	-	-	-	-	-	2,389	357	2,747	2,747	-	-	-	-	-	-	-	-	-	
46.4.11	Radioactive Waste Processing Equipment/Services	-	-	-	-	-	-	1,256	15	1,271	1,271	-	-	-	-	-	-	-	-	-	
46.4.12	ES&SI Cost	-	-	-	-	-	-	1,326	15	1,45	1,45	-	-	-	-	-	-	-	-	-	
46.4.13	Railroad Track Maintenance	-	-	-	-	-	-	1,40	21	162	162	-	-	-	-	-	-	-	-	-	
46.4.14	Remedial Actions Surveys	-	-	-	-	-	-	1,288	189	1,447	1,447	-	-	-	-	-	-	-	-	-	
46.4.15	Remedial Actions Surveys	-	-	-	-	-	-	1,469	2,191	16,295	16,295	-	-	-	-	-	-	-	-	-	
46.4.16	DOE Staff Cost	-	-	-	-	-	-	14,694	2,191	16,295	16,295	-	-	-	-	-	-	-	-	-	
46.4.17	Utility Staff Cost	-	-	-	-	-	-	19,141	2,871	22,012	20,691	-	-	-	-	-	-	-	-	-	
46.4	Subtotal Period 4a Period-Dependent Costs	87	4,683	89	46	-	370	51,826	8,539	65,639	61,339	-	4,185	-	-	-	89,703	146	-	-	
46.9	TOTAL PERIOD 4a COST	302	32,114	12,694	4,199	33,404	40,078	54,734	49,217	226,854	219,855	6,944	184,963	35,494	1,628	600	11,600	10,545,800	209,621	558,707	
PERIOD 4b - Site Decommissioning																					
46.1.1	Remove spent fuel racks	591	58	103	149	-	2,572	-	986	4,459	4,459	-	-	-	-	-	-	-	-	906	

Monticello Nuclear Generating Plant  
Decommissioning Cost Analysis

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Table H  
Monticello Nuclear Generating Plant  
SAFSTOR Decommissioning Cost Estimates with 60 Years of Spent Fuel Storage  
(Thousands of 2020 Dollars)

Table with columns: Activity Index, Activity Description, Decon Cost, Removal Cost, Packaging Cost, Transport Cost, Off-Site Processing Cost, LIRW Disposal Cost, Other Contingency, Total Contingency, Total Cost, NRC Lic. Term. Costs, Spent Fuel Management Costs, Site Restoration Costs, Processed Volume, Class A, Class B, Class C, Burial Volumes, Burial/Wt. Lbs., Craft Manhours, and Utility and Contractor Manhours.

**Monticello Nuclear Generating Plant  
 Decommissioning Cost Analysis**

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**Table H  
 Monticello Nuclear Generating Plant  
 SAFSTOR Decommissioning Cost Estimates with 60 Years of Spent Fuel Storage**  
 (Thousands of 2020 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Cost	Transport Cost	Off-Site Processing Cost	LIRW Disposal Cost	Other Contingency	Total Contingency	Total Lic. Term. Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu Feet	Barial Volumes			Burial/Processed Wt. Lbs.	Craft Manhours	Utility and Contractor Manhours	
															Class A Cu Feet	Class B Cu Feet	Class C Cu Feet				
40.2	Subtotal Period 4b Additional Costs	-	1,972	-	23	92	1,231	1,835	1,185	6,317	6,317	-	-	11,780	-	-	294,000	12,825	12,480		
40.3	Period 4b Collateral Costs	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
40.3.1	Spent fuel decommissioning water waste	12	-	-	39	-	88	-	95	156	156	-	-	-	-	-	-	12,067	39	-	
40.3.2	Spent fuel packaging	-	397	-	-	-	-	-	40	126	126	-	-	-	-	-	-	-	-	-	
40.3.3	Decommissioning Equipment Disposition	-	-	-	82	-	1,112	-	237	1,739	1,739	-	-	6,000	6,000	5,289	-	303,698	147	-	
40.3.5	Spent Fuel Capital and Transfer	-	-	-	-	-	-	6,214	592	7,147	7,147	-	-	-	-	-	-	-	-	-	
40.3	Subtotal Period 4b Collateral Costs	12	397	-	121	-	2,861	6,214	1,264	9,538	9,538	-	-	6,000	6,000	731	-	313,705	186	-	
40.4	Period 4b Period-Dependent Costs	1,701	-	-	-	-	-	-	425	2,126	2,126	-	-	-	-	-	-	-	-	-	
40.4.1	Decon supplies	-	-	-	-	-	-	1,434	43	1,477	1,477	-	-	-	-	-	-	-	-	-	
40.4.2	Insurance	-	-	-	-	-	-	620	62	682	682	-	-	-	-	-	-	-	-	-	
40.4.3	Health physics supplies	-	-	-	-	-	-	620	62	682	682	-	-	-	-	-	-	-	-	-	
40.4.4	Health physics supplies	3,000	-	-	-	-	-	-	703	3,813	3,813	-	-	-	-	-	-	-	-	-	
40.4.5	Heavy equipment rental	5,239	-	-	-	-	-	-	786	6,024	6,024	-	-	-	-	-	-	-	-	-	
40.4.6	Disposal of DAW generated	-	-	-	60	-	-	-	112	3,805	3,805	-	-	-	-	-	-	-	-	-	
40.4.7	Operating budget	-	-	-	-	-	-	2,777	112	3,805	3,805	-	-	-	-	-	-	-	-	-	
40.4.8	NRC Fees	-	-	-	-	-	-	986	99	1,085	1,085	-	-	-	-	-	-	-	-	-	
40.4.9	Emergency Planning Fees	-	-	-	-	-	-	302	30	332	332	-	-	-	-	-	-	-	-	-	
40.4.10	Fixed Overhead	-	-	-	-	-	-	4,319	648	4,967	4,967	-	-	-	-	-	-	-	-	-	
40.4.11	Processing Equipment/Services	-	-	-	-	-	-	228	31	262	262	-	-	-	-	-	-	-	-	-	
40.4.12	ESFSI Operating Costs	-	-	-	-	-	-	255	38	293	293	-	-	-	-	-	-	-	-	-	
40.4.13	Railroad Track Maintenance	-	-	-	-	-	-	313	313	2,626	2,626	-	-	-	-	-	-	-	-	-	
40.4.14	Remedial Actions Surveys	-	-	-	-	-	-	2,283	387	2,670	2,670	-	-	-	-	-	-	-	-	-	
40.4.15	Remedial Actions Surveys	-	-	-	-	-	-	25,916	3,887	29,803	29,803	-	-	-	-	-	-	-	-	-	
40.4.16	DOE Staff Cost	-	-	-	-	-	-	32,869	4,390	37,259	37,259	-	-	-	-	-	-	-	-	-	
40.4.17	Utility Staff Cost	1,701	8,289	117	60	-	-	486	90,622	106,817	106,817	-	-	-	-	-	-	-	-	-	
40.4	Subtotal Period 4b Period-Dependent Costs	1,701	8,289	117	60	-	-	486	90,622	106,817	106,817	-	-	-	-	-	-	-	-	-	
40.0	TOTAL PERIOD 4b COST	9,264	27,881	1,067	2,898	25,343	12,044	90,197	32,014	210,310	150,435	14,863	11	103,174	84,720	10,220,300	329,381	985,546	985,546		
<b>PERIOD 4c - License Termination</b>																					
Period of Direct Decommissioning Activities																					
41.1	ORISE confirmatory survey	-	-	-	-	-	-	166	50	216	216	-	-	-	-	-	-	-	-	-	
41.2	Terminate license	-	-	-	-	-	-	166	50	216	216	-	-	-	-	-	-	-	-	-	
41	Subtotal Period 4c Activity Costs	-	-	-	-	-	-	332	100	432	432	-	-	-	-	-	-	-	-	-	
Period of Additional Costs																					
42.1	License Termination Survey	-	77	-	-	-	-	6,920	2,076	8,995	8,995	-	-	-	-	-	-	-	-	-	
42.2	License Termination Survey	-	188	-	-	-	-	5,625	1,645	7,270	7,270	-	-	-	-	-	-	-	-	-	
42.2	Subtotal Period 4c Additional Costs	-	265	-	-	-	-	12,545	3,721	16,265	16,265	-	-	-	-	-	-	-	-	-	
42	Period of Collateral Costs	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
43.2	Spent fuel transportation expenses	-	-	-	-	-	-	1,204	190	1,454	1,454	-	-	-	-	-	-	-	-	-	
43.2	Small and allowance	-	-	-	-	-	-	0	0	0	0	-	-	-	-	-	-	-	-	-	
43.3	Spent Fuel Capital and Transfer	-	-	-	-	-	-	846	127	972	972	-	-	-	-	-	-	-	-	-	
43.3	Subtotal Period 4c Collateral Costs	-	-	-	-	-	-	2,110	317	2,427	2,427	-	-	-	-	-	-	-	-	-	
Period of Period-Dependent Costs																					
44.1	Insurance	-	-	-	-	-	-	530	53	583	583	-	-	-	-	-	-	-	-	-	
44.2	Property taxes	-	-	-	-	-	-	219	220	2,417	2,417	-	-	-	-	-	-	-	-	-	
44.3	Health physics supplies	786	-	-	-	-	-	2,198	193	2,391	2,391	-	-	-	-	-	-	-	-	-	
44.4	Health physics supplies	-	-	-	-	-	-	48	48	418	418	-	-	-	-	-	-	-	-	-	
44.5	Plant energy budget	-	-	-	4	-	29	-	9	315	315	-	-	-	-	-	-	-	-	-	
44.6	NRC Fees	-	-	-	-	-	-	274	41	315	315	-	-	-	-	-	-	-	-	-	
44.6	Emergency Planning Fees	-	-	-	-	-	-	426	43	468	468	-	-	-	-	-	-	-	-	-	
44.6	Emergency Planning Fees	-	-	-	-	-	-	1,502	239	1,828	1,828	-	-	-	-	-	-	-	-	-	
44.6	ESFSI Operating Costs	-	-	-	-	-	-	81	13	97	97	-	-	-	-	-	-	-	-	-	
44.9	ESFSI Operating Costs	-	-	-	-	-	-	91	14	108	108	-	-	-	-	-	-	-	-	-	
44.10	Railroad Track Maintenance	-	-	-	-	-	-	5,033	809	6,202	6,202	-	-	-	-	-	-	-	-	-	
44.12	DOE Staff Cost	-	-	-	-	-	-	5,762	864	6,626	6,626	-	-	-	-	-	-	-	-	-	
44.13	Utility Staff Cost	-	-	-	-	-	-	19,931	3,027	23,764	23,764	-	-	-	-	-	-	-	-	-	
44	Subtotal Period 4c Period-Dependent Costs	-	786	-	4	-	29	19,931	3,027	23,764	23,764	-	-	-	-	-	-	-	-	-	
44.0	TOTAL PERIOD 4c COST	-	824	195	901	-	5,954	32,244	8,037	48,245	48,245	-	-	-	-	-	-	-	-	-	
<b>PERIOD 4 TOTALS</b>																					
9,566		90,820	13,956	8,079	26,837	58,077	186,175	80,899	485,400	458,013	27,330	66	340,138	142,548	1,628	600	23,415,680	644,380	1,757,176		

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**Table H  
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 SAFSTOR Decommissioning Cost Estimates with 60 Years of Spent Fuel Storage**  
 (Thousands of 2020 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Cost	Transport Cost	Off-Site Processing Cost	LIRW Disposal Cost	Other Cost	Total Contingency	Total Cost	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu Feet	Class A Cu Feet	Class B Cu Feet	Class C Cu Feet	GFTCC Cu Feet	Burial/Processed Wt. Lbs.	Craft Manhours	Utility and Contractor Manhours	
<b>PERIOD 5b- Site Restoration</b>																						
<b>Period 5b Direct Decommissioning Activities</b>																						
Demolition of Remaining Site Buildings																						
5b.1.1.1	Reactor Building	-	1,971	-	-	-	-	-	296	2,267	-	-	2,267	-	-	-	-	-	-	13,911	-	-
5b.1.1.2	Condensate Tanks Foundation	-	10	-	-	-	-	-	1	11	-	-	11	-	-	-	-	-	-	50	-	-
5b.1.1.3	HPV Building	-	19	-	-	-	-	-	3	22	-	-	22	-	-	-	-	-	-	25	-	-
5b.1.1.5	Hot Shop	-	16	-	-	-	-	-	3	19	-	-	19	-	-	-	-	-	-	177	-	-
5b.1.1.6	Hydrogen & Oxygen Storage	-	2	-	-	-	-	-	0	2	-	-	2	-	-	-	-	-	-	19	-	-
5b.1.1.8	MSW Storage & Shipping	-	83	-	-	-	-	-	12	95	-	-	95	-	-	-	-	-	-	662	-	-
5b.1.1.9	Misc Structures 2017	-	1,410	-	-	-	-	-	212	1,622	-	-	1,622	-	-	-	-	-	-	13,042	-	-
5b.1.1.10	Offgas Stack	-	108	-	-	-	-	-	124	124	-	-	124	-	-	-	-	-	-	544	-	-
5b.1.1.11	Offgas Storage & Compressor	-	339	-	-	-	-	-	6	345	-	-	345	-	-	-	-	-	-	1,090	-	-
5b.1.1.12	Reactor Building	-	128	-	-	-	-	-	19	147	-	-	147	-	-	-	-	-	-	1,320	-	-
5b.1.1.13	Recombiner	-	186	-	-	-	-	-	28	214	-	-	214	-	-	-	-	-	-	713	-	-
5b.1.1.14	Security Barrier	-	2,461	-	-	-	-	-	369	2,830	-	-	2,830	-	-	-	-	-	-	583	-	-
5b.1.1.15	Structures Greater than 2' Below Grade	-	1,269	-	-	-	-	-	8	1,277	-	-	1,277	-	-	-	-	-	-	12,619	-	-
5b.1.1.16	Steam Generator	-	55	-	-	-	-	-	189	1,448	-	-	1,448	-	-	-	-	-	-	13,036	-	-
5b.1.1.18	Turbine Building Addition	-	182	-	-	-	-	-	8	190	-	-	190	-	-	-	-	-	-	618	-	-
5b.1.1.19	Turbine Pedestal	-	8,169	-	-	-	-	-	27	8,196	-	-	8,196	-	-	-	-	-	-	396	-	-
5b.1.1	Totals	-	9,005	-	-	-	-	-	1,225	9,231	-	-	9,231	-	-	-	-	-	-	58,869	-	-
<b>Site Cleanup Activities</b>																						
5b.1.2	Grads & landscape site	-	896	-	-	-	-	-	134	1,031	-	-	1,031	-	-	-	-	-	-	1,841	-	-
5b.1.3	Site Remediation	-	9,005	-	-	-	-	-	1,300	10,655	-	-	10,655	-	-	-	-	-	-	60,728	-	-
5b.1	Subtotal Period 5b Activity Costs	-	9,005	-	-	-	-	-	1,300	10,655	231	-	10,425	-	-	-	-	-	-	60,728	1,500	1,500
<b>Period 5b Additional Costs</b>																						
5b.2.1	Initial Structure Cofferdam	-	3,822	-	-	-	-	-	509	3,825	-	-	3,825	-	-	-	-	-	-	13	-	-
5b.2.2	Initial Structure Cofferdam	-	335	-	-	-	-	-	50	385	-	-	385	-	-	-	-	-	-	2,684	-	-
5b.2.3	Construction Debris	-	5,583	-	-	-	-	-	176	1,346	-	-	1,346	-	-	-	-	-	-	5,422	-	-
5b.2.4	Backfills	-	1,486	-	-	-	-	-	837	6,421	-	-	6,421	-	-	-	-	-	-	6,937	-	-
5b.2.5	Structures Cofferdam	-	1,486	-	-	-	-	-	268	1,977	-	-	1,977	-	-	-	-	-	-	6,937	-	-
5b.2.6	Demolition and Site Restoration of ISFSI	-	11,168	-	-	-	-	-	1,888	14,472	-	-	14,472	-	-	-	-	-	-	18,527	-	-
5b.2	Subtotal Period 5b Additional Costs	-	121	-	-	-	-	-	18	139	-	-	139	-	-	-	-	-	-	18,527	-	-
<b>Period 5b Collateral Costs</b>																						
5b.3.1	Small tool allowances	-	121	-	-	-	-	-	18	139	-	-	139	-	-	-	-	-	-	-	-	-
5b.3	Subtotal Period 5b Collateral Costs	-	121	-	-	-	-	-	18	139	-	-	139	-	-	-	-	-	-	-	-	-
<b>Period 5b Period-Dependent Costs</b>																						
5b.4.1	Insurance	-	-	-	-	-	-	-	477	5,247	-	-	5,247	-	-	-	-	-	-	-	-	-
5b.4.2	Property taxes	-	-	-	-	-	-	-	876	6,719	-	-	6,719	-	-	-	-	-	-	-	-	-
5b.4.3	Heavy equipment rental	-	5,812	-	-	-	-	-	315	6,127	-	-	6,127	-	-	-	-	-	-	-	-	-
5b.4.4	Plant energy and fuel	-	-	-	-	-	-	-	45	362	-	-	362	-	-	-	-	-	-	-	-	-
5b.4.5	Plant Operating Fees	-	-	-	-	-	-	-	17	151	-	-	151	-	-	-	-	-	-	-	-	-
5b.4.6	Fixed Overhead	-	-	-	-	-	-	-	168	1,290	-	-	1,290	-	-	-	-	-	-	-	-	-
5b.4.7	Railroad Track Maintenance	-	-	-	-	-	-	-	33	249	-	-	249	-	-	-	-	-	-	-	-	-
5b.4.8	Construction Cost	-	-	-	-	-	-	-	1,720	13,489	-	-	13,489	-	-	-	-	-	-	-	-	-
5b.4.9	DOE Staff Cost	-	-	-	-	-	-	-	740	5,671	-	-	5,671	-	-	-	-	-	-	-	-	-
5b.4.10	Utility Staff Cost	-	-	-	-	-	-	-	28,262	36,679	-	-	36,679	-	-	-	-	-	-	-	-	-
5b.4	Subtotal Period 5b Period-Dependent Costs	-	26,196	-	-	-	-	-	7,879	61,945	231	-	61,963	-	-	-	-	-	-	79,253	237,904	-
5b.0	TOTAL PERIOD 5b COST	-	26,196	-	-	-	-	-	7,879	61,945	231	-	61,963	-	-	-	-	-	-	79,253	237,904	-
<b>PERIOD 5 TOTALS</b>																						
TOTAL COST TO DECOMMISSION		21,230	100,298	14,401	8,612	58,852	53,785	1,405,928	272,732	1,941,915	1,230,098	629,040	62,778	3,401,180	153,222	1,628	600	1,100	23,724,260	876,303	9,952,997	-

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 Decommissioning Cost Analysis**

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**Table H  
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 SAFSTOR Decommissioning Cost Estimates with 60 Years of Spent Fuel Storage**  
 (Thousands of 2020 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LIRW Disposal Costs	Other Costs	Total Contingency	Total Lic. Term. Costs	NRC Management Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu Feet	Burial Volumes			Burial/Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu Feet	Class B Cu Feet	Class C Cu Feet			
<b>TOTAL COST TO DECOMMISSION WITH 16.37% CONTINGENCY:</b>																				
	TOTAL NRC LICENSE TERMINATION COST IS 64.37% OR:				\$1,391,915															
	SPENT FUEL MANAGEMENT COST IS 32.39% OR:				\$829,040															
	TOTAL LOW-LEVEL RADIOACTIVE WASTE VOLUME BURIED (EXCLUDING GTCC):				\$62,778															
	TOTAL GREATER THAN CLASS C RADWASTE VOLUME GENERATED:				155,419	Cubic Feet														
	TOTAL SCRAP METAL REMOVED:				23,123	Tons														
	TOTAL CRAFT LABOR REQUIREMENTS:				876,203	Man-hours														

Footnotes:  
 n/a - indicates that this activity not charged as decommissioning expense  
 a - indicates that this activity performed by decommissioning staff  
 0 - indicates that this value is less than 0.5 but is non-zero  
 A cell containing "-" indicates a zero value

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**APPENDIX I**

**DETAILED COST ANALYSIS**

**SCENARIO 7: SAFSTOR with 100 Year DFS**

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**Table I  
 Monticello Nuclear Generating Plant  
 SAFSTOR Decommissioning Cost Estimates with 100 Years of Spent Fuel Storage**  
 (Thousands of 2020 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LIRW Disposal Costs	Other Costs	Total Contingency	Total Costs	Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu Feet	Class A Cu Feet	Class B Cu Feet	Class C Cu Feet	GTCC Cu Feet	Burial/Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
<b>PERIOD In - Shutdown through Transition</b>																					
<b>Period In Direct Decommissioning Activities</b>																					
1a.1.1	SAFSTOR site characterization survey	-	-	-	-	-	-	415	124	539	539	-	-	-	-	-	-	-	-	-	1,300
1a.1.2	Prepare preliminary decommissioning cost	-	-	-	-	-	-	167	25	192	192	-	-	-	-	-	-	-	-	-	-
1a.1.3	Notification of Cessation of Operations	-	-	-	-	-	-	-	na	na	-	-	-	-	-	-	-	-	-	-	-
1a.1.4	Remove fuel & source material	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1a.1.5	Remove fuel & source material handling	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1a.1.6	Deactivate plant systems & process waste	-	-	-	-	-	-	257	30	296	296	-	-	-	-	-	-	-	-	-	2,000
1a.1.7	Prepare and submit FSDAR	-	-	-	-	-	-	167	25	192	192	-	-	-	-	-	-	-	-	-	1,300
1a.1.8	Review plant logs & specs.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1a.1.9	Estimate by product inventory	-	-	-	-	-	-	120	19	148	148	-	-	-	-	-	-	-	-	-	1,000
1a.1.10	Estimate by product inventory	-	-	-	-	-	-	120	19	148	148	-	-	-	-	-	-	-	-	-	1,000
1a.1.11	End product description	-	-	-	-	-	-	93	15	108	108	-	-	-	-	-	-	-	-	-	1,500
1a.1.12	Detailed by-product inventory	-	-	-	-	-	-	145	24	169	169	-	-	-	-	-	-	-	-	-	1,500
1a.1.13	Perform SER and EA	-	-	-	-	-	-	358	60	418	418	-	-	-	-	-	-	-	-	-	3,100
1a.1.14	Perform SER and EA	-	-	-	-	-	-	358	60	418	418	-	-	-	-	-	-	-	-	-	3,100
1a.1.15	Prepare/submit Detailed Technical Specifications	-	-	-	-	-	-	664	145	1,108	1,108	-	-	-	-	-	-	-	-	-	7,500
1a.1.16	Perform Site-Specific Cost Study	-	-	-	-	-	-	643	96	739	739	-	-	-	-	-	-	-	-	-	5,000
1a.1.17	Prepare/submit Final Fuel Management Plan	-	-	-	-	-	-	125	19	148	148	-	-	-	-	-	-	-	-	-	1,000
<b>Activity Specifications</b>																					
1a.1.18.1	Prepare plant and facilities for SAFSTOR	-	-	-	-	-	-	652	95	727	727	-	-	-	-	-	-	-	-	-	4,920
1a.1.18.2	Remove fuel & source material	-	-	-	-	-	-	401	60	461	461	-	-	-	-	-	-	-	-	-	3,120
1a.1.18.3	Plant structures and buildings	-	-	-	-	-	-	257	30	296	296	-	-	-	-	-	-	-	-	-	2,000
1a.1.18.4	Waste management	-	-	-	-	-	-	257	30	296	296	-	-	-	-	-	-	-	-	-	2,000
1a.1.18.5	Facility and site dormancy	-	-	-	-	-	-	257	30	296	296	-	-	-	-	-	-	-	-	-	2,000
1a.1.18	Total	-	-	-	-	-	-	2,983	312	2,366	2,366	-	-	-	-	-	-	-	-	-	16,207
<b>Detailed Work Procedures</b>																					
1a.1.19.1	Plant systems	-	-	-	-	-	-	152	23	175	175	-	-	-	-	-	-	-	-	-	1,183
1a.1.19.2	Plant systems - decommissioning	-	-	-	-	-	-	152	23	175	175	-	-	-	-	-	-	-	-	-	1,183
1a.1.19	Total	-	-	-	-	-	-	306	46	352	352	-	-	-	-	-	-	-	-	-	2,383
1a.1.20	Process vacuum drying system	-	-	-	-	-	-	13	2	15	15	-	-	-	-	-	-	-	-	-	100
1a.1.21	Drain & dry NSSS containment systems	-	-	-	-	-	-	6120	980	7,100	7,100	-	-	-	-	-	-	-	-	-	44,300
1a.1.22	Drain & dry NSSS containment systems	-	-	-	-	-	-	6120	980	7,100	7,100	-	-	-	-	-	-	-	-	-	44,300
1a.1.23	Drain/de-energize contaminated systems	-	-	-	-	-	-	1,323	198	1,522	1,522	-	-	-	-	-	-	-	-	-	-
1a.1.24	Decontaminate contaminated systems	-	-	-	-	-	-	1,323	198	1,522	1,522	-	-	-	-	-	-	-	-	-	-
1a.1	Subtotal Period In Activity Costs	-	-	-	-	-	-	11,215	1,682	12,897	12,897	-	-	-	-	-	-	-	-	-	-
<b>Period In Collateral Costs</b>																					
1a.3.1	Spent Fuel Capital and Transfer	-	-	-	-	-	-	1,323	198	1,522	1,522	-	-	-	-	-	-	-	-	-	-
1a.3.2	Spent Fuel Management	-	-	-	-	-	-	1,323	198	1,522	1,522	-	-	-	-	-	-	-	-	-	-
1a.3	Subtotal Period In Collateral Costs	-	-	-	-	-	-	2,646	396	3,042	3,042	-	-	-	-	-	-	-	-	-	-
<b>Period In Period-Dependent Costs</b>																					
1a.4.1	Emergency Planning	-	-	-	-	-	-	5,938	893	6,831	6,831	-	-	-	-	-	-	-	-	-	-
1a.4.2	Emergency taxes	-	-	-	-	-	-	5,370	327	3,927	3,927	-	-	-	-	-	-	-	-	-	-
1a.4.3	Health physics supplies	-	-	-	-	-	-	153	153	767	767	-	-	-	-	-	-	-	-	-	-
1a.4.4	Heavy equipment rental	-	-	-	-	-	-	113	896	896	896	-	-	-	-	-	-	-	-	-	-
1a.4.5	Disposal of DW generated	-	-	-	-	-	-	50	272	2,088	2,088	-	-	-	-	-	-	-	-	-	20
1a.4.6	Emergency budgets	-	-	-	-	-	-	1,817	272	2,088	2,088	-	-	-	-	-	-	-	-	-	-
1a.4.7	NRC Fees	-	-	-	-	-	-	892	89	981	981	-	-	-	-	-	-	-	-	-	-
1a.4.8	Emergency Planning Fees	-	-	-	-	-	-	3,428	343	3,770	3,770	-	-	-	-	-	-	-	-	-	-
1a.4.9	Emergency Planning Fees	-	-	-	-	-	-	3,428	343	3,770	3,770	-	-	-	-	-	-	-	-	-	-
1a.4.10	Emergency Planning Fees	-	-	-	-	-	-	845	327	971	971	-	-	-	-	-	-	-	-	-	-
1a.4.11	RFPSI Operating Costs	-	-	-	-	-	-	112	17	129	129	-	-	-	-	-	-	-	-	-	-
1a.4.12	Railroad Track Maintenance	-	-	-	-	-	-	125	19	144	144	-	-	-	-	-	-	-	-	-	-
1a.4.13	Emergency Staff Cost	-	-	-	-	-	-	4,093	4,093	33,378	33,378	-	-	-	-	-	-	-	-	-	48,410
1a.4.14	Utility Staff Cost	-	-	-	-	-	-	27,225	27,225	223,278	223,278	-	-	-	-	-	-	-	-	-	422,240
1a.4.15	Utility Staff Cost	-	-	-	-	-	-	27,225	27,225	223,278	223,278	-	-	-	-	-	-	-	-	-	422,240
1a.4	Subtotal Period In Period-Dependent Costs	-	-	-	-	-	-	50,389	8,679	64,032	64,032	-	-	-	-	-	-	-	-	-	20
1a.0	TOTAL PERIOD In COST	-	-	-	-	-	-	76,724	11,341	88,065	88,065	-	-	-	-	-	-	-	-	-	712,970

**Monticello Nuclear Generating Plant  
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**Table I  
 Monticello Nuclear Generating Plant  
 SAFSTOR Decommissioning Cost Estimates with 100 Years of Spent Fuel Storage**  
 (Thousands of 2020 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu Feet	Burial Volumes			Burial/Processed Wt. Lbs.	Craft Manhours	Utility and Contractor Manhours	
															Class A Cu Feet	Class B Cu Feet	Class C Cu Feet				
<b>PERIOD Ie - SAFSTOR Limited DECON Activities</b>																					
Period Ie Direct Decommissioning Activities																					
Decommissioning of Site Buildings																					
B.1.1.1	Reactor Building	5,135	-	-	-	-	-	-	2,977	7,732	7,732	-	-	-	-	-	-	-	70,157	-	-
B.1.1.2	Admin	95	-	-	-	-	-	-	48	143	143	-	-	-	-	-	-	-	1,387	-	-
B.1.1.3	HR Room	35	-	-	-	-	-	-	12	28	28	-	-	-	-	-	-	-	308	-	-
B.1.1.4	HR Shaft	45	-	-	-	-	-	-	17	38	38	-	-	-	-	-	-	-	308	-	-
B.1.1.5	LLRW Storage & Shipping	49	-	-	-	-	-	-	25	74	74	-	-	-	-	-	-	-	705	-	-
B.1.1.6	Offgas Stack	326	-	-	-	-	-	-	163	489	489	-	-	-	-	-	-	-	4,575	-	-
B.1.1.7	Offgas Storage & Compressor	31	-	-	-	-	-	-	17	34	34	-	-	-	-	-	-	-	1,423	-	-
B.1.1.8	Offgas Stack	105	-	-	-	-	-	-	57	151	151	-	-	-	-	-	-	-	1,423	-	-
B.1.1.9	Radwaste Material Storage Warehouse	54	-	-	-	-	-	-	27	81	81	-	-	-	-	-	-	-	768	-	-
B.1.1.10	Recombiner	23	-	-	-	-	-	-	11	34	34	-	-	-	-	-	-	-	323	-	-
B.1.1.11	Turbine	400	-	-	-	-	-	-	399	999	999	-	-	-	-	-	-	-	8,563	-	-
B.1.1.12	Building Addition	900	-	-	-	-	-	-	899	1,799	1,799	-	-	-	-	-	-	-	11,397	-	-
B.1.1.13	Reactor (Post Fuel)	839	-	-	-	-	-	-	415	1,245	1,245	-	-	-	-	-	-	-	11,397	-	-
B.1.1	Totals	7,339	-	-	-	-	-	-	3,679	11,038	11,038	-	-	-	-	-	-	-	101,033	-	-
B.1	Subtotal Period Ie Activity Costs	7,339	-	-	-	-	-	-	3,679	11,038	11,038	-	-	-	-	-	-	-	101,033	-	-
Period Ie Additional Costs																					
B.2.1	Spent Fuel Pool Isolation	-	-	-	-	-	-	12,675	1,901	14,576	14,576	-	-	-	-	-	-	-	-	-	-
B.2	Subtotal Period Ie Additional Costs	-	-	-	-	-	-	12,675	1,901	14,576	14,576	-	-	-	-	-	-	-	-	-	-
Period Ie Collateral Costs																					
B.3.1	Decon equipment	1,055	-	145	258	-	588	-	158	1,213	1,213	-	-	-	-	-	-	-	81,092	263	-
B.3.2	Water treatment and desalinating water waste	220	-	-	-	-	-	-	19	142	142	-	-	-	-	-	-	-	-	-	-
B.3.4	Small tool allowance	136	-	-	-	-	-	-	19	145	145	-	-	-	-	-	-	-	-	-	-
B.3.5	Spent Fuel Capital and Transfer	-	-	-	-	-	-	186	29	225	-	-	-	-	-	-	-	-	-	-	-
B.3.6	Retention and Severance	-	-	-	-	-	-	3,601	540	4,141	4,141	-	-	-	-	-	-	-	-	-	-
B.3.7	Subtotal Period Ie Collateral Costs	1,271	-	145	258	-	588	5,736	1,067	7,246	7,246	-	-	-	-	-	-	-	81,092	263	-
Period Ie Period-Dependent Costs																					
B.4.1	Decon supplies	1,262	-	-	-	-	-	529	391	1,953	1,953	-	-	-	-	-	-	-	-	-	-
B.4.2	Decon equipment	1,262	-	-	-	-	-	890	890	2,152	2,152	-	-	-	-	-	-	-	-	-	-
B.4.3	Property taxes	-	-	-	-	-	-	890	890	979	979	-	-	-	-	-	-	-	-	-	-
B.4.4	Health physics supplies	-	-	-	-	-	-	182	911	911	911	-	-	-	-	-	-	-	-	-	-
B.4.5	Heavy equipment rental	-	-	-	-	-	-	28	216	216	216	-	-	-	-	-	-	-	-	-	-
B.4.6	Heavy equipment rental generated	-	-	-	-	-	-	161	161	322	322	-	-	-	-	-	-	-	-	-	-
B.4.7	Plant energy budget	-	-	6	-	-	-	453	68	521	521	-	-	-	-	-	-	-	11,092	18	-
B.4.8	NRC Fees	-	-	-	-	-	-	161	161	177	177	-	-	-	-	-	-	-	-	-	-
B.4.9	Emergency Planning Fees	-	-	-	-	-	-	708	71	779	779	-	-	-	-	-	-	-	-	-	-
B.4.10	Spent Fuel Pool O&M	-	-	-	-	-	-	213	32	242	242	-	-	-	-	-	-	-	-	-	-
B.4.11	Spent Fuel Pool O&M	-	-	-	-	-	-	213	32	242	242	-	-	-	-	-	-	-	-	-	-
B.4.12	RFPSI Operating Costs	-	-	-	-	-	-	28	4	32	32	-	-	-	-	-	-	-	-	-	-
B.4.13	Railroad Track Maintenance	-	-	-	-	-	-	31	5	36	36	-	-	-	-	-	-	-	-	-	-
B.4.14	Utility Staff Cost	-	-	-	-	-	-	4,803	1,020	5,823	5,823	-	-	-	-	-	-	-	-	-	-
B.4.15	Utility Staff Cost	-	-	-	-	-	-	4,803	1,020	5,823	5,823	-	-	-	-	-	-	-	-	-	-
B.4	Subtotal Period Ie Period-Dependent Costs	1,262	-	11	6	-	48	14,599	2,987	19,828	19,828	-	-	-	-	-	-	-	11,092	18	-
B.0	TOTAL PERIOD Ie COST	10,195	-	156	284	-	634	31,970	9,325	52,968	51,410	1,278	-	-	-	-	-	-	92,135	101,314	166,463
<b>PERIOD Ie - Preparations for SAFSTOR Dormancy</b>																					
Period Ie Direct Decommissioning Activities																					
Ie.1.1	Prepare support equipment for storage	-	-	-	-	-	-	-	79	606	606	-	-	-	-	-	-	-	3,000	-	-
Ie.1.2	Install containment pressure equal lines	-	-	-	-	-	-	-	8	62	62	-	-	-	-	-	-	-	700	-	-
Ie.1.3	Interim survey prior to dormancy	-	-	-	-	-	-	733	220	953	953	-	-	-	-	-	-	-	12,801	-	-
Ie.1.5	Prepare & submit interim report	-	-	-	-	-	-	75	11	86	86	-	-	-	-	-	-	-	583	-	-
Ie.1	Subtotal Period Ie Activity Costs	-	-	-	-	-	-	808	318	1,707	1,707	-	-	-	-	-	-	-	16,091	583	-
Period Ie Collateral Costs																					
Ie.3.1	Process decommissioning water waste	161	-	107	190	-	433	-	228	1,120	1,120	-	-	-	-	-	-	-	59,053	194	-



**Monticello Nuclear Generating Plant  
 Decommissioning Cost Analysis**

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**Table I  
 Monticello Nuclear Generating Plant  
 SAFSTOR Decommissioning Cost Estimates with 100 Years of Spent Fuel Storage**  
 (Thousands of 2020 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LRW Disposal Costs	Other Contingency	Total Contingency	Total	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu Feet	Class A Cu Feet	Class B Cu Feet	Class C Cu Feet	GTCC Cu Feet	Burial/Processed Wt. Lbs.	Craft Manhours	Utility and Contractor Manhours
1e.3.3	Collateral Costs (continued)	-	-	-	-	-	-	-	-	1	6	-	-	-	-	-	-	-	-	-	-
1e.3.4	Small tool allowances	-	5	-	-	-	-	2,529	2,534	381	2,920	2,920	-	-	-	-	-	-	-	-	-
1e.3.5	Spent Fuel Capital and Transfer	-	-	-	-	-	-	2,529	2,534	381	2,920	2,920	-	-	-	-	-	-	-	-	-
1e.3.6	Retention and Severance	-	-	-	-	-	-	2,529	2,534	381	2,920	2,920	-	-	-	-	-	-	-	-	-
1e.3	Subtotal Period 1e Collateral Costs	161	5	107	190	433	433	5,274	5,275	1,029	7,150	7,150	-	-	994	-	-	-	50,653	194	-
	Period 1e Period-Dependent Costs	-	-	-	-	-	-	-	-	55	628	-	-	-	-	-	-	-	-	-	-
1e.4.1	Insurance	-	-	-	-	-	-	580	580	89	678	-	-	-	-	-	-	-	-	-	-
1e.4.2	Health physics	-	-	-	-	-	-	285	285	89	374	-	-	-	-	-	-	-	-	-	-
1e.4.3	Health physics supplies	-	-	-	-	-	-	62	62	310	310	-	-	-	-	-	-	-	-	-	-
1e.4.4	Heavy equipment rental	-	188	-	-	-	-	28	216	216	-	-	-	-	-	-	-	-	-	-	-
1e.4.5	Disposal of DAW generated	-	-	3	-	-	13	453	453	68	521	-	-	-	132	-	-	-	3,009	5	-
1e.4.6	Spent Fuel Pool O&M	-	-	-	-	-	-	161	161	177	177	-	-	-	-	-	-	-	-	-	-
1e.4.7	Emergency Planning Fees	-	-	-	-	-	-	708	708	71	779	-	-	-	-	-	-	-	-	-	-
1e.4.8	Fixed Overhead	-	-	-	-	-	-	692	692	709	709	-	-	-	-	-	-	-	-	-	-
1e.4.9	Spent Fuel Pool O&M	-	-	-	-	-	-	38	38	32	32	-	-	-	-	-	-	-	-	-	-
1e.4.10	Spent Fuel Pool O&M	-	-	-	-	-	-	28	28	4	32	-	-	-	-	-	-	-	-	-	-
1e.4.11	SPFSI Operating Costs	-	-	-	-	-	-	31	31	5	36	-	-	-	-	-	-	-	-	-	-
1e.4.12	Railroad Track Maintenance	-	-	-	-	-	-	4,082	4,082	612	4,694	-	-	-	-	-	-	-	-	-	61,192
1e.4.13	Security Staff Cost	-	-	-	-	-	-	1	1	1	1	-	-	-	-	-	-	-	-	-	61,192
1e.4.14	Subtotal Period 1e Period-Dependent Costs	-	438	3	2	13	14,507	2,166	17,216	16,163	1,053	-	-	-	132	-	-	-	3,039	5	186,463
1e.0	TOTAL PERIOD 1e COST	161	1,021	110	192	446	20,678	3,905	26,113	22,140	3,973	-	-	-	1,146	-	-	-	62,682	16,700	167,046
	PERIOD 1 TOTALS	10,357	3,431	278	462	1,130	128,472	24,170	168,301	136,658	11,613	-	-	-	3,661	-	-	-	167,017	118,034	1,045,579
	PERIOD 2a - SAFSTOR Dormancy with Wet Spent Fuel Storage	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2a.1.1	Quarterly Inspection	-	-	-	-	-	-	-	-	a	-	-	-	-	-	-	-	-	-	-	-
2a.1.2	Semi-annual environmental survey	-	-	-	-	-	-	-	-	a	-	-	-	-	-	-	-	-	-	-	-
2a.1.3	Biannual roof replacement	-	-	-	-	-	-	-	-	178	-	-	-	-	-	-	-	-	-	-	-
2a.1.4	Maintenance supplies	-	-	-	-	-	-	155	23	178	-	-	-	-	-	-	-	-	-	-	-
2a.1.5	Subtotal Period 2a Activity Costs	-	-	-	-	-	-	349	87	437	-	-	-	-	-	-	-	-	-	-	-
2a.1	Period 2a Additional Costs	-	-	-	-	-	-	504	111	615	-	-	-	-	-	-	-	-	-	-	-
2a.2.1	Security Modifications	-	-	-	-	-	-	8,686	1,304	10,000	10,000	-	-	-	-	-	-	-	-	-	-
2a.2	Subtotal Period 2a Additional Costs	-	-	-	-	-	-	8,686	1,304	10,000	10,000	-	-	-	-	-	-	-	-	-	-
2a.3.1	Spent Fuel Capital and Transfer	-	-	-	-	-	-	141,374	21,206	162,580	-	-	-	-	-	-	-	-	-	-	-
2a.3.2	Retention and Severance	-	-	-	-	-	-	19,427	22,341	22,341	-	-	-	-	-	-	-	-	-	-	-
2a.3	Subtotal Period 2a Collateral Costs	-	-	-	-	-	-	160,801	24,120	184,921	22,341	162,580	-	-	-	-	-	-	-	-	-
2a.0	TOTAL PERIOD 2a COST	-	-	-	-	-	-	176	197	1,937	10,000	10,000	-	-	-	-	-	-	-	-	-
2a.4.1	Insurance	-	-	-	-	-	-	1,761	176	1,937	-	-	-	-	-	-	-	-	-	-	-
2a.4.2	Health physics	-	-	-	-	-	-	9,035	903	9,938	-	-	-	-	-	-	-	-	-	-	-
2a.4.3	Health physics supplies	-	-	-	-	-	-	154	154	154	-	-	-	-	-	-	-	-	-	-	-
2a.4.4	Disposal of DAW generated	-	-	-	-	-	-	79	79	79	-	-	-	-	-	-	-	-	-	-	-
2a.4.5	Plant energy budget	-	-	-	-	-	-	14	14	14	-	-	-	-	-	-	-	-	-	-	-
2a.4.6	Spent Fuel Pool O&M	-	-	-	-	-	-	910	186	1,096	-	-	-	-	-	-	-	-	-	-	-
2a.4.7	Spent Fuel Pool O&M	-	-	-	-	-	-	61	61	61	-	-	-	-	-	-	-	-	-	-	-
2a.4.8	Fixed Overhead	-	-	-	-	-	-	7,821	7,821	7,821	-	-	-	-	-	-	-	-	-	-	-
2a.4.9	Spent Fuel Pool O&M	-	-	-	-	-	-	5,306	796	6,102	-	-	-	-	-	-	-	-	-	-	-
2a.4.10	Spent Fuel Pool O&M	-	-	-	-	-	-	2,115	317	2,432	-	-	-	-	-	-	-	-	-	-	-
2a.4.11	Radiation Protection Costs	-	-	-	-	-	-	680	96	776	-	-	-	-	-	-	-	-	-	-	-
2a.4.12	Security Staff Cost	-	-	-	-	-	-	37,806	6,671	44,477	-	-	-	-	-	-	-	-	-	-	-
2a.4.13	Utility Staff Cost	-	-	-	-	-	-	15,453	2,051	15,474	-	-	-	-	-	-	-	-	-	-	-
2a.1	Subtotal Period 2a Period-Dependent Costs	-	617	11	6	47	79,012	11,069	90,750	64,868	25,525	-	-	-	576	-	-	-	11,523	19	768,261
2a.0	TOTAL PERIOD 2a COST	-	617	11	6	47	240,013	36,634	296,328	97,823	188,505	-	-	-	576	-	-	-	11,523	19	768,261

**Monticello Nuclear Generating Plant  
 Decommissioning Cost Analysis**

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**Table I  
 Monticello Nuclear Generating Plant  
 SAFSTOR Decommissioning Cost Estimates with 100 Years of Spent Fuel Storage**  
 (Thousands of 2020 Dollars)

Activity Index	Activity Description	Decom Cost	Removal Cost	Packaging Cost	Transport Cost	Off-Site Processing Cost	LIRW Disposal Cost	Other Cost	Total Contingency	Total	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu Feet	Class A Cu Feet	Class B Cu Feet	Class C Cu Feet	GFTCC Cu Feet	Burial/Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
<b>PERIOD 2b - SAFSTOR Dormancy with Dry Spent Fuel Storage</b>																					
Period 2b Direct Decommissioning Activities																					
2b.1.1	Quantity inspection	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2b.1.2	Site environmental survey	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2b.1.3	Prepare reports	-	-	-	-	-	-	3,127	469	3,596	3,596	-	-	-	-	-	-	-	-	-	-
2b.1.4	Bituminous roof replacement	-	-	-	-	-	-	7,065	1,396	8,461	8,461	-	-	-	-	-	-	-	-	-	-
2b.1.5	Maintenance supplies	-	-	-	-	-	-	10,152	2,533	12,685	12,685	-	-	-	-	-	-	-	-	-	-
2b.1	Subtotal Period 2b Activity Costs	-	-	-	-	-	-	308,775	55,016	363,791	363,791	-	-	-	-	-	-	-	-	-	-
2b.2	Subtotal Period 2b Collateral Costs	-	-	-	-	-	-	386,775	55,016	441,791	441,791	-	-	-	-	-	-	-	-	-	-
Period 2b Period-Dependent Costs																					
2b.4.1	Insurance	-	-	-	-	-	-	35,006	3,861	38,867	38,867	-	-	-	-	-	-	-	-	-	-
2b.4.2	Health physics	-	-	-	-	-	-	18,673	1,512	20,185	20,185	-	-	-	-	-	-	-	-	-	-
2b.4.3	Health physics supplies	-	-	-	-	-	-	7,559	1,512	9,071	9,071	-	-	-	-	-	-	-	-	-	-
2b.4.4	Disposal of DAW generated	-	6,017	-	-	-	461	-	135	7,644	7,644	-	-	-	-	-	-	-	-	-	-
2b.4.5	Plant energy budget	-	-	-	-	-	-	9,196	1,379	10,575	10,575	-	-	-	-	-	-	-	-	-	-
2b.4.6	Emergency Planning Fees	-	-	-	-	-	-	7,506	771	8,277	8,277	-	-	-	-	-	-	-	-	-	-
2b.4.7	Emergency Planning Fees	-	-	-	-	-	-	8,256	771	9,027	9,027	-	-	-	-	-	-	-	-	-	-
2b.4.8	Fixed Overhead	-	-	-	-	-	-	10,904	1,636	12,540	12,540	-	-	-	-	-	-	-	-	-	-
2b.4.9	RFSI Operating Costs	-	-	-	-	-	-	5,696	850	6,546	6,546	-	-	-	-	-	-	-	-	-	-
2b.4.10	Security Staff	-	-	-	-	-	-	2,880	423	3,303	3,303	-	-	-	-	-	-	-	-	-	-
2b.4.11	Security Staff	-	-	-	-	-	-	2,880	423	3,303	3,303	-	-	-	-	-	-	-	-	-	-
2b.4.12	Utility Staff Cost	-	6,017	-	-	-	-	114,547	17,182	131,729	131,729	-	-	-	-	-	-	-	-	-	-
2b.4	Subtotal Period 2b Period-Dependent Costs	-	6,017	-	-	-	461	652,696	89,288	738,650	738,650	-	-	-	-	-	-	-	-	-	-
2b.0	TOTAL PERIOD 2b COST	-	6,017	-	-	-	461	1,039,632	146,539	1,192,684	1,192,684	-	-	-	-	-	-	-	-	-	-
<b>PERIOD 2 TOTALS</b>																					
Period 2b - Reactivate Site Following SAFSTOR Dormancy																					
2b.1.1	Re-activate plant & temporary facilities	-	-	-	-	-	-	947	142	1,089	1,089	-	-	-	-	-	-	-	-	-	-
2b.1.2	Plant systems	-	-	-	-	-	-	536	80	616	616	-	-	-	-	-	-	-	-	-	-
2b.1.3	Plant systems	-	-	-	-	-	-	825	125	950	950	-	-	-	-	-	-	-	-	-	-
2b.1.4	Reactor internals	-	-	-	-	-	-	835	125	960	960	-	-	-	-	-	-	-	-	-	-
2b.1.5	Sacrificial shield	-	-	-	-	-	-	64	10	74	74	-	-	-	-	-	-	-	-	-	-
2b.1.6	Misture separators/cheaters	-	-	-	-	-	-	129	19	148	148	-	-	-	-	-	-	-	-	-	-
2b.1.7	Steam generators	-	-	-	-	-	-	268	40	308	308	-	-	-	-	-	-	-	-	-	-
2b.1.8	Main Turbine	-	-	-	-	-	-	268	40	308	308	-	-	-	-	-	-	-	-	-	-
2b.1.9	Main Condensers	-	-	-	-	-	-	268	40	308	308	-	-	-	-	-	-	-	-	-	-
2b.1.10	Pressure suppression structure	-	-	-	-	-	-	257	39	296	296	-	-	-	-	-	-	-	-	-	-
2b.1.11	Pressure suppression structure	-	-	-	-	-	-	406	60	466	466	-	-	-	-	-	-	-	-	-	-
2b.1.12	Structures & buildings	-	-	-	-	-	-	406	60	466	466	-	-	-	-	-	-	-	-	-	-
2b.1.13	Waste management	-	-	-	-	-	-	591	89	680	680	-	-	-	-	-	-	-	-	-	-
2b.1.14	Facility & site closure	-	-	-	-	-	-	116	17	133	133	-	-	-	-	-	-	-	-	-	-
2b.1.9	Total	-	-	-	-	-	-	5,736	860	6,597	6,597	-	-	-	-	-	-	-	-	-	-
Planning & Site Preparations																					
2b.1.10	Prepare dismantling sequence	-	-	-	-	-	-	308	46	355	355	-	-	-	-	-	-	-	-	-	-
2b.1.11	Plant prep. & temp. access	-	-	-	-	-	-	530	80	610	610	-	-	-	-	-	-	-	-	-	-
2b.1.12	Plant prep. & temp. access	-	-	-	-	-	-	425	65	490	490	-	-	-	-	-	-	-	-	-	-
2b.1.13	Rigging/Cont. Cont'l Enviro/cooling/etc.	-	-	-	-	-	-	2,400	360	2,760	2,760	-	-	-	-	-	-	-	-	-	-
2b.1.14	Pressure canisters & containers	-	-	-	-	-	-	158	24	182	182	-	-	-	-	-	-	-	-	-	-

**Monticello Nuclear Generating Plant  
Decommissioning Cost Analysis**

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**Table I  
Monticello Nuclear Generating Plant  
SAFSTOR Decommissioning Cost Estimates with 100 Years of Spent Fuel Storage**  
(Thousands of 2020 Dollars)

Activity Index	Activity Description	Decom Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LIRW Disposal Costs	Other Disposal Costs	Total Contingency	Total	Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu Feet	Class A Cu Feet	Class B Cu Feet	Class C Cu Feet	GFTCC Cu Feet	Burial/Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours	
38.1	Subtotal Period 3a: Activity Costs	-	-	-	-	-	-	15,341	2,301	17,643	17,057	-	586	-	-	-	-	-	-	-	731,463	
38.1.1	Additional Costs	-	-	-	-	-	-	5,930	1,776	7,706	7,706	-	-	-	-	-	-	-	-	-	10,852	
38.1.2	Site Remediation	-	-	-	28	29	14	-	9	80	80	-	-	-	-	-	-	-	-	-	30,500	
38.2	Subtotal Period 3a: Additional Costs	-	-	28	29	14	-	5,930	1,788	7,788	7,788	-	43	-	-	-	-	-	5,233	-	30,661	10,852
38.3	Collateral Costs	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
38.3.1	Subtotal Period 3a: Collateral Costs	-	-	-	-	-	-	5,693	854	6,547	-	6,547	-	-	-	-	-	-	-	-	-	-
38.4	Period 3b: Period-Dependent Costs	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
38.4.1	Property taxes	-	-	-	-	-	-	703	70	774	442	332	-	-	-	-	-	-	-	-	-	-
38.4.2	Health physics supplies	-	-	-	-	-	-	3,479	348	3,827	3,241	586	-	-	-	-	-	-	-	-	-	-
38.4.3	Heavy physics supplies	-	-	-	-	-	-	-	135	673	673	-	-	-	-	-	-	-	-	-	-	-
38.4.4	Heavy equipment rental	-	-	-	-	-	-	-	113	806	806	-	-	-	-	-	-	-	-	-	-	-
38.4.5	Permitting and environmental	-	-	-	-	-	-	-	70	70	70	-	-	-	-	-	-	-	-	-	-	-
38.4.6	Plant energy budget	-	-	10	5	-	-	1,817	272	2,089	2,089	-	-	-	-	-	-	-	10,311	-	17	-
38.4.7	NRC ISFSI Fees	-	-	-	-	-	-	51	5	56	56	-	-	-	-	-	-	-	-	-	-	-
38.4.8	NRC Fees	-	-	-	-	-	-	335	33	368	368	-	-	-	-	-	-	-	-	-	-	-
38.4.9	NRC Fees - Planning Fees	-	-	-	-	-	-	267	40	307	307	-	-	-	-	-	-	-	-	-	-	-
38.4.10	Fixed Overhead	-	-	-	-	-	-	2,636	892	3,009	3,009	-	-	-	-	-	-	-	-	-	-	-
38.4.11	ISFSI Operating Costs	-	-	-	-	-	-	112	17	129	129	-	-	-	-	-	-	-	-	-	-	-
38.4.12	Railroad Track Maintenance	-	-	-	-	-	-	425	19	444	444	-	-	-	-	-	-	-	-	-	-	-
38.4.13	Railroad Track Maintenance	-	-	-	-	-	-	125	10	135	135	-	-	-	-	-	-	-	-	-	-	-
38.4.14	Utility Staff Cost	-	-	-	-	-	-	16,817	2,523	19,299	18,160	1,180	-	-	-	-	-	-	-	-	-	681,150
38.4.15	Subtotal Period 3b: Period-Dependent Costs	1,291	-	10	5	-	42	39,883	4,658	38,900	34,169	2,731	-	-	-	-	-	-	10,311	-	17	329,100
38.9	TOTAL PERIOD 3b: CONST	1,291	-	38	34	14	42	57,927	6,991	65,978	59,014	9,278	586	43	516	-	-	-	15,565	30,678	413,475	-
38.10	Period 3b - Decommissioning Preparations	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
38.10.1	Detailed Work Procedures	-	-	-	-	-	-	608	91	700	630	-	-	-	-	-	-	-	-	-	-	-
38.10.2	Plant systems	-	-	-	-	-	-	174	26	200	50	-	-	-	-	-	-	-	-	-	-	4,783
38.10.3	Remaining buildings	-	-	-	-	-	-	-	129	129	129	-	-	-	-	-	-	-	-	-	-	1,330
38.10.4	CRD housings & NIs	-	-	-	-	-	-	125	19	148	148	-	-	-	-	-	-	-	-	-	-	1,000
38.10.5	Insure instrumentation	-	-	-	-	-	-	129	19	148	148	-	-	-	-	-	-	-	-	-	-	1,000
38.10.6	Insure primary containment	-	-	-	-	-	-	467	70	537	537	-	-	-	-	-	-	-	-	-	-	3,630
38.10.7	Rescue team	-	-	-	-	-	-	154	23	177	89	-	-	-	-	-	-	-	-	-	-	1,200
38.10.8	Facility closeout	-	-	-	-	-	-	154	23	177	177	-	-	-	-	-	-	-	-	-	-	1,200
38.10.9	Sacrificial shield	-	-	-	-	-	-	257	39	296	296	-	-	-	-	-	-	-	-	-	-	2,988
38.10.10	Material science	-	-	-	-	-	-	267	40	307	307	-	-	-	-	-	-	-	-	-	-	2,980
38.10.11	Main Turbine	-	-	-	-	-	-	268	40	309	309	-	-	-	-	-	-	-	-	-	-	2,988
38.10.12	Main Condensers	-	-	-	-	-	-	257	39	296	296	-	-	-	-	-	-	-	-	-	-	2,988
38.10.13	Mixture separators & reheaters	-	-	-	-	-	-	351	53	403	363	-	-	-	-	-	-	-	-	-	-	2,000
38.10.14	Mixture separators & reheaters	-	-	-	-	-	-	351	53	403	363	-	-	-	-	-	-	-	-	-	-	2,730
38.10.15	Boiler building	-	-	-	-	-	-	420	63	483	437	-	-	-	-	-	-	-	-	-	-	2,730
38.10.16	Boiler building	-	-	-	-	-	-	420	63	483	437	-	-	-	-	-	-	-	-	-	-	2,730
38.11	Subtotal Period 3b: Activity Costs	1,055	-	-	-	-	-	4,208	631	4,839	4,376	463	-	-	-	-	-	-	-	-	-	32,711
38.12	Collateral Costs	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
38.13	Decom equipment	-	-	-	-	-	-	1,264	158	1,423	1,213	-	-	-	-	-	-	-	-	-	-	-
38.14	DOC staff relocation expenses	-	-	-	-	-	-	1,200	190	1,454	1,454	-	-	-	-	-	-	-	-	-	-	-
38.15	Equipment expenses	-	-	-	-	-	-	2,859	426	3,285	3,285	-	-	-	-	-	-	-	-	-	-	-
38.16	Subtotal Period 3b: Collateral Costs	1,055	-	-	-	-	-	4,103	954	7,311	4,047	3,365	-	-	-	-	-	-	-	-	-	-
38.17	Period 3b: Period-Dependent Costs	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
38.18	Insurance	30	-	-	-	-	-	-	10	48	48	-	-	-	-	-	-	-	-	-	-	-
38.19	Insurance	-	-	-	-	-	-	351	35	386	386	-	-	-	-	-	-	-	-	-	-	-
38.20	Property taxes	-	-	-	-	-	-	-	161	1,776	1,483	293	-	-	-	-	-	-	-	-	-	-
38.21	Health physics supplies	-	-	-	-	-	-	-	74	309	309	-	-	-	-	-	-	-	-	-	-	-
38.22	Heavy physics supplies	-	-	-	-	-	-	-	65	40	40	-	-	-	-	-	-	-	-	-	-	-
38.23	Disposal of DAW generated	-	-	6	3	-	24	-	7	40	40	-	-	-	-	-	-	-	-	-	-	9
38.24	Plant energy budget	-	-	-	-	-	-	906	136	1,042	1,042	-	-	-	-	-	-	-	-	-	-	-

Monticello Nuclear Generating Plant Decommissioning Cost Analysis

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Table I Monticello Nuclear Generating Plant SAFSTOR Decommissioning Cost Estimates with 100 Years of Spent Fuel Storage (Thousands of 2020 Dollars)

Table with columns: Activity Index, Activity Description, Decom Cost, Removal Cost, Packaging Costs, Transport Costs, Off-Site Processing Costs, LIRW Disposal Costs, Other Costs, Total Contingency Costs, Total Lic. Term. Costs, NRC Spent Fuel Management Costs, Site Restoration Costs, Processed Volume, Class A, B, C Cu Feet, Barial Volumes, Class A, B, C Cu Feet, GFTCC Cu Feet, Burial/Processed Wt. Lbs., Craft Manhours, Utility and Contractor Manhours.



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Table I  
Monticello Nuclear Generating Plant  
SAFSTOR Decommissioning Cost Estimates with 100 Years of Spent Fuel Storage  
(Thousands of 2020 Dollars)

Table with columns: Activity Index, Activity Description, Decon Cost, Removal Cost, Packaging Cost, Transport Cost, Off-Site Processing Cost, LIRW Disposal Cost, Other Contingency Cost, Total Contingency Cost, Total Cost, NRC Lic. Term. Costs, Spent Fuel Management Costs, Site Restoration Costs, Processed Volume, Class A, B, C Cu Feet, Barial Volumes, Class A, B, C Cu Feet, GFTCC Cu Feet, Burial/Processed Wt. Lbs., Craft Manhours, Utility and Contractor Manhours.

Monticello Nuclear Generating Plant  
Decommissioning Cost Analysis

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Table I  
Monticello Nuclear Generating Plant  
SAFSTOR Decommissioning Cost Estimates with 100 Years of Spent Fuel Storage  
(Thousands of 2020 Dollars)

Table with columns: Activity Index, Activity Description, Decon Cost, Removal Cost, Packaging Cost, Transport Cost, Off-Site Processing Cost, LWR Disposal Cost, Other Contingency Cost, Total Contingency Cost, Total Lic. Term. Costs, NRC Management Costs, Spent Fuel Management Costs, Site Restoration Costs, Processed Volume, Class A, B, C Volumes, GFTCC, Burial/Processed Wt., Craft/Maintenance, Utility and Contractor Manhours.

**Monticello Nuclear Generating Plant  
 Decommissioning Cost Analysis**

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**Table I  
 Monticello Nuclear Generating Plant  
 SAFSTOR Decommissioning Cost Estimates with 100 Years of Spent Fuel Storage  
 (Thousands of 2020 Dollars)**

Activity Index	Activity Description	Decom Cost	Removal Cost	Packaging Cost	Transport Cost	Off-Site Processing Cost	LLRW Disposal Cost	Other Contingency Cost	Total Contingency Cost	Total Lic. Term. Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu Feet	Burial Volumes			Craft Manhours	Utility and Contractor Manhours	
															Class A Cu Feet	Class B Cu Feet	Class C Cu Feet			
<b>Period 0b: Direct Decommissioning Activities</b>																				
Demolition of Remaining Site Buildings																				
5b.1.1.1	Reactor Building	-	1,071	-	-	-	-	-	296	2,267	-	-	2,267	-	-	-	-	-	13,911	-
5b.1.1.2	Condensate Tanks Foundation	-	10	-	-	-	-	-	1	11	-	-	-	-	-	-	-	-	50	-
5b.1.1.3	HPV Storage Basin	-	19	-	-	-	-	-	3	22	-	-	-	-	-	-	-	-	25	-
5b.1.1.5	Hot Shop	-	16	-	-	-	-	-	3	19	-	-	-	-	-	-	-	-	177	-
5b.1.1.6	Hydrogen & Oxygen Storage	-	2	-	-	-	-	-	0	2	-	-	-	-	-	-	-	-	19	-
5b.1.1.8	MSW Storage & Shipping	-	83	-	-	-	-	-	12	95	-	-	-	-	-	-	-	-	662	-
5b.1.1.9	Misc Structures 2017	-	1,410	-	-	-	-	-	212	1,622	-	-	-	-	-	-	-	-	13,042	-
5b.1.1.10	Offgas Stack	-	108	-	-	-	-	-	16	124	-	-	-	-	-	-	-	-	544	-
5b.1.1.11	Offgas Storage & Compressor	-	339	-	-	-	-	-	6	345	-	-	-	-	-	-	-	-	1,090	-
5b.1.1.12	Reactor Building	-	128	-	-	-	-	-	19	147	-	-	-	-	-	-	-	-	1,320	-
5b.1.1.13	Recombiner	-	186	-	-	-	-	-	369	2,839	-	-	-	-	-	-	-	-	713	-
5b.1.1.14	Security Barrier	-	2,461	-	-	-	-	-	389	2,850	-	-	-	-	-	-	-	-	583	-
5b.1.1.15	Structures Greater than 2' Below Grade	-	1,269	-	-	-	-	-	8	1,277	-	-	-	-	-	-	-	-	12,619	-
5b.1.1.17	Turbine Building Addition	-	55	-	-	-	-	-	189	1,448	-	-	-	-	-	-	-	-	13,036	-
5b.1.1.18	Turbine Building Addition	-	182	-	-	-	-	-	27	209	-	-	-	-	-	-	-	-	618	-
5b.1.1.19	Turbine Pedestal	-	8,169	-	-	-	-	-	1,225	9,394	-	-	-	-	-	-	-	-	58,865	-
5b.1.1	Totals	-	8,169	-	-	-	-	-	1,225	9,394	-	-	-	-	-	-	-	-	58,865	-
<b>Site Cleanup Activities</b>																				
5b.1.2	Grade & landscape site	-	896	-	-	-	-	-	134	1,031	-	-	-	-	-	-	-	-	1,841	-
5b.1.3	Subtotal Period 0b Activity Costs	-	9,065	-	-	-	-	200	1,300	10,655	231	-	10,425	-	-	-	-	-	60,726	-
<b>Period 0b: Additional Costs</b>																				
5b.2.1	Initial Structure Cofferdam	-	3,022	-	-	-	-	13	509	3,835	-	-	3,835	-	-	-	-	-	13	-
5b.2.2	Construction Debris	-	335	-	-	-	-	-	50	385	-	-	385	-	-	-	-	-	2,684	-
5b.2.3	Backfills - Structures Cofferdam	-	5,483	-	-	-	-	1,170	176	1,346	-	-	1,346	-	-	-	-	-	5,422	-
5b.2.4	Disposal of Original MPC Canisters	-	35	-	-	-	-	-	1,709	8,544	8,544	-	8,544	-	-	-	-	-	2,505,700	-
5b.2.5	Subtotal Period 0b Additional Costs	-	9,737	-	-	-	-	5,611	3,339	21,639	8,544	-	12,495	-	-	-	-	-	11,907	-
<b>Period 0b: Collateral Costs</b>																				
5b.3.1	Small fuel allowances	-	111	-	-	-	-	-	17	127	-	-	127	-	-	-	-	-	-	-
5b.3.2	Spent Fuel Capital and Transfer	-	111	-	-	-	-	10,914	1,637	12,551	-	-	12,551	-	-	-	-	-	-	-
5b.3	Subtotal Period 0b Collateral Costs	-	222	-	-	-	-	10,931	1,654	12,678	-	-	12,678	-	-	-	-	-	-	-
<b>Period 0b: Period-Dependent Costs</b>																				
5b.4.1	Insurance	-	-	-	-	-	-	1,220	122	1,342	-	-	1,342	-	-	-	-	-	-	-
5b.4.2	Property taxes	-	-	-	-	-	-	4,534	453	4,988	-	-	4,988	-	-	-	-	-	-	-
5b.4.3	Plant equipment rental	-	5,842	-	-	-	-	315	817	6,659	-	-	6,659	-	-	-	-	-	-	-
5b.4.4	NRC ISFSI Fees	-	-	-	-	-	-	414	414	456	-	-	456	-	-	-	-	-	-	-
5b.4.5	Emergency Planning Fees	-	-	-	-	-	-	287	283	570	-	-	570	-	-	-	-	-	-	-
5b.4.6	ES&I Overhead Costs	-	-	-	-	-	-	1,022	1,022	2,233	-	-	2,233	-	-	-	-	-	-	-
5b.4.7	ES&I Overhead Costs	-	-	-	-	-	-	333	333	429	-	-	429	-	-	-	-	-	-	-
5b.4.8	Railroad Track Maintenance	-	-	-	-	-	-	217	33	250	-	-	250	-	-	-	-	-	-	-
5b.4.9	Security Staff Cost	-	-	-	-	-	-	7,971	1,386	9,167	-	-	9,167	-	-	-	-	-	-	-
5b.4.10	Subtotal Period 0b Period-Dependent Costs	-	-	-	-	-	-	11,486	1,072	8,229	-	-	9,301	-	-	-	-	-	-	-
5b.4.11	Subtotal Period 0b Period-Dependent Costs	-	-	-	-	-	-	35,122	5,823	46,767	0	-	14,385	32,492	-	-	-	-	-	-
5b.4	TOTAL PERIOD 0b COST	-	21,755	-	-	-	-	5,611	47,419	12,205	8,775	26,566	55,449	-	-	-	-	-	2,505,700	-
<b>PERIOD 0c - Fuel Storage Operations/Shipping</b>																				
Period 0c: Direct Decommissioning Activities																				
5c.3.1	Spent Fuel Capital and Transfer	-	-	-	-	-	-	142,239	21,339	163,508	-	-	163,508	-	-	-	-	-	-	-



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**Table I  
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 (Thousands of 2020 Dollars)

Activity Index	Activity Description	Decom Cost	Removal Cost	Packaging Cost	Transport Cost	Off-Site Processing Cost	LARW Disposal Cost	Other Contingency Cost	Total Contingency Cost	Total Lic. Term. Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu Feet	Burial Volumes			Burial/Processed Wt. Lbs.	Craft Manhours	Utility and Contractor Manhours	
															Class A Cu Feet	Class B Cu Feet	Class C Cu Feet				
56.3	Subtotal Period 56 Collateral Costs	-	-	-	-	-	-	142,230	21,339	163,568	-	163,568	-	-	-	-	-	-	-	-	-
	Period 56 - Period-Dependent Costs	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
56.4.1	Insurance	-	-	-	-	-	-	97,126	97,126	-	-	97,126	-	-	-	-	-	-	-	-	-
56.4.2	Emergency Planning Fees	-	-	-	-	-	-	32,707	32,707	-	-	32,707	-	-	-	-	-	-	-	-	-
56.4.4	NRC ISFSI Fees	-	-	-	-	-	-	9,215	9,215	6,314	6,314	10,137	-	-	-	-	-	-	-	-	-
56.4.5	Emergency Planning Fees	-	-	-	-	-	-	5,718	5,718	6,290	6,290	4,280	-	-	-	-	-	-	-	-	-
56.4.6	Fixed Overhead	-	-	-	-	-	-	1,218	1,218	9,983	9,983	1,083	-	-	-	-	-	-	-	-	-
56.4.8	ISFSI Overhead Costs	-	-	-	-	-	-	4,317	4,317	6,290	6,290	4,280	-	-	-	-	-	-	-	-	-
56.4.8	Railroad Track Maintenance	-	-	-	-	-	-	4,823	4,823	5,546	5,546	5,546	-	-	-	-	-	-	-	-	-
56.4.9	Security Staff Cost	-	-	-	-	-	-	150,854	150,854	173,482	173,482	173,482	-	-	-	-	-	-	-	-	-
56.4.10	DOE Staff Cost	-	-	-	-	-	-	17,825	17,825	17,825	17,825	17,825	-	-	-	-	-	-	-	-	-
56.4.11	Utility Staff Cost	-	-	-	-	-	-	71,322	71,322	84,297	84,297	84,297	-	-	-	-	-	-	-	-	-
56.4	Subtotal Period 56 Period-Dependent Costs	-	-	-	-	-	-	331,605	45,957	377,562	-	377,562	-	-	-	-	-	-	-	-	-
56.0	TOTAL PERIOD 56 COST	-	-	-	-	-	-	473,925	67,196	541,121	-	541,121	-	-	-	-	-	-	-	-	-
<b>PERIOD 5d - GTCC shipping</b>																					
Period 5d Direct Decommissioning Activities																					
5d.1.1.1	Nuclear Steam Supply System Removal	-	-	-	-	-	-	-	-	918	6,314	-	-	-	-	-	-	-	-	-	-
5d.1.1.1	Vessel & Internal GTCC Disposal	-	-	-	-	-	-	-	-	918	6,314	-	-	-	-	-	-	-	-	-	-
5d.1.1	Totals	-	-	-	-	-	-	-	-	918	6,314	-	-	-	-	-	-	-	-	-	-
5d.1	Subtotal Period 5d Activity Costs	-	-	-	-	-	-	-	-	918	6,314	-	-	-	-	-	-	-	-	-	-
5d.3.1	Collateral Costs	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5d.3	Subtotal Period 5d Collateral Costs	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5d.4.1	Insurance	-	-	-	-	-	-	27	27	-	-	-	-	-	-	-	-	-	-	-	-
5d.4.2	Emergency Planning Fees	-	-	-	-	-	-	30	30	-	-	-	-	-	-	-	-	-	-	-	-
5d.4.4	NRC ISFSI Fees	-	-	-	-	-	-	9	9	-	-	-	-	-	-	-	-	-	-	-	-
5d.4.5	Emergency Planning Fees	-	-	-	-	-	-	6	6	-	-	-	-	-	-	-	-	-	-	-	-
5d.4.6	Fixed Overhead	-	-	-	-	-	-	10	10	-	-	-	-	-	-	-	-	-	-	-	-
5d.4.8	ISFSI Overhead Costs	-	-	-	-	-	-	150	150	173	173	173	-	-	-	-	-	-	-	-	-
5d.4.9	Security Staff Cost	-	-	-	-	-	-	39	39	301	301	301	-	-	-	-	-	-	-	-	-
5d.4	Subtotal Period 5d Period-Dependent Costs	-	-	-	-	-	-	278	38	316	301	15	-	-	-	-	-	-	-	-	-
5d.0	TOTAL PERIOD 5d COST	-	-	-	-	-	-	306	960	6,661	6,615	47	-	-	-	-	-	-	-	-	-
<b>PERIOD 5e - ISFSI Decommissionation</b>																					
Period 5e Direct Decommissioning Activities																					
5e.1	Period 5e Additional Costs	-	-	-	-	-	-	2,086	692	3,008	3,008	-	-	-	-	-	-	-	-	-	-
5e.2	Subtotal Period 5e Additional Costs	-	-	-	-	-	-	2,086	692	3,008	3,008	-	-	-	-	-	-	-	-	-	-
5e.4.1	Insurance	-	-	-	-	-	-	116	50	146	146	-	-	-	-	-	-	-	-	-	-
5e.4.2	Emergency Planning Fees	-	-	-	-	-	-	248	62	310	310	-	-	-	-	-	-	-	-	-	-
5e.4.3	Plant energy budget	-	-	-	-	-	-	12	3	15	15	-	-	-	-	-	-	-	-	-	-
5e.4.4	Fixed Overhead	-	-	-	-	-	-	71	18	89	89	-	-	-	-	-	-	-	-	-	-
5e.4.6	Railroad Track Maintenance	-	-	-	-	-	-	352	88	440	440	-	-	-	-	-	-	-	-	-	-
5e.4.7	Utility Staff Cost	-	-	-	-	-	-	261	65	326	326	-	-	-	-	-	-	-	-	-	-
5e.4	Subtotal Period 5e Period-Dependent Costs	-	-	-	-	-	-	1,104	276	1,380	1,380	-	-	-	-	-	-	-	-	-	-
5e.0	TOTAL PERIOD 5e COST	-	-	-	-	-	-	283	877	4,387	4,387	-	-	-	-	-	-	-	-	-	-

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**Table I  
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 SAFSTOR Decommissioning Cost Estimates with 100 Years of Spent Fuel Storage  
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Activity Index	Activity Description	Decom Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu Feet	Burial Volumes			Burial/Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours	
															Class A Cu Feet	Class B Cu Feet	Class C Cu Feet				
<b>PERIOD 51- ISFSI Site Restoration</b>																					
Period of Direct Decommissioning Activities																					
Period of Additional Costs																					
52.1	Demolition and Site Restoration of ISFSI	-	1,664	-	-	-	-	256	273	2,093	-	-	2,093	-	-	-	-	-	7,309	160	
52.2	Subtotal Period of Additional Costs	-	1,664	-	-	-	-	256	273	2,093	-	-	2,093	-	-	-	-	-	7,309	160	
Period of Collateral Costs																					
53.1	Small tool allowances	-	11	-	-	-	-	-	2	12	-	-	12	-	-	-	-	-	-	-	
53.3	Subtotal Period of Collateral Costs	-	11	-	-	-	-	-	2	12	-	-	12	-	-	-	-	-	-	-	
Period of Period-Dependent Costs																					
54.2	Property taxes	-	-	-	-	-	-	127	13	140	-	-	140	-	-	-	-	-	-	-	
54.3	Heavy equipment rental	-	118	-	-	-	-	6	18	136	-	-	136	-	-	-	-	-	-	-	
54.4	Plant coverage budget	-	-	-	-	-	-	35	3	38	-	-	38	-	-	-	-	-	-	-	
54.6	Railroad Track Maintenance	-	-	-	-	-	-	21	3	24	-	-	24	-	-	-	-	-	-	-	
54.7	Security Staff Cost	-	-	-	-	-	-	180	27	207	-	-	207	-	-	-	-	-	-	2,562	
54.8	Utility Staff Cost	-	118	-	-	-	-	111	17	128	-	-	128	-	-	-	-	-	-	1,590	
54.9	Subtotal Period of Period-Dependent Costs	-	118	-	-	-	-	452	64	658	-	-	658	-	-	-	-	-	-	4,151	
55.0	TOTAL PERIOD 51 COST	-	1,693	-	-	-	-	758	368	2,700	-	-	2,700	-	-	-	-	-	7,309	4,311	
<b>PERIOD 5 TOTALS</b>																					
TOTAL COST TO DECOMMISSION		21,016	100,400	18,576	8,641	56,852	50,781	2,228,153	303,023	2,888,431	12,448,652	1,580,426	58,229	3,401,180	151,182	1,628	600	11,000	28,626,972	90,444	3,670,425
<b>TOTAL COST TO DECOMMISSION WITH 15.75% CONTINGENCY:</b>																					
TOTAL NRC LICENSE TERMINATION COST IS 43.23%, OR:		\$2,888,431 thousands of 2020 dollars																			
SPENT FUEL MANAGEMENT COST IS 5.47%, OR:		\$1,218,652 thousands of 2020 dollars																			
NON-NUCLEAR DEMOLITION COST IS 2.05%, OR:		\$59,354 thousands of 2020 dollars																			
TOTAL LOW-LEVEL RADIOACTIVE WASTE VOLUME BURIED (EXCLUDING GTCC):		155,409 Cubic Feet																			
TOTAL GREATER THAN CLASS C RADWASTE VOLUME GENERATED:		1,160 Cubic Feet																			
TOTAL SCRAP METAL REMOVED:		23,123 Tons																			
TOTAL CRAFT LABOR REQUIREMENTS:		873,407 Man-hours																			

End Notes:  
 a - indicates that this activity not charged as decommissioning expense  
 0 - indicates that this activity performed by decommissioning staff  
 - - indicates that this value is less than 0.5 but is non-zero  
 A cell containing "-" indicates a zero value

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**APPENDIX J**

**DETAILED COST ANALYSIS**

**SCENARIO 8: SAFSTOR with 200 Year DFS**

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**Table J  
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 SAFSTOR Decommissioning Cost Estimates with 200 Years of Spent Fuel Storage**  
 (Thousands of 2020 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LIRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu Feet	Class A Cu Feet	Class B Cu Feet	Class C Cu Feet	GTCC Cu Feet	Burial/Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours	
<b>PERIOD In - Shutdown through Transition</b>																						
Period In Direct Decommissioning Activities																						
1a.1.1	SAFSTOR site characterization survey	-	-	-	-	-	-	415	124	539	539	-	-	-	-	-	-	-	-	-	-	1,300
1a.1.2	Prepare preliminary decommissioning cost	-	-	-	-	-	-	167	25	192	192	-	-	-	-	-	-	-	-	-	-	-
1a.1.3	Notification of Cessation of Operations	-	-	-	-	-	-	-	na	na	-	-	-	-	-	-	-	-	-	-	-	-
1a.1.4	Remove fuel & source material	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1a.1.5	Remove fuel & source material handling	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1a.1.6	Deactivate plant systems & process waste	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1a.1.7	Prepare and submit FSDAR	-	-	-	-	-	-	257	30	296	296	-	-	-	-	-	-	-	-	-	-	2,000
1a.1.8	Review plant logs & specs.	-	-	-	-	-	-	167	25	192	192	-	-	-	-	-	-	-	-	-	-	1,300
1a.1.9	Prepare and submit FSDAR	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1a.1.10	Estimate by product inventory	-	-	-	-	-	-	120	19	148	148	-	-	-	-	-	-	-	-	-	-	1,000
1a.1.11	End product description	-	-	-	-	-	-	120	19	148	148	-	-	-	-	-	-	-	-	-	-	1,000
1a.1.12	Detailed by-product inventory	-	-	-	-	-	-	93	15	108	108	-	-	-	-	-	-	-	-	-	-	1,500
1a.1.13	Final by-product inventory	-	-	-	-	-	-	145	24	169	169	-	-	-	-	-	-	-	-	-	-	1,500
1a.1.14	Perform SER and EA	-	-	-	-	-	-	358	60	418	418	-	-	-	-	-	-	-	-	-	-	3,100
1a.1.15	Prepare/submit Detailed Technical Specifications	-	-	-	-	-	-	964	145	1,108	1,108	-	-	-	-	-	-	-	-	-	-	7,500
1a.1.16	Perform Site-Specific Cost Study	-	-	-	-	-	-	643	96	739	739	-	-	-	-	-	-	-	-	-	-	5,000
1a.1.17	Prepare/submit Final Fuel Management Plan	-	-	-	-	-	-	125	19	148	148	-	-	-	-	-	-	-	-	-	-	1,000
Activity Specifications																						
1a.1.18.1	Prepare plant and facilities for SAFSTOR	-	-	-	-	-	-	652	95	727	727	-	-	-	-	-	-	-	-	-	-	4,920
1a.1.18.2	Remove fuel from-cont. systems	-	-	-	-	-	-	30	5	35	35	-	-	-	-	-	-	-	-	-	-	200
1a.1.18.3	Plant structures and buildings	-	-	-	-	-	-	401	60	461	461	-	-	-	-	-	-	-	-	-	-	3,120
1a.1.18.4	Waste management	-	-	-	-	-	-	257	30	296	296	-	-	-	-	-	-	-	-	-	-	2,000
1a.1.18.5	Facility and site dormancy	-	-	-	-	-	-	257	30	296	296	-	-	-	-	-	-	-	-	-	-	2,000
1a.1.18	Total	-	-	-	-	-	-	2,983	312	2,366	2,366	-	-	-	-	-	-	-	-	-	-	16,207
Detailed Work Procedures																						
1a.1.19.1	Plant systems	-	-	-	-	-	-	152	23	175	175	-	-	-	-	-	-	-	-	-	-	1,183
1a.1.19.2	Facility cleanout & dormancy	-	-	-	-	-	-	107	16	123	123	-	-	-	-	-	-	-	-	-	-	900
1a.1.19	Total	-	-	-	-	-	-	306	46	352	352	-	-	-	-	-	-	-	-	-	-	2,383
1a.1.20	Process vacuum drying system	-	-	-	-	-	-	13	2	15	15	-	-	-	-	-	-	-	-	-	-	100
1a.1.21	Remove fuel from-cont. systems	-	-	-	-	-	-	12	2	14	14	-	-	-	-	-	-	-	-	-	-	100
1a.1.22	Drain & dry NSSS	-	-	-	-	-	-	306	46	352	352	-	-	-	-	-	-	-	-	-	-	2,383
1a.1.23	Drain/de-energize contaminated systems	-	-	-	-	-	-	12	2	14	14	-	-	-	-	-	-	-	-	-	-	100
1a.1.24	Decontaminate contaminated systems	-	-	-	-	-	-	12	2	14	14	-	-	-	-	-	-	-	-	-	-	100
1a.1	Subtotal Period In Activity Costs	-	-	-	-	-	-	6,120	980	7,100	7,100	-	-	-	-	-	-	-	-	-	-	44,300
Period In Collateral Costs																						
1a.3.1	Spent Fuel Capital and Transfer	-	-	-	-	-	-	1,323	198	1,522	1,522	1,522	-	-	-	-	-	-	-	-	-	-
1a.3.2	Spent Fuel Management	-	-	-	-	-	-	1,225	180	1,405	1,405	1,405	-	-	-	-	-	-	-	-	-	-
1a.3	Subtotal Period In Collateral Costs	-	-	-	-	-	-	11,215	1,682	12,897	12,897	1,522	-	-	-	-	-	-	-	-	-	-
Period In Period-Dependent Costs																						
1a.4.2	Property taxes	-	-	-	-	-	-	5,938	933	6,871	6,871	-	-	-	-	-	-	-	-	-	-	-
1a.4.3	Health physics supplies	-	-	-	-	-	-	5,370	327	5,697	5,697	-	-	-	-	-	-	-	-	-	-	-
1a.4.4	Heavy equipment rental	-	-	-	-	-	-	113	163	276	276	-	-	-	-	-	-	-	-	-	-	-
1a.4.5	Disposal of DW generated	-	-	-	-	-	-	614	113	727	727	-	-	-	-	-	-	-	-	-	-	-
1a.4.6	Emergency Planning Budgets	-	-	-	-	-	-	50	272	322	322	-	-	-	-	-	-	-	-	-	-	-
1a.4.7	NRC Fees	-	-	-	-	-	-	1,817	272	2,089	2,089	-	-	-	-	-	-	-	-	-	-	-
1a.4.8	Emergency Planning Fees	-	-	-	-	-	-	862	89	951	951	-	-	-	-	-	-	-	-	-	-	-
1a.4.9	Professional Fees	-	-	-	-	-	-	3,428	343	3,770	3,770	-	-	-	-	-	-	-	-	-	-	-
1a.4.10	Site Remediation O&M	-	-	-	-	-	-	845	3,009	3,854	3,854	-	-	-	-	-	-	-	-	-	-	-
1a.4.11	ES&S Operating Costs	-	-	-	-	-	-	112	17	129	129	-	-	-	-	-	-	-	-	-	-	-
1a.4.12	Railroad Track Maintenance	-	-	-	-	-	-	125	19	144	144	-	-	-	-	-	-	-	-	-	-	-
1a.4.13	Emergency Spill Cont.	-	-	-	-	-	-	145	21	166	166	-	-	-	-	-	-	-	-	-	-	-
1a.4.14	Utility O&M	-	-	-	-	-	-	4,093	4,093	8,186	8,186	-	-	-	-	-	-	-	-	-	-	-
1a.4	Subtotal Period In Period-Dependent Costs	-	-	-	-	-	-	50,389	8,679	64,032	64,032	4,870	-	-	-	-	-	-	-	-	-	20
1a.0	TOTAL PERIOD In COST	-	-	-	-	-	-	76,724	11,341	88,500	88,500	6,392	-	-	-	-	-	-	-	-	-	712,070

**Monticello Nuclear Generating Plant  
 Decommissioning Cost Analysis**

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**Table J  
 Monticello Nuclear Generating Plant  
 SAFSTOR Decommissioning Cost Estimates with 200 Years of Spent Fuel Storage**  
 (Thousands of 2020 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Cost	Transport Cost	Off-Site Processing Cost	LLRW Disposal Cost	Other Cost	Total Contingency	Total Cost	NRG Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu Feet	Class A Cu Feet	Class B Cu Feet	Class C Cu Feet	GTCC Cu Feet	Burial/Processed Wt. Lbs.	Craft Manhours	Utility and Contractor Manhours
<b>PERIOD Ie - SAFSTOR Limited DECON Activities</b>																					
Period Ie Direct Decommissioning Activities																					
Decommissioning of Site Buildings																					
B.1.1.1	Reactor Building	5,135	-	-	-	-	-	-	2,977	7,732	7,732	-	-	-	-	-	-	-	-	70,157	-
B.1.1.2	Admin	95	-	-	-	-	-	-	48	143	143	-	-	-	-	-	-	-	-	1,387	-
B.1.1.3	HPV Room	35	-	-	-	-	-	-	12	28	28	-	-	-	-	-	-	-	-	308	-
B.1.1.4	LLRW Shop	45	-	-	-	-	-	-	17	38	38	-	-	-	-	-	-	-	-	298	-
B.1.1.5	LLRW Storage & Shipping	49	-	-	-	-	-	-	25	74	74	-	-	-	-	-	-	-	-	705	-
B.1.1.6	Offgas Stack	326	-	-	-	-	-	-	163	489	489	-	-	-	-	-	-	-	-	4,575	-
B.1.1.7	Offgas Storage & Compressor	31	-	-	-	-	-	-	17	34	34	-	-	-	-	-	-	-	-	1,423	-
B.1.1.8	Offgas Stack	105	-	-	-	-	-	-	57	151	151	-	-	-	-	-	-	-	-	1,423	-
B.1.1.9	Radwaste Material Storage Warehouse	54	-	-	-	-	-	-	27	81	81	-	-	-	-	-	-	-	-	768	-
B.1.1.10	Recombiner	23	-	-	-	-	-	-	11	34	34	-	-	-	-	-	-	-	-	323	-
B.1.1.11	Turbine	400	-	-	-	-	-	-	399	900	900	-	-	-	-	-	-	-	-	8,563	-
B.1.1.12	Building Addition	400	-	-	-	-	-	-	399	900	900	-	-	-	-	-	-	-	-	8,563	-
B.1.1.13	Reactor (Post Fuel)	839	-	-	-	-	-	-	415	1,245	1,245	-	-	-	-	-	-	-	-	11,337	-
B.1.1	Totals	7,339	-	-	-	-	-	-	3,679	11,038	11,038	-	-	-	-	-	-	-	-	101,033	-
B.1	Subtotal Period Ie Activity Costs	7,339	-	-	-	-	-	-	3,679	11,038	11,038	-	-	-	-	-	-	-	-	101,033	-
Period Ie Additional Costs																					
B.2.1	Spent Fuel Pool Isolation	-	-	-	-	-	-	12,675	1,901	14,576	14,576	-	-	-	-	-	-	-	-	-	-
B.2	Subtotal Period Ie Additional Costs	-	-	-	-	-	-	12,675	1,901	14,576	14,576	-	-	-	-	-	-	-	-	-	-
Period Ie Collateral Costs																					
B.3.1	Decon equipment	1,055	-	-	-	-	-	-	158	1,213	1,213	-	-	-	-	-	-	-	-	-	-
B.3.2	Water treatment/conditioning water waste	220	-	-	-	-	-	-	19	145	145	-	-	-	-	-	-	-	-	-	-
B.3.4	Small tool allowance	136	-	-	-	-	-	-	19	145	145	-	-	-	-	-	-	-	-	-	-
B.3.5	Spent Fuel Capital and Transfer	-	-	-	-	-	-	186	29	225	-	-	-	-	-	-	-	-	-	-	-
B.3.6	Retention and Severance	-	-	-	-	-	-	3,601	540	4,141	4,141	-	-	-	-	-	-	-	-	-	-
B.3	Subtotal Period Ie Collateral Costs	1,271	-	-	-	-	-	5,683	1,067	7,246	7,246	-	-	-	-	-	-	-	-	81,042	263
Period Ie Period-Dependent Costs																					
B.4.1	Decon supplies	1,562	-	-	-	-	-	-	391	1,953	1,953	-	-	-	-	-	-	-	-	-	-
B.4.2	Decon equipment	-	-	-	-	-	-	599	89	688	688	-	-	-	-	-	-	-	-	-	-
B.4.3	Property taxes	-	-	-	-	-	-	890	89	979	979	-	-	-	-	-	-	-	-	-	-
B.4.4	Health physics supplies	-	-	-	-	-	-	-	182	911	911	-	-	-	-	-	-	-	-	-	-
B.4.5	Heavy equipment rental	-	-	-	-	-	-	-	28	216	216	-	-	-	-	-	-	-	-	-	-
B.4.6	Decon equipment generated	-	-	-	-	-	-	-	68	321	321	-	-	-	-	-	-	-	-	-	-
B.4.7	Plant energy budget	-	-	-	-	-	-	453	68	521	521	-	-	-	-	-	-	-	-	-	-
B.4.8	NRG Fees	-	-	-	-	-	-	-	161	177	177	-	-	-	-	-	-	-	-	-	-
B.4.9	Emergency Planning Fees	-	-	-	-	-	-	-	71	779	779	-	-	-	-	-	-	-	-	-	-
B.4.10	Spent Fuel Pool O&M	-	-	-	-	-	-	-	32	242	242	-	-	-	-	-	-	-	-	-	-
B.4.11	Spent Fuel Pool O&M	-	-	-	-	-	-	-	32	242	242	-	-	-	-	-	-	-	-	-	-
B.4.12	RFSI Operating Costs	-	-	-	-	-	-	-	4	32	32	-	-	-	-	-	-	-	-	-	-
B.4.13	Railroad Track Maintenance	-	-	-	-	-	-	-	36	36	36	-	-	-	-	-	-	-	-	-	-
B.4.14	Spent Fuel Pool O&M	-	-	-	-	-	-	-	63	434	434	-	-	-	-	-	-	-	-	-	-
B.4.15	Utility Staff Cost	-	-	-	-	-	-	-	1,020	7,823	7,823	-	-	-	-	-	-	-	-	-	-
B.4	Subtotal Period Ie Period-Dependent Costs	1,562	-	-	-	-	-	46	14,599	16,987	16,987	-	-	-	-	-	-	-	-	11,002	18
B.0	TOTAL PERIOD Ie COST	10,195	-	-	-	-	-	634	31,070	32,688	32,688	-	-	-	-	-	-	-	-	92,135	101,314
<b>PERIOD Ie - Preparations for SAFSTOR Dormancy</b>																					
Period Ie Direct Decommissioning Activities																					
Ic.1.1	Prepare support equipment for storage	-	-	-	-	-	-	-	79	606	606	-	-	-	-	-	-	-	-	-	-
Ic.1.2	Install containment pressure equal lines	-	-	-	-	-	-	-	8	62	62	-	-	-	-	-	-	-	-	-	-
Ic.1.3	Interim survey prior to dormancy	-	-	-	-	-	-	733	220	953	953	-	-	-	-	-	-	-	-	-	-
Ic.1.5	Prepare & submit interim report	-	-	-	-	-	-	75	11	86	86	-	-	-	-	-	-	-	-	-	-
Ic.1	Subtotal Period Ie Activity Costs	-	-	-	-	-	-	808	318	1,707	1,707	-	-	-	-	-	-	-	-	-	-
Period Ie Collateral Costs																					
Ic.3.1	Process decommissioning water waste	161	-	-	-	-	-	-	228	1,120	1,120	-	-	-	-	-	-	-	-	-	-
Ic.3	Subtotal Period Ie Activity Costs	161	-	-	-	-	-	-	228	1,120	1,120	-	-	-	-	-	-	-	-	-	-

**Monticello Nuclear Generating Plant  
 Decommissioning Cost Analysis**

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**Table J  
 Monticello Nuclear Generating Plant  
 SAFSTOR Decommissioning Cost Estimates with 200 Years of Spent Fuel Storage**  
 (Thousands of 2020 Dollars)

Activity Index	Activity Description	Decom Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LIRW Disposal Costs	Other Costs	Total Contingency	Total	Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu Feet	Class A Cu Feet	Class B Cu Feet	Class C Cu Feet	GTCC Cu Feet	Burial/Processed Wt. Lbs.	Craft Manhours	Utility and Contractor Manhours
1c.3.3	Small fuel allowances	-	-	-	-	-	-	-	1	6	-	-	-	-	-	-	-	-	-	-	-
1c.3.4	Spent Fuel Capital and Transfer	-	-	-	-	-	-	-	381	2,920	6	2,920	-	-	-	-	-	-	-	-	-
1c.3.5	Retention and Sovereignty	-	-	-	-	-	-	-	410	3,145	3,145	-	-	-	-	-	-	-	-	-	-
1c.3	Subtotal Period 1c Collateral Costs	161	5	307	190	-	433	5,273	1,020	7,130	4,270	2,920	-	-	994	-	-	-	55,053	194	-
Period 1c: Period-Dependent Costs																					
1c.4.1	Insurance	-	-	-	-	-	-	580	58	638	-	-	-	-	-	-	-	-	-	-	-
1c.4.2	Property taxes	-	-	-	-	-	-	888	69	957	-	-	-	-	-	-	-	-	-	-	-
1c.4.3	Heavy equipment rental	-	-	-	-	-	-	248	28	276	-	-	-	-	-	-	-	-	-	-	-
1c.4.4	Heavy equipment rental	-	-	-	-	-	-	188	28	216	-	-	-	-	-	-	-	-	-	-	-
1c.4.5	Deposit of DAW generated	-	-	-	-	-	13	-	4	21	-	-	-	-	-	-	-	-	-	-	-
1c.4.6	Natural energy budget	-	-	3	2	-	-	-	68	921	-	-	-	-	-	-	-	-	-	-	5
1c.4.7	Plant energy budget	-	-	-	-	-	-	433	68	501	-	-	-	-	-	-	-	-	-	-	-
1c.4.8	Emergency Planning Fees	-	-	-	-	-	-	708	71	779	-	779	-	-	-	-	-	-	-	-	-
1c.4.9	Riveted Overhead	-	-	-	-	-	-	652	98	750	-	750	-	-	-	-	-	-	-	-	-
1c.4.10	Spent Fuel Pool O&M	-	-	-	-	-	-	211	32	242	-	242	-	-	-	-	-	-	-	-	-
1c.4.11	Spent Fuel Pool O&M	-	-	-	-	-	-	31	5	36	-	36	-	-	-	-	-	-	-	-	-
1c.4.12	Railroad Track Maintenance	-	-	-	-	-	-	4,082	612	4,694	-	4,694	-	-	-	-	-	-	-	-	61,192
1c.4.13	Utility Staff Cost	-	-	-	-	-	-	4,903	1,020	5,923	-	5,923	-	-	-	-	-	-	-	-	106,271
1c.4.14	Utility Staff Cost	-	-	-	-	-	-	2,166	216	2,382	-	2,382	-	-	-	-	-	-	-	-	106,658
1c.4	Subtotal Period 1c Period-Dependent Costs	-	438	3	2	-	13	11,257	2,166	13,423	-	13,423	-	-	132	-	-	-	3,039	5	-
1c.0	TOTAL PERIOD 1c COST	161	1,021	110	192	-	446	20,678	3,305	26,113	22,140	3,373	-	-	1,146	-	-	-	62,892	16,700	167,046
<b>PERIOD 1 TOTALS</b>																					
		10,357	3,431	278	482	-	1,130	128,472	24,170	168,301	156,658	11,613	-	-	3,691	-	-	-	187,017	118,004	1,045,579
<b>PERIOD 2a - SAFSTOR Dormancy with Wet Spent Fuel Storage</b>																					
Period 2a: Direct Decommissioning Activities																					
2a.1.1	Quarterly Inspection	-	-	-	-	-	-	-	a	a	-	-	-	-	-	-	-	-	-	-	-
2a.1.2	Semi-annual environmental survey	-	-	-	-	-	-	-	93	178	-	-	-	-	-	-	-	-	-	-	-
2a.1.3	Permit reports	-	-	-	-	-	-	340	87	427	-	-	-	-	-	-	-	-	-	-	-
2a.1.4	Insurance	-	-	-	-	-	-	504	111	615	-	-	-	-	-	-	-	-	-	-	-
2a.1.5	Maintenance supplies	-	-	-	-	-	-	504	111	615	-	-	-	-	-	-	-	-	-	-	-
2a.1	Subtotal Period 2a Activity Costs	-	-	-	-	-	-	504	111	615	-	-	-	-	-	-	-	-	-	-	-
Period 2a: Additional Costs																					
2a.2.1	Security Modifications	-	-	-	-	-	-	8,686	1,304	10,000	10,000	-	-	-	-	-	-	-	-	-	-
2a.2	Subtotal Period 2a Additional Costs	-	-	-	-	-	-	8,686	1,304	10,000	10,000	-	-	-	-	-	-	-	-	-	-
Period 2a: Collateral Costs																					
2a.3.1	Spent Fuel Capital and Transfer	-	-	-	-	-	-	141,374	21,306	162,680	-	162,680	-	-	-	-	-	-	-	-	-
2a.3.2	Retention and Sovereignty	-	-	-	-	-	-	19,427	2,914	22,341	-	22,341	-	-	-	-	-	-	-	-	-
2a.3	Subtotal Period 2a Collateral Costs	-	-	-	-	-	-	160,801	24,120	184,921	22,341	162,680	-	-	-	-	-	-	-	-	-
Period 2a: Period-Dependent Costs																					
2a.4.1	Insurance	-	-	-	-	-	-	1,761	176	1,937	1,937	-	-	-	-	-	-	-	-	-	-
2a.4.2	Property taxes	-	-	-	-	-	-	8,932	893	9,825	9,825	-	-	-	-	-	-	-	-	-	-
2a.4.3	Heavy equipment rental	-	-	-	-	-	-	14	14	28	-	-	-	-	-	-	-	-	-	-	-
2a.4.4	Deposit of DAW generated	-	-	-	-	-	47	-	14	70	-	-	-	-	-	-	-	-	-	-	19
2a.4.5	Plant energy budget	-	-	11	6	-	-	910	136	1,046	1,046	-	-	-	-	-	-	-	-	-	-
2a.4.6	NRC Fees	-	-	-	-	-	-	610	61	671	671	-	-	-	-	-	-	-	-	-	-
2a.4.7	Emergency Planning Fees	-	-	-	-	-	-	5,306	706	6,012	6,012	-	-	-	-	-	-	-	-	-	-
2a.4.8	Spent Fuel Pool O&M	-	-	-	-	-	-	2,115	317	2,432	2,432	-	-	-	-	-	-	-	-	-	-
2a.4.9	Spent Fuel Pool O&M	-	-	-	-	-	-	280	42	322	322	-	-	-	-	-	-	-	-	-	-
2a.4.10	ES&S Operating Costs	-	-	-	-	-	-	37,806	5,671	43,477	43,477	-	-	-	-	-	-	-	-	-	-
2a.4.11	Railroad Track Maintenance	-	-	-	-	-	-	13,543	2,031	15,574	15,574	-	-	-	-	-	-	-	-	-	-
2a.4.12	Utility Staff Cost	-	-	-	-	-	-	79,012	11,069	90,753	90,753	-	-	-	-	-	-	-	-	-	-
2a.4.13	Utility Staff Cost	-	-	-	-	-	-	47	6	53	53	-	-	-	-	-	-	-	-	-	-
2a.4	Subtotal Period 2a Period-Dependent Costs	-	617	11	6	-	47	79,012	11,069	90,753	90,753	64,868	25,565	-	576	-	-	-	11,523	19	768,261
2a.0	TOTAL PERIOD 2a COST	-	617	11	6	-	47	25,013	33,634	286,228	97,823	188,505	-	-	576	-	-	-	11,523	19	768,261
<b>PERIOD 2b - SAFSTOR Dormancy with Dry Spent Fuel Storage</b>																					
Period 2b: Direct Decommissioning Activities																					
2b.1.1	Quarterly Inspection	-	-	-	-	-	-	-	a	a	-	-	-	-	-	-	-	-	-	-	-
2b.1.2	Semi-annual environmental survey	-	-	-	-	-	-	-	a	a	-	-	-	-	-	-	-	-	-	-	-

**Monticello Nuclear Generating Plant  
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**Table J  
 Monticello Nuclear Generating Plant  
 SAFSTOR Decommissioning Cost Estimates with 200 Years of Spent Fuel Storage**  
 (Thousands of 2020 Dollars)

Activity Index	Activity Description	Decom Cost	Removal Cost	Packaging Cost	Transport Cost	Off-Site Processing Cost	LWR Disposal Cost	Other	Total Contingency	Total	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu Feet	Class A Cu Feet	Class B Cu Feet	Class C Cu Feet	GTCC Cu Feet	Burial/Processed Wt. Lbs.	Craft Manhours	Utility and Contractor Manhours
Period 2b Direct Decommissioning Activities (continued)																					
2b.1.3	Prepare reports	-	-	-	-	-	-	3,306	-	3,306	-	-	-	-	-	-	-	-	-	-	-
2b.1.4	Blowdown roof replacement	-	-	-	-	-	-	469	-	469	-	-	-	-	-	-	-	-	-	-	-
2b.1.5	Maintenance supplies	-	-	-	-	-	-	7,065	-	7,065	-	-	-	-	-	-	-	-	-	-	-
2b.1	Subtotal Period 2b Activity Costs	-	-	-	-	-	-	10,152	-	10,152	-	-	-	-	-	-	-	-	-	-	-
Period 2b Collateral Costs																					
2b.3.1	Spent Fuel Capital and Transfer	-	-	-	-	-	-	388,775	-	388,775	-	-	-	-	-	-	-	-	-	-	-
2b.3	Subtotal Period 2b Collateral Costs	-	-	-	-	-	-	388,775	-	388,775	-	-	-	-	-	-	-	-	-	-	-
Period 2b Period-Dependent Costs																					
2b.4.1	Insurance	-	-	-	-	-	-	35,606	-	35,606	-	-	-	-	-	-	-	-	-	-	-
2b.4.2	Health physics supplies	-	-	-	-	-	-	186,615	-	186,615	-	-	-	-	-	-	-	-	-	-	-
2b.4.3	Health physics supplies	-	-	-	-	-	-	1,512	-	1,512	-	-	-	-	-	-	-	-	-	-	-
2b.4.4	Disposal of DAW generated	-	6,047	-	-	-	-	7,559	-	13,596	-	-	-	-	-	-	-	-	-	-	-
2b.4.5	Plant energy budget	-	-	-	-	-	-	1,196	-	1,196	-	-	-	-	-	-	-	-	-	-	-
2b.4.6	Emergency Planning Fees	-	-	-	-	-	-	7,506	-	7,506	-	-	-	-	-	-	-	-	-	-	-
2b.4.7	Emergency Planning Fees	-	-	-	-	-	-	771	-	771	-	-	-	-	-	-	-	-	-	-	-
2b.4.8	Fixed Overhead	-	-	-	-	-	-	10,904	-	10,904	-	-	-	-	-	-	-	-	-	-	-
2b.4.9	RPSI Operating Costs	-	-	-	-	-	-	850	-	850	-	-	-	-	-	-	-	-	-	-	-
2b.4.10	Plant Maintenance	-	-	-	-	-	-	5,696	-	5,696	-	-	-	-	-	-	-	-	-	-	-
2b.4.11	Security Staff Cost	-	-	-	-	-	-	288,802	-	288,802	-	-	-	-	-	-	-	-	-	-	-
2b.4.12	Utility Staff Cost	-	-	-	-	-	-	11,547	-	11,547	-	-	-	-	-	-	-	-	-	-	-
2b.4	Subtotal Period 2b Period-Dependent Costs	-	6,047	-	-	-	-	1,115,417	-	1,121,464	-	-	-	-	-	-	-	-	-	-	-
2b.1	TOTAL PERIOD 2b COST	-	6,047	-	-	-	-	1,029,652	-	1,035,699	-	-	-	-	-	-	-	-	-	-	-
2b.0	TOTAL PERIOD 2b COST	-	6,047	-	-	-	-	1,418,451	-	1,424,498	-	-	-	-	-	-	-	-	-	-	-
PERIOD 2b TOTALS																					
2b.0	TOTAL PERIOD 2b COST	-	6,047	-	-	-	-	1,418,451	-	1,424,498	-	-	-	-	-	-	-	-	-	-	-
PERIOD 3a - Reactivate Site Following SAFSTOR Dormancy																					
Period 3a Direct Decommissioning Activities																					
3a.1.1	Review plant drawings & specs.	-	-	-	-	-	-	167	-	167	-	-	-	-	-	-	-	-	-	-	-
3a.1.2	Review plant drawings & specs.	-	-	-	-	-	-	501	-	501	-	-	-	-	-	-	-	-	-	-	-
3a.1.3	Perform detailed rad survey	-	-	-	-	-	-	129	-	129	-	-	-	-	-	-	-	-	-	-	-
3a.1.4	End product description	-	-	-	-	-	-	964	-	964	-	-	-	-	-	-	-	-	-	-	-
3a.1.5	Define major work sequences	-	-	-	-	-	-	388	-	388	-	-	-	-	-	-	-	-	-	-	-
3a.1.6	Perform SHR and EA	-	-	-	-	-	-	643	-	643	-	-	-	-	-	-	-	-	-	-	-
3a.1.7	Perform Site-Specific Cost Study	-	-	-	-	-	-	947	-	947	-	-	-	-	-	-	-	-	-	-	-
3a.1.8	Activity Specifications	-	-	-	-	-	-	536	-	536	-	-	-	-	-	-	-	-	-	-	-
3a.1.9.1	Re-activate plant & temporary facilities	-	-	-	-	-	-	825	-	825	-	-	-	-	-	-	-	-	-	-	-
3a.1.9.2	Plant systems	-	-	-	-	-	-	64	-	64	-	-	-	-	-	-	-	-	-	-	-
3a.1.9.3	Power island	-	-	-	-	-	-	129	-	129	-	-	-	-	-	-	-	-	-	-	-
3a.1.9.4	Reactor island	-	-	-	-	-	-	64	-	64	-	-	-	-	-	-	-	-	-	-	-
3a.1.9.5	Sacrificial shield	-	-	-	-	-	-	288	-	288	-	-	-	-	-	-	-	-	-	-	-
3a.1.9.6	Mixture separators/boilers	-	-	-	-	-	-	268	-	268	-	-	-	-	-	-	-	-	-	-	-
3a.1.9.7	Main Turbine	-	-	-	-	-	-	406	-	406	-	-	-	-	-	-	-	-	-	-	-
3a.1.9.8	Main Turbine	-	-	-	-	-	-	287	-	287	-	-	-	-	-	-	-	-	-	-	-
3a.1.9.9	Main Condensers	-	-	-	-	-	-	406	-	406	-	-	-	-	-	-	-	-	-	-	-
3a.1.9.10	Pressure suppression structure	-	-	-	-	-	-	406	-	406	-	-	-	-	-	-	-	-	-	-	-
3a.1.9.11	Pressure suppression structure	-	-	-	-	-	-	406	-	406	-	-	-	-	-	-	-	-	-	-	-
3a.1.9.12	Pressure suppression structure	-	-	-	-	-	-	406	-	406	-	-	-	-	-	-	-	-	-	-	-
3a.1.9.13	Waste management	-	-	-	-	-	-	591	-	591	-	-	-	-	-	-	-	-	-	-	-
3a.1.9.14	Facility & site closure	-	-	-	-	-	-	116	-	116	-	-	-	-	-	-	-	-	-	-	-
3a.1.9	Total	-	-	-	-	-	-	5,756	-	5,756	-	-	-	-	-	-	-	-	-	-	-
Planning & Site Preparations																					
3a.1.10	Prepare dismantling sequence	-	-	-	-	-	-	308	-	308	-	-	-	-	-	-	-	-	-	-	-
3a.1.11	Plant prep. & temp. access	-	-	-	-	-	-	240	-	240	-	-	-	-	-	-	-	-	-	-	-
3a.1.12	Rigging/Cont. Cont. EHV/ops/cooling/etc.	-	-	-	-	-	-	360	-	360	-	-	-	-	-	-	-	-	-	-	-
3a.1.13	Pressure cables/liners & containers	-	-	-	-	-	-	158	-	158	-	-	-	-	-	-	-	-	-	-	-
3a.1.14	Subtotal Period 3a Activity Costs	-	-	-	-	-	-	15,341	-	15,341	-	-	-	-	-	-	-	-	-	-	-
Period 3a Additional Costs																					
3a.2.1	Site Characterization	-	-	-	-	-	-	5,930	-	5,930	-	-	-	-	-	-	-	-	-	-	-

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**Table J  
 Monticello Nuclear Generating Plant  
 SAFSTOR Decommissioning Cost Estimates with 200 Years of Spent Fuel Storage**  
 (Thousands of 2020 Dollars)

Activity Index	Activity Description	Decom Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LIRW Disposal Costs	Other	Total Contingency	Total	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu Feet	Burial Volumes			Burial/Processed Wt. Lbs.	Craft Manhours	Utility and Contractor Manhours	
															Class A Cu Feet	Class B Cu Feet	Class C Cu Feet				
38.2.2	Mixed & RCMA Waste	-	-	28	29	14	-	5,930	9	7,788	80	7,788	-	43	-	-	-	5,253	161	10,852	
38.2	Subtotal Period 38 Additional Costs	-	-	28	29	14	-	5,930	9	7,788	80	7,788	-	43	-	-	-	5,253	30,061	-	
38.3.1	Spent Fuel Capital and Transfer	-	-	-	-	-	-	5,693	854	6,547	-	6,547	-	-	-	-	-	-	-	-	
38.3	Subtotal Period 38 Collateral Costs	-	-	-	-	-	-	5,693	854	6,547	-	6,547	-	-	-	-	-	-	-	-	
38.4.1	Insurance	-	-	-	-	-	-	703	70	774	442	332	-	-	-	-	-	-	-	-	
38.4.2	Property taxes	-	-	-	-	-	-	3,479	348	3,827	3,241	586	-	-	-	-	-	-	-	-	
38.4.3	Health physics supplies	-	238	-	-	-	-	-	115	623	863	-	-	-	-	-	-	-	-	-	
38.4.4	Health physics training	-	2,709	-	-	-	-	-	12	70	70	-	-	-	-	-	-	-	-	-	
38.4.5	Disposal of DAW generated	-	-	10	5	-	42	-	272	2,089	2,089	-	-	-	-	-	-	-	10,311	17	
38.4.6	Plant energy budget	-	-	-	-	-	-	1,817	272	2,089	2,089	-	-	-	-	-	-	-	-	-	
38.4.7	NRC IFSH Fees	-	-	-	-	-	-	26	33	59	368	31	-	-	-	-	-	-	-	-	
38.4.8	NRC IFSH Fees	-	-	-	-	-	-	33	31	64	368	31	-	-	-	-	-	-	-	-	
38.4.9	Emergency Planning Fees	-	-	-	-	-	-	148	15	163	163	-	-	-	-	-	-	-	-	-	
38.4.10	Fixed Overhead	-	-	-	-	-	-	2,616	392	3,009	3,009	-	-	-	-	-	-	-	-	-	
38.4.11	RFST Operating Costs	-	-	-	-	-	-	112	17	129	144	129	-	-	-	-	-	-	-	-	
38.4.12	RFST Operating Costs	-	-	-	-	-	-	112	17	129	144	129	-	-	-	-	-	-	-	-	
38.4.13	Security Staff Cost	-	-	-	-	-	-	4,690	703	5,393	5,107	286	-	-	-	-	-	-	-	61,100	
38.4.14	Utility Staff Cost	-	-	-	-	-	-	16,817	2,523	19,339	18,160	1,180	-	-	-	-	-	-	-	290,000	
38.4	Subtotal Period 38 Period-Dependent Costs	-	1,291	10	5	-	42	39,870	4,666	36,875	34,169	2,706	-	-	-	-	-	-	10,311	17	320,100
38.0	TOTAL PERIOD 38 COST	-	1,291	38	34	14	42	57,834	9,599	68,853	60,014	9,253	586	43	516	-	-	15,365	30,078	413,475	
<b>PERIOD 38 - Decommissioning Preparations</b>																					
Period 38 Direct Decommissioning Activities																					
Detailed Work Procedures																					
38.1.1.2	Reactor internals	-	-	-	-	-	-	608	91	700	630	-	-	-	-	-	-	-	-	4,759	
38.1.1.3	Remaining buildings	-	-	-	-	-	-	514	77	591	501	-	-	-	-	-	-	-	-	4,000	
38.1.1.4	CRD housings & NAs	-	-	-	-	-	-	174	26	200	50	-	-	-	-	-	-	-	-	1,350	
38.1.1.5	Reactor vessel	-	-	-	-	-	-	129	19	148	148	-	-	-	-	-	-	-	-	1,000	
38.1.1.6	Removal primary containment	-	-	-	-	-	-	257	39	296	266	-	-	-	-	-	-	-	-	2,000	
38.1.1.7	Reactor vessel	-	-	-	-	-	-	467	70	537	637	-	-	-	-	-	-	-	-	3,650	
38.1.1.8	Facility cleanup	-	-	-	-	-	-	154	23	177	89	-	-	-	-	-	-	-	-	1,200	
38.1.1.9	Reactor vessel	-	-	-	-	-	-	154	23	177	89	-	-	-	-	-	-	-	-	1,200	
38.1.1.10	Reinforced concrete	-	-	-	-	-	-	129	19	148	148	-	-	-	-	-	-	-	-	1,000	
38.1.1.11	Main Turbine	-	-	-	-	-	-	267	40	307	307	-	-	-	-	-	-	-	-	2,980	
38.1.1.12	Main Condensers	-	-	-	-	-	-	268	40	309	309	-	-	-	-	-	-	-	-	2,988	
38.1.1.13	Reactor vessel	-	-	-	-	-	-	129	19	148	148	-	-	-	-	-	-	-	-	1,000	
38.1.1.14	Reactor vessel	-	-	-	-	-	-	351	53	403	363	-	-	-	-	-	-	-	-	2,730	
38.1.1.15	Reactor building	-	-	-	-	-	-	351	53	403	363	-	-	-	-	-	-	-	-	2,730	
38.1.1	Total	-	-	-	-	-	-	4,208	631	4,839	4,376	-	-	-	-	-	-	-	-	32,741	
38.1	Subtotal Period 38 Activity Costs	-	-	-	-	-	-	4,208	631	4,839	4,376	-	-	-	-	-	-	-	-	32,741	
Period 38 Collateral Costs																					
38.3.1	Decom equipment	1,055	-	-	-	-	-	1,204	168	1,213	1,213	-	-	-	-	-	-	-	-	-	
38.3.2	DOC staff relocation expenses	-	1,200	-	-	-	-	1,800	180	1,980	1,860	-	-	-	-	-	-	-	-	-	
38.3.3	Spent Fuel Capital and Transfer	-	-	-	-	-	-	2,859	426	3,285	3,285	-	-	-	-	-	-	-	-	-	
38.3	Subtotal Period 38 Collateral Costs	1,055	1,200	-	-	-	-	4,103	554	7,311	4,047	3,285	-	-	-	-	-	-	-	-	
Period 38 Period-Dependent Costs																					
38.4.1	Decom supplies	39	-	-	-	-	-	351	10	48	48	-	-	-	-	-	-	-	-	-	
38.4.2	Insurance	-	-	-	-	-	-	351	35	386	386	-	-	-	-	-	-	-	-	-	
38.4.3	Property taxes	-	-	-	-	-	-	1,614	11	1,625	1,625	-	-	-	-	-	-	-	-	-	
38.4.4	Health physics supplies	-	295	-	-	-	-	-	56	432	432	-	-	-	-	-	-	-	-	-	
38.4.5	Heavy equipment rental	-	-	-	-	-	-	-	56	432	432	-	-	-	-	-	-	-	-	-	
38.4.6	Deposit of DAW generated	-	-	6	3	-	24	-	7	40	40	-	-	-	-	-	-	-	-	9	
38.4.7	Plant energy budget	-	-	-	-	-	-	906	130	1,036	1,036	-	-	-	-	-	-	-	-	-	
38.4.8	NRC IFSH Fees	-	-	-	-	-	-	167	17	183	183	-	-	-	-	-	-	-	-	-	
38.4.9	NRC Fees	-	-	-	-	-	-	167	17	183	183	-	-	-	-	-	-	-	-	-	
38.4.10	Emergency Planning Fees	-	-	-	-	-	-	74	7	81	81	-	-	-	-	-	-	-	-	-	



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Table J  
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SAFSTOR Decommissioning Cost Estimates with 200 Years of Spent Fuel Storage  
(Thousands of 2020 Dollars)

Table with columns: Activity Index, Activity Description, Decom Cost, Removal Cost, Packaging Cost, Transport Cost, Off-Site Processing Cost, LWR Disposal Cost, Other Contingency Cost, Total Contingency Cost, Total Lic. Term. Costs, NRC Lic. Term. Costs, Spent Fuel Management Costs, Site Restoration Costs, Processed Volume, Class A, B, C Barial Volumes, Burial/Processed Wt., Burial/Processed Manhours, Craft Manhours, Utility and Contractor Manhours.

TLG Services, LLC

**Monticello Nuclear Generating Plant  
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**Table J**  
**Monticello Nuclear Generating Plant**  
**SAFSTOR Decommissioning Cost Estimates with 200 Years of Spent Fuel Storage**  
 (Thousands of 2020 Dollars)

Activity Index	Activity Description	Decom Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LWR Disposal Costs	Other Contingency	Total Contingency	Total Lic. Term. Costs	Site Restoration Costs	Burial Volumes						Burial/Processed Wt., Lbs.	Utility and Contractor Manhours	
												Class A Cu Feet	Class B Cu Feet	Class C Cu Feet	GTCC Cu Feet	Processed Volume Cu Feet	Class A Cu Feet			Class B Cu Feet
Deposal of Plant Systems (continued)																				
46.1.5.33	Instrument & Services/Air - RCA	-	225	-	4	17	266	-	103	644	-	1,788	-	-	-	-	71,810	2,733	-	
46.1.5.34	Main Condenser	-	177	-	4	18	318	-	613	613	-	1,903	-	-	-	-	77,301	2,443	-	
46.1.5.35	Moisture Separator	-	108	-	6	15	229	-	342	342	-	1,079	-	-	-	-	26,612	852	-	
46.1.5.36	Main Turbine	-	669	-	67	258	5,339	-	10,799	7,684	-	31,835	-	-	-	-	1,264,866	12,932	-	
46.1.5.37	Main Turbine - Insulated	-	193	-	7	32	979	-	1,111	652	-	3,480	-	-	-	-	110,006	2,725	-	
46.1.5.38	Miscellaneous	-	38	-	1	3	51	-	18	110	-	302	-	-	-	-	12,283	566	-	
46.1.5.39	Off Gas Reclaimer	-	101	-	6	27	189	-	119	429	-	2,943	-	-	-	-	116,194	2,385	-	
46.1.5.40	Off Gas Reclaimer - Insulated	-	169	-	0	0	863	-	929	629	-	2,990	-	-	-	-	116,194	2,385	-	
46.1.5.41	Post-Accident Sampling	-	23	-	0	1	16	-	8	48	-	90	-	-	-	-	4,004	308	-	
46.1.5.42	Post-Accident Sampling - Insulated	-	15	-	0	1	11	-	6	33	-	67	-	-	-	-	2,797	190	-	
46.1.5.43	RRB Services Water - Insulated - RCA	-	83	-	3	14	248	-	69	439	-	1,145	-	-	-	-	60,293	1,125	-	
46.1.5.44	RRB Services Water - Insulated - RCA	-	83	-	3	14	248	-	69	439	-	1,145	-	-	-	-	60,293	1,125	-	
46.1.5.45	Reactor Feedwater Pump Seal	-	60	-	1	3	55	-	21	130	-	327	-	-	-	-	13,295	687	-	
46.1.5.46	Residual Heat Removal	-	226	-	58	147	2,210	-	529	3,584	-	12,609	-	-	-	-	609,174	3,282	-	
46.1.5.47	Residual Heat Removal - Insulated	-	500	-	39	74	851	-	384	2,312	-	5,984	-	-	-	-	294,206	7,027	-	
46.1.5.48	Residual Heat Removal - Insulated	-	101	-	9	21	133	-	49	231	-	586	-	-	-	-	24,247	841	-	
46.1.5.49	RC Core Isolation Cooling - Insulated	-	97	-	1	5	94	-	39	237	-	563	-	-	-	-	22,843	1,315	-	
46.1.5.50	RC Recirculation	-	53	-	5	4	16	-	30	161	-	46	-	-	-	-	13,794	691	-	
46.1.5.51	Steamers	-	151	-	1	5	84	-	51	292	-	502	-	-	-	-	20,395	2,272	-	
46.1.5.52	Steamer - Insulated	-	45	-	1	2	41	-	13	83	-	245	-	-	-	-	9,969	311	-	
46.1.5.53	Steamer Liquid Control - RCA	-	26	-	1	2	41	-	13	83	-	245	-	-	-	-	9,969	311	-	
46.1.5.54	Stator Cooling - RCA	-	7	-	0	1	21	-	5	35	-	126	-	-	-	-	5,135	98	-	
46.1.5.55	Stator Cooling - RCA	-	7	-	0	1	21	-	5	35	-	126	-	-	-	-	5,135	98	-	
46.1.5.56	Transferring Incore Probe	-	3	-	0	0	2	-	1	7	-	7	-	-	-	-	379	46	-	
46.1.5	Totals	-	7,489	-	347	1,370	23,261	-	5,894	39,651	-	140,459	-	-	-	-	5,806,937	104,237	-	
46.1.6	Subfiling in support of decommissioning	-	2,106	-	22	12	191	-	567	2,629	-	1,930	-	-	-	-	52,111	19,968	-	
46.1	Subtotal Period In Activity Costs	211	27,165	-	15,091	4,132	33,494	-	40,431	137,948	-	24	-	-	-	-	10,225,500	209,462	-	
Period In Collateral Costs																				
46.3.1	Process decommissioning water waste	-	4	-	7	12	-	-	12	63	-	-	-	-	-	-	-	3,806	13	
46.3.2	Spent Fuel Capital and Transfer	-	207	-	-	-	-	-	959	7,305	-	31	-	-	-	-	-	-	-	
46.3.4	Subtotal Period In Collateral Costs	-	211	-	7	12	-	-	1,011	7,724	-	31	-	-	-	-	-	3,806	13	
46.3	Subtotal Period In Collateral Costs	4	211	-	7	12	-	-	1,011	7,724	-	31	-	-	-	-	-	3,806	13	
Period In Period-Dependent Costs																				
46.4.1	Decom supplies	87	-	-	-	-	-	-	32	109	-	-	-	-	-	-	-	-	-	
46.4.2	Insurance	-	-	-	-	-	-	-	79	869	-	-	-	-	-	-	-	-	-	
46.4.3	Property taxes	-	-	-	-	-	-	-	359	3,293	-	-	-	-	-	-	-	-	-	
46.4.4	Heavy equipment supplies	-	-	-	-	-	-	-	319	2,839	-	-	-	-	-	-	-	-	-	
46.4.5	Heavy equipment rental	-	-	-	-	-	-	-	422	3,232	-	-	-	-	-	-	-	-	-	
46.4.6	Deposal of DAW generated	-	-	-	-	-	-	-	108	612	-	-	-	-	-	-	-	-	-	
46.4.7	Plant energy budget	-	-	-	-	-	-	-	291	2,229	-	-	-	-	-	-	-	-	-	
46.4.8	NRG Staff Fees	-	-	-	-	-	-	-	54	508	-	-	-	-	-	-	-	-	-	
46.4.9	NRG Fuel Fees	-	-	-	-	-	-	-	54	508	-	-	-	-	-	-	-	-	-	
46.4.10	Emergency Planning Fees	-	-	-	-	-	-	-	17	183	-	-	-	-	-	-	-	-	-	
46.4.11	Fixed Overhead	-	-	-	-	-	-	-	357	2,797	-	-	-	-	-	-	-	-	-	
46.4.12	Processing Equipment/Services	-	-	-	-	-	-	-	15	145	-	-	-	-	-	-	-	-	-	
46.4.13	ESSN Operating Costs	-	-	-	-	-	-	-	15	145	-	-	-	-	-	-	-	-	-	
46.4.14	Railroad Track Maintenance	-	-	-	-	-	-	-	21	162	-	-	-	-	-	-	-	-	-	
46.4.15	Remedial Actions Surveys	-	-	-	-	-	-	-	189	1,447	-	-	-	-	-	-	-	-	-	
46.4.16	Remedial Actions Surveys	-	-	-	-	-	-	-	189	1,447	-	-	-	-	-	-	-	-	-	
46.4.17	DOE Staff Cost	-	-	-	-	-	-	-	2,991	16,295	-	-	-	-	-	-	-	-	-	
46.4.18	Utility Staff Cost	-	-	-	-	-	-	-	2,871	22,012	-	-	-	-	-	-	-	-	-	
46.4	Subtotal Period In Period-Dependent Costs	87	4,683	-	89	46	370	-	51,888	8,542	-	4,885	-	-	-	-	89,703	146	-	
46.0	TOTAL PERIOD In COST	302	32,114	-	15,787	4,190	33,494	-	49,984	239,146	-	55	-	-	-	-	10,320,120	210,621	-	
PERIOD In - Site Decommissioning																				
46.1.1	Remove spent fuel racks	591	58	-	103	149	-	-	986	4,459	-	-	-	-	-	-	-	486,170	906	-
Period In Safety																				
46.1.2.1	Removal of 94% Steam	-	16	-	0	8	-	-	5	30	-	-	-	-	-	-	-	1,987	347	-
46.1.2.2	Alternate S2 - RCA	-	16	-	0	1	16	-	7	40	-	-	-	-	-	-	-	3,705	185	-
46.1.2.3	Cross-Heavy Loads/Rigging - RCA	-	3	-	0	1	17	-	4	25	-	-	-	-	-	-	-	4,184	48	-



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**Table J  
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 SAFSTOR Decommissioning Cost Estimates with 200 Years of Spent Fuel Storage**  
 (Thousands of 2020 Dollars)

Activity Index	Activity Description	Decom Cost	Removal Cost	Packaging Cost	Transport Cost	Off-Site Processing Cost	LLRW Disposal Cost	Other Contingency	Total Contingency	Total Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu Feet	Burial Volumes			Burial/Processed Wt. Lbs.	Craft Manhours	Utility and Contractor Manhours		
														Class A Cu Feet	Class B Cu Feet	Class C Cu Feet					
40.3.1	Process decommissioning water waste	12	-	22	39	-	88	-	36	196	-	-	-	-	202	-	-	12,097	39	-	
40.3.2	Small tool allowance	-	397	-	-	-	-	-	60	456	-	-	-	-	-	-	-	-	-	-	
40.3.3	Decommissioning Equipment Disposition	-	-	130	82	1,112	178	14,092	2,114	16,209	16,209	-	6,000	-	529	-	-	303,008	147	-	
40.3.4	Subtotal Period 40 Collateral Costs	12	397	152	121	1,112	266	14,992	2,446	18,597	16,209	-	6,000	-	731	-	-	315,705	186	-	
Period 40 Period-Dependent Costs																					
40.4.1	Insurance	1,700	-	-	-	-	-	-	425	2,126	-	-	-	-	-	-	-	-	-	-	
40.4.2	Property taxes	-	-	-	-	-	-	-	143	1,577	-	-	-	-	-	-	-	-	-	-	
40.4.3	Health physics supplies	-	-	-	-	-	-	-	629	6,917	1,197	-	-	-	-	-	-	-	-	-	
40.4.4	Plant energy budget	3,000	-	-	-	-	-	-	323	3,813	-	-	-	-	-	-	-	-	-	-	
40.4.5	Plant energy budget	9,500	-	-	-	-	-	-	76	6,933	-	-	-	-	-	-	-	-	-	-	
40.4.6	Plant energy budget	-	-	117	60	-	486	-	142	805	-	-	-	-	5,895	-	-	117,897	192	-	
40.4.7	Plant energy budget	-	-	-	-	-	-	-	417	3,194	63	-	-	-	-	-	-	-	-	-	
40.4.8	Plant energy budget	-	-	-	-	-	-	-	97	1,065	-	-	-	-	-	-	-	-	-	-	
40.4.9	Plant energy budget	-	-	-	-	-	-	-	302	3,322	332	-	-	-	-	-	-	-	-	-	
40.4.10	Emergency Planning Fees	-	-	-	-	-	-	-	648	4,967	332	-	-	-	-	-	-	-	-	-	
40.4.11	Fixed Overhead	-	-	-	-	-	-	-	130	995	862	-	-	-	-	-	-	-	-	-	
40.4.12	Liquid Waste Processing Equipment/Services	-	-	-	-	-	-	-	866	130	995	862	-	-	-	-	-	-	-	-	
40.4.13	Emergency Planning Fees	-	-	-	-	-	-	-	38	293	-	-	-	-	-	-	-	-	-	-	
40.4.14	Railroad Track Maintenance	-	-	-	-	-	-	-	38	293	-	-	-	-	-	-	-	-	-	-	
40.4.15	Remedial Actions Surveys	-	-	-	-	-	-	-	343	2,626	2,626	-	-	-	-	-	-	-	-	-	
40.4.16	Security Staff Cost	-	-	-	-	-	-	-	1,815	13,912	-	-	-	-	-	-	-	-	-	-	
40.4.17	Security Staff Cost	-	-	-	-	-	-	-	4,990	37,799	-	-	-	-	-	-	-	-	-	-	
40.4.18	Utility Staff Cost	-	-	-	-	-	-	-	32,869	244,119	-	-	-	-	-	-	-	-	-	-	
40.4.19	Utility Staff Cost	-	-	-	-	-	-	-	488	90,679	14,360	-	-	-	5,895	-	-	117,897	192	-	
40.4.20	Subtotal Period 40 Period-Dependent Costs	1,700	8,289	117	60	-	486	90,679	15,264	116,506	14,360	-	-	-	5,895	-	-	117,897	192	-	
40.9	TOTAL PERIOD 40 COST	9,264	27,881	1,097	2,898	25,343	12,044	107,132	33,892	219,432	188,855	30,565	11	156,174	81,730	-	-	10,223,300	320,391	985,546	
PERIOD 41 - License Termination																					
Period 41 Period-Dependent Activities																					
41.1	ORISE confirmatory survey	-	-	-	-	-	-	-	50	216	-	-	-	-	-	-	-	-	-	-	
41.2	Terminate license	-	-	-	-	-	-	-	50	216	-	-	-	-	-	-	-	-	-	-	
41.3	Subtotal Period 41 Activity Costs	-	-	-	-	-	-	-	106	432	-	-	-	-	-	-	-	-	-	-	
Period 41 Additional Costs																					
42.1	License Termination Survey	-	-	-	-	-	-	-	2,076	8,995	8,995	-	-	-	-	-	-	-	-	-	
42.2	Subtotal Period 41 Additional Costs	-	-	-	-	-	-	-	2,076	8,995	8,995	-	-	-	-	-	-	-	-	-	
Period 41 Collateral Costs																					
43.1	DOC staff relocation expenses	-	-	-	-	-	-	-	190	1,454	-	-	-	-	-	-	-	-	-	-	
43.2	Spent Fuel Capital and Transfer	-	-	-	-	-	-	-	643	4,933	-	-	-	-	-	-	-	-	-	-	
43.3	Subtotal Period 41 Collateral Costs	-	-	-	-	-	-	-	833	6,386	-	-	-	-	-	-	-	-	-	-	
Period 41 Period-Dependent Costs																					
44.1	Insurance	-	-	-	-	-	-	-	53	583	583	-	-	-	-	-	-	-	-	-	
44.2	Property taxes	-	-	-	-	-	-	-	177	1,984	-	-	-	-	-	-	-	-	-	-	
44.3	Health physics supplies	-	-	-	-	-	-	-	9	48	48	-	-	-	-	-	-	-	-	-	
44.4	Disposal of DAW generated	-	-	7	4	-	29	-	41	315	315	-	-	-	355	-	-	-	-	12	
44.5	Plant energy budget	-	-	-	-	-	-	-	43	428	-	-	-	-	-	-	-	-	-	-	
44.6	Plant energy budget	-	-	-	-	-	-	-	43	428	-	-	-	-	-	-	-	-	-	-	
44.7	Plant energy budget	-	-	-	-	-	-	-	112	1,123	-	-	-	-	-	-	-	-	-	-	
44.8	Emergency Planning Fees	-	-	-	-	-	-	-	289	1,836	1,836	-	-	-	-	-	-	-	-	-	
44.9	Fixed Overhead	-	-	-	-	-	-	-	13	108	108	-	-	-	-	-	-	-	-	-	
44.10	Liquid Waste Processing Equipment/Services	-	-	-	-	-	-	-	81	623	623	-	-	-	-	-	-	-	-	-	
44.11	Railroad Track Maintenance	-	-	-	-	-	-	-	3,463	1,665	-	-	-	-	-	-	-	-	-	-	
44.12	Security Staff Cost	-	-	-	-	-	-	-	809	6,201	6,201	-	-	-	-	-	-	-	-	-	
44.13	DOC Staff Cost	-	-	-	-	-	-	-	484	6,796	6,796	-	-	-	-	-	-	-	-	-	
44.14	Utility Staff Cost	-	-	-	-	-	-	-	3,014	25,719	10,110	-	-	-	335	-	-	-	-	-	
44.15	Subtotal Period 41 Period-Dependent Costs	-	798	-	4	-	29	19,992	39,311	29,805	9,997	-	-	-	335	-	-	7,067	12	-	
45.0	TOTAL PERIOD 41 COST	9,264	60,705	16,861	7,092	58,837	47,589	198,533	80,758	489,180	437,421	51,792	66	3,401,138	120,390	1,928	600	-	20,550,510	634,041	1,745,391
PERIOD 4 TOTALS																					

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**Table J  
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 SAFSTOR Decommissioning Cost Estimates with 200 Years of Spent Fuel Storage**  
 (Thousands of 2020 Dollars)

Activity Index	Activity Description	Decom Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume - Cu Feet	Burial Volumes			Burial/Processed Wt. Lbs.	Craft Manhours	Utility and Contractor Manhours	
															Class A - Cu Feet	Class B - Cu Feet	Class C - Cu Feet				
<b>Period 0b - Direct Decommissioning Activities</b>																					
Demolition of Remaining Site Buildings																					
5b.1.1.1	Reactor Building	-	1,071	-	-	-	-	-	296	2,267	-	-	2,267	-	-	-	-	-	13,911	-	
5b.1.1.2	Condensate Tanks Foundation	-	10	-	-	-	-	-	1	11	-	-	-	-	-	-	-	-	50	-	
5b.1.1.3	Emergency Retention Basin	-	19	-	-	-	-	-	3	22	-	-	-	-	-	-	-	-	25	-	
5b.1.1.5	Hot Shop	-	16	-	-	-	-	-	3	19	-	-	-	-	-	-	-	-	177	-	
5b.1.1.6	Hydrogen & Oxygen Storage	-	2	-	-	-	-	-	0	2	-	-	-	-	-	-	-	-	19	-	
5b.1.1.8	MSW Storage & Shipping	-	83	-	-	-	-	-	12	95	-	-	-	-	-	-	-	-	662	-	
5b.1.1.9	Misc. Structures 2017	-	1,410	-	-	-	-	-	212	1,622	-	-	-	-	-	-	-	-	13,042	-	
5b.1.1.10	Offgas Stack	-	108	-	-	-	-	-	16	124	-	-	-	-	-	-	-	-	544	-	
5b.1.1.11	Offgas Storage & Compressor	-	339	-	-	-	-	-	6	345	-	-	-	-	-	-	-	-	1,090	-	
5b.1.1.12	Reactor Building	-	128	-	-	-	-	-	19	147	-	-	-	-	-	-	-	-	1,320	-	
5b.1.1.13	Recombiner	-	186	-	-	-	-	-	389	2,639	-	-	-	-	-	-	-	-	713	-	
5b.1.1.14	Security Barrier	-	2,461	-	-	-	-	-	369	2,830	-	-	-	-	-	-	-	-	583	-	
5b.1.1.15	Structures Greater than 2' Below Grade	-	1,269	-	-	-	-	-	8	1,277	-	-	-	-	-	-	-	-	12,619	-	
5b.1.1.17	Turbine	-	55	-	-	-	-	-	189	1,448	-	-	-	-	-	-	-	-	13,036	-	
5b.1.1.18	Turbine Building Addition	-	182	-	-	-	-	-	27	209	-	-	-	-	-	-	-	-	618	-	
5b.1.1.19	Turbine Pedestal	-	8,169	-	-	-	-	-	1,225	9,394	-	-	-	-	-	-	-	-	58,869	-	
5b.1.1	Totals	-	8,960	-	-	-	-	-	134	1,031	-	-	-	-	-	-	-	-	1,841	-	
5b.1.2	Grads & Landscape	-	9,005	-	-	-	-	200	1,300	10,655	231	-	-	-	-	-	-	-	1,500	-	
5b.1.3	Subtotal Period 0b Activity Costs	-	9,005	-	-	-	-	200	1,300	10,655	231	-	-	-	-	-	-	-	60,728	1,500	
<b>Period 0b - Additional Costs</b>																					
5b.2.1	Initial Structure Ceilings	-	3,282	-	-	-	-	13	509	3,825	-	-	-	-	-	-	-	-	13	-	
5b.2.2	Initial Structure Ceilings	-	335	-	-	-	-	-	50	385	-	-	-	-	-	-	-	-	2,684	-	
5b.2.3	Construction Debris	-	-	-	-	-	-	1,170	176	1,346	-	-	-	-	-	-	-	-	-	-	
5b.2.4	Backfills - Structures Ceilings	-	5,683	-	-	-	-	-	837	6,421	-	-	-	-	-	-	-	-	5,422	-	
5b.2.5	Disposition of Original MPC Canisters	-	35	-	-	-	-	-	1,709	8,544	8,544	-	-	-	-	-	-	-	2,505,700	-	
5b.2.6	Subtotal Period 0b Additional Costs	-	9,737	-	-	-	-	1,183	3,339	21,639	8,544	-	-	-	-	-	-	-	21,097	-	
<b>Period 0b - Collateral Costs</b>																					
5b.3.1	Small fuel allowances	-	111	-	-	-	-	-	17	127	-	-	-	-	-	-	-	-	127	-	
5b.3.2	Spent Fuel Capital and Transfer	-	111	-	-	-	-	9,867	1,480	11,347	-	-	-	-	-	-	-	-	11,347	-	
5b.3	Subtotal Period 0b Collateral Costs	-	222	-	-	-	-	9,884	1,497	11,475	-	-	-	-	-	-	-	-	127	-	
<b>Period 0b - Period Dependent Costs</b>																					
5b.4.1	Insurance	-	-	-	-	-	-	1,220	122	1,342	-	-	-	-	-	-	-	-	1,342	-	
5b.4.2	Property taxes	-	-	-	-	-	-	4,534	453	4,988	-	-	-	-	-	-	-	-	4,988	-	
5b.4.3	Plant equipment rentals	-	5,842	-	-	-	-	917	6,759	6,759	-	-	-	-	-	-	-	-	6,719	-	
5b.4.4	NRC ISFSI Fees	-	-	-	-	-	-	315	315	630	-	-	-	-	-	-	-	-	362	-	
5b.4.5	Emergency Planning Fees	-	-	-	-	-	-	375	37	412	-	-	-	-	-	-	-	-	412	-	
5b.4.6	Emergency Planning Fees	-	-	-	-	-	-	257	28	285	-	-	-	-	-	-	-	-	429	-	
5b.4.7	ES&S Overhaul Costs	-	-	-	-	-	-	1,042	104	1,146	-	-	-	-	-	-	-	-	1,146	-	
5b.4.8	ES&S Overhaul Costs	-	-	-	-	-	-	33	33	66	-	-	-	-	-	-	-	-	66	-	
5b.4.9	Railroad Track Maintenance	-	-	-	-	-	-	217	33	249	-	-	-	-	-	-	-	-	150	-	
5b.4.10	Security Staff Cost	-	-	-	-	-	-	7,971	1,386	9,167	-	-	-	-	-	-	-	-	8,580	-	
5b.4.11	Security Staff Cost	-	-	-	-	-	-	1,176	176	1,352	-	-	-	-	-	-	-	-	1,352	-	
5b.4.12	Utility Staff Cost	-	-	-	-	-	-	1,148	107	1,255	-	-	-	-	-	-	-	-	8,091	-	
5b.4	Subtotal Period 0b Period-Dependent Costs	-	5,842	-	-	-	-	35,082	5,819	46,744	82	-	-	-	-	-	-	-	32,492	-	
5b.0	TOTAL PERIOD 0b COST	-	21,755	185	954	-	-	5,611	12,044	89,912	8,857	25,606	55,419	-	-	-	-	-	2,505,700	72,633	345,316
<b>PERIOD 0c - Fuel Storage Operations/Shipping</b>																					
Period 0c - Direct Decommissioning Activities																					
5c.3.1	Spent Fuel Capital and Transfer	-	-	-	-	-	-	1,042,659	156,399	1,199,058	-	-	-	-	-	-	-	-	-	-	

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 SAFSTOR Decommissioning Cost Estimates with 200 Years of Spent Fuel Storage**  
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Activity Index	Activity Description	Decom Cost	Removal Cost	Packaging Cost	Transport Cost	Off-Site Processing Cost	LRW Disposal Cost	Other Contingency Cost	Total Contingency Cost	Total Lic. Term. Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu Feet	Class A Cu Feet	Class B Cu Feet	Class C Cu Feet	GTCC Cu Feet	Burial/Processed Wt. Lbs.	Craft Manhours	Utility and Contractor Manhours
56.3	Subtotal Period 56 Collateral Costs	-	-	-	-	-	-	1,042,630	156,309	1,199,058	-	1,199,058	-	-	-	-	-	-	-	-	-
56.3.1	Period 56 Period-Dependent Costs	-	-	-	-	-	-	97,545	1,072,255	1,169,800	-	1,169,800	-	-	-	-	-	-	-	-	-
56.3.2	Insurance	-	-	-	-	-	-	136,666	136,666	-	-	136,666	-	-	-	-	-	-	-	-	-
56.3.3	Plant energy budget	-	-	-	-	-	-	29,939	29,939	-	-	29,939	-	-	-	-	-	-	-	-	-
56.3.4	NRC ISFSI Fees	-	-	-	-	-	-	4,650	4,650	-	-	4,650	-	-	-	-	-	-	-	-	-
56.3.5	Emergency Planning Fees	-	-	-	-	-	-	15,517	15,517	-	-	15,517	-	-	-	-	-	-	-	-	-
56.3.6	ISFSI Operating Costs	-	-	-	-	-	-	17,335	17,335	-	-	17,335	-	-	-	-	-	-	-	-	-
56.3.7	Railroad Track Maintenance	-	-	-	-	-	-	8,139	8,139	-	-	8,139	-	-	-	-	-	-	-	-	-
56.3.8	Security Staff Cost	-	-	-	-	-	-	254,872	254,872	-	-	254,872	-	-	-	-	-	-	-	-	-
56.3.9	Utility Staff Cost	-	-	-	-	-	-	11,877,001	11,877,001	-	-	11,877,001	-	-	-	-	-	-	-	-	-
56.3.10	Subtotal Period 56 Period-Dependent Costs	-	-	-	-	-	-	2,229,660	320,716	2,550,376	-	2,550,376	-	-	-	-	-	-	-	-	-
56.3.11	TOTAL PERIOD 56 COST	-	-	-	-	-	-	2,229,660	320,716	2,550,376	-	2,550,376	-	-	-	-	-	-	-	-	-
<b>PERIOD 56 - GTCC SHIPPING</b>																					
Period 56 Direct Decommissioning Activities																					
56.11.1	Nuclear Steam Supply System Removal	-	-	1,083	-	-	4,313	-	918	6,314	6,314	-	-	-	-	-	-	1,100	225,705	-	-
56.11.2	Vessel & Internals GTCC Disposal	-	-	1,083	-	-	4,313	-	918	6,314	6,314	-	-	-	-	-	-	1,100	225,705	-	-
56.11.3	Subtotal Period 56 Activity Costs	-	-	1,083	-	-	4,313	-	918	6,314	6,314	-	-	-	-	-	-	1,100	225,705	-	-
56.12.1	Period 56 Collateral Costs	-	-	-	-	-	-	38	4	32	-	32	-	-	-	-	-	-	-	-	-
56.12.2	Subtotal Period 56 Collateral Costs	-	-	-	-	-	-	38	4	32	-	32	-	-	-	-	-	-	-	-	-
56.12.3	Period 56 Period-Dependent Costs	-	-	-	-	-	-	35	3	30	-	-	-	-	-	-	-	-	-	-	-
56.12.4	Property taxes	-	-	-	-	-	-	8	1	9	-	9	-	-	-	-	-	-	-	-	-
56.12.5	NRC ISFSI Fees	-	-	-	-	-	-	6	1	6	-	6	-	-	-	-	-	-	-	-	-
56.12.6	Emergency Planning Fees	-	-	-	-	-	-	5	1	6	-	6	-	-	-	-	-	-	-	-	-
56.12.7	ISFSI Operating Costs	-	-	-	-	-	-	5	1	6	-	6	-	-	-	-	-	-	-	-	-
56.12.8	Railroad Track Maintenance	-	-	-	-	-	-	1,500	23	1,733	-	1,733	-	-	-	-	-	-	-	-	-
56.12.9	Security Staff Cost	-	-	-	-	-	-	39	6	45	-	45	-	-	-	-	-	-	-	-	-
56.12.10	Utility Staff Cost	-	-	-	-	-	-	278	38	316	-	316	-	-	-	-	-	-	-	-	-
56.12.11	Subtotal Period 56 Period-Dependent Costs	-	-	-	-	-	-	1,887,872	304,603	2,192,475	-	2,192,475	-	-	-	-	-	-	-	-	-
56.12.12	TOTAL PERIOD 56 COST	-	-	1,083	-	-	4,313	306	960	6,615	6,615	47	-	-	-	-	-	1,100	225,705	-	2,693
<b>PERIOD 56 - ISFSI DECOMMISSIONATION</b>																					
Period 56 Direct Decommissioning Activities																					
56.2.1	Period 56 Additional Costs	-	0	3	33	-	283	2,086	602	3,008	3,008	-	-	-	-	-	-	-	131,507	10,502	2,225
56.2.2	License Termination ISFSI	-	0	3	33	-	283	2,086	602	3,008	3,008	-	-	-	-	-	-	-	131,507	10,502	2,225
56.2.3	Subtotal Period 56 Additional Costs	-	0	3	33	-	283	2,086	602	3,008	3,008	-	-	-	-	-	-	-	131,507	10,502	2,225
56.4.1	Period 56 Period-Dependent Costs	-	-	-	-	-	-	118	30	148	-	-	-	-	-	-	-	-	-	-	-
56.4.2	Property taxes	-	-	-	-	-	-	248	62	310	-	310	-	-	-	-	-	-	-	-	-
56.4.3	Plant energy budget	-	-	-	-	-	-	12	3	15	-	15	-	-	-	-	-	-	-	-	-
56.4.4	Emergency Planning Fees	-	-	-	-	-	-	10	2	12	-	12	-	-	-	-	-	-	-	-	-
56.4.5	ISFSI Operating Costs	-	-	-	-	-	-	41	10	51	-	51	-	-	-	-	-	-	-	-	-
56.4.6	Railroad Track Maintenance	-	-	-	-	-	-	352	88	440	-	440	-	-	-	-	-	-	-	-	-
56.4.7	Security Staff Cost	-	-	-	-	-	-	261	65	326	-	326	-	-	-	-	-	-	-	-	-
56.4.8	Utility Staff Cost	-	-	-	-	-	-	1,104	276	1,380	-	1,380	-	-	-	-	-	-	-	-	-
56.4.9	Subtotal Period 56 Period-Dependent Costs	-	-	-	-	-	-	2,086	877	2,963	-	2,963	-	-	-	-	-	-	-	-	-
56.4.10	TOTAL PERIOD 56 COST	-	0	3	33	-	283	3,190	877	4,387	4,387	-	-	-	-	-	-	-	131,507	10,502	11,017

**Monticello Nuclear Generating Plant  
 Decommissioning Cost Analysis**

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**Table J  
 Monticello Nuclear Generating Plant  
 SAFSTOR Decommissioning Cost Estimates with 200 Years of Spent Fuel Storage  
 (Thousands of 2020 Dollars)**

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LIRW Disposal Costs	Other Costs	Total Contingency	Total	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu Feet	Burial Volumes			Burial/Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours	
															Class A Cu Feet	Class B Cu Feet	Class C Cu Feet				
<b>PERIOD 5f- ISFSI Site Restoration</b>																					
Period 5f Direct Decommissioning Activities																					
Period 5f Additional Costs																					
5E.2.1	Demolition and Site Restoration of ISFSI	-	1,664	-	-	-	-	256	273	2,093	-	-	2,093	-	-	-	-	-	7,309	160	
5E.2	Subtotal Period 5f Additional Costs	-	1,664	-	-	-	-	256	273	2,093	-	-	2,093	-	-	-	-	-	7,309	160	
Period 5f Collateral Costs																					
5E.3.1	Small tool allowances	-	11	-	-	-	-	-	2	12	-	-	12	-	-	-	-	-	-	-	
5E.3	Subtotal Period 5f Collateral Costs	-	11	-	-	-	-	-	2	12	-	-	12	-	-	-	-	-	-	-	
Period 5f Period-Dependent Costs																					
5E.4.2	Property taxes	-	-	-	-	-	-	127	13	140	-	-	140	-	-	-	-	-	-	-	
5E.4.3	Heavy equipment rental	-	118	-	-	-	-	-	18	136	-	-	136	-	-	-	-	-	-	-	
5E.4.4	Plant energy budget	-	-	-	-	-	-	6	3	7	-	-	7	-	-	-	-	-	-	-	
5E.4.5	Plant equipment maintenance	-	-	-	-	-	-	35	3	42	-	-	42	-	-	-	-	-	-	-	
5E.4.6	Railroad Track Maintenance	-	-	-	-	-	-	21	3	24	-	-	24	-	-	-	-	-	-	-	
5E.4.7	Security Staff Cost	-	-	-	-	-	-	180	27	207	-	-	207	-	-	-	-	-	-	2,562	
5E.4.8	Utility Staff Cost	-	-	-	-	-	-	111	17	128	-	-	128	-	-	-	-	-	-	1,590	
5E.4	Subtotal Period 5f Period-Dependent Costs	-	118	-	-	-	-	452	64	658	-	-	658	-	-	-	-	-	-	4,151	
5E.0	TOTAL PERIOD 5f COST	-	1,693	-	-	-	-	758	358	2,700	-	-	2,700	-	-	-	-	-	7,309	4,311	
<b>PERIOD 5 TOTALS</b>																					
TOTAL COST TO DECOMMISSION		21,016	100,400	18,576	8,641	56,852	10,258	2,380,226	646,370	4,896,303	12,448,734	3,588,215	58,229	3,401,180	153,182	1,628	600	11,000	28,625,972	90,444	122,926,070
TOTAL COST TO DECOMMISSION WITH 15.21% CONTINGENCY:																					
TOTAL NRC LICENSE TERMINATION COST IS 25.5%, OR:																					
SPENT FUEL MANAGEMENT COST IS 72.8%, OR:																					
NON-NUCLEAR DEMOLITION COST IS 1.21%, OR:																					
TOTAL LOW-LEVEL RADIOACTIVE WASTE VOLUME BURIED (EXCLUDING GTCC):																					
TOTAL GREATER THAN CLASS C RADWASTE VOLUME GENERATED:																					
TOTAL SCRAP METAL REMOVED:																					
TOTAL CRAFT LABOR REQUIREMENTS:																					

End Notes:  
 - indicates that this activity not charged as decommissioning expense  
 a - indicates that this activity performed by decommissioning staff  
 0 - indicates that this value is less than 0.5 but is non-zero  
 A cell containing "-" indicates a zero value

**Monticello Nuclear Generating Plant  
Decommissioning Cost Analysis**

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**APPENDIX K**

**ISFSI DECOMMISSIONING**

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Monticello Nuclear Generating Plant – Scenarios 3, 4, 7 and 8 .....	K-3



**Table K-1**  
**Monticello Nuclear Generating Plant**  
**ISFSI Decommissioning Cost Estimate**  
**Scenarios 1, 2, 5, and 6**  
 (thousands of 2020 dollars)

Activity Description	Removal Costs	Packaging Costs	Transport Costs	LLRW Disposal Costs	Other Costs	Total Costs	Burial Volume Class A (cubic feet)	Craft Manhours	Oversight and Contractor Manhours
<b>Decommissioning Contractor</b>									
Planning (characterization, specs and procedures)	-	-	-	-	217	217	-	-	1,048
Decontamination (activated disposition)	57	188	987	5,925	-	7,157	21,949	366	-
License Termination (radiological surveys)	-	-	-	-	1,327	1,327	-	-	9,873
<b>Subtotal</b>	<b>57</b>	<b>188</b>	<b>987</b>	<b>5,925</b>	<b>1,544</b>	<b>8,701</b>	<b>21,949</b>	<b>10,339</b>	<b>1,048</b>
<b>Supporting Costs</b>									
NRC and NRC Contractor Fees and Costs	-	-	-	-	469	469	-	-	1,153
Insurance	-	-	-	-	118	118	-	-	-
Property taxes	-	-	-	-	249	249	-	-	-
Plant energy budget	-	-	-	-	12	12	-	-	-
Fixed Overhead	-	-	-	-	71	71	-	-	-
Railroad Track Maintenance	-	-	-	-	41	41	-	-	-
Security Staff Cost	-	-	-	-	352	352	-	-	3,792
Utility Staff Cost	-	-	-	-	261	261	-	-	8,792
<b>Subtotal</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>1,574</b>	<b>1,574</b>	<b>-</b>	<b>-</b>	<b>13,737</b>
<b>Total (w/o contingency)</b>	<b>57</b>	<b>188</b>	<b>987</b>	<b>5,925</b>	<b>3,118</b>	<b>10,275</b>	<b>21,949</b>	<b>10,339</b>	<b>14,755</b>
<b>Total (w/25% contingency)</b>	<b>71</b>	<b>235</b>	<b>1,234</b>	<b>7,406</b>	<b>3,897</b>	<b>12,844</b>			

The application of contingency (25%) is consistent with the evaluation criteria referenced by the NRC in NUREG-1757 ("Consolidated Decommissioning Guidance, Financial Assurance, Recordkeeping, and Timeliness," U.S. NRC's Office of Nuclear Material Safety and Safeguards, NUREG-1757, Vol. 3, Rev. 1, February 2012)

**Table K-2**  
**Monticello Nuclear Generating Plant**  
**ISFSI Decommissioning Cost Estimate**  
**Scenarios 3, 4, 7, and 8**  
 (thousands of 2020 dollars)

Activity Description	Removal Costs	Packaging Costs	Transport Costs	LLRW Disposal Costs	Other Costs	Total Costs	Burial Volume Class A (cubic feet)	Craft Contractor Manhours	Oversight and Contractor Manhours
<b>Decommissioning Contractor</b>									
Planning (characterization, specs and procedures)	-	-	-	-	228	228	-	-	1,072
Decontamination (activated disposition)	0	3	33	283	-	320	848	29	-
License Termination (radiological surveys)	-	-	-	-	1,388	1,388	-	10,473	-
<b>Subtotal</b>	<b>0</b>	<b>3</b>	<b>33</b>	<b>283</b>	<b>1,616</b>	<b>1,936</b>	<b>848</b>	<b>10,502</b>	<b>1,072</b>
<b>Supporting Costs</b>									
NRC and NRC Contractor Fees and Costs	-	-	-	-	470	470	-	-	1,153
Insurance	-	-	-	-	118	118	-	-	-
Property taxes	-	-	-	-	249	249	-	-	-
Plant energy budget	-	-	-	-	12	12	-	-	-
Fixed Overhead	-	-	-	-	71	71	-	-	-
Railroad Track Maintenance	-	-	-	-	41	41	-	-	-
Security Staff Cost	-	-	-	-	352	352	-	-	4,999
Utility Staff Cost	-	-	-	-	261	261	-	-	3,792
<b>Subtotal</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>1,575</b>	<b>1,575</b>	<b>-</b>	<b>-</b>	<b>9,945</b>
<b>Total (w/o contingency)</b>	<b>0</b>	<b>3</b>	<b>33</b>	<b>283</b>	<b>3,191</b>	<b>3,511</b>	<b>848</b>	<b>10,502</b>	<b>11,017</b>
<b>Total (w/25% contingency)</b>	<b>0</b>	<b>4</b>	<b>41</b>	<b>354</b>	<b>3,989</b>	<b>4,389</b>			

The application of contingency (25%) is consistent with the evaluation criteria referenced by the NRC in NUREG-1757 ("Consolidated Decommissioning Guidance, Financial Assurance, Recordkeeping, and Timeliness," U.S. NRC's Office of Nuclear Material Safety and Safeguards, NUREG-1757, Vol. 3, Rev. 1, February 2012)

*Document X01-1775-003, Rev. 0*

**DECOMMISSIONING COST ANALYSIS  
FOR A 70 YEAR OPERATING LIFE**

**for the**

**MONTICELLO NUCLEAR GENERATING PLANT**



*prepared for*

**Xcel Energy**

*prepared by*

**TLG Services, LLC**  
Bridgewater, Connecticut

**October 2020**

**Monticello Nuclear Generating Plant  
Decommissioning Cost Analysis – 70 Year Lifetime**

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**APPROVALS**

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**Monticello Nuclear Generating Plant  
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**REVISION LOG**

<b>No.</b>	<b>Date</b>	<b>Item Revised</b>	<b>Reason for Revision</b>
0	10-22-2020		Original Issue



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Decommissioning Cost Analysis – 70 Year Lifetime****Document X01-1775-003, Rev. 0  
Page vii of xxv****EXECUTIVE SUMMARY**

This report presents estimates of the cost to decommission the Monticello Nuclear Generating Plant (Monticello) for the identified DECON scenario following an assumed license extension, with cessation of plant operations in 2040. The estimates are designed to provide Xcel Energy with the information to assess its current decommissioning liability, as it relates to Monticello.

The analysis relies upon site-specific, technical information from an evaluation prepared in 2017, <sup>[1]</sup> updated to reflect current assumptions pertaining to the disposition of the nuclear plant and relevant industry experience in undertaking such projects. The costs are based on several key assumptions in areas of regulation, component characterization, high-level radioactive waste management, low-level radioactive waste disposal, performance uncertainties (contingency) and site restoration requirements.

While the analysis is not a detailed engineering evaluation, it represents the estimates prepared in advance of the detailed engineering required to carry out the decommissioning of the nuclear unit. It may also not reflect the actual plan to decommission Monticello; the plan may differ from the assumptions made in this analysis based on facts that exist at the time of decommissioning.

The primary goal of the decommissioning is the removal and disposal of the contaminated systems and structures so that the plant's operating license can be terminated. The analysis recognizes that spent fuel will be stored at the site in the reactor building's storage pool and/or in an Independent Spent Fuel Storage Installation (ISFSI) until such time that it can be transferred to a Department of Energy (DOE) facility. Consequently, the estimates also include those costs to manage and subsequently decommission these storage facilities.

The cost estimates in this report assume that Monticello ceases operations in 2040. The estimates also assume that the shutdown date of the nuclear unit is scheduled and pre-planned (i.e., there is no delay in transitioning the plant and workforce from operations or in obtaining regulatory relief from operating requirements, etc.). This estimate includes additional resources to support the engineering, planning, and licensing efforts for the station; this is done to support a decommissioning schedule similar to the prior estimate. The estimates include the continued operation of the reactor building as an interim wet fuel storage facility for approximately four years after operations cease. The spent fuel will remain in the ISFSI until the DOE is able to

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<sup>1</sup> "Decommissioning Cost Analysis for the Monticello Nuclear Generating Plant," Document No. X01-1725-002, Rev. 0, TLG Services, Inc., October 2017

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complete the transfer of the fuel to a federal facility (e.g., a monitored retrievable storage facility).<sup>[2]</sup> The estimates also include the dismantling of non-essential structures and limited restoration of the site.

The 2017 plant inventory, the basis for the decontamination and dismantling requirements and cost, and the decommissioning waste streams, was reviewed for this analysis. Over the three-year period between estimates the plant confirmed there were no substantive changes to the configuration of the plant or site facilities (that would significantly impact decommissioning).

The costs to decommission Monticello, for the spent fuel scenarios evaluated, are tabulated at the end of this section. Costs are reported in 2020 dollars and include monies anticipated to be spent for radiological remediation and operating license termination, spent fuel management, and site restoration activities.

A complete discussion of the assumptions relied upon in this analysis is provided in Section 3, along with schedules of annual expenditures for each scenario. A sequence of significant project activities is provided in Section 4 with a timeline for each scenario. Detailed cost reports used to generate the summary tables contained within this document are provided in Appendices C through F.

### Alternatives and Regulations

The ultimate objective of the decommissioning process is to reduce the inventory of contaminated and activated material so that the license can be terminated. The Nuclear Regulatory Commission (NRC or Commission) provided initial decommissioning requirements in its rule adopted on June 27, 1988.<sup>[3]</sup> In this rule, the NRC set forth technical and financial criteria for decommissioning licensed nuclear power facilities. The regulations addressed planning needs, timing, funding methods, and environmental review requirements for decommissioning. The rule also defined three decommissioning alternatives as being acceptable to the NRC: DECON, SAFSTOR, and ENTOMB.

DECON is defined as "the alternative in which the equipment, structures, and portions of a facility and site containing radioactive contaminants are

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<sup>2</sup> Projected expenditures for spent fuel management identified in the cost analysis do not consider any compensation for damages with regard to the delays incurred by Xcel Energy in the timely removal of spent fuel by the DOE.

<sup>3</sup> U.S. Code of Federal Regulations, Title 10, Parts 30, 40, 50, 51, 70 and 72, "General Requirements for Decommissioning Nuclear Facilities," Nuclear Regulatory Commission, 53 Fed. Reg. 24018, June 27, 1988

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removed or decontaminated to a level that permits the property to be released for unrestricted use shortly after cessation of operations."<sup>[4]</sup>

SAFSTOR is defined as "the alternative in which the nuclear facility is placed and maintained in a condition that allows the nuclear facility to be safely stored and subsequently decontaminated (deferred decontamination) to levels that permit release for unrestricted use."<sup>[5]</sup> Decommissioning is to be completed within 60 years, although longer time periods will be considered when necessary to protect public health and safety.

ENTOMB is defined as "the alternative in which radioactive contaminants are encased in a structurally long-lived material, such as concrete; the entombed structure is appropriately maintained and continued surveillance is carried out until the radioactivity decays to a level permitting unrestricted release of the property."<sup>[6]</sup> As with the SAFSTOR alternative, decommissioning is currently required to be completed within 60 years, although longer time periods will also be considered when necessary to protect public health and safety.

The 60-year restriction has limited the practicality for the ENTOMB alternative at commercial reactors that generate significant amounts of long-lived radioactive material. In 1997, the Commission directed its staff to re-evaluate this alternative and identify the technical requirements and regulatory actions that would be necessary for entombment to become a viable option. The resulting evaluation provided several recommendations, however, rulemaking has been deferred based upon several factors (e.g., no licensee has committed to pursuing the entombment option, the unresolved issues associated with the disposition of greater-than-Class C material (GTCC), and the NRC's current priorities) at least until after the additional research studies are complete. The Commission concurred with the staff's recommendation. In a draft regulatory basis document published in March 2017 in support of rulemaking that would amend NRC regulations concerning nuclear plant decommissioning, the NRC staff proposes removing any discussion of the ENTOMB option from existing guidance documents since the method is not deemed practically feasible.

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<sup>4</sup> Ibid. Page FR24022, Column 3

<sup>5</sup> Ibid.

<sup>6</sup> Ibid. Page FR24023, Column 2

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In 1996, the NRC published revisions to its general requirements for decommissioning nuclear power plants to clarify ambiguities and codify procedures and terminology as a means of enhancing efficiency and uniformity in the decommissioning process.<sup>[7]</sup> The amendments allow for greater public participation and better define the transition process from operations to decommissioning. Regulatory Guide 1.184 Revision 1, issued in October 2013, further described the methods and procedures that are acceptable to the NRC staff for implementing the requirements of the 1996 revised rule that relate to the initial activities and the major phases of the decommissioning process. The costs and schedules presented in this analysis follow the general guidance and sequence in the amended regulations. The format and content of the estimates is also consistent with the recommendations of Regulatory Guide 1.202, issued February 2005.<sup>[8]</sup>

In 2011, the NRC published amended regulations to improve decommissioning planning and thereby reduce the likelihood that any current operating facility will become a legacy site.<sup>[9]</sup> The regulations require licensees to report additional details in their decommissioning cost estimate, including a decommissioning estimate for the ISFSI. This estimate is provided in Appendix G.

**Decommissioning Scenarios**

The following scenarios were evaluated and are intended to bound the liability associated with the removal of spent fuel from the site. The current operating license expires in 2030, but a license extension of 10 years is assumed to be requested of and approved by the NRC. The scenarios consist of four DECON spent fuel management scenarios. The duration of the spent fuel scenarios has little impact to the decommissioning costs and timing of the power block systems and structures. The spent fuel in the plant's spent fuel storage pool is transferred to the ISFSI within the first four years. The equipment, structures, and portions of the plant containing radioactive contaminants are removed or decontaminated to a level that permits the facility to be released for unrestricted use. Remaining site structures are then demolished. Spent fuel storage operations continue at the ISFSI until the transfer of the fuel to the DOE is completed (as shown in the "Last Spent Fuel Assembly" column in the following table).

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<sup>7</sup> U.S. Code of Federal Regulations, Title 10, Parts 2, 50 and 51, "Decommissioning of Nuclear Power Reactors," Nuclear Regulatory Commission, 61 Fed. Reg. 39278, July 29, 1996

<sup>8</sup> "Standard Format and Content of Decommissioning Cost Estimates for Nuclear Power Reactors," Regulatory Guide 1.202, Nuclear Regulatory Commission, February 2005

<sup>9</sup> U.S. Code of Federal Regulations, Title 10, Parts 20, 30, 40, 50, 70, and 72, "Decommissioning Planning," Nuclear Regulatory Commission, Federal Register Volume 76, (p 35512 et seq.), June 17, 2011

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Scenario	1 <sup>st</sup> Spent Fuel Canister Replacement	1 <sup>st</sup> Spent Fuel Assembly Removed from Monticello*	Last Spent Fuel Assembly Removed from Monticello	Scenario Identification
1	n/a	2052	2082	DECON with 42 Year DFS <sup>+</sup>
2	n/a	2078	2100	DECON with 60 Year DFS
3	2058	2118	2140	DECON with 100 Year DFS
4	2058	2218	2240	DECON with 200 Year DFS

\* Spent fuel stored at Morris is removed prior to fuel stored at the Monticello site.

+ Dry Fuel Storage

For Scenario 1, although it only provides a total fuel storage period of 42 years following shutdown, some of the Monticello casks have been in storage since 2008. Xcel Energy directed TLG Services to not include the cost of transferring the spent fuel in dry storage to new canisters for those casks that exceed 50 years. The assumption to not transfer spent fuel at 50-years total storage duration for this scenario was premised on the likelihood that the life of the canisters could be successfully extended for the additional years.

For Scenario 2, although it provides a total fuel storage period of nominally 60 years following shutdown, Xcel Energy directed TLG Services to not include the cost of transferring the spent fuel in dry storage to new canisters at the 50-year mark.

In Scenarios 3 and 4, the Dry Shielded Canisters (DSCs) are assumed to be replaced after fifty years of use. Since the reactor building spent fuel storage pool and fuel handling facilities are removed by the year 2048, a dry fuel transfer facility is assumed to be constructed on site to perform the transfers from the old to the new DSCs. For Scenario 3, two such transfer is needed over the time frame assumed. For Scenario 4, the spent fuel will be transferred four times following initial placement in the ISFSI.

### Methodology

The methodology used to develop the estimates follows the basic approach originally presented in the cost estimating guidelines <sup>[10]</sup> developed by the Atomic Industrial Forum (now Nuclear Energy Institute). This reference describes a unit cost factor

<sup>10</sup> T.S. LaGuardia et al., "Guidelines for Producing Commercial Nuclear Power Plant Decommissioning Cost Estimates," AIF/NESP-036, May 1986

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method for estimating decommissioning activity costs. The unit cost factors used in this analysis incorporate site-specific costs and the latest available information about worker productivity in decommissioning.

An activity duration critical path is used to determine the total decommissioning program schedule. This is required for calculating the carrying costs, which include program management, administration, field engineering, equipment rental, quality assurance, and security. This systematic approach for assembling decommissioning estimates ensures a high degree of confidence in the reliability of the resulting costs.

The estimates also reflect lessons learned from TLG's involvement in the Shippingport Station Decommissioning Project, completed in 1989, as well as the decommissioning of the Cintichem reactor, hot cells and associated facilities, completed in 1997. In addition, the planning and engineering for the Rancho Seco, Trojan, Yankee Rowe, Big Rock Point, Maine Yankee, Humboldt Bay-3, Oyster Creek, Connecticut Yankee, Crystal River, Vermont Yankee, Fort Calhoun, Pilgrim, and Indian Point nuclear units have provided additional insight into the process, the regulatory aspects, and the technical challenges of decommissioning commercial nuclear units.

### Contingency

Consistent with cost estimating practice, contingencies are applied to the decontamination and dismantling costs developed as "specific provision for unforeseeable elements of cost within the defined project scope, particularly important where previous experience relating estimates and actual costs has shown that unforeseeable events which will increase costs are likely to occur."<sup>[11]</sup> The cost elements in the estimates are based on ideal conditions; therefore, the types of unforeseeable events that are almost certain to occur in decommissioning, based on industry experience, are addressed through a percentage contingency applied on a line-item basis. This contingency factor is a nearly universal element in all large-scale construction and demolition projects. It should be noted that contingency, as used in this analysis, does not account for price escalation and inflation in the cost of decommissioning over the remaining operating life of the station, or duration of the decommissioning program and dry fuel storage period.

Contingency funds are expected to be fully expended throughout the program. As such, inclusion of contingency is necessary to provide assurance that sufficient funding will be available to accomplish the intended tasks.

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<sup>11</sup> Project and Cost Engineers' Handbook, Second Edition, American Association of Cost Engineers, Marcel Dekker, Inc., New York, New York, p. 239

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Page xiii of xxv**Low-Level Radioactive Waste Disposal

The contaminated and neutron-activated material generated in the decontamination and dismantling of a commercial nuclear reactor is classified as low-level (radioactive) waste, although not all of the material is suitable for “shallow-land” disposal. With the passage of the “Low-Level Radioactive Waste Policy Act” in 1980, <sup>[12]</sup> and its Amendments of 1985, <sup>[13]</sup> the states became ultimately responsible for the disposition of low-level radioactive waste generated within their own borders. It was expected that groups of states would combine together to jointly deal with their radioactive wastes; these organizations are referred to as waste disposal compacts.

With the exception of Texas, no new compact facilities have been successfully sited, licensed, and constructed. The Texas Compact disposal facility is now operational and waste is being accepted from generators within the Compact by the operator, Waste Control Specialists (WCS). The facility is also able to accept limited quantities of non-Compact waste.

Disposition of the various waste streams produced by the decommissioning process considered all options and services currently available to Xcel Energy. The majority of the low-level radioactive waste designated for direct disposal (Class A <sup>[14]</sup>) can be sent to EnergySolutions’ facility in Clive, Utah. Therefore, disposal costs for Class A waste were based upon current contract rates. This facility is not licensed to receive the higher activity portion of the decommissioning waste stream (Classes B and C resins and activated metal from the reactor vessel<sup>[15]</sup>).

The Texas facility is licensed to receive the higher activity waste forms (Classes B and C). As such, for this analysis, disposal costs for the Class B and C waste were based upon the Xcel-provided information on the cost for such from WCS.

The dismantling of the components residing closest to the reactor core generates radioactive waste considered unsuitable for shallow-land disposal (i.e., low-level radioactive waste with concentrations of radionuclides that exceed the limits established by the NRC for Class C radioactive waste (GTCC)). The Low-Level Radioactive Waste Policy Amendments Act of 1985 assigned the federal government the responsibility for the disposal of this material. The Act also stated that the

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<sup>12</sup> “Low-Level Radioactive Waste Policy Act,” Public Law 96-573, 1980

<sup>13</sup> “Low-Level Radioactive Waste Policy Amendments Act of 1985,” Public Law 99-240, 1986

<sup>14</sup> Waste is classified in accordance with U.S. Code of Federal Regulations, Title 10, Part 61.55

<sup>15</sup> U.S. Code of Federal Regulations, Title 10, Part 61, “Licensing Requirements for Land Disposal of Radioactive Waste”

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beneficiaries of the activities resulting in the generation of such radioactive waste bear all reasonable costs of disposing of such waste.

The DOE issued its final Environmental Impact Statement for the disposal of GTCC on January 2016.<sup>[16]</sup> The study evaluated the potential environmental impacts associated with constructing and operating a new facility or using an existing facility, disposal methods, and locations. DOE is awaiting Congressional action on the report and its recommendations. At this time, the federal government has not identified a specific cost for disposing of GTCC or a schedule for acceptance.

For purposes of this analysis, the GTCC radioactive waste is assumed to be packaged and disposed of in a similar manner as high-level waste and at a cost equivalent to that envisioned for the spent fuel. The GTCC is packaged in the same canisters used for spent fuel and is stored on site along with the spent fuel in the ISFSI. The GTCC will be transferred to the DOE upon completion of spent fuel transfer to the DOE.

A significant portion of the waste material generated during decommissioning may only be potentially contaminated by radioactive materials. This waste can be analyzed on site or shipped off site to licensed facilities for further analysis, for processing and/or for conditioning/recovery. Reduction in the volume of low-level radioactive waste requiring disposal in a licensed low-level radioactive waste disposal facility can be accomplished through a variety of methods, including analyses and surveys or decontamination to isolate the portion of waste that does not require disposal as radioactive waste, compaction, incineration or metal melt. The estimates reflect the savings from waste recovery/volume reduction.

### High-Level Radioactive Waste Management

Congress passed the “Nuclear Waste Policy Act” <sup>[17]</sup> (NWPA) in 1982, assigning the federal government’s long-standing responsibility for disposal of the spent nuclear fuel created by the commercial nuclear generating plants to the DOE. The DOE was to begin accepting spent fuel by January 31, 1998; however, to date no progress in the removal of spent fuel from commercial generating sites has been made.

Today, the country is at an impasse on high-level waste disposal, even with the License Application for a geologic repository submitted by the DOE to the NRC in 2008. The Obama administration cut the budget for the repository program while promising to “conduct a comprehensive review of policies for managing the back end

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<sup>16</sup> “Final Environmental Impact Statement for the Disposal of Greater-Than-Class C (GTCC) Low-Level Radioactive Waste and GTCC-Like Waste (DOE/EIS-0375),” January 2016

<sup>17</sup> “Nuclear Waste Policy Act of 1982 and Amendments,” DOE’s Office of Civilian Radioactive Management, 1982



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of the nuclear fuel cycle ... and make recommendations for a new plan.”<sup>[18]</sup> Towards this goal, the administration appointed a Blue Ribbon Commission on America’s Nuclear Future (Blue Ribbon Commission) to make recommendations for a new plan for nuclear waste disposal. The Blue Ribbon Commission’s charter includes a requirement that it consider “[o]ptions for safe storage of used nuclear fuel while final disposition pathways are selected and deployed.”<sup>[19]</sup>

On January 26, 2012, the Blue Ribbon Commission issued its “Report to the Secretary of Energy” containing a number of recommendations on nuclear waste disposal. Two of the recommendations that may impact decommissioning planning are:

- “[T]he United States [should] establish a program that leads to the timely development of one or more consolidated storage facilities”<sup>[20]</sup>
- “[T]he United States should undertake an integrated nuclear waste management program that leads to the timely development of one or more permanent deep geological facilities for the safe disposal of spent fuel and high-level nuclear waste.”<sup>[21]</sup>

In January 2013, the DOE issued the “Strategy for the Management and Disposal of Used Nuclear Fuel and High-Level Radioactive Waste,” in response to the recommendations made by the Blue Ribbon Commission and as “a framework for moving toward a sustainable program to deploy an integrated system capable of transporting, storing, and disposing of used nuclear fuel...”<sup>[22]</sup> This document states:

“With the appropriate authorizations from Congress, the Obama Administration planned to implement a program over the next 10 years that would have:

- Sites, designs and licenses, constructs and begins operations of a pilot interim storage facility by 2021 with an initial focus on accepting used nuclear fuel from shut-down reactor sites;

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<sup>18</sup> Blue Ribbon Commission on America’s Nuclear Future’s Charter, <http://cybercemetery.unt.edu/archive/brc/20120620215336/http://brc.gov/index.php?q=page/charter>

<sup>19</sup> *Ibid.*

<sup>20</sup> “Blue Ribbon Commission on America’s Nuclear Future, Report to the Secretary of Energy,” p. 32, January 2012

<sup>21</sup> *Ibid.*, p.27

<sup>22</sup> “Strategy for the Management and Disposal of Used Nuclear Fuel and High-Level Radioactive Waste,” U.S. DOE, January 11, 2013

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- Advances toward the siting and licensing of a larger interim storage facility to be available by 2025 that will have sufficient capacity to provide flexibility in the waste management system and allows for acceptance of enough used nuclear fuel to reduce expected government liabilities; and
- Makes demonstrable progress on the siting and characterization of repository sites to facilitate the availability of a geologic repository by 2048.”<sup>[23]</sup>

The NRC’s review of DOE’s license application to construct a geologic repository at Yucca Mountain was suspended in 2011 when the Obama Administration significantly reduced the budget for completing that work. However, the US Court of Appeals for the District of Columbia Circuit issued a writ of mandamus (in August 2013) <sup>[24]</sup> ordering NRC to comply with federal law and restart its review of DOE’s Yucca Mountain repository license application to the extent of previously appropriated funding for the review. That review is now complete with the publication of the five-volume safety evaluation report. A supplement to DOE’s environmental impact statement and an adjudicatory hearing on the contentions filed by interested parties must be completed before a licensing decision can be made. Although the DOE proposed it would start fuel acceptance in 2025, no progress has been made in the repository program since DOE’s 2013 strategy was issued except for the completion of the Yucca Mountain safety evaluation report.

Holtec International submitted a license application to the NRC on March 30, 2017 for a consolidated interim spent fuel storage facility in southeast New Mexico called HI-STORE CIS (Consolidated Interim Storage) under the provisions of 10 CFR Part 72. The application is currently under NRC review.

A centralized interim storage project was initiated by Waste Control Specialists (WCS) for a site in Andrews County, Texas, adjacent to WCS’s existing low-level radioactive waste and hazardous waste storage and disposal facilities. The NRC license application for this project was filed in April 2016. In April 2017, WCS asked the NRC to suspend the review of this application. Subsequently, WCS and Orano USA (formerly Areva Nuclear Materials) formed a joint venture to license the facility. In response to letters to the NRC in June and July 2018 from the joint venture, Interim Storage Partners, the NRC restarted its review of the application

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<sup>23</sup> *Ibid.*, p.2

<sup>24</sup> United States Court of Appeals for the District Of Columbia Circuit, In Re: Aiken County, et al, August 2013

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On May 10, 2018, the U.S. House of Representatives passed H.R. 3053, the “Nuclear Waste Policy Amendments Act of 2018.” Proposed to amend the Nuclear Waste Policy Act of 1982, the legislation, if approved by the Senate and signed by the President, would provide the DOE the authority to site, construct, and operate one or more Monitored Retrieval Storage (MRS) facilities while a permanent repository is licensed and constructed and/or to enter into an MRS agreement with a non-Federal entity for temporary storage.

Completion of the decommissioning process is dependent upon the DOE’s ability to remove spent fuel from the site in a timely manner. DOE’s repository program had originally assumed that spent fuel allocations would be accepted for disposal from the nation’s commercial nuclear plants, with limited exceptions, in the order (the “queue”) in which it was discharged from the reactor.<sup>[25]</sup> However, the Blue Ribbon Commission, in its final report, noted that: “[A]ccepting spent fuel according to the OFF [Oldest Fuel First] priority ranking instead of giving priority to shutdown reactor sites could greatly reduce the cost savings that could be achieved through consolidated storage if priority could be given to accepting spent fuel from shutdown reactor sites before accepting fuel from still-operating plants. .... The magnitude of the cost savings that could be achieved by giving priority to shutdown sites appears to be large enough (i.e., in the billions of dollars) to warrant DOE exercising its right under the Standard Contract to move this fuel first.”

The state of Minnesota directed the Public Utilities Commission, “when considering approval of a plan for the accrual of funds for the decommissioning of nuclear facilities” ...to “include an evaluation of the costs, if any, arising from storage of used nuclear fuel that may be incurred by the state of Minnesota, and any tribal community, county, city, or township where used nuclear fuel is located following the cessation of operations at a nuclear plant.”<sup>[26]</sup>

The state of Minnesota statute also prescribed the parameters to be used in evaluating spent fuel management costs. “To assist the commission in making the determination ... the filing shall provide cost estimates, including ratepayer impacts, assuming used

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<sup>25</sup> U.S. Code of Federal Regulations, Title 10, Part 961.11, Article IV – Responsibilities of the Parties, B. DOE Responsibilities, 5.(a) ... DOE shall issue an annual acceptance priority ranking for receipt of SNF and/or HLW at the DOE repository. This priority ranking shall be based on the age of SNF and/or HLW as calculated from the date of discharge of such materials from the civilian nuclear power reactor. The oldest fuel or waste will have the highest priority for acceptance ...”

<sup>26</sup> Minnesota Statute 216B.2445, “Nuclear Power Plant Decommissioning and Storage of Used Nuclear Fuel”

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nuclear fuel will be stored in the state for 60 years, 100 years, and 200 years following the cessation of operation of the nuclear plant.”<sup>[27]</sup>

Xcel Energy’s current spent fuel management plan for the Monticello spent fuel is based in general upon:

- 1) Fuel transferred from the pool to the ISFSI within 4 years of shutdown;
- 2) Exchange of Prairie Island and Monticello spent fuel acceptance rights to best manage the overall cost of spent fuel storage for both plants;
- 3) Fuel will be shipped in the existing NUHOMS DSCs (Scenarios 1, 2, 5, and 6); the NUHOMS are periodically replaced in Scenarios 3, 4, 7 and 8. Canisters that are unloaded in the spent fuel transfer operation will be surveyed for neutron activation.
- 4) As an allowance, some of these canisters and NUHOMS modules from the first off-load operation are assumed to be mildly neutron activated and therefore must be disposed of as radioactive waste.
- 5) For the 100 and 200 year dry fuel storage scenarios (Scenarios 3, 4, 7 and 8) the canisters and casks will be replaced on a 50 year schedule using a dry transfer facility.<sup>[28]</sup>
- 6) Currently Monticello is storing spent fuel assemblies at the Morris Operation facility of GE Hitachi Nuclear Energy in Morris, Illinois. These assemblies will be shipped for final disposal to DOE prior to the removal of fuel from the Monticello site.

The NRC requires that licensees establish a program to manage and provide funding for the caretaking of all irradiated fuel at the reactor site until title of the fuel is transferred to the Secretary of Energy, pursuant to 10 CFR Part 50.54(bb).<sup>[29]</sup> This requirement is prepared for through inclusion of certain cost elements in the decommissioning estimates, for example, associated with the isolation and continued operation of the spent fuel pool and the ISFSI.

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<sup>27</sup> Ibid.

<sup>28</sup> “Order Approving Nuclear Decommissioning Study, Assumptions, and Annual Accrual, and Setting Filing Requirements”, Page 8, Items 12e and 12g, Minnesota Public Utilities Commission Docket E-002/M-14-761 October 4, 2015

<sup>29</sup> U.S. Code of Federal Regulations, Title 10, Part 50, “Domestic Licensing of Production and Utilization Facilities,” Subpart 54 (bb), “Conditions of Licenses”

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The spent fuel pool is expected to contain freshly discharged assemblies (from the most recent refueling cycles) as well as the final reactor core at shutdown. The assemblies are packaged into dry shielded canisters (DSCs) over the first four years after shutdown for transfer to the ISFSI for interim storage. It is assumed that this period provides the necessary cooling for the final core to meet the transport and/or storage requirements for decay heat.

An ISFSI, operated under a Part 50 General License (in accordance with 10 CFR 72, Subpart K <sup>[30]</sup>), has been constructed to support continued plant operations. The facility is assumed to be expanded to support decommissioning. This will allow decommissioning activities to proceed within the reactor building.

DOE has breached its obligations to remove fuel from reactor sites, and has also failed to provide the plant owners with information about how it will ultimately perform. DOE officials have stated that DOE does not have an obligation to accept already-canistered fuel without an amendment to DOE's contracts with plant licensees to remove the fuel (the "Standard Contract"), but DOE has not explained what any such amendment would involve. Consequently, Xcel Energy has no information or expectations on how DOE will remove fuel from the site in the future. In the absence of information about how DOE will perform, and for purposes of this analysis only, it is assumed that DOE will accept already-canistered fuel. If this assumption is incorrect, it is assumed that DOE will have liability for costs incurred to transfer the fuel to DOE-supplied containers.

Xcel Energy's position is that the DOE has a contractual obligation to accept Monticello's fuel earlier than the projections set out above consistent with its contract commitments. No assumption made in this study should be interpreted to be inconsistent with this claim. However, including the cost of storing spent fuel in this study is appropriate to ensure the availability of sufficient decommissioning funds at the end of the station's life if the DOE has not met its obligation. The cost for the interim storage of spent fuel has been calculated and is separately presented as "Spent Fuel Management" expenditures in this report.

### Site Restoration

The efficient removal of the contaminated materials at the site may result in damage to many of the site structures. Blasting, coring, drilling, and the other decontamination activities can substantially damage power block structures, potentially weakening the footings and structural supports. It is unreasonable to anticipate that these structures would be repaired and preserved after the

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<sup>30</sup> U.S. Code of Federal Regulations, Title 10, Part 72, Subpart K, "General License for Storage of Spent Fuel at Power Reactor Sites"

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radiological contamination is removed. The cost to dismantle site structures with a work force already mobilized is more efficient and less costly than if the process were deferred. Experience at shutdown generating stations has shown that plant facilities quickly degrade without maintenance, adding additional expense and creating potential hazards to the public and the demolition work force.

This estimate assumes that some site features will remain following the decommissioning project. These include the existing electrical switchyard, which is assumed to remain functional in support of the regional electrical distribution system. The existing shoreline will also be left intact.

Consequently, non-essential site structures addressed by this analysis are completely removed (including foundations) as required by Minnesota statute <sup>[31]</sup>. The site is then graded and stabilized. The cost for the site restoration of non-essential and/or non-contaminated structures has been calculated and is separately presented as "Site Restoration" expenditures in this report.

### Summary

The costs to decommission the Monticello station were evaluated for several spent fuel removal scenarios, using the DECON decommissioning alternative. Regardless of spent fuel scenario, the estimates to decommission Monticello assume the removal of all contaminated and activated plant components and structural materials such that Xcel Energy may then have unrestricted use of the site with no further requirements for an operating license. In the scenarios, spent fuel remains on site following the decommissioning and site restoration of the power block structures. The spent fuel remains in storage at the site until such time that the transfer to a DOE facility can be completed. Once the transfer is complete, the storage facilities are also decommissioned.

The decommissioning alternative evaluated in this analysis is described in Section 2. The assumptions are presented in Section 3, along with schedules of annual expenditures. The major cost contributors are identified in Section 6, with detailed activity costs, waste volumes, and associated manpower requirements delineated in Appendices C through F. The major cost components are also identified in the cost summary provided at the end of this section.

The estimates presented in this document reflect the total cost to decontaminate the nuclear unit, manage the spent fuel until the DOE is able to complete the transfer to a federal facility, dismantle the plant and restore the site for alternative use.

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<sup>31</sup> Minnesota Administrative Rule part 7035.0400 "General Requirements"

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The cost elements in the estimates for the four DECON alternatives are assigned to one of three subcategories: NRC License Termination (radiological remediation), Spent Fuel Management, and Site Restoration. The subcategory “NRC License Termination” is used to accumulate costs that are consistent with “decommissioning” as defined by the NRC in its financial assurance regulations (i.e., 10 CFR §50.75). The cost reported for this subcategory is generally sufficient to terminate the unit’s operating license, recognizing that there may be some additional cost impact from spent fuel management. The License Termination cost subcategory also includes costs to decommission the ISFSI (as required by 10 CFR §72.30). Section 3.4.1 provides the basis for the ISFSI decommissioning cost.

The “Spent Fuel Management” subcategory contains costs associated with the containerization and transfer of spent fuel from the wet storage pool to the ISFSI, as well as the transfer of the spent fuel in storage at the ISFSI to the DOE. Costs are included for the operation of the storage pool and the management of the ISFSI until such time that the transfer is complete. It does not include any spent fuel management expenses incurred prior to the cessation of plant operations, nor does it include any costs related to the final disposal of the spent fuel.

“Site Restoration” is used to capture costs associated with the dismantling and demolition of buildings and facilities demonstrated to be free from contamination. This includes structures never exposed to radioactive materials, as well as those facilities that have been decontaminated to appropriate levels. Structures are completely removed (including foundations) and backfilled to conform to local surface elevation.

It should be noted that the costs assigned to these subcategories are allocations. Delegation of cost elements is for the purposes of comparison (e.g., with NRC financial guidelines) or to permit specific financial treatment (e.g., Asset Retirement Obligation determinations). In reality, there can be considerable interaction between the activities in the three subcategories. For example, Xcel Energy may decide to remove non-contaminated structures early in the project to improve access to highly contaminated facilities or plant components. In these instances, the non-contaminated removal costs could be reassigned from Site Restoration to an NRC License Termination support activity. However, in general, the allocations represent a reasonable accounting of those costs that can be expected to be incurred for the specific subcomponents of the total estimated program cost, if executed as described.

As noted within this document, the estimates were developed and costs are presented in 2020 dollars. As such, the estimates do not reflect the escalation of costs (due to inflationary and market forces) over the remaining operating life of the plant or during the decommissioning period.

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DECOMMISSIONING COST ELEMENTS**  
(thousands of 2020 dollars)

Cost Element	Total
Decontamination	24,330
Removal	125,270
Packaging	26,543
Transportation	14,145
Waste Disposal	114,148
Off-site Waste Processing	57,444
Program Management <sup>[1]</sup>	291,789
Site Security	300,346
Spent Fuel Pool Isolation	14,576
Spent Fuel Storage (Direct Costs) <sup>[2]</sup>	237,381
Insurance and Regulatory Fees	39,753
Energy	10,030
Characterization and Licensing Surveys	23,012
Property Taxes	55,377
Miscellaneous	7,411
Railroad Track Maintenance	6,914
Retention and Severance	41,002
Security Modifications	10,000
Total <sup>[3]</sup>	1,399,471

Cost Element	Total
NRC License Termination	776,355
Spent Fuel Management	549,339
Site Restoration	73,776
Total <sup>[3]</sup>	1,399,471

<sup>[1]</sup> Includes engineering costs<sup>[2]</sup> Includes costs for the dry storage system components, spent fuel loading and transfer, spent fuel pool O&M and EP fees, but excludes program management costs (staffing), security and other related costs<sup>[3]</sup> Columns may not add due to rounding



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DECOMMISSIONING COST ELEMENTS**  
(thousands of 2020 dollars)

Cost Element	Total
Decontamination	24,330
Removal	125,270
Packaging	26,543
Transportation	14,145
Waste Disposal	114,148
Off-site Waste Processing	57,444
Program Management <sup>[1]</sup>	317,530
Security	389,426
Spent Fuel Pool Isolation	14,576
Spent Fuel Storage (Direct Costs) <sup>[2]</sup>	306,597
Insurance and Regulatory Fees	53,687
Energy	10,030
Characterization and Licensing Surveys	23,012
Property Taxes	73,368
Miscellaneous Equipment	7,411
Railroad Track Maintenance	9,504
Retention and Severance	41,002
Security Modifications	10,000
<b>Total <sup>[3]</sup></b>	<b>1,618,023</b>

Cost Element	Total
NRC License Termination	776,355
Spent Fuel Management	767,892
Site Restoration	73,776
<b>Total <sup>[3]</sup></b>	<b>1,618,023</b>

<sup>[1]</sup> Includes engineering costs<sup>[2]</sup> Includes costs for the dry storage system components, spent fuel loading and transfer, spent fuel pool O&M and EP fees, but excludes program management costs (staffing), security and other related costs<sup>[3]</sup> Columns may not add due to rounding

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DECOMMISSIONING COST ELEMENTS**  
(thousands of 2020 dollars)

Cost Element	Total
Decontamination	24,330
Removal	125,359
Packaging	26,543
Transportation	14,145
Waste Disposal	114,148
Off-site Waste Processing	57,444
Program Management <sup>[1]</sup>	502,435
Security	587,397
Spent Fuel Pool Isolation	14,576
Spent Fuel Storage (Direct Costs) <sup>[2]</sup>	954,297
Insurance and Regulatory Fees	84,655
Energy	10,030
Characterization and Licensing Surveys	23,012
Property Taxes	113,348
Miscellaneous Equipment	7,411
Railroad Track Maintenance	15,260
Retention and Severance	41,002
Security Modifications	10,000
<b>Total <sup>[3]</sup></b>	<b>2,725,392</b>

Cost Element	Total
NRC License Termination	776,400
Spent Fuel Management	1,874,865
Site Restoration	74,127
<b>Total <sup>[3]</sup></b>	<b>2,725,392</b>

<sup>[1]</sup> Includes engineering costs<sup>[2]</sup> Includes costs for the dry storage system components, spent fuel loading and transfer, spent fuel pool O&M and EP fees, but excludes program management costs (staffing), security and other related costs<sup>[3]</sup> Columns may not add due to rounding

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DECOMMISSIONING COST ELEMENTS**  
(thousands of 2020 dollars)

Cost Element	Total
Decontamination	24,330
Removal	125,359
Packaging	26,543
Transportation	14,145
Waste Disposal	114,148
Off-site Waste Processing	57,444
Program Management <sup>[1]</sup>	782,364
Security	1,082,311
Spent Fuel Pool Isolation	14,576
Spent Fuel Storage (Direct Costs) <sup>[2]</sup>	2,114,481
Insurance and Regulatory Fees	162,073
Energy	10,030
Characterization and Licensing Surveys	23,012
Property Taxes	213,298
Miscellaneous Equipment	7,411
Railroad Track Maintenance	29,650
Retention and Severance	41,002
Security Modifications	10,000
<b>Total <sup>[3]</sup></b>	<b>4,852,175</b>

Cost Element	Total
NRC License Termination	776,400
Spent Fuel Management	4,001,648
Site Restoration	74,127
<b>Total <sup>[3]</sup></b>	<b>4,852,175</b>

<sup>[1]</sup> Includes engineering costs<sup>[2]</sup> Includes costs for the dry storage system components, spent fuel loading and transfer, spent fuel pool O&M and EP fees, but excludes program management costs (staffing), security and other related costs<sup>[3]</sup> Columns may not add due to rounding

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## 1. INTRODUCTION

This report presents estimates of the cost to decommission the Monticello Nuclear Generating Plant (Monticello) and the operation and eventual decommissioning of the on-site Independent Spent Fuel Storage Installation (ISFSI) for the selected decommissioning scenarios following the scheduled cessation of plant operations. The estimates are designed to provide Xcel Energy with the information to assess its current decommissioning liability, as it relates to Monticello.

The analysis relies upon site-specific, technical information from an earlier evaluation prepared in 2017, [1]\* updated to reflect current assumptions pertaining to the disposition of the nuclear plant and relevant industry experience in undertaking such projects. The costs are based on several key assumptions in areas of regulation, component characterization, high-level radioactive waste management, low-level radioactive waste disposal, performance uncertainties (contingency) and site restoration requirements.

The analysis is not a detailed engineering evaluation, but an estimate prepared in advance of the detailed engineering required to carry out the decommissioning of the nuclear unit. It may also not reflect the actual plan to decommission Monticello; the plan may differ from the assumptions made in this analysis based on facts that exist at the time of decommissioning.

The 2017 plant inventory was reviewed for this analysis. It serves as the basis for the decontamination and dismantling requirements, cost, and the decommissioning waste streams. The review confirmed that there were no substantive changes to the configuration of the plant or site facilities that would impact decommissioning over the last three years.

### 1.1 OBJECTIVES OF STUDY

The objectives of this study are to prepare comprehensive estimates of the cost to decommission Monticello, to provide a sequence or schedule for the associated activities, and to develop waste stream projections from the decontamination and dismantling activities.

The operating license was originally issued for the plant on September 8<sup>th</sup>, 1970, and was valid for a period of 40 years. In early 2005, Nuclear Management Company (as agent for Xcel Energy), submitted an application for

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\* Annotated references for citations in Sections 1-6 are provided in Section 7

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a renewed license (i.e., 20 year extension). The application was approved by the NRC in November 2006. For the purposes of this study, a subsequent license renewal is assumed to be requested and approved, with a final shutdown date (license expiration) for Monticello changing to September 8<sup>th</sup>, 2040, assuming a 70-year operating life (ten years after the current operating license's expiration date).

**1.2 SITE DESCRIPTION**

Monticello is located on the Mississippi River within the city limits of Monticello, in Wright County, Minnesota. The plant is located approximately 30 miles northwest of the Minneapolis-St. Paul area.

The Nuclear Steam Supply System (NSSS) consists of a single cycle, forced circulation, low power density boiling water reactor. The reactor recirculation system is comprised of the reactor vessel; the two loop reactor recirculation system with its pumps, pipes, and valves; the main steam piping up to the main steam isolation valves; and the reactor auxiliary systems piping. The system is housed within a "containment system," consisting of a steel light bulb-shaped drywell, a steel doughnut-shaped pressure suppression chamber, and interconnecting vent pipes. This system provides the first containment barrier surrounding the reactor vessel and reactor primary system. The reactor building provides secondary containment and is designed as a controlled leakage structure.

The saturated steam leaving the reactor vessel flows through the four main steam lines to the main turbine located in the turbine building. After passing through the main turbine, low-pressure steam is condensed, the non-condensable gases are removed, and the condensate is demineralized before being returned to the reactor vessel through the reactor feedwater system heaters. The turbine-generator system converts the thermodynamic energy of the steam into electrical energy. The unit's turbine-generator consists of one single-flow, high-pressure, and two double-flow, low-pressure turbines driving a direct-coupled generator at 1800 rpm. Heat rejected in the main condenser is removed by the circulating water system.

The circulating water system has been designed for open cycle once-through cooling towers, closed cycle with cooling towers, or for variations of these modes, i.e., partial recirculation. The system for open cycle operation consists of an intake structure with two half-capacity circulating water pumps, piping river water through the condenser to a discharge structure where the water enters a 1000-foot long canal that returns the water to the river downstream from the intake. Two induced-draft cooling towers are used during the open

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and closed cycle operations. Cooled effluent returns by gravity to the intake structure from the cooling tower basins.

### 1.3 REGULATORY GUIDANCE

The Nuclear Regulatory Commission (NRC or Commission) provided initial decommissioning requirements in its rule "General Requirements for Decommissioning Nuclear Facilities," issued in June 1988.<sup>[2]</sup> This rule set forth financial criteria for decommissioning licensed nuclear power facilities. The regulation addressed decommissioning planning needs, timing, funding methods, and environmental review requirements. The intent of the rule was to ensure that decommissioning would be accomplished in a safe and timely manner and that adequate funds would be available for this purpose. Subsequent to the rule, the NRC issued Regulatory Guide 1.159, "Assuring the Availability of Funds for Decommissioning Nuclear Reactors,<sup>[3]</sup>" which provided additional guidance to the licensees of nuclear facilities on the financial methods acceptable to the NRC staff for complying with the requirements of the rule. The regulatory guide addressed the funding requirements and provided guidance on the content and form of the financial assurance mechanisms indicated in the rule.

The rule defined three decommissioning alternatives as being acceptable to the NRC: DECON, SAFSTOR, and ENTOMB. The DECON alternative assumes that any contaminated or activated portion of the plant's systems, structures, and facilities are removed or decontaminated to levels that permit the site to be released for unrestricted use shortly after the cessation of plant operations while the SAFSTOR and ENTOMB alternatives defer the process.

The rule also placed limits on the time allowed to complete the decommissioning process. For the SAFSTOR alternative, the process is restricted in overall duration to 60 years, unless it can be shown that a longer duration is necessary to protect public health and safety. The guidelines for ENTOMB are similar, providing the NRC with both sufficient leverage and flexibility to ensure that these deferred options are only used in situations where it is reasonable and consistent with the definition of decommissioning. At the conclusion of a 50 to 60-year dormancy period (or longer for ENTOMB if the NRC approves such a case), the site would still require significant remediation to meet the unrestricted release limits for license termination.

The ENTOMB alternative has not been viewed as a viable option for power reactors due to the significant time required to isolate the long-lived radionuclides for decay to permissible levels. However, with rulemaking permitting the controlled release of a site, <sup>[4]</sup> the NRC did re-evaluate the

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alternative. The resulting feasibility study, based upon an assessment by Pacific Northwest National Laboratory, concluded that the method did have conditional merit for some, if not most reactors. The staff also found that additional rulemaking would be needed before this option could be treated as a generic alternative.

The NRC had considered rulemaking to alter the 60-year time for completing decommissioning and to clarify the use of engineered barriers for reactor entombments.<sup>[5]</sup> However, the NRC's staff has recommended that rulemaking be deferred, based upon several factors, e.g., no licensee has committed to pursuing the entombment option, the unresolved issues associated with the disposition of greater-than-Class C material (GTCC), and the NRC's current priorities, at least until after the additional research studies are complete. The Commission concurred with the staff's recommendation. In a draft regulatory basis document published in March 2017 in support of rulemaking that would amend NRC regulations concerning nuclear plant decommissioning, the NRC staff proposes removing any discussion of the ENTOMB option from existing guidance documents since the method is not deemed practically feasible.

In 1996, the NRC published revisions to the general requirements for decommissioning nuclear power plants.<sup>[6]</sup> When the regulations were originally adopted in 1988, it was assumed that the majority of licensees would decommission at the end of the facility's operating licensed life. Since that time, several licensees permanently and prematurely ceased operations. Exemptions from certain operating requirements were required once the reactor was defueled to facilitate the decommissioning. Each case was handled individually, without clearly defined generic requirements. The NRC amended the decommissioning regulations in 1996 to clarify ambiguities and codify procedures and terminology as a means of enhancing efficiency and uniformity in the decommissioning process. The new amendments allow for greater public participation and better define the transition process from operations to decommissioning.

Under the revised regulations, licensees will submit written certification to the NRC within 30 days after permanent shutdown. Certification will also be required once the fuel is permanently removed from the reactor vessels. Submittal of these notices will entitle the licensee to a fee reduction and eliminate the obligation to follow certain requirements needed only during operation of the reactor. Prior to or within two years following permanent cessation of operations, the licensee is required to submit a Post-Shutdown Decommissioning Activities Report (PSDAR) to the NRC, and a copy to the affected State(s) (10 CFR 50.82(a)(4)(i)). The PSDAR describes the planned decommissioning activities, the associated sequence and schedule, and an

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estimate of expected costs. Prior to completing decommissioning, the licensee is required to submit applications to the NRC to terminate the license, which will include a License Termination Plan (LTP).

In 2011, the NRC published amended regulations to improve decommissioning planning and thereby reduce the likelihood that any current operating facility will become a legacy site.<sup>[7]</sup> The regulations require licensees to report additional details in their decommissioning cost estimate including a decommissioning estimate for the ISFSI. This estimate is provided in Appendix G.

### 1.3.1 High-Level Radioactive Waste Management

Congress passed the “Nuclear Waste Policy Act” <sup>[8]</sup> (NWPA) in 1982, assigning the federal government’s long-standing responsibility for disposal of the spent nuclear fuel created by the commercial nuclear generating plants to the DOE. The DOE was to begin accepting spent fuel by January 31, 1998; however, to date no progress in the removal of spent fuel from commercial generating sites has been made.

Today, the country is at an impasse on high-level waste disposal, even with the License Application for a geologic repository submitted by the DOE to the NRC in 2008. The Obama administration cut the budget for the repository program while promising to “conduct a comprehensive review of policies for managing the back end of the nuclear fuel cycle ... and make recommendations for a new plan.” Towards this goal, the administration appointed a Blue Ribbon Commission on America’s Nuclear Future (Blue Ribbon Commission) to make recommendations for a new plan for nuclear waste disposal. The Blue Ribbon Commission’s charter includes a requirement that it consider “[o]ptions for safe storage of used nuclear fuel while final disposition pathways are selected and deployed.”<sup>[9]</sup>

On January 26, 2012, the Blue Ribbon Commission issued its “Report to the Secretary of Energy” containing a number of recommendations on nuclear waste disposal. Two of the recommendations that may impact decommissioning planning are:

- “[T]he United States [should] establish a program that leads to the timely development of one or more consolidated storage facilities”<sup>[10]</sup>
- “[T]he United States should undertake an integrated nuclear waste management program that leads to the timely



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development of one or more permanent deep geological facilities for the safe disposal of spent fuel and high-level nuclear waste.”

In January 2013, the DOE issued the “Strategy for the Management and Disposal of Used Nuclear Fuel and High-Level Radioactive Waste,” in response to the recommendations made by the Blue Ribbon Commission and as “a framework for moving toward a sustainable program to deploy an integrated system capable of transporting, storing, and disposing of used nuclear fuel...”<sup>[11]</sup> This document states:

“With the appropriate authorizations from Congress, the Obama Administration planned to implement a program over the next 10 years that would have:

- Sites, designs and licenses, constructs and begins operations of a pilot interim storage facility by 2021 with an initial focus on accepting used nuclear fuel from shut-down reactor sites;
- Advances toward the siting and licensing of a larger interim storage facility to be available by 2025 that will have sufficient capacity to provide flexibility in the waste management system and allows for acceptance of enough used nuclear fuel to reduce expected government liabilities; and
- Makes demonstrable progress on the siting and characterization of repository sites to facilitate the availability of a geologic repository by 2048.”

The NRC’s review of DOE’s license application to construct a geologic repository at Yucca Mountain was suspended in 2011 when the Obama Administration significantly reduced the budget for completing that work. However, the US Court of Appeals for the District of Columbia Circuit issued a writ of mandamus (in August 2013)<sup>[12]</sup> ordering NRC to comply with federal law and restart its review of DOE’s Yucca Mountain repository license application to the extent of previously appropriated funding for the review. That review is now complete with the publication of the five-volume safety evaluation report. A supplement to DOE’s environmental impact statement and an adjudicatory hearing on the contentions filed by interested parties must be completed before a licensing decision can be made. Although the DOE proposed it would start fuel acceptance in 2025, no progress has been made in the repository program since DOE’s 2013 strategy was issued except for the completion of the Yucca Mountain safety evaluation report.

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Holtec International submitted a license application to the NRC on March 30, 2017 for a consolidated interim spent fuel storage facility in southeast New Mexico called HI-STORE CIS (Consolidated Interim Storage) under the provisions of 10 CFR Part 72. The application is currently under NRC review.

A centralized interim storage project was initiated by Waste Control Specialists (WCS) for a site in Andrews County, Texas, adjacent to WCS's existing low-level radioactive waste and hazardous waste storage and disposal facilities. The NRC license application for this project was filed in April 2016. In April 2017, WCS asked the NRC to suspend the review of this application. Subsequently, WCS and Orano USA (formerly Areva Nuclear Materials) formed a joint venture to license the facility. In response to letters to the NRC in June and July 2018 from the joint venture, Interim Storage Partners, the NRC restarted its review of the application.

On May 10, 2018, the U.S. House of Representatives passed H.R. 3053, the "Nuclear Waste Policy Amendments Act of 2018." Proposed to amend the Nuclear Waste Policy Act of 1982, the legislation, if approved by the Senate and signed by the President, would provide the DOE the authority to site, construct, and operate one or more Monitored Retrieval Storage (MRS) facilities while a permanent repository is licensed and constructed and/or to enter into an MRS agreement with a non-Federal entity for temporary storage.

Completion of the decommissioning process is dependent upon the DOE's ability to remove spent fuel from the site in a timely manner. DOE's repository program had originally assumed that spent fuel allocations would be accepted for disposal from the nation's commercial nuclear plants, with limited exceptions, in the order (the "queue") in which it was discharged from the reactor.<sup>[13]</sup> However, the Blue Ribbon Commission, in its final report, noted that: "[A]ccepting spent fuel according to the OFF [Oldest Fuel First] priority ranking instead of giving priority to shutdown reactor sites could greatly reduce the cost savings that could be achieved through consolidated storage if priority could be given to accepting spent fuel from shutdown reactor sites before accepting fuel from still-operating plants. .... The magnitude of the cost savings that could be achieved by giving priority to shutdown sites appears to be large enough (i.e., in the billions of dollars) to warrant DOE exercising its right under the Standard Contract to move this fuel first."

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The state of Minnesota directed the Public Utilities Commission, “when considering approval of a plan for the accrual of funds for the decommissioning of nuclear facilities” ...to “include an evaluation of the costs, if any, arising from storage of used nuclear fuel that may be incurred by the state of Minnesota, and any tribal community, county, city, or township where used nuclear fuel is located following the cessation of operations at a nuclear plant.”<sup>[14]</sup>

The state of Minnesota statute also prescribed the parameters to be used in evaluating spent fuel management costs. “To assist the commission in making the determination ... the filing shall provide cost estimates, including ratepayer impacts, assuming used nuclear fuel will be stored in the state for 60 years, 100 years, and 200 years following the cessation of operation of the nuclear plant.”

Xcel Energy’s current spent fuel management plan for the Monticello spent fuel is based in general upon:

- 1) Fuel transferred from the pool to the ISFSI within 4 years of shutdown;
- 2) Exchange of Prairie Island and Monticello spent fuel acceptance rights to best manage the overall cost of spent fuel storage for both plants;
- 3) Fuel will be shipped in the existing NUHOMS DSCs (Scenarios 1, 2, 5, and 6); the NUHOMS are periodically replaced in Scenarios 3, 4, 7 and 8. Canisters that are unloaded in the spent fuel transfer operation will be surveyed for neutron activation.
- 4) As an allowance, some of these canisters and NUHOMS modules from the first off-load operation are assumed to be mildly neutron activated and therefore must be disposed of as radioactive waste.
- 5) For the 100 and 200 year dry fuel storage scenarios (Scenarios 3, 4, 7 and 8) the canisters and casks will be replaced on a 50 year schedule using a dry transfer facility.<sup>[15]</sup>
- 6) Currently Monticello is storing spent fuel assemblies at the Morris Operation facility of GE Hitachi Nuclear Energy in Morris, Illinois. These assemblies will be shipped for final disposal to DOE prior to the removal of fuel from the Monticello site.

The NRC requires that licensees establish a program to manage and provide funding for the caretaking of all irradiated fuel at the reactor site until title of the fuel is transferred to the Secretary of Energy,

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pursuant to 10 CFR Part 50.54(bb).<sup>[16]</sup> This requirement is prepared for through inclusion of certain cost elements in the decommissioning estimates, for example, associated with the isolation and continued operation of the spent fuel pool and the ISFSI.

The spent fuel pool is expected to contain freshly discharged assemblies (from the most recent refueling cycles) as well as the final reactor core at shutdown. The assemblies are packaged into dry shielded canisters (DSCs) over the first four years after shutdown for transfer to the ISFSI for interim storage. It is assumed that this period provides the necessary cooling for the final core to meet the transport and/or storage requirements for decay heat.

An ISFSI, operated under a Part 50 General License (in accordance with 10 CFR 72, Subpart K<sup>[17]</sup>), has been constructed to support continued plant operations. The facility is assumed to be expanded to support decommissioning. This will allow decommissioning activities to proceed within the reactor building.

DOE has breached its obligations to remove fuel from reactor sites, and has also failed to provide the plant owners with information about how it will ultimately perform. DOE officials have stated that DOE does not have an obligation to accept already-canistered fuel without an amendment to DOE's contracts with plant licensees to remove the fuel (the "Standard Contract"), but DOE has not explained what any such amendment would involve. Consequently, Xcel Energy has no information or expectations on how DOE will remove fuel from the site in the future. In the absence of information about how DOE will perform, and for purposes of this analysis only, it is assumed that DOE will accept already-canistered fuel. If this assumption is incorrect, it is assumed that DOE will have liability for costs incurred to transfer the fuel to DOE-supplied containers.

Xcel Energy's position is that the DOE has a contractual obligation to accept Monticello's fuel earlier than the projections set out above, consistent with its contract commitments. No assumption made in this study should be interpreted to be inconsistent with this claim. However, including the cost of storing spent fuel in this study is appropriate to ensure the availability of sufficient decommissioning funds at the end of the station's life if the DOE has not met its obligation. The cost for the interim storage of spent fuel has been calculated and is separately presented as "Spent Fuel Management" expenditures in this report.

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Section 1, Page 10 of 15****1.3.2 Low-Level Radioactive Waste Disposal**

The contaminated and activated material generated in the decontamination and dismantling of a commercial nuclear reactor is classified as low-level (radioactive) waste, although not all of the material is suitable for “shallow-land” disposal. With the passage of the “Low-Level Radioactive Waste Policy Act” in 1980, <sup>[18]</sup> and its Amendments of 1985, <sup>[19]</sup> the states became ultimately responsible for the disposition of low-level radioactive waste generated within their own borders. It was expected that groups of states would combine together to jointly deal with their radioactive wastes; these organizations are referred to as waste disposal compacts.

With the exception of Texas, no new compact facilities have been successfully sited, licensed, and constructed. The Texas Compact disposal facility is now operational and waste is being accepted from generators within the Compact by the operator, Waste Control Specialists (WCS). The facility is also able to accept limited quantities of non-Compact waste.

Disposition of the various waste streams produced by the decommissioning process considered all options and services currently available to Xcel Energy. The majority of the low-level radioactive waste designated for direct disposal (Class A <sup>[20]</sup>) can be sent to EnergySolutions’ facility in Clive, Utah. Therefore, disposal costs for Class A waste were based upon current contract rates. This facility is not licensed to receive the higher activity portion (Classes B and C) of the decommissioning waste stream.

The Texas facility is licensed to receive the higher activity waste forms (Classes B and C). As such, for this analysis, disposal costs for the Class B and C waste were based upon the preliminary and indicative information on the cost for such from WCS.

The dismantling of the components residing closest to the reactor core generates radioactive waste considered unsuitable for shallow-land disposal (i.e., low-level radioactive waste with concentrations of radionuclides that exceed the limits established by the NRC for Class C radioactive waste (GTCC)). The Low-Level Radioactive Waste Policy Amendments Act of 1985 assigned the federal government the responsibility for the disposal of this material. The Act also stated that the beneficiaries of the activities resulting in the generation of such radioactive waste bear all reasonable costs of disposing of such waste.

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The DOE issued its final Environmental Impact Statement for the disposal of GTCC on January 2016.<sup>[21]</sup> The study evaluated the potential environmental impacts associated with constructing and operating a new facility or using an existing facility, disposal methods, and locations. DOE is awaiting Congressional action on the report and its recommendations. At this time, the federal government has not identified a specific cost for disposing of GTCC or a schedule for acceptance.

For purposes of this analysis, the GTCC radioactive waste is assumed to be packaged and disposed of in a similar manner as high-level waste and at a cost equivalent to that envisioned for the spent fuel. The GTCC is packaged in the same canisters used for spent fuel and is stored on site along with the spent fuel in the ISFSI. The GTCC will be transferred to the DOE upon completion of spent fuel transfer to the DOE.

A significant portion of the metallic waste material generated during decommissioning may only be potentially contaminated by radioactive materials. This waste can be surveyed on site or shipped off site to licensed facilities for further analysis, for processing and/or for conditioning/recovery. Reduction in the volume of low-level radioactive waste requiring disposal in a licensed low-level radioactive waste disposal facility can be accomplished through a variety of methods, including analyses and surveys or decontamination to isolate the portion of waste that does not require disposal as radioactive waste, compaction, incineration or metal melt. The estimates reflect the savings from waste recovery/volume reduction.

### 1.3.3 Radiological Criteria for License Termination

In 1997, the NRC published Subpart E, “Radiological Criteria for License Termination,”<sup>[22]</sup> amending 10 CFR §20. This subpart provides radiological criteria for releasing a facility for unrestricted use. The regulation states that the site can be released for unrestricted use if radioactivity levels are such that the average member of a critical group would not receive a Total Effective Dose Equivalent (TEDE) in excess of 25 millirem per year, and provided that residual radioactivity has been reduced to levels that are As Low As Reasonably Achievable (ALARA). The decommissioning estimates assume that the Monticello site will be remediated to a residual level consistent with the NRC-prescribed level.

It should be noted that the NRC and the Environmental Protection Agency (EPA) differ on the amount of residual radioactivity considered

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acceptable in site remediation. The EPA has two limits that apply to radioactive materials. An EPA limit of 15 millirem per year is derived from criteria established by the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA or Superfund).<sup>[23]</sup> An additional and separate limit of 4 millirem per year, as defined in 40 CFR §141.66, is applied to drinking water.<sup>[24]</sup>

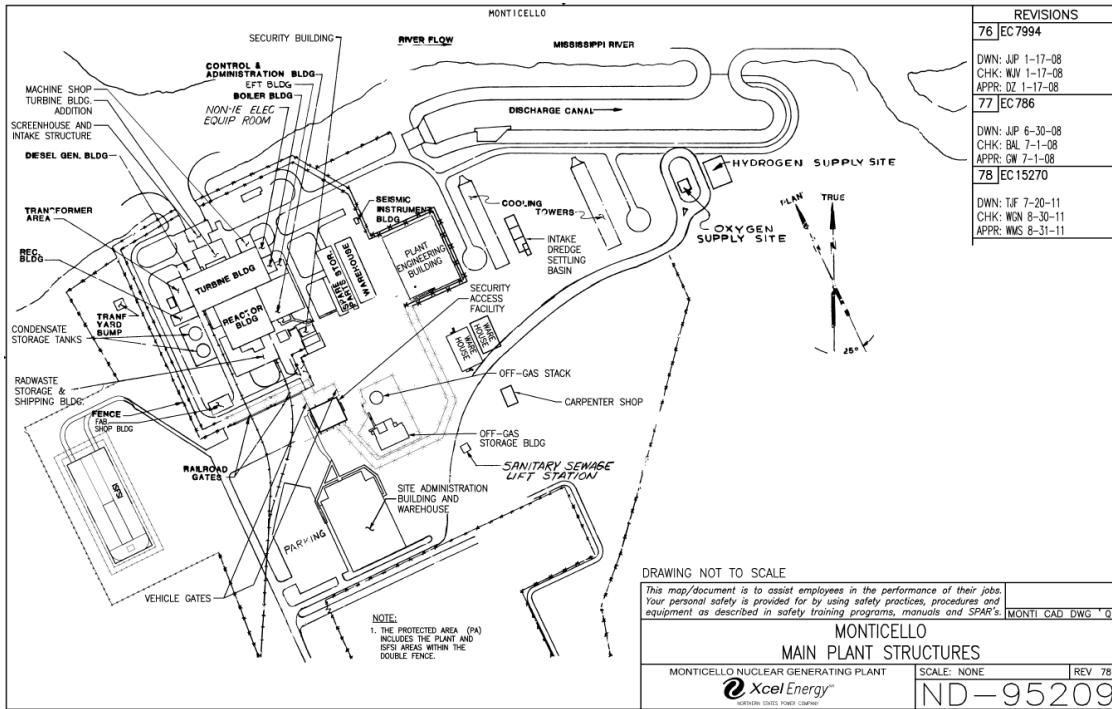
On October 9, 2002, the NRC signed an agreement with the EPA on the radiological decommissioning and decontamination of NRC-licensed sites. The Memorandum of Understanding (MOU)<sup>[25]</sup> provides that EPA will defer exercise of authority under CERCLA for the majority of facilities decommissioned under NRC authority. The MOU also includes provisions for NRC and EPA consultation for certain sites when, at the time of license termination, (1) groundwater contamination exceeds EPA-permitted levels; (2) NRC contemplates restricted release of the site; and/or (3) residual radioactive soil concentrations exceed levels defined in the MOU.

The MOU does not impose any new requirements on NRC licensees and should reduce the involvement of the EPA with NRC licensees who are decommissioning. Most sites are expected to meet the NRC criteria for unrestricted use, and the NRC believes that only a few sites will have groundwater or soil contamination in excess of the levels specified in the MOU that trigger consultation with the EPA. However, if there are other hazardous materials on the site, the EPA may be involved in the cleanup. As such, the possibility of dual regulation remains for certain licensees. The present study does not include any costs for this occurrence.

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**FIGURE 1.1  
 MONTICELLO NUCLEAR GENERATING PLANT  
 GENERAL PLAN**





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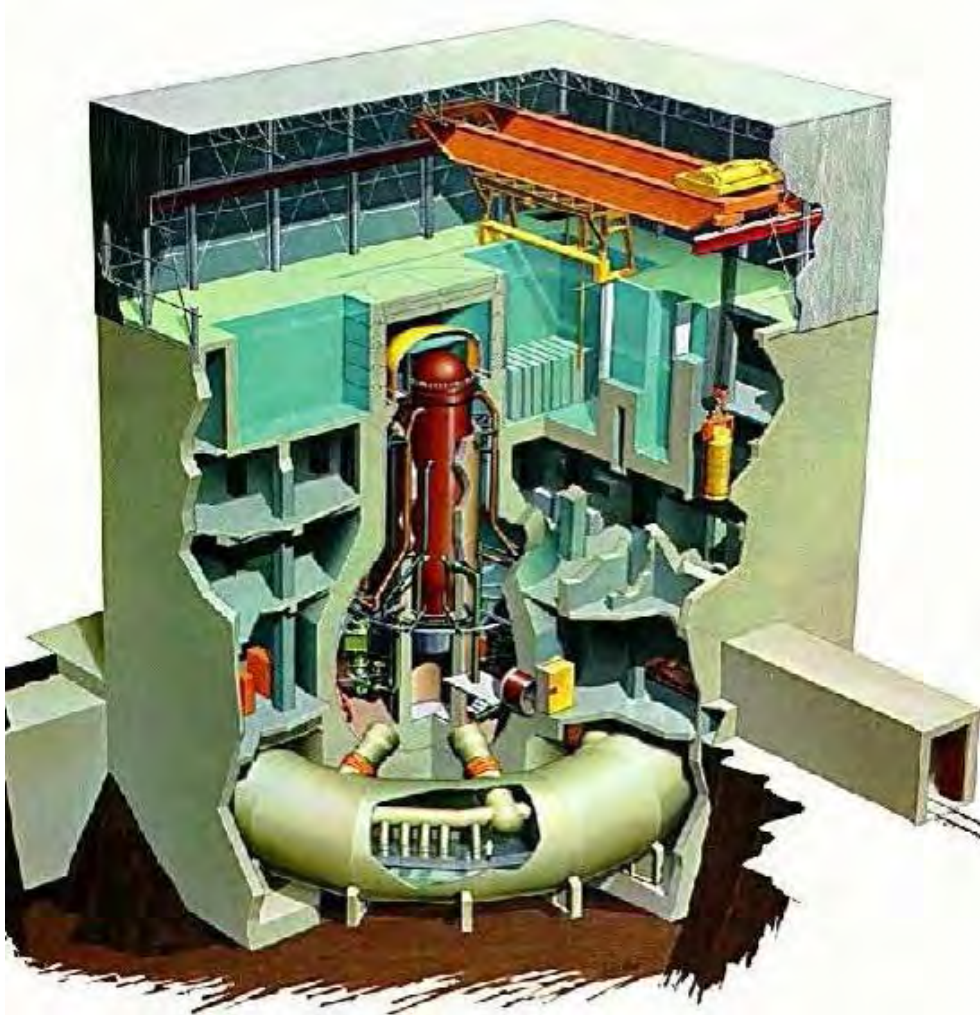
**FIGURE 1.2  
MONTICELLO NUCLEAR GENERATING PLANT  
AERIAL VIEW**



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**FIGURE 1.3  
MONTICELLO NUCLEAR GENERATING PLANT  
REACTOR BUILDING SECTION**



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**2. DECON DECOMMISSIONING ALTERNATIVE**

Detailed cost estimates were developed to decommission Monticello based upon the approved DECON decommissioning alternative. Although the alternatives differ with respect to technique, process, cost, and schedule, they attain the same result: the ultimate release of the site for unrestricted use.

The following scenarios were evaluated and are intended to bound the liability associated with the removal of spent fuel from the site. The scenarios consist of four spent fuel management scenarios. The duration of the spent fuel scenarios has little impact to the decommissioning costs and timing of the power block systems and structures. The spent fuel in the plant’s spent fuel storage pool is transferred to the ISFSI within the first four years. The equipment, structures, and portions of the plant containing radioactive contaminants are removed or decontaminated to a level that permits the facility to be released for unrestricted use. Non-essential structures are then demolished. Spent fuel storage operations continue at the ISFSI until the transfer of the fuel to the DOE is completed (as shown in the “Last Spent Fuel Assembly” column in the following table).

Scenario	1 <sup>st</sup> Spent Fuel Canister Replacement	1 <sup>st</sup> Spent Fuel Assembly Removed from Monticello	Last Spent Fuel Assembly Removed from Monticello	Scenario Identification
1	n/a	2052	2082	DECON with 42 Year DFS <sup>+</sup>
2	n/a	2078	2100	DECON with 60 Year DFS
3	2058	2118	2140	DECON with 100 Year DFS
4	2058	2218	2240	DECON with 200 Year DFS

\* Spent fuel stored at Morris is removed after fuel stored at the Monticello site.

+ Dry Fuel Storage

For Scenario 1, although it only provides a total fuel storage period of 42 years following shutdown, some of the Monticello casks have been in storage since 2008. Xcel Energy directed TLG Services to not include the cost of transferring the spent fuel in dry storage to new canisters for those casks that exceed 50 years. The assumption to not transfer spent fuel at 50-years total storage duration for this scenario was premised on the likelihood that the life of the canisters could be successfully extended for the additional years.

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For Scenario 2, although it provides a total fuel storage period of nominally 60 years following shutdown, Xcel Energy directed TLG Services to not include the cost of transferring the spent fuel in dry storage to new canisters at the 50-year mark.

In Scenarios 3 and 4, the Dry Shielded Canisters (DSCs) are assumed to be replaced after fifty years of use. Since the reactor building spent fuel storage pool and fuel handling facilities are removed by the year 2048, a dry fuel transfer facility is assumed to be constructed on site to perform the transfers from the old to the new DSCs. For Scenario 3, two such transfer is needed over the time frame assumed. For Scenario 4, the spent fuel will be transferred four times following initial placement in the ISFSI. The following sections describe the basic activities associated with each alternative. Although detailed procedures for each activity identified are not provided, and the actual sequence of work may vary, the activity descriptions provide a basis not only for estimating but also for the expected scope of work (i.e., engineering and planning at the time of decommissioning).

The conceptual approach that the NRC has described in its regulations divides decommissioning into three phases. The initial phase commences with the effective date of permanent cessation of operations and involves the transition of both plant and licensee from reactor operations (i.e., power production) to facilitate deactivation and closure. During the first phase, notification is to be provided to the NRC certifying the permanent cessation of operations and the removal of fuel from the reactor vessel. The licensee would then be prohibited from reactor operation.

The second phase encompasses activities during the storage period or during major decommissioning activities, or a combination of the two. The third phase pertains to the activities involved in license termination. The decommissioning estimates developed for Monticello are also divided into phases or periods; however, demarcation of the phases is based upon major milestones within the project or significant changes in the projected expenditures.

This study does not address the cost to dispose of the spent fuel residing at the site; such costs are funded through a surcharge on electrical generation. However, the study does estimate the costs incurred with the interim on-site storage of the fuel pending shipment by the DOE to an off-site disposal facility. Those costs are separately presented as "Spent Fuel Management" expenditures in this report.

The DECON alternative, as defined by the NRC, is "the alternative in which the equipment, structures, and portions of a facility and site containing radioactive contaminants are removed or decontaminated to a level that permits the property to be released for unrestricted use shortly after cessation of operations." The DECON alternative for Monticello is detailed below.

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Section 2, Page 3 of 10****2.1 PERIOD 1 - PREPARATIONS**

In anticipation of the cessation of plant operations, detailed preparations are undertaken to provide a smooth transition from plant operations to site decommissioning. Through implementation of a staffing transition plan, the organization required to manage the intended decommissioning activities is assembled from available plant staff and outside resources. Preparations include the planning for permanent defueling of the reactor, revision of technical specifications applicable to the operating conditions and requirements, a characterization of the facility and major components, and the development of the PSDAR.

**Engineering and Planning**

The PSDAR, required prior to, or within two years of permanent cessation of operations, provides a description of the licensee's planned decommissioning activities, a timetable, a site-specific decommissioning cost estimate, and the associated financial requirements of the intended decommissioning program. Upon receipt of the PSDAR, the NRC will make the document available to the public for comment in a local meeting to be held in the vicinity of the reactor site. Ninety days following submittal and NRC receipt of the PSDAR, the licensee may begin to perform major decommissioning activities under a modified 10 CFR §50.59 procedure, (10 CFR §50.59 establishes the conditions under which licensees may make changes to the facility or procedures and conduct test or experiments, i.e., without prior NRC approval). Major activities are defined as any activity that results in permanent removal of major radioactive components, permanently modifies the structure of the containment, or results in dismantling components (for shipment) containing GTCC, as defined by 10 CFR §61. Major components are further defined as comprising the reactor vessel and internals, large bore reactor recirculation system piping, and other large components that are radioactive. The NRC includes the following additional criteria for use of the §50.59 process in decommissioning. The proposed activity must not:

- foreclose release of the site for possible unrestricted use,
- significantly increase decommissioning costs,
- cause any significant environmental impact not previously reviewed, or
- result in there no longer being reasonable assurance that adequate funds will be available for decommissioning

Existing operational technical specifications are reviewed and modified to reflect plant conditions and the safety concerns associated with permanent

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cessation of operations. The environmental impact associated with the planned decommissioning activities is also considered. Typically, a licensee will not be allowed to proceed if the consequences of a particular decommissioning activity are greater than that bounded by previously evaluated environmental assessments or impact statements. In this instance, the licensee would have to submit a license amendment for the specific activity and update the environmental report.

The decommissioning program outlined in the PSDAR will be designed to accomplish the required tasks within the ALARA guidelines (as defined in 10 CFR §20) for protection of personnel from exposure to radiation hazards. It will also address the continued protection of the health and safety of the public and the environment during the dismantling activity. Consequently, with the development of the PSDAR, activity specifications, cost-benefit and safety analyses, and work packages and procedures, would be assembled to support the proposed decontamination and dismantling activities.

**Site Preparations**

Following final plant shutdown, and in preparation for actual decommissioning activities, the following activities are initiated:

- Characterization of the site and surrounding environs. This includes radiation surveys of work areas, major components (including the reactor vessel and its internals), internal piping, and primary shield cores.
- An ISFSI has been constructed to support continued plant operation and will need to be expanded following the cessation of operations to offload the spent fuel pool in support of the decommissioning program.
- Isolation of the spent fuel storage pool and fuel handling systems, such that decommissioning operations can commence on the balance of the plant. Decommissioning operations are scheduled around the fuel handling area to optimize the overall project schedule. It is assumed that the fuel pool remains operational for the transfer of fuel for approximately four years following the cessation of operations.
- Specification of transport and disposal requirements for activated materials and/or hazardous materials, including shielding and waste stabilization.
- Development of procedures for occupational exposure control, control and release of liquid and gaseous effluent, processing of radwaste (including dry-active waste, resins, filter media, metallic and non-metallic

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components generated in decommissioning), site security and emergency programs, and industrial safety.

- Perform chemical decontamination of the NSSS to reduce radiation levels in support of removal operations.

**2.2 PERIOD 2 -DECOMMISSIONING OPERATIONS**

This period includes the physical decommissioning activities associated with the removal and disposal of contaminated and activated components and structures, including the successful amendment of the 10 CFR §50 operating license (releasing the site, exclusive of the ISFSI). Significant decommissioning activities in this phase include:

- Construction of temporary facilities and/or modification of existing facilities to support dismantling activities. This may include a centralized processing area to facilitate equipment removal and component preparations for off-site disposal.
- Reconfiguration and modification of site structures and facilities as needed to support decommissioning operations. This may include the upgrading of roads (on- and off-site) to facilitate hauling and transport. Modifications may be required to the containment structure to facilitate access of large/heavy equipment. Modifications may also be required to the refueling area of the reactor building to support the segmentation of the reactor vessel internals and component extraction.
- Transfer of the spent fuel from the spent fuel storage pool to the ISFSI pad for interim storage.
- Design and fabrication of temporary and permanent shielding to support removal and transportation activities, construction of contamination control envelopes, and the procurement of specialty tooling.
- Procurement (lease or purchase) of shipping canisters, cask liners, and industrial packages.
- Decontamination of components and piping systems as required to control (minimize) worker exposure.
- Removal of piping and components no longer essential to support decommissioning operations.
- Transfer of the steam separator and dryer assemblies to the dryer-separator pool for segmentation. Segmentation by weight and activity maximizes the loading of the shielded transport casks. The operations are conducted under water using remotely operated tooling and contamination controls.



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- Disconnection of the control blades from the drives on the vessel lower head. Blades are transferred to the spent fuel pool for packaging.
- Disassembly, segmentation, and packaging of the core shroud and in-core guide tubes. Some of the material is expected to exceed Class C disposal requirements. As such, those segments are packaged in modified fuel storage canisters for geologic disposal.
- Removal and segmentation of the remaining internals including the jet pump assemblies, fuel support castings, and core plate assembly.
- Removal of spent fuel storage racks from spent fuel pool, and cleanup of spent fuel pool.
- Draining and decontamination of the reactor well and the permanent sealing of the spent fuel transfer gate. Installation of a shielded platform for segmentation of the reactor vessel. Cutting operations are performed in air using remotely operated equipment within a contamination control envelope, with the water level maintained just below the cut to minimize the working area dose rates. Sections are transferred to the dryer-separator pool for packaging and interim storage.
- Disconnection of the control rod drives and instrumentation tubes from the reactor vessel lower head. The lower reactor head and vessel supporting structure are then segmented.
- Removal of the reactor recirculation pumps. Exterior surfaces are decontaminated and openings covered. Components can serve as their own burial containers provided that all penetrations are properly sealed.
- Demolition of the sacrificial shield wall activated concrete by controlled demolition.
- Expansion of the ISFSI and transfer of the spent fuel from the storage pool to the ISFSI pad for interim storage. Spent fuel storage operations continue throughout the active decommissioning period. Fuel transfer to DOE is expected to be completed by the end of the year 2082 (Scenario 1).

At least two years prior to the anticipated date of license termination, an LTP is required. Submitted as a supplement to the Final Safety Analysis Report (FSAR) or its equivalent, the plan must include: a site characterization, description of the remaining dismantling activities, plans for site remediation, procedures for the final radiation survey, designation of the end use of the site, an updated cost estimate to complete the decommissioning, and any associated environmental concerns. The NRC will notice the receipt of the plan, make the plan available for public comment, and schedule a local meeting. LTP approval will be subject to any conditions and limitations as deemed appropriate by the



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Commission. The licensee may then commence with the final remediation of site facilities and services, including:

- Removal of remaining plant systems and associated components as they become nonessential to the decommissioning program or worker health and safety (e.g., waste collection and treatment systems, electrical power and ventilation systems).
- Removal of the steel liners from the drywell, disposing of the activated and contaminated sections as radioactive waste. Removal of any activated/contaminated concrete.
- Removal of the steel liners from the dryer/separator pool, reactor well, and spent fuel storage pool.
- Surveys of the decontaminated areas of the containment structure.
- Removal of the contaminated equipment and material from the turbine and radwaste buildings, and any other contaminated facility. Use radiation and contamination control techniques until radiation surveys indicate that the structures can be released for unrestricted access and conventional demolition. This activity may necessitate the dismantling and disposition of most of the systems and components (both clean and contaminated) located within these buildings. This activity will facilitate surface decontamination and subsequent verification surveys required prior to obtaining release for demolition.
- Removal of the remaining components, equipment, and plant services in support of the area release survey(s).
- Routing of material removed in the decontamination and dismantling to a central processing area. Material certified to be free of contamination is released for unrestricted disposition, e.g., as scrap, recycle, or general disposal. Contaminated material is characterized and segregated for additional off-site processing (disassembly, chemical cleaning, volume reduction, and waste treatment), and/or packaged for controlled disposal at a low-level radioactive waste disposal facility.

Incorporated into the LTP is the Final Survey Plan. This plan identifies the radiological surveys to be performed once the decontamination activities are completed and is developed using the guidance provided in the “Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM).”<sup>[26]</sup> This document incorporates the statistical approaches to survey design and data interpretation used by the EPA. It also identifies commercially available instrumentation and procedures for conducting radiological surveys. Use of this guidance ensures that the surveys are conducted in a manner that

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provides a high degree of confidence that applicable NRC criteria are satisfied. Once the survey is complete, the results are provided to the NRC in a format that can be verified. The NRC then reviews and evaluates the information, performs an independent confirmation of radiological site conditions, and makes a determination on the requested change to the operating license (that would release the property, exclusive of the ISFSI, for unrestricted use).

The NRC will amend the operating license to reduce the licensed area to the ISFSI area if it determines that site remediation has been performed in accordance with the LTP, and that the terminal radiation survey and associated documentation demonstrate that the property (exclusive of the ISFSI) is suitable for release.

**2.3 PERIOD 3 –SITE RESTORATION**

Following completion of decommissioning operations, site restoration activities will begin. Efficient removal of the contaminated materials and verification that residual radionuclide concentrations are below the NRC limits will result in substantial damage to many of the structures. Although performed in a controlled and safe manner, blasting, coring, drilling, scarification (surface removal), and the other decontamination activities will substantially degrade power block structures including the reactor, turbine and radwaste buildings. Under certain circumstances, verifying that subsurface radionuclide concentrations meet NRC site release requirements will require removal of grade slabs and lower floors, potentially weakening footings and structural supports. This removal activity will be necessary for those facilities and plant areas where historical records, when available, indicate the potential for radionuclides having been present in the soil, where system failures have been recorded, or where it is required to confirm that subsurface process and drain lines were not breached over the operating life of the station.

Dismantling of site structures following decommissioning is clearly the most appropriate and cost-effective option. It is unreasonable to anticipate that these structures would be repaired and preserved after the radiological contamination is removed. The effort to dismantle site structures with a work force already mobilized on site is more efficient than if the process were deferred. Site facilities quickly degrade without maintenance, adding additional expense and creating potential hazards to the public as well as to future workers. Abandonment creates a breeding ground for vermin infestation as well as other biological hazards.

This cost study presumes that non-essential structures and site facilities are dismantled as a continuation of the decommissioning activity. Foundations

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and exterior walls are completely removed, including foundations and basemats, as required by Minnesota regulations. [27] Site areas affected by the dismantling activities are restored and the plant area graded as required to prevent ponding, establish erosion control by the planting of native vegetation, and inhibit the refloating of subsurface materials.

Non-contaminated concrete rubble produced by demolition activities is processed to remove reinforcing steel and miscellaneous embedments. All non-contaminated materials are trucked to an off-site area for disposal as construction debris. Subgrade voids are backfilled with clean construction fill, suitable under Minnesota regulations.

**2.4 ISFSI OPERATIONS AND DECOMMISSIONING**

The ISFSI will continue to operate under a general license (10 CFR §50) following the amendment of the operating license to release the adjacent (power block) property. Assuming that Monticello spent fuel shipments begin in 2052, the process is not expected to be completed until 2082 (Scenario 1). Any delay in the transfer process, for example, due to a delay in the scheduled opening of the geologic repository, a slower acceptance rate, or a combination of both, can result in a longer on-site residence time for the fuel discharge from the reactor, as well as additional caretaking expenses. Scenarios 3 and 4 address extended delay periods, which includes the assumption that the spent fuel DSCs and NUHOMS horizontal storage modules (HSMs) will need to be replaced every fifty years.

The assumed design for the ISFSI is based upon the use of a multi-purpose dry shielded storage canister and a NUHOMS HSM for pad storage.

At the conclusion of the spent fuel transfer process, the ISFSI will be decommissioned. The Commission will terminate the license if it determines that the remediation of the ISFSI has been performed in accordance with an ISFSI license termination plan and that the final radiation survey and associated documentation demonstrate that the facility is suitable for release. Once the requirements are satisfied, the NRC can terminate the license for the ISFSI.

For purposes of this cost analysis, it is assumed that once the DSCs containing the spent fuel assemblies have been removed, any required decontamination is performed on the storage overpacks (some minor neutron-induced activation is assumed), and the license for the facility terminated, the concrete overpacks can be dismantled using conventional techniques for the demolition of

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reinforced concrete. The concrete storage pad is then removed and the area regraded. This topic is discussed in greater detail in section 3.4.1.

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### 3. COST ESTIMATES

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

#### 3.1 BASIS OF ESTIMATES

The estimates were developed using the site-specific, technical information from the 2017 analysis. The plant inventory, the basis for the decontamination and dismantling requirements and cost, and the decommissioning waste streams, was reviewed for this analysis; no substantive changes were identified over the three-year period (between estimates) to the configuration of the plant or site facilities that would impact decommissioning. The site-specific considerations and assumptions used in the previous evaluation were also revisited; no necessary modifications were identified. Modifications were incorporated where new information was available or experience from ongoing decommissioning programs provided viable alternatives or improved processes.

#### 3.2 METHODOLOGY

The methodology used to develop the estimates follows the basic approach originally presented in the AIF/NESP-036 study report, "Guidelines for Producing Commercial Nuclear Power Plant Decommissioning Cost Estimates,"<sup>[28]</sup> and the DOE "Decommissioning Handbook."<sup>[29]</sup> These documents present a unit factor method for estimating decommissioning activity costs, which simplifies the estimating calculations. Unit factors for concrete removal (\$/cubic yard), steel removal (\$/ton), and cutting costs (\$/inch) were developed using local labor rates. The activity-dependent costs were estimated with the item quantities (cubic yards and tons), developed from plant drawings and inventory documents. Removal rates and material costs for the conventional disposition of components and structures relied upon information available in the industry publication, "Building Construction Cost Data," published by RSMMeans.<sup>[30]</sup>

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

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detailed development of a typical unit factor. Appendix B provides the values contained within one set of factors developed for this analysis.

Regulatory Guide 1.184 <sup>[31]</sup> describes the methods and procedures that are acceptable to the NRC staff for implementing the requirements that relate to the initial activities and the major phases of the decommissioning process. The costs and schedules presented in this analysis follow the general guidance and sequence in the regulations. The format and content of the estimates is also consistent with the recommendations of Regulatory Guide 1.202. <sup>[32]</sup>

The estimates also reflect lessons learned from TLG's involvement in the Shippingport Station Decommissioning Project, completed in 1989, as well as the decommissioning of the Cintichem reactor, hot cells and associated facilities, completed in 1997. In addition, the planning and engineering for the Rancho Seco, Trojan, Yankee Rowe, Big Rock Point, Maine Yankee, Humboldt Bay-3, Oyster Creek, Connecticut Yankee, Crystal River, Vermont Yankee, Fort Calhoun, Pilgrim, and Indian Point nuclear units have provided additional insight into the process, the regulatory aspects, and the technical challenges of decommissioning commercial nuclear units.

**Work Difficulty Factors**

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

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

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

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

**Scheduling Program Durations**

The unit factors, adjusted by the WDFs as described above, are applied against the inventory of materials to be removed in the radiologically controlled areas. The resulting man-hours, or crew-hours, are used in the development of the decommissioning program schedule, using resource loading and event sequencing considerations. The scheduling of conventional removal and dismantling activities are based upon productivity information available from the RSMeans "Building Construction Cost Data" publication. Dismantling of the fuel handling systems and decontamination of the spent fuel pool is also dependent upon the timetable for the transfer of the spent fuel assemblies from the pool to the ISFSI.

The program schedule is used to determine the period-dependent costs for program management, administration, field engineering, equipment rental, contracted services, etc. The study relies upon regional or site-specific salary and wage rates for the personnel associated with the intended program.

**3.3 FINANCIAL COMPONENTS OF THE COST MODEL**

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

**3.3.1 Contingency**

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

The activity- and period-dependent costs are combined to develop the total decommissioning cost. A contingency is then applied on a line-item basis, using one or more of the contingency types listed in the

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AIF/NESP-036 study. "Contingencies" are defined in the American Association of Cost Engineers "Project and Cost Engineers' Handbook"<sup>[33]</sup> as "specific provision for unforeseeable elements of cost within the defined project scope; particularly important where previous experience relating estimates and actual costs has shown that unforeseeable events which will increase costs are likely to occur." The cost elements in this analysis are based upon ideal conditions and maximum efficiency; therefore, consistent with industry practice, a contingency factor has been applied. In the AIF/NESP-036 study, the types of unforeseeable events that are likely to occur in decommissioning are discussed and guidelines are provided for percentage contingency in each category. It should be noted that contingency, as used in this analysis, does not account for price escalation and inflation in the cost of decommissioning over the remaining operating life of the station.

The use and role of contingency within decommissioning estimates is not a "safety factor issue." Safety factors provide additional security and address situations that may never occur. Contingency funds are expected to be fully expended throughout the program. They also provide assurance that sufficient funding is available to accomplish the intended tasks. An estimate without contingency, or from which contingency has been removed, can disrupt the orderly progression of events and jeopardize a successful conclusion to the decommissioning process.

For example, the most technologically challenging task in decommissioning a commercial nuclear plant is the disposition of the reactor vessel and internal components, now highly radioactive after a lifetime of exposure to core activity. The disposition of these components forms the basis of the critical path (schedule) for decommissioning operations. Cost and schedule are interdependent, and any deviation in schedule has a significant impact on cost for performing a specific activity.

Disposition of the reactor vessel internals involves the underwater cutting of complex components that are highly radioactive. Costs are based upon optimum segmentation, handling, and packaging scenarios. The schedule is primarily dependent upon the turnaround time for the heavily shielded shipping casks, including preparation, loading, and decontamination of the containers for transport. The number of casks required is a function of the pieces generated in the segmentation activity, a value calculated on optimum performance of the tooling employed in cutting the various subassemblies. The expected



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optimization, however, may not be achieved, resulting in delays and additional program costs. For this reason, contingency must be included to mitigate the consequences of the expected inefficiencies inherent in this complex activity, along with related concerns associated with the operation of highly specialized tooling, field conditions, and water clarity.

Contingency funds are an integral part of the total cost to complete the decommissioning process. Exclusion of this component puts at risk a successful completion of the intended tasks and, potentially, subsequent related activities. For this study, TLG examined the major activity-related problems (decontamination, segmentation, equipment handling, packaging, transport, and waste disposal) that necessitate a contingency. Individual activity contingencies ranged from 10% to 75%, depending on the degree of difficulty judged to be appropriate from TLG's actual decommissioning experience. The contingency values used in this study are as follows:

Decontamination	50%
Contaminated Component Removal	25%
Contaminated Component Packaging	10%
Contaminated Component Transport	15%
Low-Level Radioactive Waste Disposal	25%
Low-Level Radioactive Waste Processing	15%
Reactor Segmentation	75%
NSSS Component Removal	25%
Reactor Waste Packaging	25%
Reactor Waste Transport	25%
Reactor Vessel Component Disposal	50%
GTCC Disposal	15%
Staffing	15%
Spent Fuel Management	15%
Non-Radioactive Component Removal	15%
Heavy Equipment and Tooling	15%
Supplies	25%
Engineering	15%
Energy	15%
Insurance and Fees	10%
Characterization and Termination Surveys	30%
Operations and Maintenance Expense	15%

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Construction	15%
Property Taxes	10%
ISFSI Decommissioning	25%

The contingency values are applied to the appropriate components of the estimates on a line item basis. A composite value is then reported at the end of each detailed estimate (as provided in Appendices C through F). Appendix G, the ISFSI decommissioning calculation, uses a flat 25% contingency added at the end of the calculation.

**3.3.2 Financial Risk**

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

- Transition activities and costs: ancillary expenses associated with eliminating 50% to 80% of the site labor force shortly after the cessation of plant operations, added cost for worker separation packages throughout the decommissioning program, national or company-mandated retraining, and retention incentives for key personnel.
- Delays in approval of the decommissioning plan due to intervention, public participation in local community meetings, legal challenges, and national and local hearings.
- Changes in the project work scope from the baseline estimate, involving the discovery of unexpected levels of contaminants, contamination in places not previously expected, contaminated soil previously undiscovered (either radioactive or hazardous material contamination), variations in plant inventory or configuration not indicated by the as-built drawings.
- Regulatory changes (e.g., affecting worker health and safety, site release criteria, waste transportation, and disposal).
- Policy decisions altering national commitments (e.g., in the ability to accommodate certain waste forms for disposition) or in the timetable

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for such, for example, the start and rate of acceptance of spent fuel by the DOE.

- Pricing changes for basic inputs such as labor, energy, materials, and disposal. Items subject to widespread price competition (such as materials) may not show significant variation; however, others such as waste disposal could exhibit large pricing uncertainties, particularly in markets where limited access to services is available.

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

### 3.4 SITE-SPECIFIC CONSIDERATIONS

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

#### 3.4.1 Spent Fuel Management

The cost to dispose of spent fuel generated from plant operations is not reflected within the estimates to decommission Monticello. Ultimate disposition of the spent fuel is within the province of the DOE's Waste Management System, as defined by the Nuclear Waste Policy Act. As such, the disposal cost was financed by a 1 mill/kWhr surcharge paid into the DOE's waste fund during operations. On November 19, 2013, the U.S. Court of Appeals for the D.C. Circuit ordered the Secretary of the Department of Energy to suspend collecting annual fees for nuclear waste disposal from nuclear power plant operators until the DOE has conducted a legally adequate fee assessment.

The NRC does, however, require licensees to establish a program to manage and provide funding for the management of all irradiated fuel at the reactor site until title of the fuel is transferred to the Secretary of Energy. This requirement is prepared for through inclusion of certain high-level waste cost elements within the estimates, as described below.

Xcel Energy's current spent fuel management plan for the Monticello spent fuel is based in general upon:

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- 1) Fuel transferred from the pool to the ISFSI within 4 years of shutdown;
- 2) Exchange of Prairie Island and Monticello spent fuel acceptance rights to best manage the overall cost of spent fuel storage for both plants;
- 3) Fuel will be shipped in the existing NUHOMS DSCs (Scenarios 1, 2, 5, and 6); the NUHOMS are periodically replaced in Scenarios 3, 4, 7 and 8. Canisters that are unloaded in the spent fuel transfer operation will be surveyed for neutron activation.
- 4) As an allowance, some of these canisters and NUHOMS modules from the first off-load operation are assumed to be mildly neutron activated and therefore must be disposed of as radioactive waste.
- 5) For the 100 and 200 year dry fuel storage scenarios (Scenarios 3, 4, 7 and 8) the canisters and casks will be replaced on a 50 year schedule using a dry transfer facility.
- 6) Currently Monticello is storing spent fuel assemblies at the Morris Operation facility of GE Hitachi Nuclear Energy in Morris, Illinois. These assemblies will be shipped for final disposal to DOE prior to the removal of fuel from the Monticello site.

This analysis assumes that the existing ISFSI is modified at the cessation of plant operations to accommodate the fuel present in the storage pool at shutdown.

The DOE's repository program assumes that spent fuel will be accepted for disposal from the nation's commercial nuclear plants in the order (the "queue") in which it was removed from service ("oldest fuel first").<sup>[34]</sup> Repository operations were based upon annual industry-wide receipt of 400 Metric Tons Heavy Metal (MTHM) in the first year of operation, a total of 3,800 MTHM in years 2 through 4 and 3,000 MTHM for year 5 and beyond.<sup>[35]</sup> This logic supports the spent fuel schedule for Scenario 1. All other spent fuel scenarios are consistent with those identified by the Minnesota PSC.

Operation and maintenance costs for the spent fuel pool and ISFSI are included within the estimates and address the costs for staffing the facility, as well as security, insurance, and licensing fees. The estimates also include the costs to purchase, load, and transfer the NUHOMs DSCs from the pool to the ISFSI. Costs are also provided for the final

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disposition of the ISFSI once the transfer of the DSCs from the ISFSI to the DOE is complete.

**Storage Canister Design**

The design and capacity of the ISFSI is based upon the Transnuclear NUHOMS system (with a 61-fuel assembly capacity). The system consists of a multi-purpose (storage and transport) dry shielded storage canister (DSC) and a horizontal storage module (HSM). The existing DSCs and HSMs will remain in the ISFSI until either shipment to the DOE, or until recasked.

**Canister Loading and Transfer**

The estimates include an average cost of \$626,000 for the labor to load/transport the spent fuel from the pool to the ISFSI pad. For estimating purposes an allowance of \$361,000 is used for the cost to transfer each fuel canister from the ISFSI pad to the DOE transport vehicle.

**Operations and Maintenance**

An annual cost (excluding labor) of approximately \$845,000 and \$112,000 are used for operation and maintenance of the spent fuel pool and the ISFSI, respectively.

At shutdown, the spent fuel pool is expected to contain freshly discharged assemblies (from the most recent refueling cycles). Over the next four years the assemblies are packaged into DSCs for transfer to the ISFSI for transfer to the DOE. It is assumed that the four years provides the necessary cooling period for the final core to meet the decay heat requirements for dry storage. Once the pool is emptied, the spent fuel storage and handling facilities are available for decommissioning.

**Replacement of DSCs during ISFSI fuel storage period**

Scenarios 1 and 2 do not assume any replacement of the spent fuel storage DSCs (recasking).

The other four cost estimates, Scenarios 3 and 4, include costs to recask the spent fuel, based upon an assumption that the DSC has a limited lifetime of approximately 50 years.

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Scenario 3 which is 100 years (nominally) in length, considers two repackaging effort for each DSC in the ISFSI.

Scenario 4, which is a (nominal) 200-year scenario, assumes that when any DSC in the ISFSI reaches the 50 years of storage milestone, the DSC is replaced. The fuel will be recasked four times following final shutdown of Monticello.

Since the reactor building, spent fuel storage pool, and fuel handling facilities are removed by the year 2048, a dry fuel transfer facility is assumed to be constructed on site to perform the transfers from the old to the new DSCs. Scenarios 3 and 4 include the cost to construct such a transfer facility, as well as additional staffing positions for support of the dry transfer activities, and additional NRC oversight associated with the transfer operations. The decommissioning of this transfer facility is also included in these scenarios.

**ISFSI Decommissioning**

In accordance with 10 CFR §72.30, licensees must have a proposed decommissioning plan for the ISFSI site and facilities that includes a cost estimate for the plan. The plan should contain sufficient information on the proposed practices and procedures for the decontamination of the ISFSI and for the disposal of residual radioactive materials after all spent fuel, high-level radioactive waste, and reactor-related GTCC waste have been removed.

The NUHOMS multi-purpose dry shielded storage canister with a horizontal, reinforced concrete storage module is used as a basis for the ISFSI decommissioning cost analyses. The modules are assumed to have some level of neutron-induced activation, as a result of the long-term storage of the fuel, i.e., to levels exceeding free-release limits. As an allowance, 8 modules are assumed to require remediation, equivalent to the number of modules required to accommodate the final core offload at Monticello (484 assemblies). The cost of the disposition of this material, as well as the demolition of the ISFSI facility, is included in the estimates.

In accordance with the specific requirements of 10 CFR §72.30 for the ISFSI work scope, the cost estimate for decommissioning the ISFSI reflects: 1) the cost of an independent contractor performing the decommissioning activities; 2) an adequate contingency factor; and 3) the cost of meeting the criteria for unrestricted use. The cost summary

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for decommissioning the ISFSI is presented in Appendix G. It contains two different scenarios reflecting the different number of casks present at the end of the ISFSI operations. The demolition of the ISFSI for both scenarios is reflected within the estimates.

### GTCC

The dismantling of the reactor internals is expected to generate radioactive waste considered unsuitable for shallow land disposal (i.e., low-level radioactive waste with concentrations of radionuclides that exceed the limits established by the NRC for Class C radioactive waste (GTCC)). The Low-Level Radioactive Waste Policy Amendments Act of 1985 assigned the federal government the responsibility for the disposal of this material. The Act also stated that the beneficiaries of the activities resulting in the generation of such radioactive waste bear all reasonable costs of disposing of such waste. <sup>[36]</sup>

Although the material is not classified as high-level waste, federal regulations under the Act designate that disposal of this material is a federal responsibility under Section 3(b)(1)(D). However, the DOE has not been forthcoming with an acceptance criteria or disposition schedule for this material, and numerous questions remain as to the ultimate disposal cost and waste form requirements.

As such, for purposes of this study, the GTCC has been packaged and disposed of in the same manner as high-level waste, at a cost equivalent to that envisioned for the spent fuel. The number of DSCs required and the packaged volume for GTCC was based upon experience at Maine Yankee (e.g., the constraints on loading as identified in the canister's certificate of compliance), but adjusted for the increased spent fuel capacity of the current DSCs.

It is assumed that the DOE would not accept this waste prior to completing the transfer of spent fuel. Therefore, until such time the DOE is ready to accept GTCC waste, it is reasonable to assume that this material would remain in storage at Monticello. GTCC costs have been segregated and included within the "License Termination" expenditures.

#### 3.4.2 Reactor Vessel and Internal Components

The reactor coolant system components are assumed to be decontaminated using chemical agents prior to the start of cutting operations. This type of decontamination can be expected to have a

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significant ALARA impact, since the removal work is done within the first few years of shutdown. A decontamination factor (average reduction) of 10 is assumed for the process. Disposal of the decontamination solution effluent is included within the estimate as a "process liquid waste" charge.

The reactor pressure vessel and internal components are segmented for disposal in shielded, reusable transportation casks. Segmentation is performed underwater in the dryer-separator pool, where a turntable and remote cutter are installed. The vessel is segmented in place, using a mast-mounted cutter supported off the lower head and directed from a shielded work platform installed overhead in the reactor well. Transportation cask specifications and transportation regulations dictate the segmentation and packaging methodology.

Intact disposal of reactor vessel shells has been successfully demonstrated at several of the sites that have been decommissioned. Access to navigable waterways has allowed these large packages to be transported to the Barnwell disposal site with minimal overland travel. Intact disposal of the reactor vessel and internal components can provide savings in cost and worker exposure by eliminating the complex segmentation requirements, isolation of the GTCC material, and transport/storage of the resulting waste packages. Portland General Electric (PGE) was able to dispose of the Trojan reactor as an intact package (including the internals). However, its location on the Columbia River simplified the transportation analysis since:

- the reactor package could be secured to the transport vehicle for the entire journey, i.e., the package was not lifted during transport,
- there were no man-made or natural terrain features between the plant site and the disposal location that could produce a large drop, and
- transport speeds were very low, limited by the overland transport vehicle and the river barge.

As a member of the Northwest Compact, PGE had a site available for disposal of the package - the US Ecology facility in Washington State. The characteristics of this arid site proved favorable in demonstrating compliance with land disposal regulations.



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It is not known whether this option will be available when Monticello ceases operation. Future viability of this option will depend upon the ultimate location of the disposal site, as well as the disposal site licensee's ability to accept highly radioactive packages and effectively isolate them from the environment. Additionally, with BWRs, the diameter of the reactor vessel may severely limit overland transport. Consequently, the study assumes the reactor vessel will require segmentation, as a bounding condition.

**3.4.3 Primary System Components**

Reactor recirculation piping is cut from the reactor vessel once the water level in the vessel (used for personnel shielding during dismantling and cutting operations in and around the vessel) is dropped below the nozzle zone. The piping is boxed and transported by shielded van. The reactor recirculation pumps and motors are lifted out intact, packaged, and transported for processing and/or disposal.

**3.4.4 Main Turbine and Condenser**

The main turbine will be dismantled using conventional maintenance procedures. The turbine rotors and shafts will be removed to a laydown area. The lower turbine casings will be removed from their anchors by controlled demolition. The main condensers will also be disassembled and moved to a laydown area. Material is then prepared for transportation to an off-site recycling facility where it will be surveyed and designated for either decontamination or volume reduction, or controlled disposal. Components will be packaged and readied for transport in accordance with the intended disposition.

**3.4.5 Transportation Methods**

Contaminated piping, components, and structural material other than the highly activated reactor vessel and internal components will qualify as LSA-I, II or III or Surface Contaminated Object, SCO-I or II, as described in Title 49.<sup>[37]</sup> The contaminated material will be packaged in Industrial Packages (IP-1, IP-2, or IP-3, as defined in subpart 10 CFR 173.411) for transport unless demonstrated to qualify as their own shipping containers. The reactor vessel and internal components are expected to be transported in accordance with 10 CFR Part 71, as Type B. It is conceivable that the reactor, due to its limited specific activity, could qualify as LSA II or III. However, the high radiation levels on the outer surface would require that additional shielding be incorporated

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within the packaging so as to attenuate the dose to levels acceptable for transport.

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

Transport of the highly activated metal, produced in the segmentation of the reactor vessel and internal components, will be by shielded truck cask. Cask shipments may exceed 95,000 pounds, including vessel segment(s), supplementary shielding, cask tie-downs, and tractor-trailer. The maximum level of activity per shipment assumed permissible was based upon the license limits of the available shielded transport casks. The segmentation scheme for the vessel and internal segments is designed to meet these limits.

Transportation costs for Class A radioactive material requiring controlled disposal are based upon the mileage to the EnergySolutions facility in Clive, Utah. Transportation costs for the higher activity Class B and C radioactive material are based upon the mileage to the WCS facility in Andrews County, Texas. The transportation cost for the GTCC material is assumed to be contained within the disposal cost. Transportation costs for off-site waste processing are based upon the mileage to Oak Ridge, Tennessee. Truck transport costs were estimated using published tariffs from Tri-State Motor Transit. <sup>[38]</sup>

#### 3.4.6 Low-Level Radioactive Waste Disposal

To the greatest extent practical, metallic material generated in the decontamination and dismantling processes is processed to reduce the total cost of controlled disposal. Material meeting the regulatory and/or site release criterion, is released as scrap, requiring no further cost consideration. Conditioning (preparing the material to meet the waste acceptance criteria of the disposal site) and recovery of the waste stream is performed off site at a licensed processing center. Any material leaving the site is subject to a survey and release charge, at a minimum.

The mass of radioactive waste generated during the various decommissioning activities at the site is shown on a line-item basis in the detailed Appendices C through F, and summarized in Section 5. The

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quantified waste summaries shown in these tables are consistent with 10 CFR Part 61 classifications. Commercially available steel containers are presumed to be used for the disposal of piping, small components, and concrete. Larger components can serve as their own containers, with proper closure of all openings, access ways, and penetrations. The volumes are calculated based on the exterior package dimensions for containerized material or a specific calculation for components serving as their own waste containers.

The more highly activated reactor components will be shipped in reusable, shielded truck casks with disposable liners. In calculating disposal costs, the burial fees are applied against the liner volume and weight, with surcharges added for the special handling requirements and the radiological characteristics of the payload. Packaging efficiencies are lower for the highly activated materials (greater than Type A quantity waste), where high concentrations of gamma-emitting radionuclides limit the capacity of the shipping canisters.

The cost to dispose of the lowest level and majority of the material generated from the decontamination and dismantling activities is based upon representative costs for disposal at EnergySolutions facility in Clive, Utah. Disposal costs for the higher activity waste (Class B and C) were based upon preliminary and indicative information from WCS for the Andrews County facility.

Material exceeding Class C limits (limited to material closest to the reactor core and comprising less than 1% of the total waste volume) is generally not suitable for shallow-land disposal. This material is packaged in the same multipurpose canisters used for spent fuel storage/transport, for eventual transfer to the DOE for disposal.

#### 3.4.7 Site Conditions Following Decommissioning

The NRC will amend or terminate the unit license if it determines that site remediation has been performed in accordance with the license termination plan, and that the terminal radiation survey and associated documentation demonstrate that the facility is suitable for release. The NRC's involvement in the decommissioning process will end at this point. Building codes and environmental regulations will dictate the next step in the decommissioning process, as well as Xcel Energy's own future plans for the site, e.g., the electrical switchyard will remain in support of the regional transmission and distribution system.

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Asphalt surfaces in the immediate vicinity of site buildings are broken up and the material disposed of as construction debris. The site access road will remain.

Only existing site structures are considered in the dismantling cost. All subgrade structures are removed. The voids are backfilled with clean debris and capped with soil. The site is then re-graded to conform to the adjacent landscape. Vegetation is established to inhibit erosion. These “non-radiological costs” are included in the total cost of decommissioning.

Bulk excavation of soil and material in the immediate vicinity of the reactor building is included to remove various duct banks, catch basins, and underground utilities that may exist.

The estimates do not assume the remediation of any significant volume of contaminated soil. This assumption may be affected by continued plant operations and/or future regulatory actions, such as the development of site-specific release criteria.

### 3.5 ASSUMPTIONS

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

#### 3.5.1 Estimating Basis

Decommissioning costs are reported in the year of projected expenditure; however, the values are provided in 2020 dollars. Costs are not inflated, escalated, or discounted over the periods of performance.

The estimates rely upon the physical plant inventory that was the basis for the 2017 analysis (updated to reflect any material changes to the plant over the past three years).

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

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### 3.5.2 Labor Costs

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

Utility labor costs were provided by Xcel Energy. Average costs were provided by department or work group and included payroll overheads. Decommissioning Operations Contractor (DOC) labor costs were based on utility labor costs with modified markups to account for employee benefits, DOC overhead and profit.

The craft labor required to decontaminate and dismantle the nuclear station will be acquired through standard site contracting practices. Craft labor costs were based upon information from Xcel Energy. Craft labor costs include applicable overheads and profit.

Security levels are assumed to be maintained at “operating levels” for approximately 18 months after operations ceases. Additional reductions in force size are assumed when the pool is empty and with the completion of the decommissioning and site restoration activities.

Staffing levels are assigned by sub-period and functional area. The types of positions and staffing levels are adjusted based upon the type of activity occurring in each sub-period.

Representative profiles of the staffing level for decommissioning, including contractors and craft, is provided in Figure 3.1 (Scenario 2). Utility staffing levels will gradually decrease after completing the removal of physical systems. Staffing levels and management support will vary based upon the amount and type of decommissioning work. Craft manpower levels decrease after systems removal and structures decontamination and drop substantially during the delay period and the license termination survey period. However, craft levels increase again during the site restoration period due to the work associated with structures demolition.

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Security, while reduced from operating levels, is maintained throughout the decommissioning for access control, material control, and to safeguard the spent fuel (in accordance with the requirements of 10 CFR Part 37, Part 72, and Part 73).

### 3.5.3 Design Conditions

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

The curie contents of the vessel and internals at final shutdown are derived from those listed in NUREG/CR-3474.<sup>[39]</sup> Actual estimates are derived from the curie/gram values contained therein and adjusted for the different mass of the Monticello components, projected operating life, and different periods of decay. Additional short-lived isotopes were derived from NUREG/CR-0130<sup>[40]</sup> and NUREG/CR-0672, <sup>[41]</sup> and benchmarked to the long-lived values from NUREG/CR-3474.

The disposal cost for the control blades removed from the vessel with the final core load was included within the estimates. Control blade residence time in the reactor is assumed to be controlled such that the blades do not become GTCC material. Disposition of any blades stored in the pool from operations was considered an operating expense and therefore not accounted for in the estimates.

Neutron activation of the reactor building structure is confined to the reactor sacrificial shield.

### 3.5.4 General

#### Transition Activities

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

- Drain and collect fuel oils, lubricating oils, and transformer oils for recycle and/or sale.

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

**Scrap and Salvage**

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

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

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

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The concrete debris resulting from building demolition activities is crushed on site to reduce the size of the debris. The resulting crushed concrete is disposed offsite as construction debris. The rebar removed from the concrete crushing process is disposed of as scrap steel in a similar fashion as other scrap metal as discussed previously.

**Energy**

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

**Emergency Planning**

FEMA and state fees associated with emergency planning are assumed to continue for approximately 12 months following the cessation of operations. At this time, the FEMA fees are discontinued. The timing is based upon the anticipated condition of the spent fuel (i.e., the hottest spent fuel assemblies are assumed to be cool enough that no substantial Zircaloy oxidation and off-site event would occur with the loss of spent fuel pool water). State and local fees are continued until all spent fuel is transferred out of the spent fuel pool. Local fees are continued until all spent fuel has been removed from the site.

**Insurance**

Costs for continuing coverage (nuclear liability and property insurance) following cessation of plant operations and during decommissioning are included and based upon current operating premiums. Reductions in premiums, throughout the decommissioning process, are based upon the guidance provided in SECY-00-0145, “Integrated Rulemaking Plan for Nuclear Power Plant Decommissioning.”<sup>[42]</sup> The NRC’s financial protection requirements are based on various reactor (and spent fuel) configurations.

**Site Non-Labor Overhead**

These estimates include costs for site non-labor overhead charges. These costs include telephones, copy machines, computers, IT infrastructure, office supplies, janitorial supplies, training expenses, etc. Xcel Energy provided a two-part cost to address these costs. A variable charge of \$7,389 per person per year of the Xcel Energy staff is included



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throughout the estimate. A fixed annual overhead charge is also included, starting at \$2.6 million at the time of unit shut down and decreasing at various intervals to approximately \$215 thousand per reactor.

**Severance Program**

Severance for personnel retained for the decommissioning organization is included in this estimate.

**Taxes**

Property taxes are included for all decommissioning periods. Xcel Energy provided a schedule of decreasing tax payments against the current tax assessment. These payments are maintained for the balance of the decommissioning program.

**NRC Fees**

These estimates include charges from the NRC to support the Monticello decommissioning program. Charges are included for the yearly license held by Xcel Energy for the Part 50 license, as well as engineering support charges by the NRC to review activities at the site. The Part 50 license fee for a reactor in a decommissioning or possession-only status and which has spent fuel onsite is \$188 thousand per year. Once the reactor has been decommissioned, the site Part 50 license continues at the same fee until final removal of the spent fuel. The hourly rate for NRC review is \$279.00. The level of effort of NRC participation is commensurate with the decommissioning alternative and schedule.

**Disposal of Processed Water**

This estimate assumes that processed water which meets state and federal release limits can be disposed of without additional cost.

**Site Modifications**

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

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Section 3, Page 22 of 40*****Morris Facility Payments**

This estimate includes a yearly cost of \$63 thousand to pay for the storage of spent fuel at the Morris facility.

**Minnesota state regulations regarding concrete**

This estimate complies with the Minnesota state regulations regarding the removal of all subterranean concrete during demolition, plus the survey and confirmation of the suitability of the clean fill used for backfill of the subgrade structures following concrete removal.

**3.6 COST ESTIMATE SUMMARY**

The estimates presented in this document reflects the total cost to decontaminate the nuclear unit, manage the spent fuel until the DOE is able to complete the transfer to a federal facility, dismantle the plant and restore the site for alternative use.

Schedules of expenditures are provided in Tables 3.1 through 3.4. The tables delineate the cost contributors by year of expenditures as well as cost contributor (e.g., labor, materials, and waste disposal).

Additional tables in Appendices C through F provide detailed costs elements. The cost elements are also assigned to one of three subcategories: “License Termination,” “Spent Fuel Management,” and “Site Restoration.” The subcategory “License Termination” is used to accumulate costs that are consistent with “decommissioning” as defined by the NRC in its financial assurance regulations (i.e., 10 CFR §50.75). In situations where the long-term management of spent fuel is not an issue, the cost reported for this subcategory is generally sufficient to terminate the unit’s operating license, recognizing that there may be some additional cost impact from spent fuel management.

The “Spent Fuel Management” subcategory contains costs associated with the containerization and transfer of spent fuel from the pool to the ISFSI for interim storage, and the transfer of the multipurpose canisters from the ISFSI to the DOE. Costs are also included for the operations of the pool and management of the ISFSI until such time that the transfer of all fuel from this facility to an off-site location (e.g., interim storage facility) is complete.

“Site Restoration” is used to capture costs associated with the dismantling and demolition of buildings and facilities demonstrated to be free from contamination. This includes structures never exposed to radioactive

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materials, as well as those facilities that have been decontaminated to appropriate levels. Structures are completely removed, including foundations and basemats and backfilled to conform to local grade.

As discussed in Section 3.4.1, it is assumed that the DOE will not accept the GTCC waste prior to completing the transfer of spent fuel. Therefore, the cost of GTCC disposal is shown in the final year of ISFSI operation (for the DECON alternative). While designated for disposal at a federal facility along with the spent fuel, GTCC waste is still classified as low-level radioactive waste and, as such, included as a “License Termination” expense.

Decommissioning costs are reported in 2020 dollars. Costs are not inflated, escalated, or discounted over the period of expenditure (or projected lifetime of the plant).

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**TABLE 3.1**  
**SCENARIO 1: DECON WITH 42 YEAR DFS**  
**TOTAL ANNUAL EXPENDITURES**  
(thousands, 2020 dollars)

Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2040	23,126	2,441	658	20	7,605	33,849
2041	78,419	11,551	2,747	1,362	34,057	128,136
2042	84,919	36,588	2,387	59,462	32,141	215,498
2043	95,736	65,581	1,831	56,853	27,814	247,814
2044	97,793	77,421	1,341	29,727	22,841	229,122
2045	52,983	4,350	601	11,794	5,833	75,560
2046	37,181	10,198	249	9	4,036	51,673
2047	32,119	11,301	193	0	3,937	47,551
2048	7,112	2,158	0	0	2,557	11,827
2049	6,375	0	0	0	2,550	8,925
2050	6,375	0	0	0	2,550	8,925
2051	6,375	0	0	0	2,550	8,925
2052	6,496	311	0	0	2,557	9,364
2053	6,686	934	0	0	2,550	10,170
2054	6,583	623	0	0	2,550	9,755
2055	6,583	623	0	0	2,550	9,755
2056	7,015	1,868	0	0	2,557	11,440
2057	6,894	1,557	0	0	2,550	11,001
2058	6,894	1,557	0	0	2,550	11,001
2059	6,894	1,557	0	0	2,550	11,001
2060	6,704	934	0	0	2,557	10,195
2061	6,583	623	0	0	2,550	9,755
2062	6,686	934	0	0	2,550	10,170
2063	6,583	623	0	0	2,550	9,755
2064	6,600	623	0	0	2,557	9,780
2065	6,686	934	0	0	2,550	10,170
2066	6,583	623	0	0	2,550	9,755
2067	6,583	623	0	0	2,550	9,755
2068	6,704	934	0	0	2,557	10,195
2069	6,790	1,245	0	0	2,550	10,585

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**TABLE 3.1 (continued)**  
**SCENARIO 1: DECON WITH 42 YEAR DFS**  
**TOTAL ANNUAL EXPENDITURES**  
(thousands, 2020 dollars)

Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2070	6,583	623	0	0	2,550	9,755
2071	6,790	1,245	0	0	2,550	10,585
2072	6,704	934	0	0	2,557	10,195
2073	6,479	311	0	0	2,550	9,340
2074	6,479	311	0	0	2,550	9,340
2075	6,583	623	0	0	2,550	9,755
2076	6,496	311	0	0	2,557	9,364
2077	6,479	311	0	0	2,550	9,340
2078	6,583	623	0	0	2,550	9,755
2079	6,479	311	0	0	2,550	9,340
2080	6,496	311	0	0	2,557	9,364
2081	6,583	623	0	0	2,550	9,755
2082	6,583	1,976	0	0	7,500	16,059
2083	2,096	1,639	22	7,406	4,949	16,112
<b>Total</b>	<b>736,471</b>	<b>248,869</b>	<b>10,030</b>	<b>166,633</b>	<b>237,468</b>	<b>1,399,471</b>

Note: Columns may not add due to rounding

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**TABLE 3.2  
SCENARIO 2: DECON WITH 60 YEAR DFS  
TOTAL ANNUAL EXPENDITURES**  
(thousands, 2020 dollars)

Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2040	22,676	1,092	658	20	7,605	32,050
2041	77,447	8,635	2,747	1,362	34,057	124,248
2042	84,937	36,642	2,387	59,462	32,141	215,570
2043	95,756	65,640	1,831	56,853	27,814	247,894
2044	97,812	77,479	1,341	29,727	22,841	229,199
2045	52,998	4,394	601	11,794	5,833	75,619
2046	37,199	10,252	249	9	4,036	51,745
2047	32,137	11,355	193	0	3,931	47,617
2048	7,130	2,212	0	0	2,472	11,814
2049	6,393	54	0	0	2,465	8,912
2050	8,012	4,910	0	0	2,465	15,387
2051	8,012	4,910	0	0	2,465	15,387
2052	8,749	7,070	0	0	2,472	18,291
2053	9,272	8,690	0	0	2,465	20,427
2054	8,192	5,450	0	0	2,465	16,107
2055	9,092	8,150	0	0	2,465	19,707
2056	9,469	9,230	0	0	2,472	21,171
2057	6,375	0	0	0	2,465	8,840
2058	6,375	0	0	0	2,465	8,840
2059	6,375	0	0	0	2,465	8,840
2060	6,393	0	0	0	2,472	8,864
2061	6,375	0	0	0	2,465	8,840
2062	6,375	0	0	0	2,465	8,840
2063	6,375	0	0	0	2,465	8,840
2064	6,393	0	0	0	2,472	8,864
2065	6,375	0	0	0	2,465	8,840
2066	6,375	0	0	0	2,465	8,840
2067	6,375	0	0	0	2,465	8,840
2068	6,393	0	0	0	2,472	8,864
2069	6,375	0	0	0	2,465	8,840

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**TABLE 3.2 (continued)**  
**SCENARIO 2: DECON WITH 60 YEAR DFS**  
**TOTAL ANNUAL EXPENDITURES**  
 (thousands, 2020 dollars)

Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2070	6,375	0	0	0	2,465	8,840
2071	6,375	0	0	0	2,465	8,840
2072	6,393	0	0	0	2,472	8,864
2073	6,375	0	0	0	2,465	8,840
2074	6,375	0	0	0	2,465	8,840
2075	6,375	0	0	0	2,465	8,840
2076	6,393	0	0	0	2,472	8,864
2077	6,375	0	0	0	2,465	8,840
2078	6,894	1,557	0	0	2,465	10,916
2079	6,998	1,868	0	0	2,465	11,331
2080	6,911	1,557	0	0	2,472	10,940
2081	6,894	1,557	0	0	2,465	10,916
2082	6,894	1,557	0	0	2,465	10,916
2083	6,998	1,868	0	0	2,465	11,331
2084	6,911	1,557	0	0	2,472	10,940
2085	6,894	1,557	0	0	2,465	10,916
2086	6,894	1,557	0	0	2,465	10,916
2087	6,998	1,868	0	0	2,465	11,331
2088	7,631	3,715	0	0	2,472	13,818
2089	6,894	1,557	0	0	2,465	10,916
2090	6,479	311	0	0	2,465	9,255
2091	6,479	311	0	0	2,465	9,255
2092	6,496	311	0	0	2,472	9,279
2093	6,583	623	0	0	2,465	9,670
2094	6,479	311	0	0	2,465	9,255
2095	6,479	311	0	0	2,465	9,255
2096	6,600	623	0	0	2,472	9,694
2097	6,479	311	0	0	2,465	9,255
2098	6,479	311	0	0	2,465	9,255
2099	6,583	623	0	0	2,465	9,670

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**TABLE 3.2 (continued)**  
**SCENARIO 2: DECON WITH 60 YEAR DFS**  
**TOTAL ANNUAL EXPENDITURES**  
 (thousands, 2020 dollars)

Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2100	6,583	1,976	0	0	7,419	15,978
2101	2,096	1,639	22	7,406	4,949	16,112
Total	866,871	295,605	10,030	166,633	278,884	1,618,023

Note: Columns may not add due to rounding



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**TABLE 3.3**  
**SCENARIO 3: DECON WITH 100 YEAR DFS**  
**TOTAL ANNUAL EXPENDITURES**  
(thousands, 2020 dollars)

Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2040	22,676	1,092	658	20	7,605	32,050
2041	77,873	9,916	2,747	1,362	34,057	125,955
2042	86,878	42,467	2,387	59,462	32,141	223,336
2043	97,068	69,577	1,831	56,853	27,814	253,143
2044	97,812	77,479	1,341	29,727	22,841	229,199
2045	52,998	4,394	601	11,794	5,833	75,619
2046	37,374	10,365	249	3,296	4,592	55,875
2047	32,437	11,481	193	3,765	4,567	52,443
2048	8,502	2,212	0	0	2,458	13,173
2049	7,761	54	0	0	2,451	10,267
2050	9,380	4,911	0	0	2,451	16,742
2051	9,380	4,911	0	0	2,451	16,742
2052	9,401	4,911	0	0	2,458	16,770
2053	9,380	4,911	0	0	2,451	16,742
2054	9,380	4,911	0	0	2,451	16,742
2055	9,380	4,911	0	0	2,451	16,742
2056	9,401	4,911	0	0	2,458	16,770
2057	9,380	4,911	0	0	2,451	16,742
2058	16,558	26,445	0	0	2,451	45,455
2059	9,380	4,911	0	0	2,451	16,742
2060	9,401	4,911	0	0	2,458	16,770
2061	9,380	4,911	0	0	2,451	16,742
2062	9,380	4,911	0	0	2,451	16,742
2063	12,969	15,678	0	0	2,451	31,098
2064	9,401	4,911	0	0	2,458	16,770
2065	9,380	4,911	0	0	2,451	16,742
2066	10,098	7,064	0	0	2,451	19,613
2067	9,380	4,911	0	0	2,451	16,742
2068	19,451	35,059	0	0	2,458	56,968
2069	9,380	4,911	0	0	2,451	16,742

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**TABLE 3.3 (continued)**  
**SCENARIO 3: DECON WITH 100 YEAR DFS**  
**TOTAL ANNUAL EXPENDITURES**  
(thousands, 2020 dollars)

Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2070	9,380	4,911	0	0	2,451	16,742
2071	9,380	4,911	0	0	2,451	16,742
2072	9,401	4,911	0	0	2,458	16,770
2073	9,380	4,911	0	0	2,451	16,742
2074	9,380	4,911	0	0	2,451	16,742
2075	9,380	4,911	0	0	2,451	16,742
2076	9,401	4,911	0	0	2,458	16,770
2077	9,380	4,911	0	0	2,451	16,742
2078	9,380	4,911	0	0	2,451	16,742
2079	9,380	4,911	0	0	2,451	16,742
2080	12,990	15,678	0	0	2,458	31,126
2081	9,380	4,911	0	0	2,451	16,742
2082	9,380	4,911	0	0	2,451	16,742
2083	9,380	4,911	0	0	2,451	16,742
2084	9,401	4,911	0	0	2,458	16,770
2085	12,969	15,678	0	0	2,451	31,098
2086	9,380	4,911	0	0	2,451	16,742
2087	11,534	11,371	0	0	2,451	25,356
2088	10,121	7,069	0	0	2,458	19,648
2089	9,380	4,911	0	0	2,451	16,742
2090	9,380	4,911	0	0	2,451	16,742
2091	9,380	4,911	0	0	2,451	16,742
2092	10,121	7,070	0	0	2,458	19,650
2093	10,640	8,690	0	0	2,451	21,781
2094	34,684	80,821	0	0	2,451	117,956
2095	10,460	8,150	0	0	2,451	21,062
2096	10,841	9,230	0	0	2,458	22,529
2097	7,743	0	0	0	2,451	10,195
2098	7,743	0	0	0	2,451	10,195
2099	7,743	0	0	0	2,451	10,195

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Section 3, Page 31 of 40****TABLE 3.3 (continued)**  
**SCENARIO 3: DECON WITH 100 YEAR DFS**  
**TOTAL ANNUAL EXPENDITURES**  
(thousands, 2020 dollars)

Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2100	7,743	0	0	0	2,451	10,195
2101	7,743	0	0	0	2,451	10,195
2102	7,743	0	0	0	2,451	10,195
2103	7,743	0	0	0	2,451	10,195
2104	7,765	0	0	0	2,458	10,223
2105	7,743	0	0	0	2,451	10,195
2106	7,743	0	0	0	2,451	10,195
2107	7,743	0	0	0	2,451	10,195
2108	14,943	21,534	0	0	2,458	38,935
2109	7,743	0	0	0	2,451	10,195
2110	7,743	0	0	0	2,451	10,195
2111	7,743	0	0	0	2,451	10,195
2112	7,765	0	0	0	2,458	10,223
2113	11,332	10,767	0	0	2,451	24,551
2114	7,743	0	0	0	2,451	10,195
2115	7,743	0	0	0	2,451	10,195
2116	8,482	2,153	0	0	2,458	13,094
2117	7,743	0	0	0	2,451	10,195
2118	18,312	31,705	0	0	2,451	52,468
2119	8,366	1,868	0	0	2,451	12,686
2120	8,283	1,557	0	0	2,458	12,299
2121	8,262	1,557	0	0	2,451	12,271
2122	8,262	1,557	0	0	2,451	12,271
2123	8,366	1,868	0	0	2,451	12,686
2124	8,283	1,557	0	0	2,458	12,299
2125	8,262	1,557	0	0	2,451	12,271
2126	8,262	1,557	0	0	2,451	12,271
2127	8,366	1,868	0	0	2,451	12,686
2128	9,003	3,715	0	0	2,458	15,176
2129	8,262	1,557	0	0	2,451	12,271

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**TABLE 3.3 (continued)**  
**SCENARIO 3: DECON WITH 100 YEAR DFS**  
**TOTAL ANNUAL EXPENDITURES**  
 (thousands, 2020 dollars)

Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2130	11,436	11,079	0	0	2,451	24,966
2131	7,847	311	0	0	2,451	10,610
2132	7,868	311	0	0	2,458	10,638
2133	7,951	623	0	0	2,451	11,025
2134	7,847	311	0	0	2,451	10,610
2135	11,436	11,079	0	0	2,451	24,966
2136	7,972	623	0	0	2,458	11,053
2137	10,001	6,772	0	0	2,451	19,224
2138	7,847	311	0	0	2,451	10,610
2139	7,951	623	0	0	2,451	11,025
2140	7,920	1,977	0	0	7,412	17,309
2141	2,074	1,449	22	354	3,830	7,729
Total	1,406,512	765,842	10,030	166,633	376,375	2,725,391

Note: Columns may not add due to rounding

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**TABLE 3.4  
SCENARIO 4: DECON WITH 200 YEAR DFS  
TOTAL ANNUAL EXPENDITURES  
(thousands, 2020 dollars)**

Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2040	22,676	1,092	658	20	7,605	32,050
2041	77,873	9,916	2,747	1,362	34,057	125,955
2042	86,878	42,467	2,387	59,462	32,141	223,336
2043	97,068	69,577	1,831	56,853	27,814	253,143
2044	97,812	77,479	1,341	29,727	22,841	229,199
2045	52,998	4,394	601	11,794	5,833	75,619
2046	37,374	10,365	249	3,296	4,592	55,875
2047	32,437	11,481	193	3,765	4,566	52,443
2048	8,502	2,212	0	0	2,449	13,163
2049	7,761	54	0	0	2,442	10,258
2050	9,380	4,911	0	0	2,442	16,733
2051	9,380	4,911	0	0	2,442	16,733
2052	9,401	4,911	0	0	2,449	16,761
2053	9,380	4,911	0	0	2,442	16,733
2054	9,380	4,911	0	0	2,442	16,733
2055	9,380	4,911	0	0	2,442	16,733
2056	9,401	4,911	0	0	2,449	16,761
2057	9,380	4,911	0	0	2,442	16,733
2058	16,558	26,445	0	0	2,442	45,445
2059	9,380	4,911	0	0	2,442	16,733
2060	9,401	4,911	0	0	2,449	16,761
2061	9,380	4,911	0	0	2,442	16,733
2062	9,380	4,911	0	0	2,442	16,733
2063	12,969	15,678	0	0	2,442	31,089
2064	9,401	4,911	0	0	2,449	16,761
2065	9,380	4,911	0	0	2,442	16,733
2066	10,098	7,064	0	0	2,442	19,604
2067	9,380	4,911	0	0	2,442	16,733
2068	19,451	35,059	0	0	2,449	56,958
2069	9,380	4,911	0	0	2,442	16,733

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**TABLE 3.4 (continued)**  
**SCENARIO 4: DECON WITH 200 YEAR DFS**  
**TOTAL ANNUAL EXPENDITURES**  
(thousands, 2020 dollars)

Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2070	9,380	4,911	0	0	2,442	16,733
2071	9,380	4,911	0	0	2,442	16,733
2072	9,401	4,911	0	0	2,449	16,761
2073	9,380	4,911	0	0	2,442	16,733
2074	9,380	4,911	0	0	2,442	16,733
2075	9,380	4,911	0	0	2,442	16,733
2076	9,401	4,911	0	0	2,449	16,761
2077	9,380	4,911	0	0	2,442	16,733
2078	9,380	4,911	0	0	2,442	16,733
2079	9,380	4,911	0	0	2,442	16,733
2080	12,990	15,678	0	0	2,449	31,117
2081	9,380	4,911	0	0	2,442	16,733
2082	9,380	4,911	0	0	2,442	16,733
2083	9,380	4,911	0	0	2,442	16,733
2084	9,401	4,911	0	0	2,449	16,761
2085	12,969	15,678	0	0	2,442	31,089
2086	9,380	4,911	0	0	2,442	16,733
2087	11,534	11,371	0	0	2,442	25,347
2088	10,121	7,069	0	0	2,449	19,639
2089	9,380	4,911	0	0	2,442	16,733
2090	9,380	4,911	0	0	2,442	16,733
2091	9,380	4,911	0	0	2,442	16,733
2092	9,401	4,911	0	0	2,449	16,761
2093	9,380	4,911	0	0	2,442	16,733
2094	34,504	80,281	0	0	2,442	117,226
2095	9,380	4,911	0	0	2,442	16,733
2096	9,401	4,911	0	0	2,449	16,761
2097	9,380	4,911	0	0	2,442	16,733
2098	9,380	4,911	0	0	2,442	16,733
2099	9,380	4,911	0	0	2,442	16,733

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**TABLE 3.4 (continued)  
 SCENARIO 4: DECON WITH 200 YEAR DFS  
 TOTAL ANNUAL EXPENDITURES**  
 (thousands, 2020 dollars)

Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2100	9,380	4,911	0	0	2,442	16,733
2101	9,380	4,911	0	0	2,442	16,733
2102	9,380	4,911	0	0	2,442	16,733
2103	9,380	4,911	0	0	2,442	16,733
2104	9,401	4,911	0	0	2,449	16,761
2105	9,380	4,911	0	0	2,442	16,733
2106	9,380	4,911	0	0	2,442	16,733
2107	9,380	4,911	0	0	2,442	16,733
2108	16,579	26,445	0	0	2,449	45,473
2109	9,380	4,911	0	0	2,442	16,733
2110	9,380	4,911	0	0	2,442	16,733
2111	9,380	4,911	0	0	2,442	16,733
2112	9,401	4,911	0	0	2,449	16,761
2113	12,969	15,678	0	0	2,442	31,089
2114	9,380	4,911	0	0	2,442	16,733
2115	9,380	4,911	0	0	2,442	16,733
2116	10,119	7,064	0	0	2,449	19,632
2117	9,380	4,911	0	0	2,442	16,733
2118	19,430	35,059	0	0	2,442	56,930
2119	9,380	4,911	0	0	2,442	16,733
2120	9,401	4,911	0	0	2,449	16,761
2121	9,380	4,911	0	0	2,442	16,733
2122	9,380	4,911	0	0	2,442	16,733
2123	9,380	4,911	0	0	2,442	16,733
2124	9,401	4,911	0	0	2,449	16,761
2125	9,380	4,911	0	0	2,442	16,733
2126	9,380	4,911	0	0	2,442	16,733
2127	9,380	4,911	0	0	2,442	16,733
2128	10,121	7,069	0	0	2,449	19,639
2129	9,380	4,911	0	0	2,442	16,733

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**TABLE 3.4 (continued)**  
**SCENARIO 4: DECON WITH 200 YEAR DFS**  
**TOTAL ANNUAL EXPENDITURES**  
 (thousands, 2020 dollars)

Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2130	12,969	15,678	0	0	2,442	31,089
2131	9,380	4,911	0	0	2,442	16,733
2132	9,401	4,911	0	0	2,449	16,761
2133	9,380	4,911	0	0	2,442	16,733
2134	9,380	4,911	0	0	2,442	16,733
2135	12,969	15,678	0	0	2,442	31,089
2136	9,401	4,911	0	0	2,449	16,761
2137	11,534	11,371	0	0	2,442	25,347
2138	9,380	4,911	0	0	2,442	16,733
2139	9,380	4,911	0	0	2,442	16,733
2140	9,401	4,911	0	0	2,449	16,761
2141	9,380	4,911	0	0	2,442	16,733
2142	9,380	4,911	0	0	2,442	16,733
2143	9,380	4,911	0	0	2,442	16,733
2144	34,525	80,281	0	0	2,449	117,254
2145	9,380	4,911	0	0	2,442	16,733
2146	9,380	4,911	0	0	2,442	16,733
2147	9,380	4,911	0	0	2,442	16,733
2148	9,401	4,911	0	0	2,449	16,761
2149	9,380	4,911	0	0	2,442	16,733
2150	9,380	4,911	0	0	2,442	16,733
2151	9,380	4,911	0	0	2,442	16,733
2152	9,401	4,911	0	0	2,449	16,761
2153	9,380	4,911	0	0	2,442	16,733
2154	9,380	4,911	0	0	2,442	16,733
2155	9,380	4,911	0	0	2,442	16,733
2156	9,401	4,911	0	0	2,449	16,761
2157	9,380	4,911	0	0	2,442	16,733
2158	16,558	26,445	0	0	2,442	45,445
2159	9,380	4,911	0	0	2,442	16,733



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**TABLE 3.4 (continued)**  
**SCENARIO 4: DECON WITH 200 YEAR DFS**  
**TOTAL ANNUAL EXPENDITURES**  
 (thousands, 2020 dollars)

Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2160	9,401	4,911	0	0	2,449	16,761
2161	9,380	4,911	0	0	2,442	16,733
2162	9,380	4,911	0	0	2,442	16,733
2163	12,969	15,678	0	0	2,442	31,089
2164	9,401	4,911	0	0	2,449	16,761
2165	9,380	4,911	0	0	2,442	16,733
2166	10,098	7,064	0	0	2,442	19,604
2167	9,380	4,911	0	0	2,442	16,733
2168	20,170	37,217	0	0	2,449	59,836
2169	9,380	4,911	0	0	2,442	16,733
2170	9,380	4,911	0	0	2,442	16,733
2171	9,380	4,911	0	0	2,442	16,733
2172	9,401	4,911	0	0	2,449	16,761
2173	9,380	4,911	0	0	2,442	16,733
2174	9,380	4,911	0	0	2,442	16,733
2175	9,380	4,911	0	0	2,442	16,733
2176	9,401	4,911	0	0	2,449	16,761
2177	9,380	4,911	0	0	2,442	16,733
2178	9,380	4,911	0	0	2,442	16,733
2179	9,380	4,911	0	0	2,442	16,733
2180	12,990	15,678	0	0	2,449	31,117
2181	9,380	4,911	0	0	2,442	16,733
2182	9,380	4,911	0	0	2,442	16,733
2183	9,380	4,911	0	0	2,442	16,733
2184	9,401	4,911	0	0	2,449	16,761
2185	12,969	15,678	0	0	2,442	31,089
2186	9,380	4,911	0	0	2,442	16,733
2187	11,534	11,371	0	0	2,442	25,347
2188	9,401	4,911	0	0	2,449	16,761
2189	9,380	4,911	0	0	2,442	16,733

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 Decommissioning Cost Analysis – 70 Year Lifetime**

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**TABLE 3.4 (continued)**  
**SCENARIO 4: DECON WITH 200 YEAR DFS**  
**TOTAL ANNUAL EXPENDITURES**  
 (thousands, 2020 dollars)

Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2190	9,380	4,911	0	0	2,442	16,733
2191	9,380	4,911	0	0	2,442	16,733
2192	10,121	7,070	0	0	2,449	19,641
2193	10,640	8,690	0	0	2,442	21,772
2194	34,684	80,821	0	0	2,442	117,946
2195	10,460	8,150	0	0	2,442	21,052
2196	10,841	9,230	0	0	2,449	22,520
2197	7,743	0	0	0	2,442	10,186
2198	7,743	0	0	0	2,442	10,186
2199	7,743	0	0	0	2,442	10,186
2200	7,743	0	0	0	2,442	10,186
2201	7,743	0	0	0	2,442	10,186
2202	7,743	0	0	0	2,442	10,186
2203	7,743	0	0	0	2,442	10,186
2204	7,765	0	0	0	2,449	10,214
2205	7,743	0	0	0	2,442	10,186
2206	7,743	0	0	0	2,442	10,186
2207	7,743	0	0	0	2,442	10,186
2208	15,662	23,693	0	0	2,449	41,804
2209	7,743	0	0	0	2,442	10,186
2210	7,743	0	0	0	2,442	10,186
2211	7,743	0	0	0	2,442	10,186
2212	7,765	0	0	0	2,449	10,214
2213	11,332	10,767	0	0	2,442	24,542
2214	7,743	0	0	0	2,442	10,186
2215	7,743	0	0	0	2,442	10,186
2216	8,482	2,153	0	0	2,449	13,085
2217	7,743	0	0	0	2,442	10,186
2218	18,312	31,705	0	0	2,442	52,459
2219	8,366	1,868	0	0	2,442	12,677

Appendix BB: 2022-2024 Triennial Nuclear Plant  
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**TABLE 3.4 (continued)**  
**SCENARIO 4: DECON WITH 200 YEAR DFS**  
**TOTAL ANNUAL EXPENDITURES**  
(thousands, 2020 dollars)

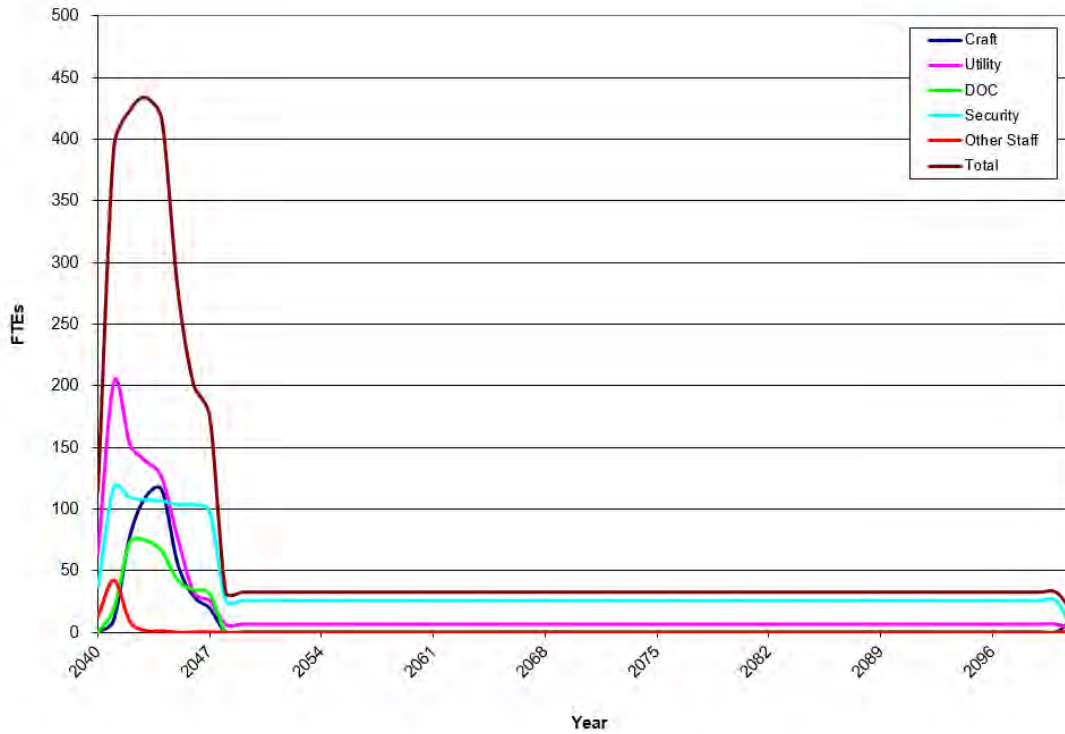
Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2220	8,283	1,557	0	0	2,449	12,289
2221	8,262	1,557	0	0	2,442	12,261
2222	8,262	1,557	0	0	2,442	12,261
2223	8,366	1,868	0	0	2,442	12,677
2224	8,283	1,557	0	0	2,449	12,289
2225	8,262	1,557	0	0	2,442	12,261
2226	8,262	1,557	0	0	2,442	12,261
2227	8,366	1,868	0	0	2,442	12,677
2228	8,283	1,557	0	0	2,449	12,289
2229	8,262	1,557	0	0	2,442	12,261
2230	11,436	11,079	0	0	2,442	24,957
2231	7,847	311	0	0	2,442	10,601
2232	7,868	311	0	0	2,449	10,629
2233	7,951	623	0	0	2,442	11,016
2234	7,847	311	0	0	2,442	10,601
2235	11,436	11,079	0	0	2,442	24,957
2236	7,972	623	0	0	2,449	11,044
2237	10,001	6,772	0	0	2,442	19,215
2238	7,847	311	0	0	2,442	10,601
2239	7,951	623	0	0	2,442	11,016
2240	7,920	1,976	0	0	7,404	17,300
2241	2,074	1,449	22	354	3,830	7,729
<b>Total</b>	<b>2,458,456</b>	<b>1,597,144</b>	<b>10,030</b>	<b>166,633</b>	<b>619,914</b>	<b>4,852,176</b>

Note: Columns may not add due to rounding

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**FIGURE 3.1  
SCENARIO 2: DECON WITH 60 YEAR DFS  
MONTICELLO NUCLEAR GENERATING PLANT  
MANPOWER LEVELS**



Note that the labor hour basis of this chart was taken from Appendix D; however not all line items in Appendix D have labor hour values available (e.g. spent fuel canister loading estimates from Xcel Energy)

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#### 4. SCHEDULE ESTIMATE

The schedules for the decommissioning scenarios considered in this study follow the sequence presented in the AIF/NESP-036 study, with minor changes to reflect recent experience and site-specific constraints. In addition, the scheduling has been revised to reflect the spent fuel management plans described in Section 3.4.1.

A schedule or sequence of activities is presented in Figure 4.1. The schedule is also representative of the work activities identified in the delayed dismantling scenarios, absent any spent fuel constraints. The scheduling sequence is based on the fuel being removed from the spent fuel pool within the first four years after operations cease. The key activities listed in the schedule do not reflect a one-to-one correspondence with those activities in the cost tables, but reflect dividing some activities for clarity and combining others for convenience. The schedule was prepared using the "Microsoft Project Professional" computer software.<sup>[43]</sup>

##### 4.1 SCHEDULE ESTIMATE ASSUMPTIONS

The schedule reflects the results of a precedence network developed for the site decommissioning activities, i.e., a PERT (Program Evaluation and Review Technique) Software Package. The work activity durations used in the precedence network reflect the actual man-hour estimates from the cost table, adjusted by stretching certain activities over their slack range and shifting the start and end dates of others. The following assumptions were made in the development of the decommissioning schedule:

- The reactor building is isolated until such time that all spent fuel has been discharged from the storage pool to the ISFSI. Decontamination and dismantling of the spent fuel storage pool is initiated once the transfer of spent fuel is complete.
- All work (except vessel and internals removal) is performed during an 8-hour workday, 5 days per week, with no overtime. There are eleven paid holidays per year.
- Reactor and internals removal activities are performed by using separate crews for different activities working on different shifts, with a corresponding backshift charge for the second shift.
- Multiple crews work parallel activities to the maximum extent possible, consistent with optimum efficiency, adequate access for cutting, removal and laydown space, and with the stringent safety measures necessary during demolition of heavy components and structures.

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- For plant systems removal, the systems with the longest removal durations in areas on the critical path are considered to determine the duration of the activity.

**4.2 PROJECT SCHEDULE**

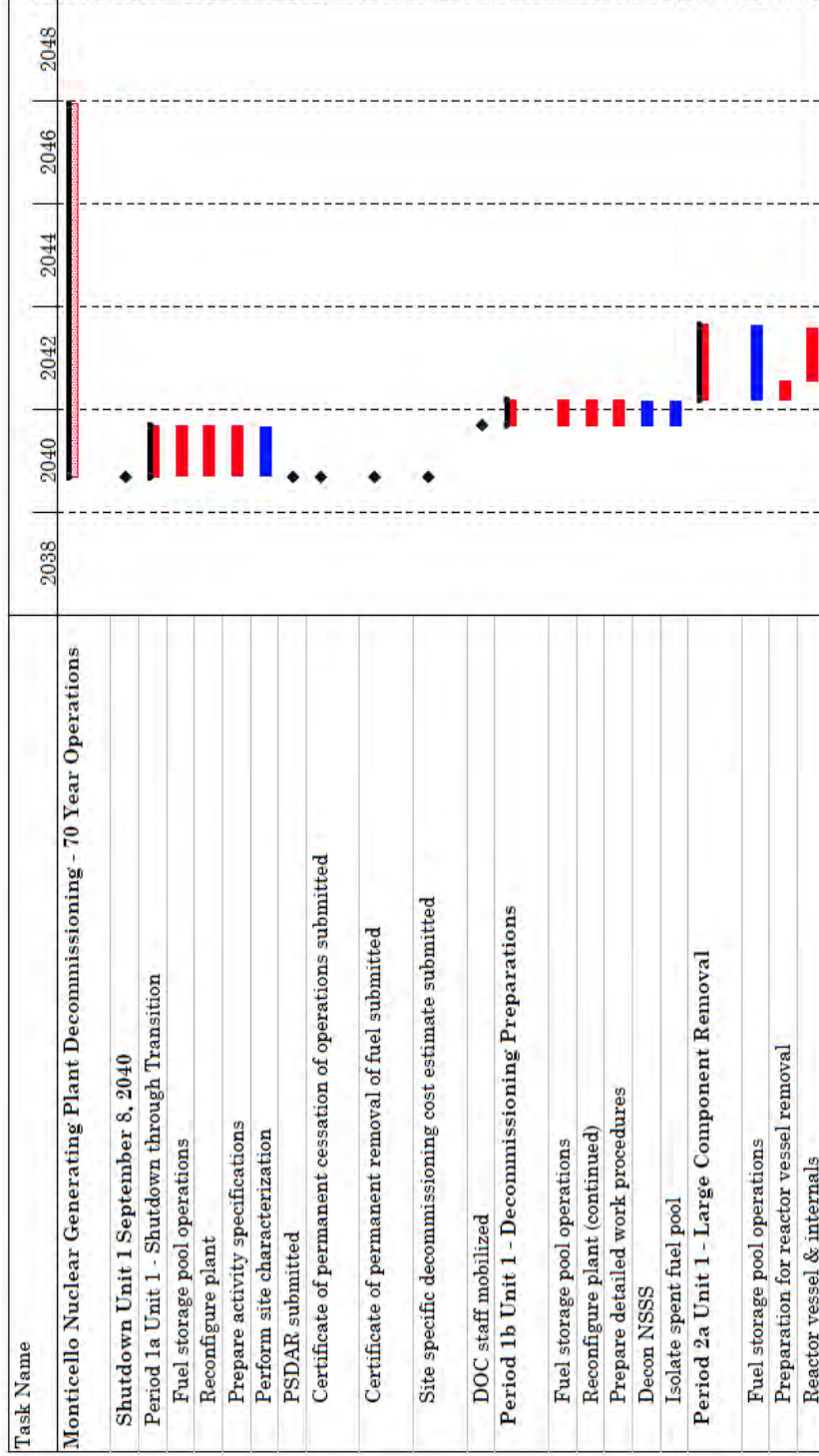
The period-dependent costs presented in the detailed cost tables are based upon the durations developed in the schedules for decommissioning Monticello. Durations are established between several milestones in each project period; these durations are used to establish a critical path for the entire project. In turn, the critical path duration for each period is used as the basis for determining the period-dependent costs. A second parallel path is also shown for the spent fuel cooling period, which determines the release of the reactor building for final decontamination.

Project timelines are provided in Figures 4.2 through 4.5, with milestone dates based on a 2040 shutdown date. The spent fuel pool is emptied approximately four years after shutdown, while ISFSI operations continue until the DOE completes the transfer of assemblies.

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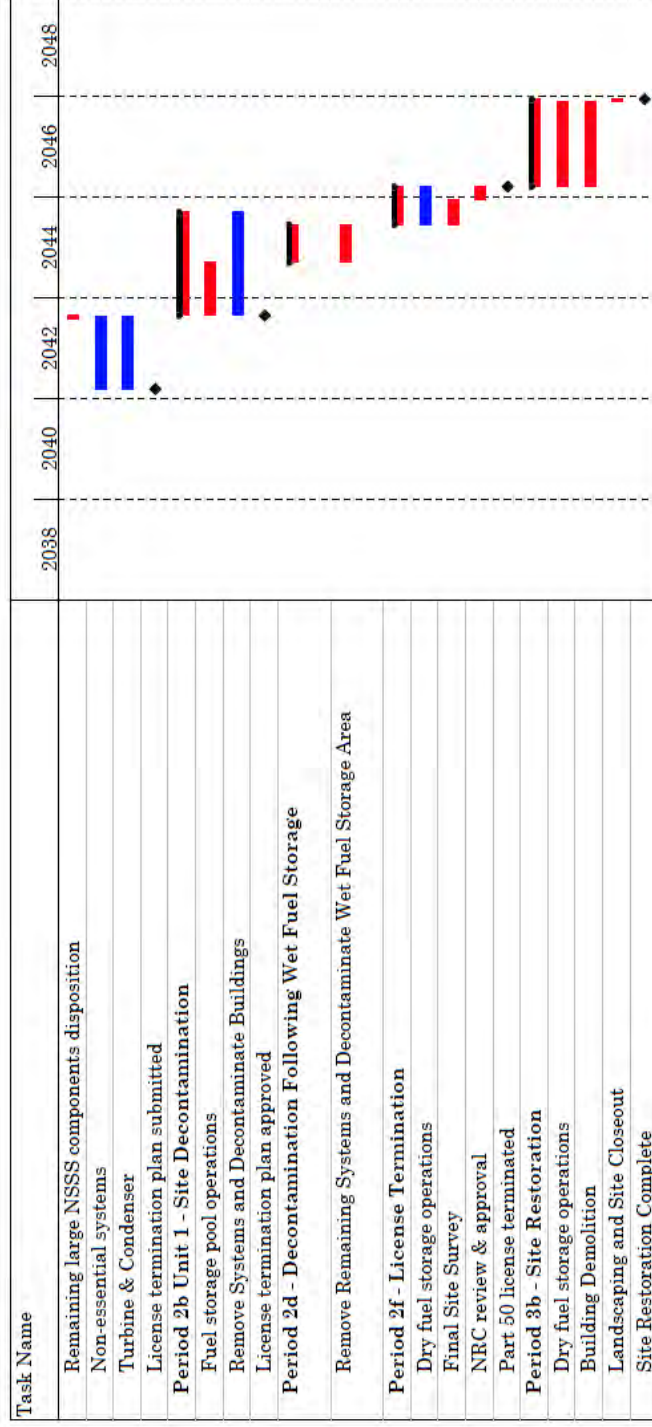
**FIGURE 4.1  
 DECON ACTIVITY SCHEDULE**



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**FIGURE 4.1 (continued)  
 DECON ACTIVITY SCHEDULE**



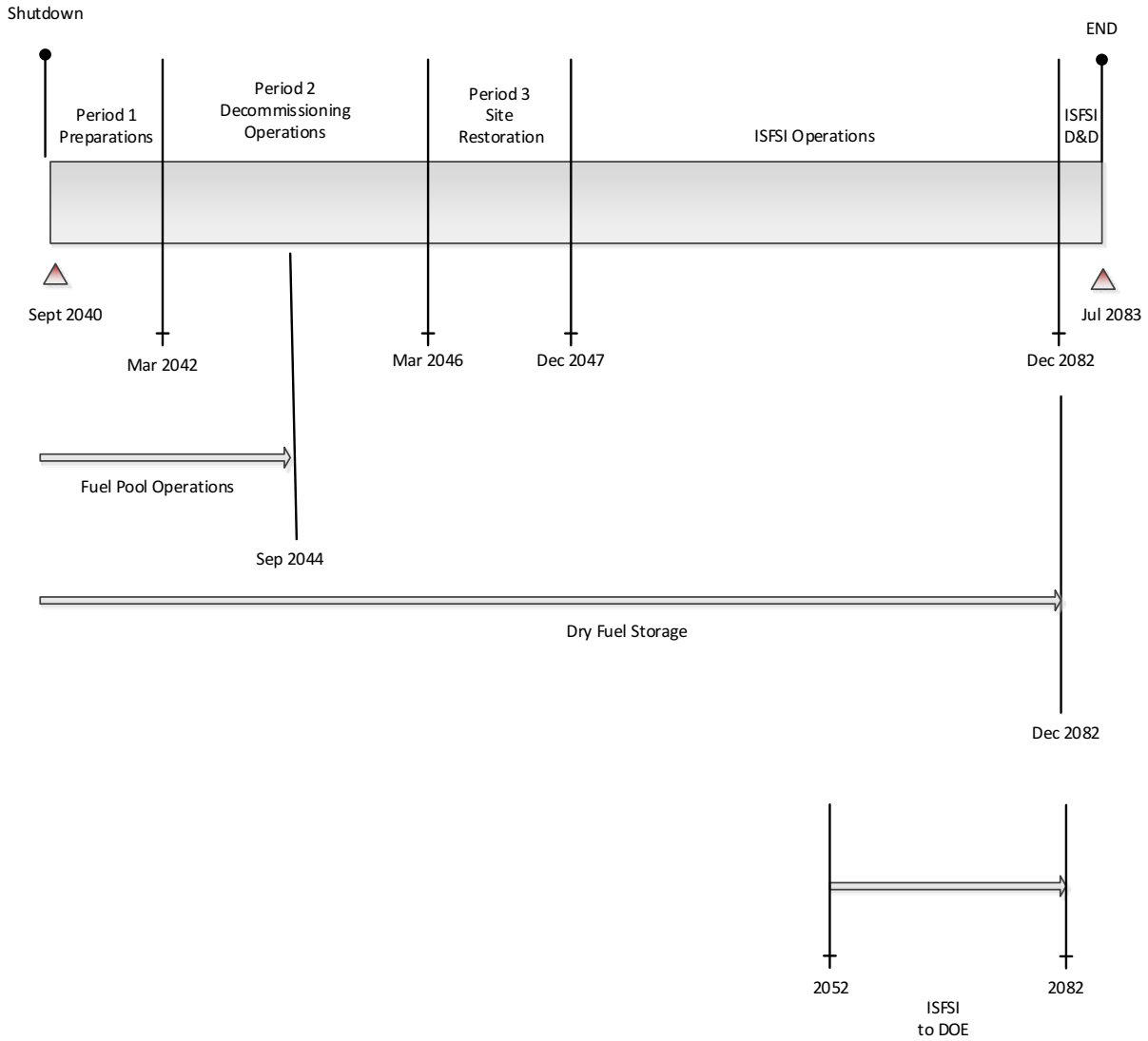
1. Red scheduling bars indicate critical path activities
2. Blue scheduling bars associated with non-critical path activities
3. Diamond symbols indicate major milestones



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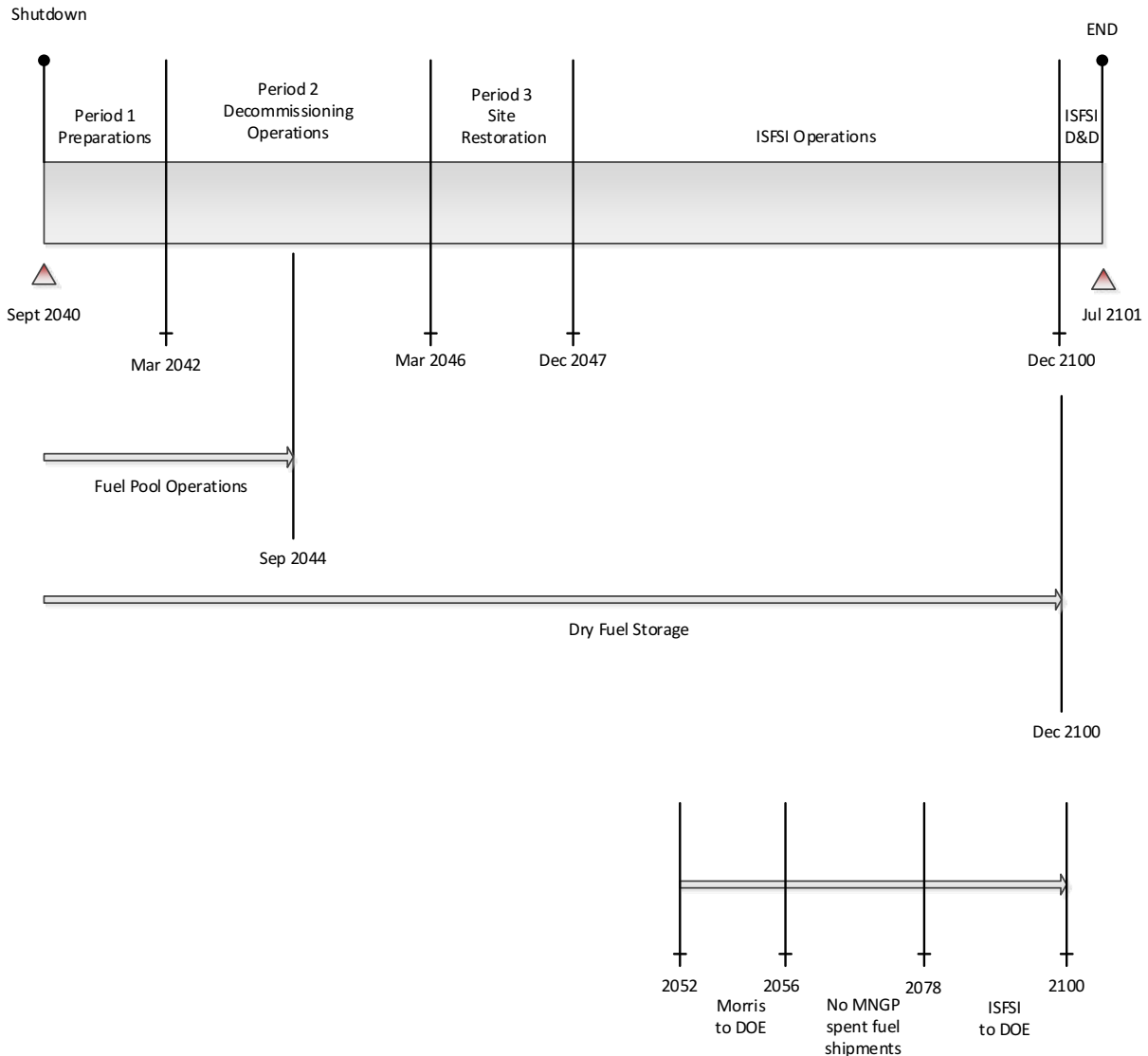
**FIGURE 4.2  
SCENARIO 1: DECON WITH 42 YEAR DFS  
DECOMMISSIONING TIMELINE**  
(not to scale)



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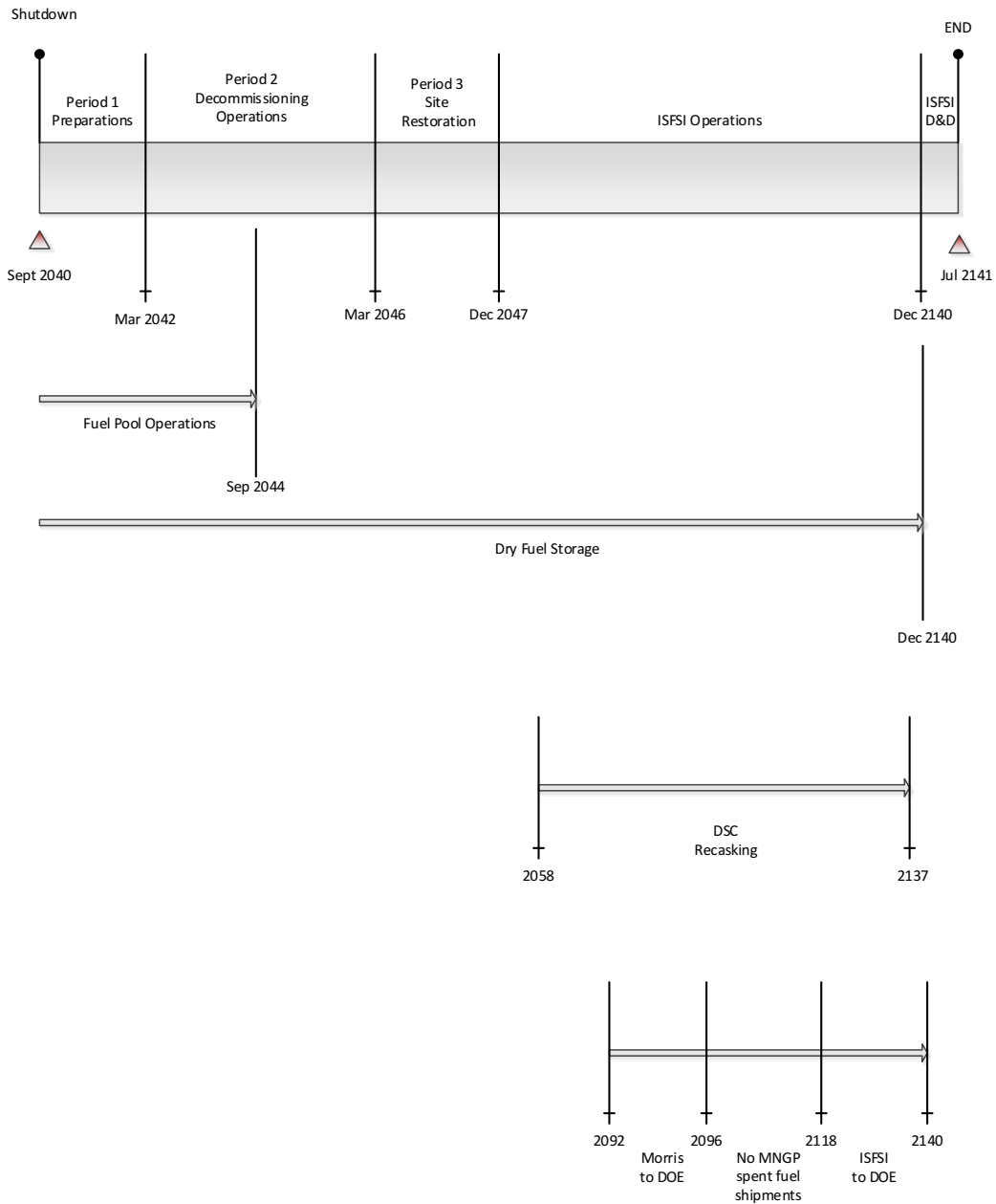
**FIGURE 4.3  
SCENARIO 2: DECON WITH 60 YEAR DFS  
DECOMMISSIONING TIMELINE  
(not to scale)**



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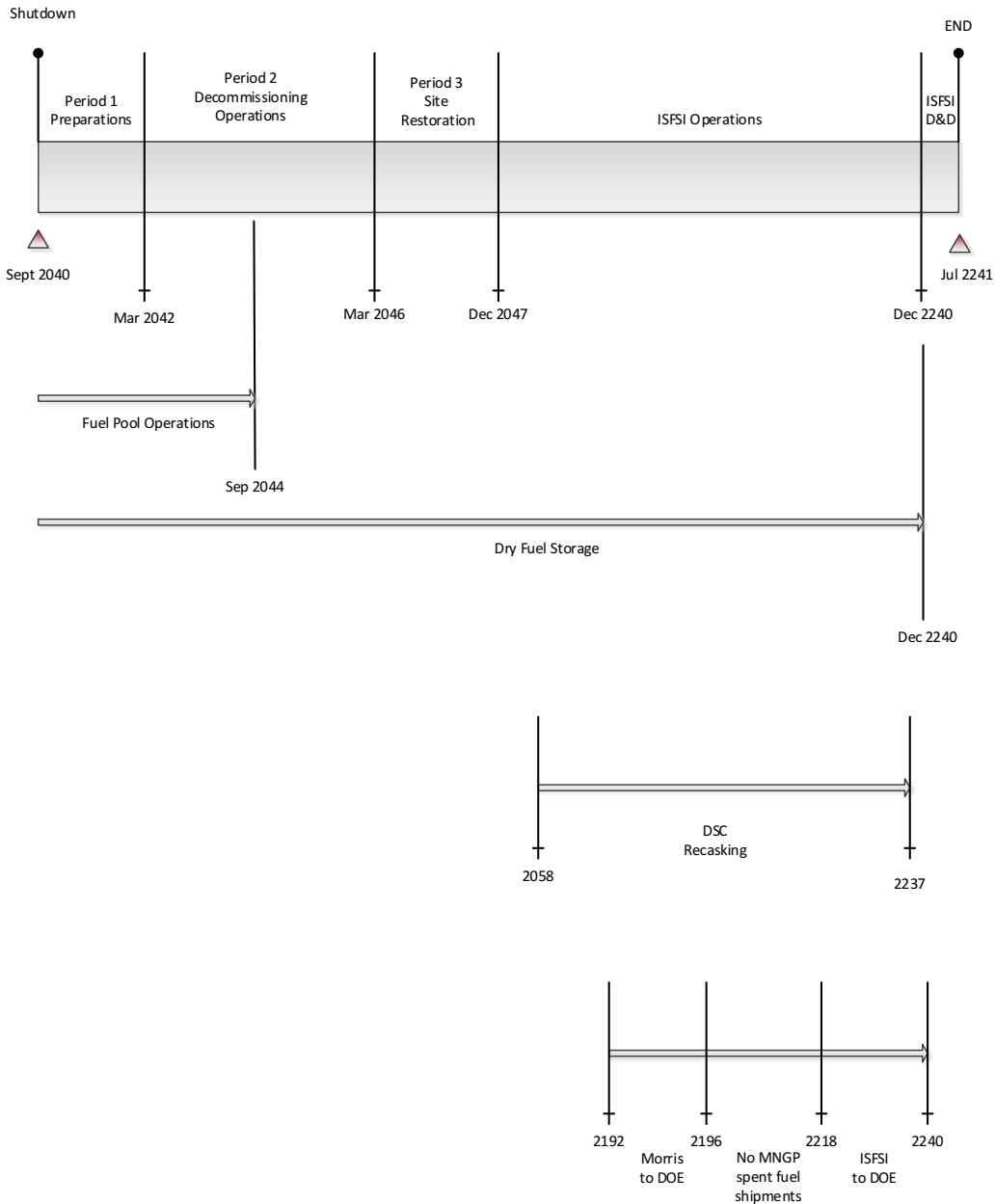
**FIGURE 4.4  
SCENARIO 3: DECON WITH 100 YEAR DFS  
DECOMMISSIONING TIMELINE  
(not to scale)**



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**FIGURE 4.5  
SCENARIO 4: DECON WITH 200 YEAR DFS  
DECOMMISSIONING TIMELINE**  
(not to scale)



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## 5. RADIOACTIVE WASTES

The objectives of the decommissioning process are the removal of all radioactive material from the site that would restrict its future use and the termination of the NRC license. This currently requires the remediation of all radioactive material at the site in excess of applicable legal limits. Under the Atomic Energy Act, <sup>[44]</sup> the NRC is responsible for protecting the public from sources of ionizing radiation. Title 10 of the Code of Federal Regulations delineates the production, utilization, and disposal of radioactive materials and processes. In particular, Part 71 defines radioactive material as it pertains to transportation and Part 61 specifies its disposition.

Most of the materials being transported for controlled burial are categorized as Low Specific Activity (LSA) or Surface Contaminated Object (SCO) materials containing Type A quantities, as defined in 49 CFR Parts 173-178. Shipping containers are required to be Industrial Packages (IP-1, IP-2 or IP-3, as defined in 10 CFR §173.411). For this study, commercially available steel containers are presumed to be used for the disposal of piping, small components, and concrete. Larger components can serve as their own containers, with proper closure of all openings, access ways, and penetrations.

The destinations for the various waste streams from decommissioning are identified in Figures 5.1 and 5.2. The volumes of radioactive waste generated during the various decommissioning activities at the site are shown on a line-item basis in Appendices C through F and summarized in Tables 5.1 through 5.4. The quantified waste volume summaries shown in these tables are consistent with §61 classifications. The volumes are calculated based on the exterior dimensions for containerized material and on the displaced volume of components serving as their own waste containers.

The reactor vessel and internals are categorized as large quantity shipments and, accordingly, will be shipped in reusable, shielded truck casks with disposable liners. In calculating disposal costs, the burial fees are applied against the liner volume, as well as the special handling requirements of the payload. Packaging efficiencies are lower for the highly activated materials (greater than Type A quantity waste), where high concentrations of gamma-emitting radionuclides limit the capacity of the shipping canisters.

No process system containing/handling radioactive substances at shutdown is presumed to meet material release criteria by decay alone, i.e., systems radioactive at shutdown will still be radioactive over the time period during which the decommissioning is accomplished, due to the presence of long-lived radionuclides.

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While the dose rates decrease with time, radionuclides such as  $^{137}\text{Cs}$  will still control the disposition requirements.

The waste material generated in the decontamination and dismantling of Monticello is primarily generated during Period 2. Material that is considered potentially contaminated when removed from the radiologically controlled area is sent to processing facilities in Tennessee for conditioning and disposal. Heavily contaminated components and activated materials are routed for controlled disposal. The disposal volumes reported in the tables reflect the savings resulting from reprocessing and recycling.

Disposal fees are calculated using representative costs, with surcharges added for the highly activated components, for example, generated in the segmentation of the reactor vessel. The cost to dispose of the majority of the material generated from the decontamination and dismantling activities is based upon representative rates.

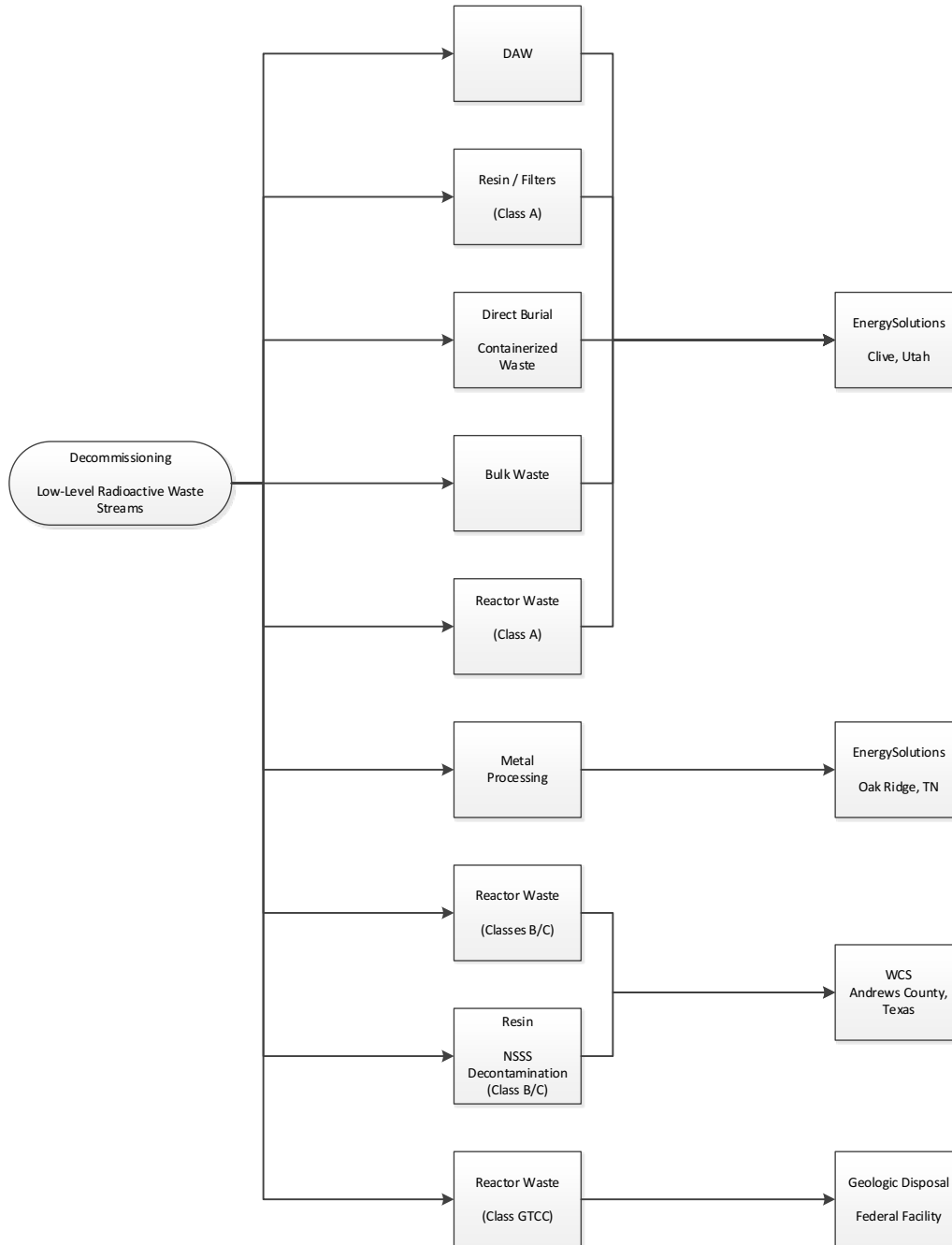
EnergySolutions is not able to accept the higher activity waste (Class B and C) generated in the decontamination of the NSSS and segmentation of the components closest to the core. Waste disposal costs for the higher activity waste (Class B and C) are based upon preliminary and indicative information on the cost for such from WCS.

A small quantity of material generated during the Monticello decommissioning will not be considered suitable for near-surface disposal, and is assumed to be disposed of in a geologic repository, in a manner similar to that envisioned for spent fuel disposal. Such material, known as Greater-Than-Class-C or GTCC material, is estimated to require four spent fuel storage canisters (or the equivalent) to dispose of the most radioactive portions of the reactor vessel internals. The volume and weight reported in Tables 5.1 through 5.4 represent the packaged weight and volume of the spent fuel storage canisters.

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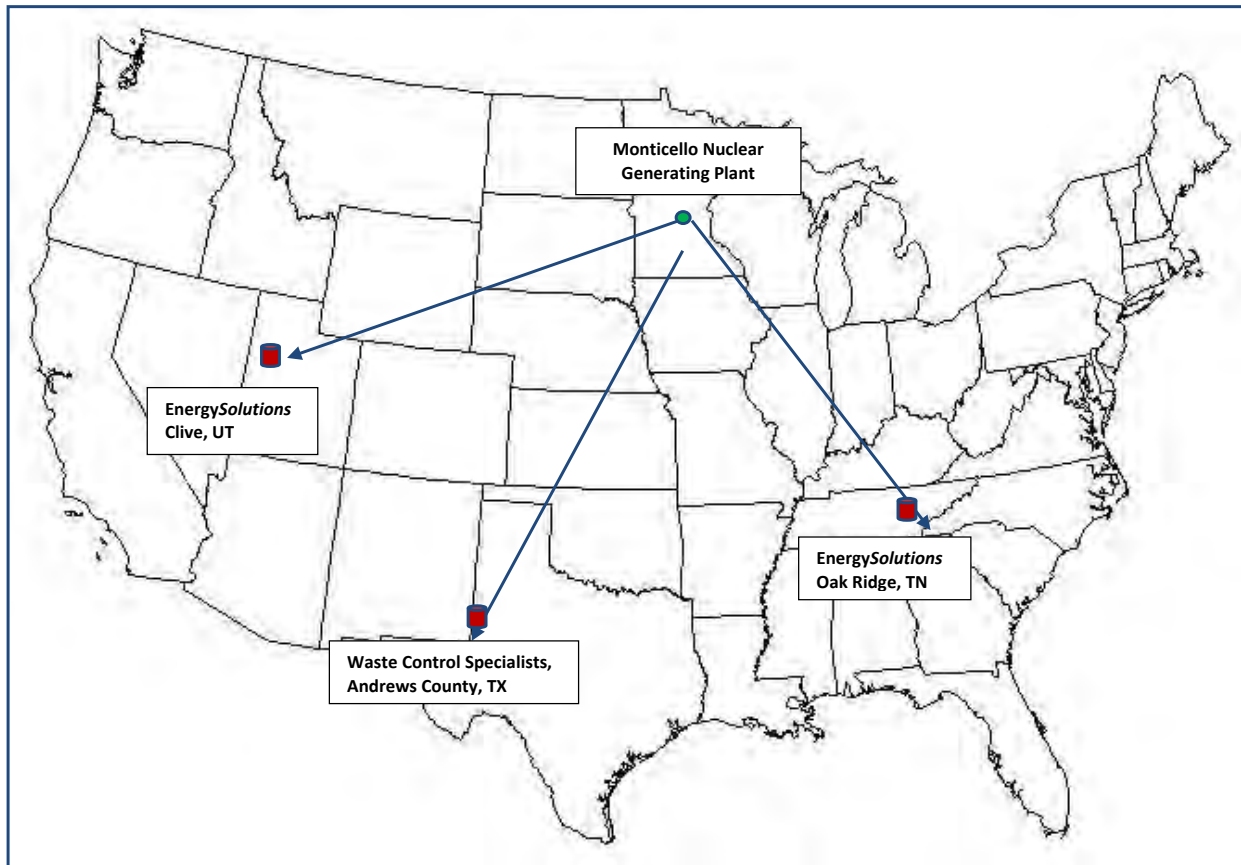
**FIGURE 5.1  
RADIOACTIVE WASTE DISPOSITION**



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**FIGURE 5.2  
DECOMMISSIONING WASTE DESTINATIONS  
RADIOLOGICAL**



The figure indicates the destinations for the low-level radioactive waste designated for direct disposal (Clive, Utah) and processing/recovery (Oak Ridge, Tennessee).

Disposition of the Class B and C low-level radioactive waste will be at the Waste Control Specialists site in Andrews County, Texas.

Disposition options (and destinations) for GTCC are still being evaluated.



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**TABLE 5.1  
 SCENARIO 1: DECON WITH 42 YEAR DFS  
 DECOMMISSIONING WASTE SUMMARY**

Waste	Cost Basis	Class <sup>[1]</sup>	Waste Volume (cubic feet)	Mass (pounds)
Low-Level Radioactive Waste (near-surface disposal)	EnergySolutions Containerized	A	122,218	7,165,609
	EnergySolutions Bulk	A	75,053	4,661,497
	Future LLRW Disposal Facility (Proxy)	B	1,711	185,173
	Future LLRW Disposal Facility (Proxy)	C	1,178	110,575
Greater than Class C (geologic repository)	Spent Fuel Equivalent	GTCC	1,160	225,765
Total <sup>[2]</sup>			201,320	12,348,620
Processed/Conditioned (off-site recycling center)	Recycling Vendors	A	288,203	12,125,960
Scrap Metal				46,246,000

<sup>[1]</sup> Waste is classified according to the requirements as delineated in Title 10 CFR, Part 61.55

<sup>[2]</sup> Columns may not add due to rounding

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**TABLE 5.2  
 SCENARIO 2: DECON WITH 60 YEAR DFS  
 DECOMMISSIONING WASTE SUMMARY**

Waste	Cost Basis	Class <sup>[1]</sup>	Waste Volume (cubic feet)	Mass (pounds)
Low-Level Radioactive Waste (near-surface disposal)	EnergySolutions Containerized	A	122,218	7,165,609
	EnergySolutions Bulk	A	75,053	4,661,497
	Future LLRW Disposal Facility (Proxy)	B	1,711	185,173
	Future LLRW Disposal Facility (Proxy)	C	1,178	110,575
Greater than Class C (geologic repository)	Spent Fuel Equivalent	GTCC	1,160	225,765
Total <sup>[2]</sup>			201,320	12,348,620
Processed/Conditioned (off-site recycling center)	Recycling Vendors	A	288,203	12,125,960
Scrap Metal				46,246,000

<sup>[1]</sup> Waste is classified according to the requirements as delineated in Title 10 CFR, Part 61.55

<sup>[2]</sup> Columns may not add due to rounding

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**TABLE 5.3  
 SCENARIO 3: DECON WITH 100 YEAR DFS  
 DECOMMISSIONING WASTE SUMMARY**

Waste	Cost Basis	Class <sup>[1]</sup>	Waste Volume (cubic feet)	Mass (pounds)
Low-Level Radioactive Waste (near-surface disposal)	EnergySolutions Containerized	A	122,218	7,169,509
	EnergySolutions Bulk	A	75,048	4,661,403
	Future LLRW Disposal Facility (Proxy)	B	1,711	185,173
	Future LLRW Disposal Facility (Proxy)	C	1,178	110,575
Greater than Class C (geologic repository)	Spent Fuel Equivalent	GTCC	1,160	225,765
Total <sup>[2]</sup>			201,315	12,352,426
Processed/Conditioned (off-site recycling center)	Recycling Vendors	A	288,203	12,125,960
Scrap Metal				46,246,000

<sup>[1]</sup> Waste is classified according to the requirements as delineated in Title 10 CFR, Part 61.55

<sup>[2]</sup> Columns may not add due to rounding

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**TABLE 5.4  
 SCENARIO 4: DECON WITH 200 YEAR DFS  
 DECOMMISSIONING WASTE SUMMARY**

Waste	Cost Basis	Class <sup>[1]</sup>	Waste Volume (cubic feet)	Mass (pounds)
Low-Level Radioactive Waste (near-surface disposal)	EnergySolutions Containerized	A	122,218	7,169,509
	EnergySolutions Bulk	A	75,048	4,661,403
	Future LLRW Disposal Facility (Proxy)	B	1,711	185,173
	Future LLRW Disposal Facility (Proxy)	C	1,178	110,575
Greater than Class C (geologic repository)	Spent Fuel Equivalent	GTCC	1,160	225,765
Total <sup>[2]</sup>			201,315	12,352,426
Processed/Conditioned (off-site recycling center)	Recycling Vendors	A	288,203	12,125,960
Scrap Metal				46,246,000

<sup>[1]</sup> Waste is classified according to the requirements as delineated in Title 10 CFR, Part 61.55

<sup>[2]</sup> Columns may not add due to rounding

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## 6. RESULTS

This report presents estimates of the cost to decommission Monticello for the selected decommissioning scenarios following the cessation of plant operations. The estimates are based on numerous fundamental assumptions, including regulatory requirements, project contingencies, low-level radioactive waste disposal practices, high-level radioactive waste management options, and site restoration requirements. While not an engineering study, the estimates provide Xcel Energy with sufficient information to assess their financial obligations, as they pertain to the eventual decommissioning of the nuclear station.

The decommissioning scenarios assume continued operation of the station's spent fuel pool for a minimum of four years following the cessation of operations for continued cooling of the assemblies. The existing ISFSI is expanded to accommodate the spent fuel, once sufficiently cooled, until such time that the DOE can complete the transfer of the assemblies to its repository.

Using Scenario 2 as the base case, the cost projected to promptly decommission the station, restore the site, and manage the spent fuel is estimated to be \$1.618 billion (2020 dollars). The majority of this cost (approximately 48.0%) is associated with the physical decontamination and dismantling of the nuclear plant so that the operating license can be terminated. Another 47.5% is associated with the management, interim storage, and eventual transfer of the spent fuel. The remaining 4.5% is for the demolition of the designated structures and limited restoration of the site.

The primary cost contributors, identified in Tables 6.1 through 6.4, are either labor-related or associated with the management and disposition of the spent fuel or radioactive waste. Program management (including security) is the largest single contributor to the overall cost. The magnitude of the expense is a function of both the size of the organization required to manage the decommissioning, as well as the duration of the program. It is assumed, for purposes of this analysis, that Xcel Energy will hire a contractor to manage the decommissioning labor force. The size and composition of the management organizations varies with the decommissioning phase and associated site activities. However, once the operating license is amended or terminated, the staff is substantially reduced for the conventional demolition and restoration of the site, and the long-term care of the spent fuel

As described in this report, the spent fuel pool will remain operational for a minimum of four years following the cessation of operations. The pool will be isolated and an independent spent fuel island created. This will allow decommissioning operations to proceed in and around the pool areas. Over the four

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year period, the spent fuel will be packaged into transportable canisters for future loading into a DOE-provided transport cask or relocation to the ISFSI. The canisters will be stored in horizontal storage casks at the ISFSI until the DOE is able to receive them. Dry storage of the fuel provides additional flexibility in the event the DOE is not able to meet the current timetable for completing the transfer of assemblies to an off-site facility and minimizes the associated caretaking expenses.

The cost for waste disposal includes only those costs associated with the controlled disposition of the low-level radioactive waste generated from decontamination and dismantling activities, including plant equipment and components, structural material, filters, resins and dry-active waste. As described in Section 5, disposition of the majority of the low-level radioactive material requiring controlled disposal is at the EnergySolutions facility, with higher-activity waste sent to the WCS facility. Highly activated components, requiring additional isolation from the environment (GTCC), are packaged for geologic disposal. The cost of geologic disposal is based upon a cost equivalent for spent fuel.

A significant portion of the metallic waste is designated for additional processing and treatment at an off-site facility. Processing reduces the volume of material requiring controlled disposal through such techniques and processes as survey and sorting, decontamination, and volume reduction. The material that cannot be unconditionally released is packaged for controlled disposal at one of the currently operating facilities. The cost identified in the summary tables for processing is all-inclusive, incorporating the ultimate disposition of the material.

Removal costs reflect the labor-intensive nature of the decommissioning process, as well as the management controls required to ensure a safe and successful program. Decontamination and packaging costs also have a large labor component that is based upon prevailing wages. Non-radiological demolition is a natural extension of the decommissioning process. The methods employed in decontamination and dismantling are generally destructive and indiscriminate in inflicting collateral damage. With a work force mobilized to support decommissioning operations, non-radiological demolition can be an integrated activity and a logical expansion of the work being performed in the process of terminating the operating license.

The reported cost for transport includes the tariffs and surcharges associated with moving large components and/or overweight shielded casks overland, as well as the general expense, e.g., labor and fuel, of transporting material to the destinations identified in this report. For purposes of this analysis, material is moved overland by truck.

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Decontamination is used to reduce the plant's radiation fields and minimize worker exposure. Slightly contaminated material or material located within a contaminated area is sent to an off-site processing center, i.e., this analysis does not assume that contaminated plant components and equipment can be decontaminated for uncontrolled release in-situ. Centralized processing centers have proven to be a more economical means of handling the large volumes of material produced in the dismantling of a nuclear plant.

License termination survey costs are associated with the labor intensive and complex activity of verifying that contamination has been removed from the site to the levels specified by the regulating agency. This process involves a systematic survey of all remaining plant surface areas and surrounding environs, sampling, isotopic analysis, and documentation of the findings. The status of any plant components and materials not removed in the decommissioning process will also require confirmation and will add to the expense of surveying the facilities alone.

The remaining costs include allocations for heavy equipment and temporary services, as well as for other expenses such as regulatory fees and the premiums for nuclear insurance. While site operating costs are greatly reduced following the final cessation of plant operations, certain administrative functions do need to be maintained either at a basic functional or regulatory level.

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**TABLE 6.1**  
**SCENARIO 1: DECON WITH 42 YEAR DFS**  
**DECOMMISSIONING COST ELEMENTS**  
(thousands of 2020 dollars)

Cost Element	Total	Percentage
Decontamination	24,330	1.7%
Removal	125,270	9.0%
Packaging	26,543	1.9%
Transportation	14,145	1.0%
Waste Disposal	114,148	8.2%
Off-site Waste Processing	57,444	4.1%
Program Management <sup>[1]</sup>	291,789	20.8%
Security	300,346	21.5%
Spent Fuel Pool Isolation	14,576	1.0%
Spent Fuel Storage (Direct Costs) <sup>[2]</sup>	237,381	17.0%
Insurance and Regulatory Fees	39,753	2.8%
Energy	10,030	0.7%
Characterization and Licensing Surveys	23,012	1.6%
Property Taxes	55,377	4.0%
Miscellaneous Equipment	7,411	0.5%
Railroad Track Maintenance	6,914	0.5%
Retention and Severance	41,002	2.9%
Security Modifications	10,000	0.7%
<b>Total <sup>[3]</sup></b>	<b>1,399,471</b>	<b>100.0%</b>

Cost Element	Total	Percentage
NRC License Termination	776,355	55.5%
Spent Fuel Management	549,339	39.3%
Site Restoration	73,776	5.3%
<b>Total <sup>[3]</sup></b>	<b>1,399,471</b>	<b>100.0%</b>

<sup>[1]</sup> Includes engineering

<sup>[2]</sup> Includes costs for the dry storage system components, spent fuel loading and transfer, spent fuel pool O&M and EP fees, but excludes program management costs (staffing), security and other related costs

<sup>[3]</sup> Columns may not add due to rounding



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**TABLE 6.2**  
**SCENARIO 2: DECON WITH 60 YEAR DFS**  
**DECOMMISSIONING COST ELEMENTS**  
(thousands of 2020 dollars)

Cost Element	Total	Percentage
Decontamination	24,330	1.5%
Removal	125,270	7.7%
Packaging	26,543	1.6%
Transportation	14,145	0.9%
Waste Disposal	114,148	7.1%
Off-site Waste Processing	57,444	3.6%
Program Management <sup>[1]</sup>	317,530	19.6%
Security	389,426	24.1%
Spent Fuel Pool Isolation	14,576	0.9%
Spent Fuel Storage (Direct Costs) <sup>[2]</sup>	306,597	18.9%
Insurance and Regulatory Fees	53,687	3.3%
Energy	10,030	0.6%
Characterization and Licensing Surveys	23,012	1.4%
Property Taxes	73,368	4.5%
Miscellaneous Equipment	7,411	0.5%
Railroad Track Maintenance	9,504	0.6%
Retention and Severance	41,002	2.5%
Security Modifications	10,000	0.6%
<b>Total <sup>[3]</sup></b>	<b>1,618,023</b>	<b>100.0%</b>

Cost Element	Total	Percentage
NRC License Termination	776,355	48.0%
Spent Fuel Management	767,892	47.5%
Site Restoration	73,776	4.6%
<b>Total <sup>[3]</sup></b>	<b>1,618,023</b>	<b>100.0%</b>

<sup>[1]</sup> Includes engineering

<sup>[2]</sup> Includes costs for the dry storage system components, spent fuel loading and transfer, spent fuel pool O&M and EP fees, but excludes program management costs (staffing), security and other related costs

<sup>[3]</sup> Columns may not add due to rounding

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**TABLE 6.3**  
**SCENARIO 3: DECON WITH 100 YEAR DFS**  
**DECOMMISSIONING COST ELEMENTS**  
(thousands of 2020 dollars)

Cost Element	Total	Percentage
Decontamination	24,330	0.9%
Removal	125,359	4.6%
Packaging	26,543	1.0%
Transportation	14,145	0.5%
Waste Disposal	114,148	4.2%
Off-site Waste Processing	57,444	2.1%
Program Management <sup>[1]</sup>	502,435	18.4%
Security	587,397	21.6%
Spent Fuel Pool Isolation	14,576	0.5%
Spent Fuel Storage (Direct Costs) <sup>[2]</sup>	954,297	35.0%
Insurance and Regulatory Fees	84,655	3.1%
Energy	10,030	0.4%
Characterization and Licensing Surveys	23,012	0.8%
Property Taxes	113,348	4.2%
Miscellaneous Equipment	7,411	0.3%
Railroad Track Maintenance	15,260	0.6%
Retention and Severance	41,002	1.5%
Security Modifications	10,000	0.4%
<b>Total <sup>[3]</sup></b>	<b>2,725,392</b>	<b>100.0%</b>

Cost Element	Total	Percentage
NRC License Termination	776,400	28.5%
Spent Fuel Management	1,874,865	68.8%
Site Restoration	74,127	2.7%
<b>Total <sup>[3]</sup></b>	<b>2,725,392</b>	<b>100.0%</b>

<sup>[1]</sup> Includes engineering

<sup>[2]</sup> Includes costs for the dry storage system components, spent fuel loading and transfer, spent fuel pool O&M and EP fees, but excludes program management costs (staffing), security and other related costs

<sup>[3]</sup> Columns may not add due to rounding

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**TABLE 6.4**  
**SCENARIO 4: DECON WITH 200 YEAR DFS**  
**DECOMMISSIONING COST ELEMENTS**  
(thousands of 2020 dollars)

Cost Element	Total	Percentage
Decontamination	24,330	0.5%
Removal	125,359	2.6%
Packaging	26,543	0.5%
Transportation	14,145	0.3%
Waste Disposal	114,148	2.4%
Off-site Waste Processing	57,444	1.2%
Program Management <sup>[1]</sup>	782,364	16.1%
Security	1,082,311	22.3%
Spent Fuel Pool Isolation	14,576	0.3%
Spent Fuel Storage (Direct Costs) <sup>[2]</sup>	2,114,481	43.6%
Insurance and Regulatory Fees	162,073	3.3%
Energy	10,030	0.2%
Characterization and Licensing Surveys	23,012	0.5%
Property Taxes	213,298	4.4%
Miscellaneous Equipment	7,411	0.2%
Railroad Track Maintenance	29,650	0.6%
Retention and Severance	41,002	0.8%
Security Modifications	10,000	0.2%
<b>Total <sup>[3]</sup></b>	<b>4,852,175</b>	<b>100.0%</b>

Cost Element	Total	Percentage
NRC License Termination	776,400	16.0%
Spent Fuel Management	4,001,648	82.5%
Site Restoration	74,127	1.5%
<b>Total <sup>[3]</sup></b>	<b>4,852,175</b>	<b>100.0%</b>

<sup>[1]</sup> Includes engineering

<sup>[2]</sup> Includes costs for the dry storage system components, spent fuel loading and transfer, spent fuel pool O&M and EP fees, but excludes program management costs (staffing), security and other related costs

<sup>[3]</sup> Columns may not add due to rounding

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40. R.I. Smith, G.J. Konzek, W.E. Kennedy, Jr., "Technology, Safety and Costs of Decommissioning a Reference Pressurized Water Reactor Power Station," NUREG/CR-0130 and addenda, Pacific Northwest Laboratory for the Nuclear Regulatory Commission, June 1978 [\[Open Main Report\]](#) [\[Open Appendices\]](#)
41. H.D. Oak, et al., "Technology, Safety and Costs of Decommissioning a Reference Boiling Water Reactor Power Station," NUREG/CR-0672 and addenda, Pacific Northwest Laboratory for the Nuclear Regulatory Commission, June 1980 [\[Open Main Report\]](#) [\[Open Appendices\]](#)
42. SECY-00-0145, "Integrated Rulemaking Plan for Nuclear Power Plant Decommissioning," June 2000 [\[Open\]](#)
43. "Microsoft Project Professional 2013," Microsoft Corporation, Redmond, WA
44. "Atomic Energy Act of 1954," (68 Stat. 919) [\[Open\]](#)

***Monticello Nuclear Generating Plant  
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Appendix A, Page 1 of 4***

## **APPENDIX A**

### **UNIT COST FACTOR DEVELOPMENT**



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Appendix A, Page 2 of 4****APPENDIX A**  
**UNIT COST FACTOR DEVELOPMENT**

Example: Unit Factor for Removal of Contaminated Heat Exchanger &lt; 3,000 lbs.

**1. SCOPE**

Heat exchangers weighing &lt; 3,000 lbs. will be removed in one piece using a crane or small hoist. They will be disconnected from the inlet and outlet piping. The heat exchanger will be sent to the waste processing area.

**2. CALCULATIONS**

Act ID	Activity Description	Activity Duration (minutes)	Critical Duration (minutes)*
a	Remove insulation	60	(b)
b	Mount pipe cutters	60	60
c	Install contamination controls	20	(b)
d	Disconnect inlet and outlet lines	60	60
e	Cap openings	20	(d)
f	Rig for removal	30	30
g	Unbolt from mounts	30	30
h	Remove contamination controls	15	15
i	Remove, wrap, send to waste processing area	<u>60</u>	<u>60</u>
Totals (Activity/Critical)		355	255

Duration adjustment(s):

+ Respiratory protection adjustment (50 of critical duration)	128
+ Radiation/ALARA adjustment (37.1 of critical duration)	<u>95</u>
Adjusted work duration	478

+ Protective clothing adjustment (30 of adjusted duration)	<u>143</u>
Productive work duration	621

+ Work break adjustment (8.33 of productive duration)	<u>52</u>
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Total work duration (minutes)	673
-------------------------------	-----

**\*\*\* Total duration = 11.217 hr \*\*\***

\* alpha designators indicate activities that can be performed in parallel

**Monticello Nuclear Generating Plant  
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**APPENDIX A  
(continued)**

**3. LABOR REQUIRED**

Crew	Number	Duration (hours)	Rate (\$/hr)	Cost
Laborers	3.00	11.217	\$61.19	\$2,059.10
Craftsmen	2.00	11.217	\$76.95	\$1,726.30
Foreman	1.00	11.217	\$80.53	\$903.30
General Foreman	0.25	11.217	\$82.80	\$232.19
Fire Watch	0.05	11.217	\$61.19	\$34.32
Health Physics Technician	1.00	11.217	\$53.89	<u>\$604.48</u>
<b>Total Labor Cost</b>				<b>\$5,559.69</b>

**4. EQUIPMENT & CONSUMABLES COSTS**

Equipment Costs none

Consumables/Materials Costs

- Universal Sorbent 50 @ \$0.63 sq ft <sup>(1)</sup> \$31.50
- Tarpaulins (oil resistant/fire retardant) 50 @ \$0.47/sq ft <sup>(2)</sup> \$23.50
- Gas torch consumables 1 @ \$20.79/hr x 1 hr <sup>(3)</sup> \$20.79

Subtotal cost of equipment and materials \$75.79

Overhead & profit on equipment and materials @ 16.88% \$12.79

Total costs, equipment & material \$88.58

**TOTAL COST:**

**Removal of contaminated heat exchanger <3000 pounds: \$5,648.27**

Total labor cost: \$5,559.69

Total equipment/material costs: \$88.58

Total craft labor man-hours required per unit: 81.88

**Monticello Nuclear Generating Plant  
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Appendix A, Page 4 of 4****5. NOTES AND REFERENCES**

- Work difficulty factors were developed in conjunction with the Atomic Industrial Forum's (now NEI) program to standardize nuclear decommissioning cost estimates and are delineated in Volume 1, Chapter 5 of the "Guidelines for Producing Commercial Nuclear Power Plant Decommissioning Cost Estimates," AIF/NESP-036, May 1986.
- References for equipment & consumables costs:
  1. [www.mcmaster.com](http://www.mcmaster.com) online catalog, McMaster Carr Spill Control (7193T88)
  2. R.S. Means (2020) Division 01 56, Section 13.60-0600, page 23
  3. R.S. Means (2020) Division 01 54 33, Section 40-6360, page 736
- Material and consumable costs were adjusted using the regional indices for Minneapolis, Minnesota.

***Monticello Nuclear Generating Plant  
Decommissioning Cost Analysis – 70 Year Lifetime***

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## **APPENDIX B**

### **UNIT COST FACTOR LISTING (DECON: Power Block Structures Only)**

**Monticello Nuclear Generating Plant  
Decommissioning Cost Analysis – 70 Year Lifetime****Document X01-1775-003, Rev. 0  
Appendix B, Page 2 of 7****APPENDIX B****UNIT COST FACTOR LISTING  
(Power Block Structures Only)**

<b>Unit Cost Factor</b>	<b>Cost/Unit</b>
Removal of clean instrument and sampling tubing, \$/linear foot	0.66
Removal of clean pipe 0.25 to 2 inches diameter, \$/linear foot	7.12
Removal of clean pipe >2 to 4 inches diameter, \$/linear foot	10.10
Removal of clean pipe >4 to 8 inches diameter, \$/linear foot	19.57
Removal of clean pipe >8 to 14 inches diameter, \$/linear foot	37.90
Removal of clean pipe >14 to 20 inches diameter, \$/linear foot	49.31
Removal of clean pipe >20 to 36 inches diameter, \$/linear foot	72.54
Removal of clean pipe >36 inches diameter, \$/linear foot	86.18
Removal of clean valve >2 to 4 inches	129.74
Removal of clean valve >4 to 8 inches	195.68
Removal of clean valve >8 to 14 inches	379.05
Removal of clean valve >14 to 20 inches	493.07
Removal of clean valve >20 to 36 inches	725.39
Removal of clean valve >36 inches	861.75
Removal of clean pipe hanger for small bore piping	44.86
Removal of clean pipe hanger for large bore piping	160.35
Removal of clean pump, <300 pound	330.70
Removal of clean pump, 300-1000 pound	912.70
Removal of clean pump, 1000-10,000 pound	3,609.83
Removal of clean pump, >10,000 pound	6,983.56
Removal of clean pump motor, 300-1000 pound	381.49
Removal of clean pump motor, 1000-10,000 pound	1,499.79
Removal of clean pump motor, >10,000 pound	3,374.52
Removal of clean heat exchanger <3000 pound	1,938.45
Removal of clean heat exchanger >3000 pound	4,882.77
Removal of clean feedwater heater/deaerator	13,764.03
Removal of clean moisture separator/reheater	28,295.13
Removal of clean tank, <300 gallons	425.32
Removal of clean tank, 300-3000 gallon	1,339.93
Removal of clean tank, >3000 gallons, \$/square foot surface area	11.21

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Appendix B, Page 3 of 7****APPENDIX B****UNIT COST FACTOR LISTING  
(Power Block Structures Only)**

<b>Unit Cost Factor</b>	<b>Cost/Unit</b>
Removal of clean electrical equipment, <300 pound	179.21
Removal of clean electrical equipment, 300-1000 pound	621.10
Removal of clean electrical equipment, 1000-10,000 pound	1,242.20
Removal of clean electrical equipment, >10,000 pound	2,944.57
Removal of clean electrical transformer < 30 tons	2,044.97
Removal of clean electrical transformer > 30 tons	5,889.16
Removal of clean standby diesel generator, <100 kW	2,088.76
Removal of clean standby diesel generator, 100 kW to 1 MW	4,662.25
Removal of clean standby diesel generator, >1 MW	9,651.80
Removal of clean electrical cable tray, \$/linear foot	16.85
Removal of clean electrical conduit, \$/linear foot	7.36
Removal of clean mechanical equipment, <300 pound	179.21
Removal of clean mechanical equipment, 300-1000 pound	621.10
Removal of clean mechanical equipment, 1000-10,000 pound	1,242.20
Removal of clean mechanical equipment, >10,000 pound	2,944.57
Removal of clean HVAC equipment, <300 pound	216.70
Removal of clean HVAC equipment, 300-1000 pound	746.29
Removal of clean HVAC equipment, 1000-10,000 pound	1,487.38
Removal of clean HVAC equipment, >10,000 pound	2,944.57
Removal of clean HVAC ductwork, \$/pound	0.70
Removal of contaminated instrument and sampling tubing, \$/linear foot	1.95
Removal of contaminated pipe 0.25 to 2 inches diameter, \$/linear foot	27.83
Removal of contaminated pipe >2 to 4 inches diameter, \$/linear foot	47.82
Removal of contaminated pipe >4 to 8 inches diameter, \$/linear foot	74.96
Removal of contaminated pipe >8 to 14 inches diameter, \$/linear foot	148.03
Removal of contaminated pipe >14 to 20 inches diameter, \$/linear foot	177.89
Removal of contaminated pipe >20 to 36 inches diameter, \$/linear foot	246.18
Removal of contaminated pipe >36 inches diameter, \$/linear foot	290.94
Removal of contaminated valve >2 to 4 inches	566.42
Removal of contaminated valve >4 to 8 inches	683.47

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Appendix B, Page 4 of 7****APPENDIX B****UNIT COST FACTOR LISTING  
(Power Block Structures Only)**

<b>Unit Cost Factor</b>	<b>Cost/Unit</b>
Removal of contaminated valve >8 to 14 inches	1,416.07
Removal of contaminated valve >14 to 20 inches	1,800.35
Removal of contaminated valve >20 to 36 inches	2,397.55
Removal of contaminated valve >36 inches	2,845.15
Removal of contaminated pipe hanger for small bore piping	185.78
Removal of contaminated pipe hanger for large bore piping	626.83
Removal of contaminated pump, <300 pound	1,220.05
Removal of contaminated pump, 300-1000 pound	2,838.23
Removal of contaminated pump, 1000-10,000 pound	9,385.29
Removal of contaminated pump, >10,000 pound	22,861.69
Removal of contaminated pump motor, 300-1000 pound	1,207.33
Removal of contaminated pump motor, 1000-10,000 pound	3,818.35
Removal of contaminated pump motor, >10,000 pound	8,572.65
Removal of contaminated heat exchanger <3000 pound	5,648.27
Removal of contaminated heat exchanger >3000 pound	16,376.90
Removal of contaminated feedwater heater/deaerator	40,348.66
Removal of contaminated moisture separator/reheater	88,508.97
Removal of contaminated tank, <300 gallons	2,028.12
Removal of contaminated tank, >300 gallons, \$/square foot	39.80
Removal of contaminated electrical equipment, <300 pound	945.59
Removal of contaminated electrical equipment, 300-1000 pound	2,314.13
Removal of contaminated electrical equipment, 1000-10,000 pound	4,457.30
Removal of contaminated electrical equipment, >10,000 pound	8,759.01
Removal of contaminated electrical cable tray, \$/linear foot	45.76
Removal of contaminated electrical conduit, \$/linear foot	22.38
Removal of contaminated mechanical equipment, <300 pound	1,051.94
Removal of contaminated mechanical equipment, 300-1000 pound	2,555.55
Removal of contaminated mechanical equipment, 1000-10,000 pound	4,914.24
Removal of contaminated mechanical equipment, >10,000 pound	8,759.01
Removal of contaminated HVAC equipment, <300 pound	1,051.94

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Appendix B, Page 5 of 7****APPENDIX B****UNIT COST FACTOR LISTING  
(Power Block Structures Only)**

<b>Unit Cost Factor</b>	<b>Cost/Unit</b>
Removal of contaminated HVAC equipment, 300-1000 pound	2,555.55
Removal of contaminated HVAC equipment, 1000-10,000 pound	4,914.24
Removal of contaminated HVAC equipment, >10,000 pound	8,759.01
Removal of contaminated HVAC ductwork, \$/pound	2.68
Removal/plasma arc cut of contaminated thin metal components, \$/linear in.	5.11
Additional decontamination of surface by washing, \$/square foot	10.44
Additional decontamination of surfaces by hydrolasing, \$/square foot	45.11
Decontamination rig hook up and flush, \$/ 250 foot length	8,866.81
Chemical flush of components/systems, \$/gallon	21.45
Removal of clean standard reinforced concrete, \$/cubic yard	79.60
Removal of grade slab concrete, \$/cubic yard	90.54
Removal of clean concrete floors, \$/cubic yard	462.42
Removal of sections of clean concrete floors, \$/cubic yard	1,391.16
Removal of clean heavily rein concrete w/#9 rebar, \$/cubic yard	115.00
Removal of contaminated heavily rein concrete w/#9 rebar, \$/cubic yard	2,709.95
Removal of clean heavily rein concrete w/#18 rebar, \$/cubic yard	155.86
Removal of contaminated heavily rein concrete w/#18 rebar, \$/cubic yard	3,585.12
Removal heavily rein concrete w/#18 rebar & steel embedments, \$/cubic yard	568.99
Removal of below-grade suspended floors, \$/cubic yard	218.59
Removal of clean monolithic concrete structures, \$/cubic yard	1,160.31
Removal of contaminated monolithic concrete structures, \$/cubic yard	2,697.57
Removal of clean foundation concrete, \$/cubic yard	910.72
Removal of contaminated foundation concrete, \$/cubic yard	2,512.94
Explosive demolition of bulk concrete, \$/cubic yard	61.21
Removal of clean hollow masonry block wall, \$/cubic yard	27.85
Removal of contaminated hollow masonry block wall, \$/cubic yard	72.42
Removal of clean solid masonry block wall, \$/cubic yard	27.85
Removal of contaminated solid masonry block wall, \$/cubic yard	72.42
Backfill of below-grade voids, \$/cubic yard	36.73
Removal of subterranean tunnels/voids, \$/linear foot	143.27



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Appendix B, Page 6 of 7****APPENDIX B****UNIT COST FACTOR LISTING  
(Power Block Structures Only)**

<b>Unit Cost Factor</b>	<b>Cost/Unit</b>
Placement of concrete for below-grade voids, \$/cubic yard	142.83
Excavation of clean material, \$/cubic yard	3.38
Excavation of contaminated material, \$/cubic yard	48.84
Removal of clean concrete rubble (tipping fee included), \$/cubic yard	28.05
Removal of contaminated concrete rubble, \$/cubic yard	30.62
Removal of building by volume, \$/cubic foot	0.35
Removal of clean building metal siding, \$/square foot	1.77
Removal of contaminated building metal siding, \$/square foot	5.62
Removal of standard asphalt roofing, \$/square foot	3.11
Removal of transite panels, \$/square foot	2.87
Scarifying contaminated concrete surfaces (drill & spall), \$/square foot	15.31
Scabbling contaminated concrete floors, \$/square foot	9.92
Scabbling contaminated concrete walls, \$/square foot	26.57
Scabbling contaminated ceilings, \$/square foot	91.52
Scabbling structural steel, \$/square foot	7.85
Removal of clean overhead crane/monorail < 10 ton capacity	863.54
Removal of contaminated overhead crane/monorail < 10 ton capacity	2,333.05
Removal of clean overhead crane/monorail >10-50 ton capacity	2,072.50
Removal of contaminated overhead crane/monorail >10-50 ton capacity	5,598.35
Removal of polar crane > 50 ton capacity	8,635.54
Removal of gantry crane > 50 ton capacity	32,881.12
Removal of structural steel, \$/pound	0.25
Removal of clean steel floor grating, \$/square foot	6.20
Removal of contaminated steel floor grating, \$/square foot	17.35
Removal of clean free standing steel liner, \$/square foot	16.80
Removal of contaminated free standing steel liner, \$/square foot	46.58
Removal of clean concrete-anchored steel liner, \$/square foot	8.40
Removal of contaminated concrete-anchored steel liner, \$/square foot	54.29
Placement of scaffolding in clean areas, \$/square foot	18.98
Placement of scaffolding in contaminated areas, \$/square foot	31.88

*Monticello Nuclear Generating Plant  
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(Power Block Structures Only)**

<b>Unit Cost Factor</b>	<b>Cost/Unit</b>
Landscaping with topsoil, \$/acre	25,605.38
Cost of CPC B-88 LSA box & preparation for use	2,185.34
Cost of CPC B-25 LSA box & preparation for use	1,785.69
Cost of CPC B-12V 12 gauge LSA box & preparation for use	1,711.39
Cost of CPC B-144 LSA box & preparation for use	10,802.17
Cost of LSA drum & preparation for use	260.76
Cost of cask liner for CNSI 8 120A cask (resins)	12,914.97
Cost of cask liner for CNSI 8 120A cask (filters)	9,404.01
Decontamination of surfaces with vacuuming, \$/square foot	1.04

***Monticello Nuclear Generating Plant  
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**APPENDIX C**

**DETAILED COST ANALYSIS**

**SCENARIO 1: DECON with 42 Year DFS**

**Monticello Nuclear Generating Plant  
 Decommissioning Cost Analysis**

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**Table C  
 Monticello Nuclear Generating Plant  
 DECON Decommissioning Cost Estimate with DOE Pickup of Industry Fuel Starting in 2035**  
 (Thousands of 2020 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Cost	Transport Cost	OE-Site Processing Costs	LIRW Disposal Costs	Other Costs	Total Contingency	Total Lic. Term Costs	NRC Lic. Term Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes			Burial/Processed Mt. Dbs.	Craft Manhours	Utility and Contractor Manhours		
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet					
<b>PERIOD Ia - Shutdown through Transition</b>																						
Period Ia Direct Decommissioning Activities																						
Ia.1.1	Remove fuel & source material	-	-	-	-	-	-	167	25	182	192	-	-	-	-	-	-	-	-	-	1,200	
Ia.1.2	Notification of Cessation of Operations	-	-	-	-	-	-	-	n/a	n/a	-	-	-	-	-	-	-	-	-	-	-	
Ia.1.3	Remove fuel & source material	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Ia.1.4	Notification of Permanent Defueling	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Ia.1.5	Remove process waste	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Ia.1.6	Prepare and submit PSD&M	-	-	-	-	-	-	257	39	296	296	-	-	-	-	-	-	-	-	-	2,000	
Ia.1.7	Review plant design & specs.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4,600	
Ia.1.8	Perform detailed rad survey	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Ia.1.9	Perform rad survey inventory	-	-	-	-	-	-	129	10	148	148	-	-	-	-	-	-	-	-	-	1,000	
Ia.1.10	End product description	-	-	-	-	-	-	129	10	148	148	-	-	-	-	-	-	-	-	-	1,000	
Ia.1.11	Detailed by-product inventory	-	-	-	-	-	-	167	25	192	192	-	-	-	-	-	-	-	-	-	1,300	
Ia.1.12	Define major work sequence	-	-	-	-	-	-	964	145	1,108	1,108	-	-	-	-	-	-	-	-	-	7,500	
Ia.1.13	Perform rad survey inventory	-	-	-	-	-	-	964	145	1,108	1,108	-	-	-	-	-	-	-	-	-	7,500	
Ia.1.14	Perform rad survey inventory	-	-	-	-	-	-	964	145	1,108	1,108	-	-	-	-	-	-	-	-	-	7,500	
Ia.1.15	Perform Site-Specific Cost Study	-	-	-	-	-	-	643	96	739	739	-	-	-	-	-	-	-	-	-	5,000	
Ia.1.16	Prepare/submit Irradiated Fuel Management Plan	-	-	-	-	-	-	129	19	148	148	-	-	-	-	-	-	-	-	-	1,000	
Activity Specifications																						
Ia.1.17.1	Plant & temporary facilities	-	-	-	-	-	-	632	95	727	654	-	-	-	-	-	-	-	-	-	4,920	
Ia.1.17.2	Plant systems	-	-	-	-	-	-	536	80	616	554	-	-	-	-	-	-	-	-	-	4,167	
Ia.1.17.3	SSS/Decommissionation Flush	-	-	-	-	-	-	10	1	11	11	-	-	-	-	-	-	-	-	-	500	
Ia.1.17.4	SSS/Decommissionation Flush	-	-	-	-	-	-	952	137	1,089	1,044	-	-	-	-	-	-	-	-	-	7,500	
Ia.1.17.5	Reactor vessel	-	-	-	-	-	-	835	125	961	961	-	-	-	-	-	-	-	-	-	6,500	
Ia.1.17.6	Sacrificial shield	-	-	-	-	-	-	64	10	74	74	-	-	-	-	-	-	-	-	-	500	
Ia.1.17.7	Mixture separators/behaviors	-	-	-	-	-	-	129	3	148	148	-	-	-	-	-	-	-	-	-	1,000	
Ia.1.17.8	Mixture separators/behaviors	-	-	-	-	-	-	129	3	148	148	-	-	-	-	-	-	-	-	-	1,000	
Ia.1.17.9	Main Turbine	-	-	-	-	-	-	268	40	309	309	-	-	-	-	-	-	-	-	-	2,988	
Ia.1.17.10	Main Condensers	-	-	-	-	-	-	268	40	309	309	-	-	-	-	-	-	-	-	-	2,988	
Ia.1.17.11	Pressure suppression structures	-	-	-	-	-	-	257	39	296	296	-	-	-	-	-	-	-	-	-	2,000	
Ia.1.17.12	Pressure suppression structures	-	-	-	-	-	-	257	39	296	296	-	-	-	-	-	-	-	-	-	2,000	
Ia.1.17.13	Plant structures & buildings	-	-	-	-	-	-	401	60	461	461	-	-	-	-	-	-	-	-	-	3,120	
Ia.1.17.14	Waste management	-	-	-	-	-	-	501	89	590	590	-	-	-	-	-	-	-	-	-	4,600	
Ia.1.17.15	Facility & site closure	-	-	-	-	-	-	116	17	133	67	-	-	-	-	-	-	-	-	-	900	
Ia.1.17	Total	-	-	-	-	-	-	5,466	825	6,291	5,759	-	-	-	-	-	-	-	-	-	42,683	
<b>Planting &amp; Site Preparations</b>																						
Ia.1.18	Prepare dismantling sequence	-	-	-	-	-	-	308	46	355	355	-	-	-	-	-	-	-	-	-	2,400	
Ia.1.19	Prepare site & equipment	-	-	-	-	-	-	340	52	392	407	-	-	-	-	-	-	-	-	-	2,400	
Ia.1.20	Design and construct system	-	-	-	-	-	-	180	27	207	207	-	-	-	-	-	-	-	-	-	1,400	
Ia.1.21	Rigging/Cont. Crut. Evlps/cooling/etc.	-	-	-	-	-	-	2,400	360	2,760	2,760	-	-	-	-	-	-	-	-	-	-	
Ia.1.22	Procure caselines & containers	-	-	-	-	-	-	158	24	182	182	-	-	-	-	-	-	-	-	-	1,250	
Ia.1	Subtotal Period Ia Activity Costs	-	-	-	-	-	-	16,360	2,486	19,051	18,305	-	-	-	-	-	-	-	-	-	85,913	
<b>Period Ia Collateral Costs</b>																						
Ia.3.1	Spent Fuel Capital and Transfer	-	-	-	-	-	-	6,298	943	7,242	7,242	-	-	-	-	-	-	-	-	-	-	
Ia.3.2	Retention and Sovereignty	-	-	-	-	-	-	892	148	1,040	1,040	-	-	-	-	-	-	-	-	-	-	
Ia.3	Subtotal Period Ia Collateral Costs	-	-	-	-	-	-	7,190	1,091	8,281	8,281	-	-	-	-	-	-	-	-	-	-	
<b>Period Ia Period-Dependent Costs</b>																						
Ia.4.1	Insurance	-	-	-	-	-	-	2,228	333	2,561	2,561	-	-	-	-	-	-	-	-	-	-	
Ia.4.2	Health physics supplies	-	-	-	-	-	-	3,210	495	3,705	3,705	-	-	-	-	-	-	-	-	-	-	
Ia.4.3	Heavy equipment rental	-	-	-	-	-	-	113	17	130	130	-	-	-	-	-	-	-	-	-	-	
Ia.4.4	Disposal of DAW generated	-	-	-	-	-	-	50	8	58	58	-	-	-	-	-	-	-	-	-	20	
Ia.4.5	Disposal of DAW generated	-	-	-	-	-	-	1,817	273	2,090	2,090	-	-	-	-	-	-	-	-	-	-	
Ia.4.6	Operating budget	-	-	-	-	-	-	1,137	174	1,311	1,311	-	-	-	-	-	-	-	-	-	-	
Ia.4.7	NRC Fees	-	-	-	-	-	-	3,428	514	3,942	3,942	-	-	-	-	-	-	-	-	-	-	
Ia.4.8	Emergency Planning Fees	-	-	-	-	-	-	392	58	450	450	-	-	-	-	-	-	-	-	-	-	
Ia.4.9	Fixed Overhead	-	-	-	-	-	-	2,616	392	3,008	3,008	-	-	-	-	-	-	-	-	-	-	
Ia.4.10	Fixed Overhead	-	-	-	-	-	-	112	17	129	129	-	-	-	-	-	-	-	-	-	-	
Ia.4.11	RSFS Operating Costs	-	-	-	-	-	-	125	19	144	144	-	-	-	-	-	-	-	-	-	-	
Ia.4.12	Railroad Track Maintenance	-	-	-	-	-	-	16,372	2,496	18,868	18,868	-	-	-	-	-	-	-	-	-	-	
Ia.4.13	Security Staff Cost	-	-	-	-	-	-	1,367	204	1,571	1,571	-	-	-	-	-	-	-	-	-	-	
Ia.4.14	Subtotal Period Ia Period-Dependent Costs	-	-	-	-	-	-	50,683	8,703	59,386	59,386	-	-	-	-	-	-	-	-	-	246,440	
Ia.4	Subtotal Period Ia Period-Dependent Costs	-	-	-	-	-	-	50,683	8,703	59,386	59,386	-	-	-	-	-	-	-	-	-	-	462,680

**Monticello Nuclear Generating Plant  
 Decommissioning Cost Analysis**

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**Table C  
 Monticello Nuclear Generating Plant  
 DECON Decommissioning Cost Estimate with DOE Pickup of Industry Fuel Starting in 2035  
 (Thousands of 2020 Dollars)**

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	OE-Site Processing Costs	LIRW Disposal Costs	Other Contingency Costs	Total Contingency	Total Lk. Term Costs	NRC Lk. Term Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes			Burial/Processed Mt. Dbs.	Craft Manhours	Utility and Contractor Manhours		
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet					
10.0	TOTAL PERIOD 10 COST	-	1,367	12	6	-	50	92,383	13,615	107,434	94,793	12,102	570	-	-	-	-	121,190	20	760,693	-	
PERIOD 10 - Decommissioning Preparations																						
Period 10 Direct Decommissioning Activities																						
Detailed Work Procedures																						
10.1.1	SSS Decommintation Blush	-	-	-	-	-	-	626	61	700	630	-	-	-	-	-	-	-	-	-	4,733	
10.1.1.1	Remainig buildings	-	-	-	-	-	-	514	77	591	591	-	-	-	-	-	-	-	-	-	1,000	
10.1.1.2	Incess instrumentation	-	-	-	-	-	-	174	26	200	188	-	-	-	-	-	-	-	-	-	1,350	
10.1.1.3	Removal primary containment	-	-	-	-	-	-	257	39	296	296	-	-	-	-	-	-	-	-	-	1,000	
10.1.1.4	Reactor vessel	-	-	-	-	-	-	407	70	537	537	-	-	-	-	-	-	-	-	-	2,000	
10.1.1.5	Reactor vessel	-	-	-	-	-	-	154	23	177	177	-	-	-	-	-	-	-	-	-	3,630	
10.1.1.6	Reactor vessel	-	-	-	-	-	-	154	23	177	177	-	-	-	-	-	-	-	-	-	1,200	
10.1.1.7	Reinforced concrete	-	-	-	-	-	-	129	19	148	148	-	-	-	-	-	-	-	-	-	1,000	
10.1.1.8	Main Turbine	-	-	-	-	-	-	207	40	307	307	-	-	-	-	-	-	-	-	-	2,080	
10.1.1.9	Main Condensers	-	-	-	-	-	-	255	39	296	296	-	-	-	-	-	-	-	-	-	2,000	
10.1.1.10	Steam Generators & reubsters	-	-	-	-	-	-	351	53	403	363	-	-	-	-	-	-	-	-	-	2,780	
10.1.1.11	Reactor building	-	-	-	-	-	-	351	53	403	363	-	-	-	-	-	-	-	-	-	2,780	
10.1.1.12	Total	-	-	-	-	-	-	4,336	690	4,987	4,324	-	-	-	-	-	-	-	-	-	33,711	
10.1.2	Decon NSSS	296	-	-	-	-	-	4,336	798	5,431	4,968	-	-	-	-	-	-	-	-	1,007	33,711	
10.1.3	Subtotal Period 10 Activity Costs	296	-	-	-	-	-	4,336	798	5,431	4,968	-	-	-	-	-	-	-	-	1,007	33,711	
Period 10 Additional Costs																						
10.2.1	Site Characterization	-	-	-	-	-	-	12,075	1,901	14,576	14,576	-	-	-	-	-	-	-	-	-	-	
10.2.2	Mixed & RCRA Waste	-	-	28	20	14	-	5,830	9	7,708	7,708	-	-	-	-	-	-	-	-	-	30,500	
10.2	Subtotal Period 10 Additional Costs	-	-	28	20	14	-	18,005	3,680	22,365	22,365	-	-	-	-	-	-	-	-	-	10,852	
Period 10 Collateral Costs																						
10.3.1	Decon equipment	1,065	-	-	-	-	-	1,264	108	1,213	1,213	-	-	-	-	-	-	-	-	-	-	
10.3.2	Process decommissioning water waste	38	-	-	-	-	-	1,02	53	263	263	-	-	-	-	-	-	-	-	-	-	
10.3.3	Process decommissioning chemical flush waste	1	-	-	-	-	-	1,526	396	2,024	2,024	-	-	-	-	-	-	-	-	-	45	
10.3.4	Small tool allowance	-	1,200	-	-	-	-	-	1,200	2	2	-	-	-	-	-	-	-	-	-	-	
10.3.5	Deconstruing equipment	2,004	-	-	-	-	-	316	316	2,419	2,419	-	-	-	-	-	-	-	-	-	43	
10.3.6	Spent Fuel Capital and Transfer	-	-	-	-	-	-	360	54	414	414	-	-	-	-	-	-	-	-	-	-	
10.3.7	Retention and Sovereignty	3,197	1,292	49	122	-	-	6,310	951	7,291	7,291	-	-	-	-	-	-	-	-	-	-	
10.3	Subtotal Period 10 Collateral Costs	3,197	1,292	49	122	-	-	7,864	2,208	10,000	10,000	-	-	-	-	-	-	-	-	-	89	
Period 10 Period-Dependent Costs																						
10.4.1	Decon supplies	39	-	-	-	-	-	1,101	10	48	48	-	-	-	-	-	-	-	-	-	-	
10.4.2	Insurance	-	-	-	-	-	-	1,101	17	1,277	1,277	-	-	-	-	-	-	-	-	-	-	
10.4.3	Health physics supplies	-	-	-	-	-	-	1,101	17	1,277	1,277	-	-	-	-	-	-	-	-	-	-	
10.4.4	Heavy equipment rental	-	344	-	-	-	-	86	86	430	430	-	-	-	-	-	-	-	-	-	-	
10.4.5	Disposal of DAW generated	-	375	-	-	-	-	56	56	432	432	-	-	-	-	-	-	-	-	-	-	
10.4.6	Emergency Planning Fees	-	-	7	-	-	-	1,812	272	2,089	2,089	-	-	-	-	-	-	-	-	-	12	
10.4.7	Emergency Planning Fees	-	-	-	-	-	-	323	32	355	355	-	-	-	-	-	-	-	-	-	-	
10.4.8	Fixed Overhead	-	-	-	-	-	-	1,416	142	1,557	1,557	-	-	-	-	-	-	-	-	-	-	
10.4.9	Fixed Overhead	-	-	-	-	-	-	1,395	136	1,500	1,500	-	-	-	-	-	-	-	-	-	-	
10.4.10	RSFSI Operating Costs	-	-	-	-	-	-	16	8	64	64	-	-	-	-	-	-	-	-	-	-	
10.4.11	RSFSI Operating Costs	-	-	-	-	-	-	62	9	72	72	-	-	-	-	-	-	-	-	-	-	
10.4.12	Railroad Track Maintenance	-	-	-	-	-	-	8,163	1,225	9,388	9,388	-	-	-	-	-	-	-	-	-	-	
10.4.13	Security Staff Cost	-	-	-	-	-	-	13,682	2,032	15,714	15,714	-	-	-	-	-	-	-	-	-	-	
10.4.14	Utility Staff Cost	-	-	-	-	-	-	35,056	5,323	42,078	42,078	-	-	-	-	-	-	-	-	-	-	
10.4.15	Subtotal Period 10 Period-Dependent Costs	39	719	7	4	-	-	29	35,056	5,323	42,078	2,106	-	-	-	-	-	-	-	-	12	
10.4	TOTAL PERIOD 10 COST	3,531	1,621	84	154	14	1,057	66,862	12,100	86,333	85,350	2,520	463	43	589	231	-	-	-	50,964	31,828	441,822
10.0	TOTAL PERIOD 10 COST	3,531	3,288	96	100	14	1,707	159,215	27,725	193,767	174,133	14,622	1,012	43	1,199	231	-	-	-	63,155	31,848	1,192,515

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 Decommissioning Cost Analysis

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Table C  
 Monticello Nuclear Generating Plant  
 DECON Decommissioning Cost Estimate with DOE Pickup of Industry Fuel Starting in 2035  
 (Thousands of 2020 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost		Packaging Cost	Transport Cost	On-Site Processing Costs		LIRW Disposal Costs	Other Contingency Costs	Total Contingency Costs	Total Lk-Term Management Costs	Site Restoration Costs		Processed Volume Cu. Feet	Class A Cu. Feet	Burial Volumes		Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet	Burial/Processed Wt. Dbs	Craft Manhours	Utility and Contractor Manhours
			Cost	Cost			Cost	Cost					Cost	Cost			Cost	Cost						
PERIOD 2a - Large Component Removal																								
Period 2a Direct Decommissioning Activities																								
Nuclear Steam Supply System Removal																								
2a.1.1.1	Recirculation System Piping & Valves	111	94	17	27	50	528	-	221	1,031	1,031	1,031	-	-	-	1,430	-	-	-	-	-	60,742	2,905	-
2a.1.1.2	Recirculation Pumps & Motors	40	63	16	16	51	539	-	186	638	638	638	-	-	96	945	-	-	-	-	-	112,290	1,563	-
2a.1.1.3	Reactor Vessel Internals	214	6,722	12,852	2,696	4,099	29,845	364	24,027	75,719	75,719	75,719	-	-	-	1,252	1,481	1,178	-	-	-	83,100	30,015	1,379
2a.1.1.4	Reactor Vessel Internals	113	9,121	2,672	1,167	42	37,003	728	35,973	112,449	112,449	112,449	-	-	96	23,536	1,481	1,178	-	-	-	1,105,210	30,515	1,379
2a.1.1.1	Totals	702	17,620	15,682	4,099	42	37,003	728	35,973	112,449	112,449	112,449	-	-	96	23,536	1,481	1,178	-	-	-	1,871,002	83,307	2,758
Removal of Major Equipment																								
2a.1.2	Main Turbines/Generator	-	385	1,356	521	6,139	439	-	1,341	10,182	10,182	10,182	-	-	21,435	1,383	-	-	-	-	-	1,077,059	5,438	-
2a.1.3	Main Condensers	-	1,347	360	191	3,225	244	-	947	6,317	6,317	6,317	-	-	17,096	727	-	-	-	-	-	829,555	18,881	-
Cascading Costs from Clean Building Demolition																								
2a.1.4.1	Reactor Building	-	332	-	-	-	-	-	50	381	381	381	-	-	-	-	-	-	-	-	-	-	2,217	-
2a.1.4.2	Radiation	-	25	-	-	-	-	-	4	28	28	28	-	-	-	-	-	-	-	-	-	-	127	-
2a.1.4.3	Turbine	-	87	-	-	-	-	-	9	166	166	166	-	-	-	-	-	-	-	-	-	-	1,254	-
2a.1.4	Totals	-	455	-	-	-	-	-	72	585	585	585	-	-	-	-	-	-	-	-	-	-	3,608	-
Deposit of Plant Systems																								
2a.1.5.1	Automatic Press Relief	-	118	7	12	12	154	79	-	410	410	410	-	-	503	205	-	-	-	-	-	45,652	1,655	-
2a.1.5.2	Chemistry Sampling - Insulated	-	2	0	0	0	2	0	1	3	3	3	-	-	1	1	-	-	-	-	-	6	28	-
2a.1.5.3	Chemistry Sampling - Insulated	-	2	0	0	0	2	0	1	3	3	3	-	-	1	1	-	-	-	-	-	72	28	-
2a.1.5.4	Circulating Water - RCA	-	207	14	62	1,114	-	-	2,290	1,626	1,626	1,626	-	-	6,056	-	-	-	-	-	-	270,307	2,850	-
2a.1.5.5	Combustible Gas Control - RCA	-	29	0	2	36	-	-	33	80	80	80	-	-	212	-	-	-	-	-	-	8,017	378	-
2a.1.5.6	Condensate & Feedwater - Insulated	-	987	183	329	3,237	2,064	-	1,431	8,731	8,731	8,731	-	-	10,917	7,319	-	-	-	-	-	1,273,810	14,196	-
2a.1.5.8	Condensate & Feedwater - Insulated	-	492	34	63	690	408	-	343	2,038	2,038	2,038	-	-	4,176	1,267	-	-	-	-	-	246,698	6,964	-
2a.1.5.9	Condensate DRAIN	-	545	30	51	590	339	-	316	1,840	1,840	1,840	-	-	3,346	1,000	-	-	-	-	-	109,498	5,618	-
2a.1.5.10	Control Rod Drive	-	72	0	0	11	2	-	4	2,749	2,749	2,749	-	-	7,408	79	-	-	-	-	-	10,917	163	-
2a.1.5.11	Control Rod Drive	-	3	0	0	3	1	-	2	9	9	9	-	-	19	4	-	-	-	-	-	1,009	41	-
2a.1.5.12	Control Rod Drive Hydraulic	-	416	16	26	277	190	-	199	1,124	1,124	1,124	-	-	1,658	562	-	-	-	-	-	103,306	5,888	-
2a.1.5.13	Core Spray - Insulated	-	79	20	51	734	176	-	184	1,244	1,244	1,244	-	-	4,884	521	-	-	-	-	-	211,329	1,163	-
2a.1.5.14	Demain Water - Insulated	-	15	0	0	14	4	-	8	43	43	43	-	-	85	26	-	-	-	-	-	3,445	203	-
2a.1.5.15	Demain Water - Insulated - RCA	-	15	0	0	14	4	-	8	36	36	36	-	-	253	4	-	-	-	-	-	314	181	-
2a.1.5.17	Diesel Oil - RCA	-	2	0	0	4	-	-	1	7	7	7	-	-	23	-	-	-	-	-	-	931	25	-
2a.1.5.18	Diesel Oil - RCA	-	0	0	0	0	0	-	0	19	19	19	-	-	58	-	-	-	-	-	-	56	4	-
2a.1.5.19	DPA Emergency Water - Insul - RCA	-	0	0	0	0	0	-	0	1	1	1	-	-	4	-	-	-	-	-	-	22	84	-
2a.1.5.20	Electrical - Clean	-	13	0	0	0	0	-	2	15	15	15	-	-	2	-	-	-	-	-	-	8	4	-
2a.1.5.21	Emergency Service Water - Insul - RCA	-	21	0	1	23	-	-	0	55	55	55	-	-	137	-	-	-	-	-	-	5,514	281	-
2a.1.5.22	Emergency Service Water - RCA	-	3	0	0	2	0	-	1	5	5	5	-	-	10	-	-	-	-	-	-	432	22	-
2a.1.5.23	Generator Physical Design - RCA	-	5	0	0	17	-	-	4	25	25	25	-	-	103	-	-	-	-	-	-	434	26	-
2a.1.5.24	Generator Physical Design - RCA	-	5	0	0	5	-	-	2	12	12	12	-	-	31	-	-	-	-	-	-	1,250	67	-
2a.1.5.25	HE O2 Control Analyzing - RCA	-	0	0	0	1	5	-	3	15	15	15	-	-	6	-	-	-	-	-	-	1,080	81	-
2a.1.5.25	HE O2 Control Analyzing - Insulated	-	67	6	6	183	76	-	61	381	381	381	-	-	972	13	-	-	-	-	-	82,980	961	-
2a.1.5.26	High Pressure Coolant Injection - Insula	-	219	14	24	207	163	-	141	839	839	839	-	-	1,908	481	-	-	-	-	-	95,738	3,079	-
2a.1.5.29	Hydrogen Cooling	-	8	-	-	-	-	-	1	10	10	10	-	-	10	-	-	-	-	-	-	-	118	-
2a.1.5.30	Hydrogen Cooling - RCA	-	17	0	0	7	-	-	4	39	39	39	-	-	137	-	-	-	-	-	-	7,690	79	-
2a.1.5.31	Hydrogen Water Chemistry - RCA	-	24	0	1	23	-	-	10	59	59	59	-	-	140	-	-	-	-	-	-	5,672	304	-
2a.1.5.32	Hydrogen Water Chemistry - RCA	-	225	14	17	206	-	-	103	644	644	644	-	-	1,768	-	-	-	-	-	-	71,810	2,733	-
2a.1.5.33	Instrument & Service Air - RCA	-	196	12	20	228	139	-	103	712	712	712	-	-	1,333	411	-	-	-	-	-	80,439	2,746	-
2a.1.5.34	Main Condenser	-	205	353	3,306	2,921	-	-	1,553	9,350	9,350	9,350	-	-	19,760	8,887	-	-	-	-	-	1,351,661	14,733	-
2a.1.5.36	Main Turbine	-	214	18	37	423	225	-	180	1,097	1,097	1,097	-	-	2,630	667	-	-	-	-	-	145,298	3,069	-
2a.1.5.37	Main Turbine - Insulated	-	43	1	3	51	11	-	19	115	115	115	-	-	302	764	-	-	-	-	-	12,288	622	-
2a.1.5.38	Miscellaneous	-	19	0	0	32	229	240	197	1,100	1,100	1,100	-	-	1,368	709	-	-	-	-	-	100,933	5,385	-
2a.1.5.40	Off Gas Recombiner - Insulated	-	387	19	32	448	251	-	292	1,686	1,686	1,686	-	-	4,063	1,118	-	-	-	-	-	31,587	1,125	-
2a.1.5.41	Post Accident Sampling	-	25	1	1	1	11	-	8	58	58	58	-	-	53	33	-	-	-	-	-	4,318	345	-
2a.1.5.42	Post Accident Sampling - Insulated	-	17	1	1	3	13	-	1	43	43	43	-	-	17	37	-	-	-	-	-	3,136	212	-
2a.1.5.43	RBS Service Water - Insulated - RCA	-	0	0	0	0	0	-	0	409	409	409	-	-	1,135	-	-	-	-	-	-	4,660	112	-
2a.1.5.44	RBS Service Water - RCA	-	0	0	0	0	0	-	0	12	12	12	-	-	35	-	-	-	-	-	-	1,125	66	-
2a.1.5.45	Reactor Feedwater Pump Seal	-	56	2	4	32	33	-	28	155	155	155	-	-	183	96	-	-	-	-	-	14,069	773	-

**Monticello Nuclear Generating Plant  
 Decommissioning Cost Analysis**

**Table C  
 Monticello Nuclear Generating Plant  
 DECON Decommissioning Cost Estimate with DOE Pickup of Industry Fuel Starting in 2035  
 (Thousands of 2020 Dollars)**

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	OE-Site Processing Costs	LIRW Disposal Costs	Other Costs	Total Contingency	Total	NRC Lic. Term Management Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet	Burial/Processed Mt. Dbs	Craft Manhours	Utility and Contractor Manhours
<b>Decon of Plant Systems (continued)</b>																					
2a.1.5.46	Residual Heat Removal	362	252	172	178	1,072	2,051	-	962	5,049	5,049	-	-	6,406	6,012	-	-	-	617,941	4,135	-
2a.1.5.47	Residual Heat Removal - Insulated	622	554	61	82	563	880	-	772	3,535	3,535	-	-	3,367	2,907	-	-	-	393,087	10,340	-
2a.1.5.48	Rx Recirculation	-	-	-	2	4	5	-	5	12	12	-	-	-	-	-	-	-	1,000	-	-
2a.1.5.49	Rx Core Isolation Cooling - Insulated	-	107	-	7	48	67	-	52	287	287	-	-	288	188	-	-	-	24,419	1,479	-
2a.1.5.50	Rx Recirculation	56	58	6	4	7	65	-	61	258	258	-	-	43	180	-	-	-	14,095	1,580	-
2a.1.5.51	Shambers	-	169	-	2	6	30	-	60	331	331	-	-	377	90	-	-	-	21,009	2,548	-
2a.1.5.52	Steam Generator - Insul. - RCA	-	-	-	0	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2a.1.5.53	Steam Generator - RCA	-	26	1	0	2	41	-	15	83	83	-	-	245	-	-	-	-	9,089	341	-
2a.1.5.54	Steam Generator - RCA	-	7	-	0	1	21	-	5	35	35	-	-	126	-	-	-	-	5,135	98	-
2a.1.5.55	Stator Cooling - RCA	-	4	-	0	0	2	-	1	7	7	-	-	1	5	-	-	-	386	51	-
2a.1.5.56	Traversing Incore Probe	1,040	8,221	924	1,572	10,390	11,425	-	8,200	47,300	47,300	-	24	37,054	33,868	-	-	-	6,120,515	119,943	-
2a.1.6	Scaffolding in support of decommissioning	-	2,395	22	12	191	31	-	607	3,127	3,127	-	24	1,410	53,545	1,491	1,178	-	52,111	22,564	-
2a.1	Subtotal Period 2a Activity Costs	1,742	29,721	18,645	6,398	25,937	50,042	728	47,148	180,330	180,330	-	24	141,010	53,545	1,491	1,178	-	10,465,540	253,640	2,758
<b>Period 2a Collateral Costs</b>																					
2a.3.1	Process decommissioning water waste	85	-	57	-	232	-	-	122	698	698	-	-	-	-	-	-	-	31,942	104	-
2a.3.2	Process decommissioning chemical flush waste	5	-	216	-	1,619	-	-	37	3,077	3,077	-	37	-	2,693	-	-	-	223,006	392	-
2a.3.3	Spent Fuel Capital and Transfer	-	324	-	-	-	-	13,627	2,044	15,671	15,671	-	15,671	-	-	-	-	-	-	-	-
2a.3.4	Retention and Severance	-	-	-	-	-	-	13,145	1,972	15,117	15,117	-	-	-	-	-	-	-	-	-	-
2a.3.5	Subtotal Period 2a Collateral Costs	91	324	271	804	-	1,851	26,772	4,720	34,835	34,835	-	15,671	-	2,625	-	-	-	25,050	495	-
<b>Period 2a Period-Dependent Costs</b>																					
2a.4.1	Decon supplies	112	-	-	-	-	-	-	28	140	140	-	-	-	-	-	-	-	-	-	-
2a.4.2	Insurance	-	-	-	-	-	-	1,019	102	1,121	1,121	-	-	-	-	-	-	-	-	-	-
2a.4.3	Professional Fees	-	-	-	-	-	-	4,283	59	4,342	4,342	-	-	-	-	-	-	-	-	-	-
2a.4.4	Health physics supplies	-	2,356	-	-	-	-	-	589	2,945	2,945	-	-	-	-	-	-	-	-	-	-
2a.4.5	Heavy equipment rental	-	-	-	-	-	-	-	544	4,171	4,171	-	-	-	-	-	-	-	-	-	-
2a.4.6	Disposal of DAW generated	-	110	-	57	-	407	-	134	2,758	2,758	-	-	-	-	-	-	-	111,023	181	-
2a.4.7	Operating budget	-	-	-	-	-	-	2,501	86	912	912	-	-	-	-	-	-	-	-	-	-
2a.4.8	NRC Fees	-	-	-	-	-	-	856	86	942	942	-	-	-	-	-	-	-	-	-	-
2a.4.9	Emergency Planning Fees	-	-	-	-	-	-	4,115	412	4,527	4,527	-	-	-	-	-	-	-	-	-	-
2a.4.10	Fixed Overhead	-	-	-	-	-	-	3,071	461	3,532	3,532	-	-	-	-	-	-	-	-	-	-
2a.4.11	Fixed Overhead - O&M	-	-	-	-	-	-	1,824	244	2,068	2,068	-	-	-	-	-	-	-	-	-	-
2a.4.12	RFSS Operating Costs	-	-	-	-	-	-	162	34	197	197	-	-	-	-	-	-	-	-	-	-
2a.4.13	Railroad Track Maintenance	-	-	-	-	-	-	181	27	208	208	-	-	-	-	-	-	-	-	-	-
2a.4.14	Remedial Actions Surveys	-	-	-	-	-	-	1,624	244	1,867	1,867	-	-	-	-	-	-	-	-	-	-
2a.4.15	DOCS Staff Cost	-	-	-	-	-	-	2,021	306	2,327	2,327	-	-	-	-	-	-	-	-	-	-
2a.4.16	DOCS Staff Cost	-	-	-	-	-	-	21,021	3,153	24,174	24,174	-	-	-	-	-	-	-	-	-	-
2a.4.17	Utility Staff Cost	-	-	-	-	-	-	27,966	4,186	32,092	32,092	-	-	-	-	-	-	-	-	-	-
2a.4	Subtotal Period 2a Period-Dependent Costs	112	5,982	110	57	-	407	89,914	14,288	110,931	110,931	-	6,121	-	5,561	-	-	-	111,023	181	984,002
2a.0	TOTAL PERIOD 2a CONST	1,945	36,028	19,028	7,259	25,937	52,250	117,444	66,136	326,126	326,126	-	21,730	141,010	67,222	1,491	1,178	-	10,824,520	254,317	984,002
<b>PERIOD 2b - Site Decommissionation</b>																					
<b>Period 2b Direct Decommissioning Activities</b>																					
2b.1.1.1	ALARA/Radiological	-	18	0	1	6	3	-	6	35	35	-	-	35	10	-	-	-	2,080	277	-
2b.1.1.2	Decontamination Projects	-	1	0	0	0	0	-	0	2	2	-	-	2	0	-	-	-	5,129	17	-
2b.1.1.3	Electrical - Contaminated	-	445	6	24	400	30	-	183	1,080	1,080	-	-	2,880	90	-	-	-	102,726	6,325	-
2b.1.1.4	Electrical - Contaminated	-	2,698	48	218	3,066	-	-	1,298	8,167	8,167	-	-	23,344	-	-	-	-	948,013	37,107	-
2b.1.1.5	HVAC Ductwork	-	305	7	27	448	34	-	156	975	975	-	-	2,605	100	-	-	-	114,598	4,111	-
2b.1.1.6	HVAC Ductwork	-	324	6	26	461	76	-	302	1,915	1,915	-	-	2,782	227	-	-	-	111,779	3,985	-
2b.1.1.7	Heating & Ventilation	-	483	16	61	1,007	76	-	302	1,915	1,915	-	-	2,782	227	-	-	-	258,789	7,101	-
2b.1.1.8	Liquid Radwaste - Insulated - RCA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2b.1.1.9	Liquid Radwaste - Insulated - RCA	-	687	48	63	514	586	-	703	3,188	3,188	-	-	3,073	1,728	-	-	-	203,484	17,191	-
2b.1.1.10	Makeup Dosing - RCA	588	103	3	14	246	-	-	65	431	431	-	-	1,474	-	-	-	-	59,747	1,412	-
2b.1.1.11	Non-Essential Diesel Generator - RCA	-	37	3	13	238	514	-	45	1,327	1,327	-	-	1,421	-	-	-	-	57,892	395	-
2b.1.1.12	Primary Containment	-	425	14	28	467	514	-	410	1,685	1,685	-	-	6,201	1,506	-	-	-	317,741	6,454	-
2b.1.1.13	Primary Containment	-	425	14	28	467	514	-	410	1,685	1,685	-	-	6,201	1,506	-	-	-	317,741	6,454	-
2b.1.1.14	Process Radiation Monitors	-	46	2	2	24	18	-	20	111	111	-	-	142	52	-	-	-	9,115	649	-

**Monticello Nuclear Generating Plant  
Decommissioning Cost Analysis**

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**Table C  
Monticello Nuclear Generating Plant  
DECON Decommissioning Cost Estimate with DOE Pickup of Industry Fuel Starting in 2035  
(Thousands of 2020 Dollars)**

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Cost	Transport Cost	OE-Site Processing Cost	LIRW		Other Contingency	Total Contingency	Total	NRC Lic. Term Costs	Site Restoration Costs	Processed Volume			Class A Cu. Feet	Burial Volumes			Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet	Burial/Processed Wt. Dbs.	Craft Manhours	Utility and Contractor Manhours
							Disposal	Costs						Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet		Volume	Volume	Volume						
20.1.117	Rx Bridge Closed Cng Water - Insal - RCA	-	114	2	9	163	-	54	343	343	-	-	-	977	-	-	-	-	-	-	-	-	30675	1,484	-	
20.1.118	Rx Bridge Closed Cng Water - RCA	-	184	15	66	1,187	-	235	1,687	1,687	-	-	-	7,088	829	-	-	-	-	-	-	-	288,031	2,489	-	
20.1.119	Rx Bridge Closed Cng Water - RCA	-	27	2	1	138	-	7	148	148	-	-	-	1,198	359	-	-	-	-	-	-	-	13,482	1,031	-	
20.1.120	Rx Pressure Vessel	-	47	5	13	78	-	48	225	225	-	-	-	75	230	-	-	-	-	-	-	-	17,816	1,031	-	
20.1.121	Rx Water Cleanup	-	205	19	16	251	-	222	965	965	-	-	-	1,037	737	-	-	-	-	-	-	-	52,670	5,736	-	
20.1.122	Secondary Containment	-	124	7	14	170	-	81	483	483	-	-	-	1,017	255	-	-	-	-	-	-	-	57,507	1,783	-	
20.1.123	Service Air Blower - Insal - RCA	-	150	4	17	303	-	88	570	570	-	-	-	1,809	65	-	-	-	-	-	-	-	73,453	2,016	-	
20.1.124	Service Air Blower - RCA	-	15	0	2	34	-	0	62	62	-	-	-	206	-	-	-	-	-	-	-	-	8,364	206	-	
20.1.125	Shield Rhdwaste	338	494	36	49	599	407	490	2,204	2,204	-	-	-	2,887	1,380	-	-	-	-	-	-	-	185,221	10,820	-	
20.1.126	Shield Rhdwaste	-	10	2	5	60	29	37	210	210	-	-	-	357	85	-	-	-	-	-	-	-	10,535	1,144	-	
20.1.127	Wells & Domestic Water - RCA	-	10	0	0	0	0	0	0	0	-	-	-	11	-	-	-	-	-	-	-	-	13,874	633	-	
20.1.128	Wells & Domestic Water - RCA	-	52	1	3	57	-	22	136	136	-	-	-	342	-	-	-	-	-	-	-	-	13,874	633	-	
20.1.129	Wells & Domestic Water - RCA	-	7,860	31.5	804	11,608	2,637	5,107	20,933	20,933	-	-	-	69,735	7,859	-	-	-	-	-	-	-	3,331,214	122,835	-	
20.1.1	Totals	1,163	7,860	31.5	804	11,608	2,637	5,107	20,933	20,933	-	-	-	69,735	7,859	-	-	-	-	-	-	-	3,331,214	122,835	-	
20.1.2	Scaffolding in support of decommissioning	-	2,831	28	16	230	38	758	3,000	3,000	-	-	-	1,287	114	-	-	-	-	-	-	-	651,30	28,205	-	
20.1.4	Decommissioning of Site Buildings	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
20.1.3	Reactor Building	6,262	2,963	178	516	8,044	1,163	4,654	22,848	22,848	-	-	-	48,077	7,614	-	-	-	-	-	-	-	2,317,670	119,516	-	
20.1.31	HPIC Room	206	6	0	3	20	14	5	180	180	-	-	-	18	125	-	-	-	-	-	-	-	6,844	4,000	-	
20.1.32	Hot Shop	17	4	0	2	11	7	12	46	46	-	-	-	103	780	-	-	-	-	-	-	-	4,880	286	-	
20.1.33	LIRW Storage & Shipping	38	24	0	8	53	24	31	135	135	-	-	-	1,333	623	-	-	-	-	-	-	-	8,127	827	-	
20.1.34	Offgas Storage & Compressor	41	28	0	7	25	14	31	128	128	-	-	-	1,333	623	-	-	-	-	-	-	-	8,127	827	-	
20.1.35	Offgas Storage & Compressor	37	25	0	6	33	4	34	136	136	-	-	-	25	316	-	-	-	-	-	-	-	15,948	785	-	
20.1.36	Rhdwaste	121	61	3	17	29	96	107	435	435	-	-	-	172	910	-	-	-	-	-	-	-	49,943	2,903	-	
20.1.37	Rhdwaste Material Storage Warehouse	64	24	0	9	52	32	32	202	202	-	-	-	95	405	-	-	-	-	-	-	-	23,400	1,107	-	
20.1.38	Rhdwaste Material Storage Warehouse	64	24	0	9	52	32	32	202	202	-	-	-	95	405	-	-	-	-	-	-	-	23,400	1,107	-	
20.1.39	Turbine Building Addition	705	323	21	104	215	664	632	2,804	2,804	-	-	-	1,283	6,209	-	-	-	-	-	-	-	203,100	14,413	-	
20.1.40	Turbine Building Addition	58	21	1	8	874	2,164	47	181	181	-	-	-	5,127	10,159	-	-	-	-	-	-	-	2,880,206	145,889	-	
20.1.41	Turbine Building Addition	6,709	3,736	218	704	8,574	2,164	70	605	605	-	-	-	5,127	10,159	-	-	-	-	-	-	-	2,880,206	145,889	-	
20.1.4	Preprocessor/License Termination Plan	-	-	-	-	-	-	70	605	605	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
20.1.5	Receive NRC approval of termination plan	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
20.1	Subtotal Period 20 Activities Costs	7,562	14,427	560	1,524	20,481	4,539	12,932	62,661	62,661	-	-	-	11	122,269	24,132	-	-	-	-	-	-	6,279,589	296,929	4,096	
20.2	Period 20 Additional Costs	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
20.2.1	Operational Equipment	-	-	23	92	1,211	-	198	1,824	1,824	-	-	-	11,760	-	-	-	-	-	-	-	-	291,000	32	-	
20.2.2	Operational Equipment	-	1,972	-	-	-	-	8,895	10,000	10,000	-	-	-	-	-	-	-	-	-	-	-	-	-	12,435	-	
20.2.3	Security Modification Services	-	-	-	-	-	-	-	130	130	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
20.2	Subtotal Period 20 Additional Costs	-	1,972	23	92	1,211	-	2,032	14,422	14,422	-	-	-	11,760	-	-	-	-	-	-	-	-	291,000	12,525	-	
20.3	Period 20 Colateral Costs	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
20.3.1	Decommissioning water waste	198	-	133	240	546	-	285	1,404	1,404	-	-	-	1,253	-	-	-	-	-	-	-	-	751,86	244	-	
20.3.2	Process decommissioning chemical flush waste	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
20.3.3	Small tool allowance	1	364	-	-	-	-	55	418	418	-	-	-	413	-	-	-	-	-	-	-	-	43,978	77	-	
20.3.4	Spent Fuel Capital and Transfer	-	-	-	-	-	-	117.22	134,679	134,679	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
20.3.5	Spent Fuel Capital and Transfer	-	-	-	-	-	-	-	7,218	7,218	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
20.3	Subtotal Period 20 Colateral Costs	199	364	178	378	865	123,389	18,053	144,339	144,339	-	-	-	1,666	-	-	-	-	-	-	-	-	119,165	322	-	
20.4	Period 20 Period-Dependent Costs	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
20.4.1	Insurance	1,410	-	-	-	-	-	990	1,700	1,700	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
20.4.2	Insurance	-	-	-	-	-	-	712	816	816	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
20.4.3	Property taxes	-	-	-	-	-	-	2,70	2,967	2,967	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
20.4.4	Health physics supplies	-	2,376	-	-	-	-	594	2,970	2,970	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
20.4.5	Health physics supplies	-	2,711	-	-	-	-	123	694	694	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
20.4.6	Disposal of DAW generated	-	-	103	52	419	-	123	694	694	-	-	-	5,084	-	-	-	-	-	-	-	-	101,679	166	-	
20.4.7	Plant energy budget	-	-	-	-	-	-	62	685	685	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
20.4.8	NRC Fees	-	-	-	-	-	-	62	685	685	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
20.4.9	Plant energy budget	-	-	-	-	-	-	62	685	685	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
20.4.10	Fixed Overhead	-	-	-	-	-	-	335	2,570	2,570	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
20.4.11	Spent Fuel Pool O&M	-	-	-	-	-	-	134	1,024	1,024	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
20.4.12	Liquid Rhdwaste Processing Equipment/Services	-	-	-	-	-	-	224	34	258	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
20.4.13	Liquid Rhdwaste Processing Equipment/Services	-	-	-	-	-	-	224	34	258	-	-	-</													



**Monticello Nuclear Generating Plant  
 Decommissioning Cost Analysis**

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**Table C  
 Monticello Nuclear Generating Plant  
 DECON Decommissioning Cost Estimate with DOE Pickup of Industry Fuel Starting in 2035  
 (Thousands of 2020 Dollars)**

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Cost	Transport Cost	OE-Site		Other Costs	Total Contingency	Total	NRC Lic. Term Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes			Craft Manhours	Utility and Contractor Manhours	
						Processing Costs	Disposal Costs								Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet			
Period 2b Period-Dependent Costs (continued)																				
20.4.16	Security Staff Cost	-	-	-	-	-	-	15,925	2,389	18,314	18,314	-	-	-	-	-	-	-	236,949	
20.4.17	DOE Staff Cost	-	-	-	-	-	-	14,772	2,216	16,988	16,988	-	-	-	-	-	-	-	190,180	
20.4.18	Subtotal Period 2b Period-Dependent Costs	1,440	5,067	101	52	419	63,741	77,076	10,691	81,539	81,539	4,455	-	-	-	101,679	-	166	694,332	
20.0	TOTAL PERIOD 2b COST	9,091	21,850	861	2,046	21,692	6,143	136,728	43,928	392,839	392,839	139,134	11	134,029	30,882	-	-	6,794,438	306,941	698,488
PERIOD 2d - Decontamination Following Wet Fuel Storage																				
Period 2d Direct Decommissioning Activities																				
20.1.1	Remove spent fuel racks	654	58	103	140	-	2,722	-	1,017	4,553	4,553	-	-	-	7,653	-	-	466,170	906	-
Disposal of Plant Systems																				
20.1.2.1	Crane/Heavy Loads/Rigging - RCA	-	3	0	1	17	-	-	4	25	25	-	-	103	-	-	-	4,184	48	-
20.1.2.2	Decontamination Fuel Pool	-	1	0	0	0	3	-	10	12	12	-	-	103	-	-	-	6,063	65	-
20.1.2.3	Electrical - Ductwork - Fuel Pool Area	-	297	5	22	411	-	-	146	876	876	-	-	2,437	9	-	-	49,283	4,000	-
20.1.2.4	Fans - RCA - Fuel Pool Area	-	11	0	1	10	-	-	4	26	26	-	-	62	-	-	-	24,499	143	-
20.1.2.5	Fuel Pool Cooling & Cleanup	246	428	34	37	107	455	-	382	1,781	1,781	-	-	1,179	1,341	-	-	133,939	8,380	-
20.1.2.6	Removal of Fuel Pool Cooling & Cleanup - Insulated	27	34	3	3	11	40	-	36	117	117	-	-	96	117	-	-	12,229	445	-
20.1.2.7	HVAC Chilled Water - RCA Fuel Pool Area	-	34	0	0	30	-	-	108	138	138	-	-	233	11	-	-	9,072	397	-
20.1.2.8	HVAC Chilled Water - RCA Fuel Pool Area	-	29	0	2	37	-	-	14	87	87	-	-	14	91	-	-	10,841	337	-
20.1.2.9	Instrument & Services Air-RCA-Fuel Pool	-	23	0	2	45	-	-	14	91	91	-	-	207	-	-	-	295,606	13,385	-
20.1.1.2	Totals	273	924	45	75	619	502	-	691	3,268	3,268	-	-	4,894	1,179	-	-	250,606	13,385	-
Decontamination of Site Buildings																				
20.1.3.1	Reactor (Post Fuel)	946	2,299	172	913	329	10,216	-	3,880	10,056	10,056	-	-	1,689	62,698	-	-	2,732,406	45,703	-
20.1.3	Totals	946	2,299	172	913	329	10,216	-	3,880	10,056	10,056	-	-	1,689	62,698	-	-	2,732,406	45,703	-
20.1.4	Scaffolding in support of decontamination	-	506	6	3	48	8	-	102	782	782	-	-	247	23	-	-	13,028	5,611	-
20.1	Subtotal Period 2d Activity Costs	1,872	4,147	326	1,139	1,196	13,298	-	5,680	27,659	27,659	-	-	7,120	71,852	-	-	3,827,210	67,635	-
Period 2d Additional Costs																				
20.2.1	License Termination Survey Planning	-	-	-	-	-	-	1,458	437	1,896	1,896	-	-	-	-	-	-	-	-	-
20.2	Subtotal Period 2d Additional Costs	-	-	-	-	-	-	1,458	437	1,896	1,896	-	-	-	-	-	-	-	-	-
Period 2d Collateral Costs																				
20.3.1	Process decommissioning water waste	79	-	54	96	-	220	-	114	263	263	-	-	-	-	-	-	30,239	98	-
20.3.2	Process decommissioning chemical flush waste	1	-	26	84	-	193	-	64	396	396	-	-	-	-	-	-	26,558	47	-
20.3.3	Decontamination Equipment Disposition	-	91	130	82	1,112	178	-	237	1,739	1,739	-	-	6,000	529	-	-	303,698	147	-
20.3	Subtotal Period 2d Collateral Costs	80	91	210	262	1,112	500	-	428	2,773	2,773	-	-	6,000	1,282	-	-	360,400	292	-
Period 2d Period-Dependent Costs																				
20.4.1	Insurance	244	-	-	-	-	-	-	61	305	305	-	-	-	-	-	-	-	-	-
20.4.2	Property taxes	-	-	-	-	-	-	530	53	583	583	-	-	-	-	-	-	-	-	-
20.4.3	Health physics supplies	-	906	-	-	-	-	1,692	106	1,828	1,828	-	-	-	-	-	-	-	-	-
20.4.4	Health physics supplies	-	1,806	-	-	-	-	-	292	2,098	2,098	-	-	-	-	-	-	-	-	-
20.4.6	Disposal of DAW generated	-	-	40	21	107	-	-	49	277	277	-	-	-	-	-	-	40,600	66	-
20.4.7	Plant energy budget	-	-	-	-	-	-	547	82	630	630	-	-	-	-	-	-	-	-	-
20.4.8	NRC Fees	-	-	-	-	-	-	424	12	436	436	-	-	-	-	-	-	-	-	-
20.4.9	Fixed Overhead	-	-	-	-	-	-	1,937	239	1,838	1,838	125	-	-	-	-	-	-	-	-
20.4.10	Fixed Overhead	-	-	-	-	-	-	320	48	368	368	-	-	-	-	-	-	-	-	-
20.4.11	Liquid Backwash Processing Equipment/Services	-	-	-	-	-	-	84	13	97	97	-	-	-	-	-	-	-	-	-
20.4.12	ES&S Operating Costs	-	-	-	-	-	-	84	13	97	97	-	-	-	-	-	-	-	-	-
20.4.13	Remedial Action Surveys	-	-	-	-	-	-	844	127	971	971	-	-	-	-	-	-	-	-	-
20.4.14	Remedial Action Surveys	-	-	-	-	-	-	844	127	971	971	-	-	-	-	-	-	-	-	-
20.4.15	Security Staff Cost	-	-	-	-	-	-	10,969	1,650	12,649	12,649	-	-	-	-	-	-	-	-	-
20.4.16	DOE Staff Cost	-	-	-	-	-	-	7,311	1,097	8,408	8,408	-	-	-	-	-	-	-	-	-
20.4.17	Subtotal Period 2d Period-Dependent Costs	244	2,743	40	21	107	34,277	-	5,032	43,144	43,144	4,842	-	-	2,603	-	-	40,600	66	-
20.0	TOTAL PERIOD 2d COST	2,196	6,981	576	1,422	2,308	14,055	36,035	12,198	75,772	70,930	4,842	-	13,120	75,164	-	-	3,926,210	67,983	463,477

**Monticello Nuclear Generating Plant  
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**Table C  
 Monticello Nuclear Generating Plant  
 DECON Decommissioning Cost Estimate with DOE Pickup of Industry Fuel Starting in 2035**  
 (Thousands of 2020 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Cost	Transport Cost	OE-Site Processing Cost	LIRW Disposal Cost	Other Contingency Cost	Total Contingency Cost	Total Lic. Term Costs	NRC Lic. Term Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes			Burial/Processed Mt. Dbs.	Craft Manhours	Utility and Contractor Manhours	
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet				
<b>PERIOD 2F - License Termination</b>																					
Period 2F Direct Decommissioning Activities																					
21.1	Site survey	-	-	-	-	-	-	-	50	216	216	-	-	-	-	-	-	-	-	-	-
21.2	Terminate license	-	-	-	-	-	-	-	50	216	216	-	-	-	-	-	-	-	-	-	-
21.3	Subtotal Period 2F Activity Costs	-	-	-	-	-	-	-	100	432	432	-	-	-	-	-	-	-	-	-	-
Period 2F Additional Costs																					
22.1	License Termination Survey	-	-	-	-	-	-	6,920	2,076	8,995	8,995	-	-	-	-	-	-	-	-	95,048	6,240
22.2	Subtotal Period 2F Additional Costs	-	-	-	-	-	-	6,920	2,076	8,995	8,995	-	-	-	-	-	-	-	-	95,048	6,240
Period 2F Cultural Costs																					
23.1	DOE-staff collaboration expenses	-	-	-	-	-	-	1,264	190	1,454	1,454	-	-	-	-	-	-	-	-	-	-
23.2	Subtotal Period 2F Cultural Costs	-	-	-	-	-	-	1,264	190	1,454	1,454	-	-	-	-	-	-	-	-	-	-
Period 2F Physical-Dependent Costs																					
24.1	Property taxes	-	-	-	-	-	-	53	583	583	583	-	-	-	-	-	-	-	-	-	-
24.2	Health physics supplies	-	-	-	-	-	-	1,471	1,471	1,618	1,618	-	-	-	-	-	-	-	-	-	-
24.3	Health physics salaries	-	-	-	-	-	-	1,777	884	884	884	-	-	-	-	-	-	-	-	-	-
24.4	Disposal of DAW generated	-	-	-	-	-	-	29	9	8	8	-	-	-	-	-	-	-	-	-	-
24.5	Disposal of DAW generated	-	-	-	-	-	-	274	41	315	315	-	-	-	-	-	-	-	-	-	-
24.6	NRC Fees	-	-	-	-	-	-	426	43	468	468	-	-	-	-	-	-	-	-	-	-
24.7	Emergency Planning Fees	-	-	-	-	-	-	112	11	123	123	-	-	-	-	-	-	-	-	-	-
24.8	Emergency Planning Fees	-	-	-	-	-	-	230	1,505	1,806	1,806	-	-	-	-	-	-	-	-	-	-
24.9	ES&M Overhead	-	-	-	-	-	-	1,297	14	108	108	-	-	-	-	-	-	-	-	-	-
24.10	Radiation Tank Maintenance	-	-	-	-	-	-	94	14	108	108	-	-	-	-	-	-	-	-	-	-
24.11	Security Staff Cost	-	-	-	-	-	-	10,660	1,650	12,610	8,918	-	-	-	-	-	-	-	-	-	-
24.12	DOE Staff Cost	-	-	-	-	-	-	5,293	809	6,201	6,201	-	-	-	-	-	-	-	-	-	-
24.13	DOE Staff Cost	-	-	-	-	-	-	2,363	809	6,201	6,201	-	-	-	-	-	-	-	-	-	-
24.14	Subtotal Period 2F Physical-Dependent Costs	-	708	7	4	49,937	29	26,711	4,070	31,558	26,710	4,839	-	-	355	-	-	7,007	12	300,888	307,128
25.0	TOTAL PERIOD 2F COST	13,731	65,566	20,473	10,731	49,937	29	35,060	6,385	42,223	37,383	4,839	-	355	174,123	1,481	1,178	21,052,280	727,310	2,393,096	2,393,096
<b>PERIOD 3B - Site Restoration</b>																					
Period 3B Direct Decommissioning Activities																					
30.1.1	Demolition of Remaining Site Buildings	-	1,971	-	-	-	-	-	290	2,497	-	-	2,297	-	-	-	-	-	-	13,911	-
30.1.2	Concrete Tank Foundation	-	40	-	-	-	-	-	1	11	-	-	5	-	-	-	-	-	-	50	-
30.1.3	Discharge Retention Basin	-	19	-	-	-	-	-	3	22	-	-	25	-	-	-	-	-	-	97	-
30.1.4	HPCI Room	-	19	-	-	-	-	-	2	2	-	-	2	-	-	-	-	-	-	17	-
30.1.5	Hot Shop	-	2	-	-	-	-	-	2	2	-	-	2	-	-	-	-	-	-	10	-
30.1.6	Hot Shop & Oxygen Storage	-	2	-	-	-	-	-	2	2	-	-	2	-	-	-	-	-	-	10	-
30.1.7	LLRW Storage & Shipping	-	83	-	-	-	-	-	12	95	-	-	95	-	-	-	-	-	-	662	-
30.1.8	MSIV	-	4	-	-	-	-	-	4	4	-	-	4	-	-	-	-	-	-	42	-
30.1.9	MSIV Structures 2017	-	1,105	-	-	-	-	-	212	1,022	-	-	1,022	-	-	-	-	-	-	15,042	-
30.1.10	MSIV Structures 2017	-	39	-	-	-	-	-	6	15	-	-	15	-	-	-	-	-	-	150	-
30.1.11	Offgas Storage & Compressor	-	228	-	-	-	-	-	34	262	-	-	262	-	-	-	-	-	-	1,220	-
30.1.12	Radwaste	-	128	-	-	-	-	-	3	17	-	-	17	-	-	-	-	-	-	133	-
30.1.13	Recontaminated	-	128	-	-	-	-	-	3	17	-	-	17	-	-	-	-	-	-	133	-
30.1.14	Recontaminated	-	128	-	-	-	-	-	3	17	-	-	17	-	-	-	-	-	-	133	-
30.1.15	Structures Greater than 2' Below Grade	-	2,461	-	-	-	-	-	369	2,830	-	-	2,830	-	-	-	-	-	-	12,619	-
30.1.16	Tank Farm	-	4	-	-	-	-	-	1	5	-	-	5	-	-	-	-	-	-	21	-
30.1.17	Turbine Building Addition	-	1,259	-	-	-	-	-	189	1,448	-	-	1,448	-	-	-	-	-	-	13,098	-
30.1.18	Turbine Building Addition	-	182	-	-	-	-	-	27	209	-	-	209	-	-	-	-	-	-	926	-
30.1.19	Turbine Pedestal	-	8,169	-	-	-	-	-	27	209	-	-	209	-	-	-	-	-	-	926	-
30.1.1	Totals	-	8,169	-	-	-	-	-	1,225	9,394	-	-	9,394	-	-	-	-	-	-	58,885	-
Site Cleanup Activities																					
30.1.2	Grads & landscape site	-	806	-	-	-	-	-	134	1,031	-	-	1,031	-	-	-	-	-	-	1,841	-
30.1.3	Final report to NRC	-	200	-	-	-	-	-	30	231	-	-	231	-	-	-	-	-	-	1,500	-
30.1	Subtotal Period 3B Activity Costs	-	9,065	-	-	-	-	200	1,390	10,055	231	-	10,425	-	-	-	-	-	-	60,726	-
Period 3B Additional Costs																					
30.2.1	Clean Concrete Disposal	-	3,322	-	-	-	-	13	500	3,835	-	-	3,835	-	-	-	-	-	-	12	-

**Monticello Nuclear Generating Plant  
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**Table C  
 Monticello Nuclear Generating Plant  
 DECON Decommissioning Cost Estimate with DOE Pickup of Industry Fuel Starting in 2035**  
 (Thousands of 2020 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Cost	Transport Cost	On-Site		Other Contingency	Total Contingency	Total Lk-Term Costs	NRC Lk-Term Costs	Spent Fuel Management Costs		Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes			Burial/Processed Mt. Dbs.	Craft Manhours	Utility and Contractor Manhours		
						Processing Costs	Disposal Costs					Class A Cu. Feet	Class B Cu. Feet			Class C Cu. Feet	GTCC Cu. Feet						
<b>Period 3a Additional Costs (continued)</b>																							
3a.2.2	Intake Structures Cofferdam	-	335	-	-	-	-	50	385	-	-	-	-	385	-	-	-	-	-	2,584	-	-	
3a.2.3	Construction Ditches	-	5,592	-	-	-	1,170	176	1,346	-	-	-	-	1,346	-	-	-	-	-	5,182	-	-	
3a.2.4	Discharge Structures Cofferdam	-	442	-	-	-	66	66	508	-	-	-	-	508	-	-	-	-	-	3,552	-	-	
3a.2.5	Subtotal Period 3a Additional Costs	-	9,882	-	-	-	1,183	1,630	12,495	-	-	-	-	12,495	-	-	-	-	-	11,570	-	-	
<b>Period 3a Collateral Costs</b>																							
3a.3.1	Small tool allowance	-	110	-	-	-	-	17	127	-	-	-	-	127	-	-	-	-	-	-	-	-	
3a.3	Subtotal Period 3a Collateral Costs	-	110	-	-	-	-	17	127	-	-	-	-	127	-	-	-	-	-	-	-	-	
<b>Period 3a Period-Dependent Costs</b>																							
3a.4.1	Insurance	-	-	-	-	-	1,220	122	1,342	1,342	-	-	-	-	-	-	-	-	-	-	-	-	
3a.4.2	Property taxes	-	-	-	-	-	2,543	254	2,797	2,797	-	-	-	2,797	-	-	-	-	-	-	-	-	
3a.4.3	Heavy equipment rental	-	5,842	-	-	-	1,145	876	6,719	-	-	-	-	6,719	-	-	-	-	-	-	-	-	
3a.4.4	Professional fee budget	-	-	-	-	-	355	35	390	390	-	-	-	390	-	-	-	-	-	-	-	-	
3a.4.5	NRC ISRF Fees	-	-	-	-	-	355	35	390	390	-	-	-	390	-	-	-	-	-	-	-	-	
3a.4.6	Emergency Planning Fees	-	-	-	-	-	257	26	283	283	-	-	-	283	-	-	-	-	-	-	-	-	
3a.4.7	Fixed Overhead	-	-	-	-	-	1,122	168	1,290	429	-	-	-	869	-	-	-	-	-	-	-	-	
3a.4.8	RFSS Operating Costs	-	-	-	-	-	44	20	64	64	-	-	-	64	-	-	-	-	-	-	-	-	
3a.4.9	RFSS Operating Costs	-	-	-	-	-	54	8	62	249	-	-	-	322	-	-	-	-	-	-	-	-	
3a.4.10	RFSS Operating Costs	-	-	-	-	-	25,319	3,798	29,117	0	-	-	-	20,527	-	-	-	-	-	-	-	-	
3a.4.11	Security Staff Cost	-	-	-	-	-	11,729	1,769	13,498	-	-	-	-	13,498	-	-	-	-	-	-	-	-	
3a.4.12	DOC Staff Cost	-	-	-	-	-	6,873	1,031	7,904	-	-	-	-	7,904	-	-	-	-	-	-	-	-	
3a.4	Subtotal Period 3a Period-Dependent Costs	-	5,842	-	-	-	26,140	5,226	31,366	2,620	2,620	-	-	49,931	-	-	-	-	-	-	-	-	
3a.0	TOTAL PERIOD 3a COST	-	24,700	-	-	-	51,853	11,264	87,817	2,251	2,251	-	-	15,928	69,638	-	-	-	-	72,296	-	-	
<b>PERIOD 3a - Fuel Storage Operations/Shipping</b>																							
<b>Period 3a Direct Decommissioning Activities</b>																							
<b>Period 3a Collateral Costs</b>																							
3a.3.1	Spent Fuel Capital and Transfer	-	-	-	-	-	30,633	4,505	35,228	-	-	-	-	35,228	-	-	-	-	-	-	-	-	
3a.3	Subtotal Period 3a Collateral Costs	-	-	-	-	-	30,633	4,505	35,228	-	-	-	-	35,228	-	-	-	-	-	-	-	-	
<b>Period 3a Period-Dependent Costs</b>																							
3a.4.1	Insurance	-	-	-	-	-	24,059	2,466	27,125	-	-	-	-	27,125	-	-	-	-	-	-	-	-	
3a.4.2	Property taxes	-	-	-	-	-	31,863	3,186	35,049	-	-	-	-	35,049	-	-	-	-	-	-	-	-	
3a.4.3	NRC ISRF Fees	-	-	-	-	-	10,883	1,088	11,970	-	-	-	-	11,970	-	-	-	-	-	-	-	-	
3a.4.4	Professional fee budget	-	-	-	-	-	7,252	725	7,977	7,977	-	-	-	7,977	-	-	-	-	-	-	-	-	
3a.4.5	Fixed Overhead	-	-	-	-	-	7,252	1,133	8,685	8,685	-	-	-	8,685	-	-	-	-	-	-	-	-	
3a.4.6	RFSS Operating Costs	-	-	-	-	-	4,284	589	4,873	4,873	-	-	-	4,873	-	-	-	-	-	-	-	-	
3a.4.7	RFSS Operating Costs	-	-	-	-	-	4,284	589	4,873	4,873	-	-	-	4,873	-	-	-	-	-	-	-	-	
3a.4.8	Railroad Track Maintenance	-	-	-	-	-	4,284	658	5,042	-	-	-	-	5,042	-	-	-	-	-	-	-	-	
3a.4.9	Utility Staff Cost	-	-	-	-	-	1,846	268	2,114	-	-	-	-	2,114	-	-	-	-	-	-	-	-	
3a.4.10	Utility Staff Cost	-	-	-	-	-	38,420	5,440	43,860	-	-	-	-	43,860	-	-	-	-	-	-	-	-	
3a.4	Subtotal Period 3a Period-Dependent Costs	-	-	-	-	-	275,250	37,058	312,308	-	-	-	-	312,308	-	-	-	-	-	-	-	-	
3a.0	TOTAL PERIOD 3a COST	-	-	-	-	-	305,883	42,263	348,146	-	-	-	-	348,146	-	-	-	-	-	-	-	-	
<b>PERIOD 3a - GTCC shipping</b>																							
<b>Period 3a Direct Decommissioning Activities</b>																							
<b>Nuclear Steam Supply System Removal</b>																							
3a.1.1.1	Vessel & Internals GTCC Disposal	-	-	1,083	-	-	-	918	6,314	6,314	-	-	-	-	-	-	-	-	-	1,100	225,765	-	-
3a.1.1	Totals	-	-	1,083	-	-	-	918	6,314	6,314	-	-	-	-	-	-	-	-	-	1,100	225,765	-	-
3a.1	Subtotal Period 3a Activity Costs	-	-	1,083	-	-	-	918	6,314	6,314	-	-	-	-	-	-	-	-	-	1,100	225,765	-	-
<b>Period 3a Collateral Costs</b>																							
3a.3.1	Spent Fuel Capital and Transfer	-	-	-	-	-	28	4	32	-	-	-	-	32	-	-	-	-	-	-	-	-	
3a.3	Subtotal Period 3a Collateral Costs	-	-	-	-	-	28	4	32	-	-	-	-	32	-	-	-	-	-	-	-	-	
<b>Period 3a Period-Dependent Costs</b>																							
3a.4.1	Insurance	-	-	-	-	-	27	3	30	30	-	-	-	30	-	-	-	-	-	-	-	-	
3a.4.2	Property taxes	-	-	-	-	-	36	3	39	39	-	-	-	39	-	-	-	-	-	-	-	-	
3a.4.3	NRC ISRF Fees	-	-	-	-	-	8	1	9	9	-	-	-	9	-	-	-	-	-	-	-	-	
3a.4.4	Emergency Planning Fees	-	-	-	-	-	6	1	7	7	-	-	-	7	-	-	-	-	-	-	-	-	
3a.4.5	Emergency Planning Fees	-	-	-	-	-	6	1	7	7	-	-	-	7	-	-	-	-	-	-	-	-	

**Monticello Nuclear Generating Plant  
 Decommissioning Cost Analysis**

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**Table C  
 Monticello Nuclear Generating Plant  
 DECON Decommissioning Cost Estimate with DOE Pickup of Industry Fuel Starting in 2035  
 (Thousands of 2020 Dollars)**

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Cost	Transport Cost	OE Site Processing Cost	LIRW Disposal Cost	Other Contingency Cost	Total Contingency Cost	Total Lic. Term Costs	NRC Lic. Term Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes			Burial/Processed Mt. Dbs.	Craft Manhours	Utility and Contractor Manhours		
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet					
Period 3d Period-Dependent Costs (continued)																						
3d.4.6	Fixed Overhead	-	-	-	-	-	-	8	1	10	10	-	-	-	-	-	-	-	-	-	-	
3d.4.7	Railroad Track Maintenance	-	-	-	-	-	-	6	1	6	6	-	-	-	-	-	-	-	-	-	2,074	
3d.4.8	Utility Staff Cost	-	-	-	-	-	-	39	6	45	45	-	-	-	-	-	-	-	-	-	559	
3d.4.9	Subtotal Period 3d Period-Dependent Costs	-	-	-	-	-	-	293	40	333	318	15	-	-	-	-	-	-	-	-	2,613	
3d.0	TOTAL PERIOD 3d COST	-	-	1,083	-	-	4,313	321	902	6,678	6,632	47	-	-	-	-	-	-	1,100	25,756	-	2,613
<b>PERIOD 3e - ISFSI Decontamination</b>																						
Period 3e Direct Decommissioning Activities																						
Period 3e Additional Costs																						
3e.2.1	License Termination ISFSI	-	57	188	987	-	5,925	2,185	2,396	11,678	11,678	-	-	-	-	-	-	-	-	-	2,833,402	2,249
3e.2	Subtotal Period 3e Additional Costs	-	57	188	987	-	5,925	2,185	2,396	11,678	11,678	-	-	-	-	-	-	-	-	-	2,833,402	2,249
Period 3e Period-Dependent Costs																						
3e.4.1	Insurance	-	-	-	-	-	-	118	30	148	148	-	-	-	-	-	-	-	-	-	-	-
3e.4.2	Property taxes	-	-	-	-	-	-	219	62	281	281	-	-	-	-	-	-	-	-	-	-	-
3e.4.3	Fixed Overhead	-	-	-	-	-	-	112	31	143	143	-	-	-	-	-	-	-	-	-	-	-
3e.4.4	Budget	-	-	-	-	-	-	71	18	89	89	-	-	-	-	-	-	-	-	-	-	-
3e.4.5	Railroad Track Maintenance	-	-	-	-	-	-	41	10	52	52	-	-	-	-	-	-	-	-	-	-	-
3e.4.6	Security Staff Cost	-	-	-	-	-	-	302	66	368	368	-	-	-	-	-	-	-	-	-	-	6,899
3e.4.7	Utility Staff Cost	-	-	-	-	-	-	282	48	330	330	-	-	-	-	-	-	-	-	-	-	3,792
3e.4	Subtotal Period 3e Period-Dependent Costs	-	-	-	-	-	-	1,105	276	1,381	1,381	-	-	-	-	-	-	-	-	-	-	8,792
3e.0	TOTAL PERIOD 3e COST	-	57	188	987	-	5,925	3,260	2,612	13,059	13,059	-	-	-	-	-	-	-	2,833,402	11,541	11,041	
<b>PERIOD 3f - ISFSI Site Restoration</b>																						
Period 3f Direct Decommissioning Activities																						
Period 3f Additional Costs																						
3f.2.1	Demolition and Site Restoration of ISFSI	-	1,786	-	-	-	-	270	308	2,365	-	-	-	-	-	-	-	-	-	-	-	8,361
3f.2	Subtotal Period 3f Additional Costs	-	1,786	-	-	-	-	270	308	2,365	-	-	-	-	-	-	-	-	-	-	-	8,361
Period 3f Collateral Costs																						
3f.3.1	Small tool allowance	-	12	-	-	-	-	-	2	14	-	-	-	-	-	-	-	-	-	-	-	-
3f.3	Subtotal Period 3f Collateral Costs	-	12	-	-	-	-	-	2	14	-	-	-	-	-	-	-	-	-	-	-	-
Period 3f Period-Dependent Costs																						
3f.4.2	Property taxes	-	-	-	-	-	-	126	13	138	-	-	-	-	-	-	-	-	-	-	-	-
3f.4.3	Heavy equipment rental	-	-	-	-	-	-	17	17	134	-	-	-	-	-	-	-	-	-	-	-	-
3f.4.4	Plant energy budget	-	-	-	-	-	-	6	1	7	-	-	-	-	-	-	-	-	-	-	-	-
3f.4.5	Fixed Overhead	-	-	-	-	-	-	36	4	41	-	-	-	-	-	-	-	-	-	-	-	-
3f.4.6	Railroad Track Maintenance	-	-	-	-	-	-	21	3	24	-	-	-	-	-	-	-	-	-	-	-	-
3f.4.7	Security Staff Cost	-	-	-	-	-	-	177	27	204	-	-	-	-	-	-	-	-	-	-	-	2,550
3f.4.8	Utility Staff Cost	-	-	-	-	-	-	109	16	125	-	-	-	-	-	-	-	-	-	-	-	1,594
3f.4	Subtotal Period 3f Period-Dependent Costs	-	-	-	-	-	-	671	82	753	-	-	-	-	-	-	-	-	-	-	-	4,894
3f.0	TOTAL PERIOD 3f COST	-	1,915	-	-	-	745	393	303	-	-	-	-	-	-	-	-	-	-	-	-	8,361
<b>PERIOD 3 TOTALS</b>																						
TOTAL COST TO DECOMMISSION		17,263	96,526	21,839	11,878	49,002	84,523	906,635	211,896	1,399,471	776,355	548,339	73,776	298,203	197,270	1,711	1,178	1,160	2,859,167	92,198	3,002,859	6,589,469

**Monticello Nuclear Generating Plant  
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**Table C  
 Monticello Nuclear Generating Plant  
 DECON Decommissioning Cost Estimate with DOE Pickup of Industry Fuel Starting in 2035  
 (Thousands of 2020 Dollars)**

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Cost	Transport Cost	OE Site Processing Cost	LLRW Disposal Cost	Other Contingency Cost	Total Contingency Cost	Total Lic. Term Costs	NRC Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes			Burial/Processed Mt., Dbs.	Craft Manhours	Utility and Contractor Manhours
														Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet			
<b>TOTAL COST TO DECOMMISSION WITH 17.8% CONTINGENCY:</b>																			
	TOTAL NRC LICENSE TERMINATION COST IS 55.32% OR:				\$1,298,417														
	SPENT FUEL MANAGEMENT COST IS 38.42% OR:				\$76,335														
	NON-NUCLEAR DEMOLITION COST IS 5.26% OR:				\$545,339														
	TOTAL LOW-LEVEL RADIOACTIVE WASTE VOLUME BURIED (EXCLUDING GTCC):				\$73,776														
	TOTAL GREATER THAN CLASS C RADWASTE VOLUME GENERATED:				200,160														
	TOTAL SCRAP METAL REMOVED:				1,160														
	TOTAL CRAFT LABOR REQUIREMENTS:				23,123														
	TOTAL CRAFT LABOR REQUIREMENTS:				851,396														

Real Notes:  
 nb - indicates that this activity not charged as decommissioning expense  
 a - indicates that this activity performed by decommissioning staff  
 0 - indicates that this value is less than 0.5 but is non-zero  
 A cell containing "-" indicates a zero value

***Monticello Nuclear Generating Plant  
Decommissioning Cost Analysis – 70 Year Lifetime***

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**APPENDIX D**

**DETAILED COST ANALYSIS**

**SCENARIO 2: DECON with 60 Year DFS**

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DECON Decommissioning Cost Estimate with 60 Years of Spent Fuel Storage  
(Thousands of 2020 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Cost	Transport Cost	Off-Site Processing Cost	LLRW Disposal Cost	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet	Burial/Processed Mt. Lbs.	Craft Manhours	Utility and Contractor Manhours
PERIOD Ia - Shutdown through Transition																					
Period Ia Direct Decommissioning Activities																					
Ia.1.1	Notification of Cessation of Operations	-	-	-	-	-	-	187	25	192	192	-	-	-	-	-	-	-	-	-	1,390
Ia.1.2	Remove fuel & source material	-	-	-	-	-	-	-	n/a	n/a	-	-	-	-	-	-	-	-	-	-	-
Ia.1.3	Notification of Permanent Defueling	-	-	-	-	-	-	257	39	296	296	-	-	-	-	-	-	-	-	-	2,900
Ia.1.4	Review and submit PSD AR	-	-	-	-	-	-	591	80	680	680	-	-	-	-	-	-	-	-	-	4,890
Ia.1.5	Perform detailed rad survey	-	-	-	-	-	-	199	19	218	218	-	-	-	-	-	-	-	-	-	1,900
Ia.1.6	End product description	-	-	-	-	-	-	129	19	148	148	-	-	-	-	-	-	-	-	-	1,000
Ia.1.7	Define major work sequence	-	-	-	-	-	-	964	25	1,022	1,022	-	-	-	-	-	-	-	-	-	1,300
Ia.1.8	Perform Site-Specific Cost Study	-	-	-	-	-	-	968	145	1,113	1,113	-	-	-	-	-	-	-	-	-	7,500
Ia.1.9	Prepare/submit Irradiated Fuel Management Plan	-	-	-	-	-	-	867	145	1,012	1,012	-	-	-	-	-	-	-	-	-	7,200
Ia.1.10	Activity Specifications	-	-	-	-	-	-	129	19	148	148	-	-	-	-	-	-	-	-	-	1,000
Ia.1.11	Plant systems	-	-	-	-	-	-	632	95	727	727	-	-	-	-	-	-	-	-	-	4,920
Ia.1.12	RSSS Decontamination Wash	-	-	-	-	-	-	496	616	554	554	62	-	-	-	-	-	-	-	-	4,167
Ia.1.13	Reactor vessel	-	-	-	-	-	-	835	1,049	1,049	1,049	-	-	-	-	-	-	-	-	-	7,500
Ia.1.14	Sacrificial shield	-	-	-	-	-	-	64	74	74	74	-	-	-	-	-	-	-	-	-	6,590
Ia.1.15	Mixture separators/boilers	-	-	-	-	-	-	129	19	148	148	-	-	-	-	-	-	-	-	-	1,000
Ia.1.16	Main Turbine	-	-	-	-	-	-	258	40	309	309	-	-	-	-	-	-	-	-	-	2,088
Ia.1.17	Pressure suppression structure	-	-	-	-	-	-	257	39	296	296	-	-	-	-	-	-	-	-	-	2,000
Ia.1.18	Plant structures & buildings	-	-	-	-	-	-	401	601	461	461	-	-	-	-	-	-	-	-	-	3,120
Ia.1.19	Facility & site closure	-	-	-	-	-	-	591	80	680	680	-	-	-	-	-	-	-	-	-	4,890
Ia.1.20	Total	-	-	-	-	-	-	5,456	825	6,338	6,338	67	550	-	-	-	-	-	-	-	42,683
Planning & Site Preparations																					
Ia.1.21	Prepare dismantling sequence	-	-	-	-	-	-	308	46	355	355	-	-	-	-	-	-	-	-	-	2,400
Ia.1.22	Disassemble system	-	-	-	-	-	-	180	207	207	207	-	-	-	-	-	-	-	-	-	1,400
Ia.1.23	Rigging/Cont. Cont. Eryllyst/soiling/etc.	-	-	-	-	-	-	2,400	360	2,760	2,760	-	-	-	-	-	-	-	-	-	1,230
Ia.1.24	Procure caskholders & containers	-	-	-	-	-	-	158	24	182	182	-	-	-	-	-	-	-	-	-	8,013
Ia.1	Subtotal Period Ia Activity Costs	-	-	-	-	-	-	10,369	2,486	13,051	13,051	550	-	-	-	-	-	-	-	-	-
Period Ia Collateral Costs																					
Ia.3.1	Spent Fuel Capital and Transfer	-	-	-	-	-	-	1,323	198	1,522	1,522	-	-	-	-	-	-	-	-	-	-
Ia.3.2	Station and Severance	-	-	-	-	-	-	9,892	1,484	11,376	11,376	-	-	-	-	-	-	-	-	-	-
Ia.5	Subtotal Period Ia Collateral Costs	-	-	-	-	-	-	11,215	1,682	12,897	12,897	-	-	-	-	-	-	-	-	-	-
Period Ia Period-Dependent Costs																					
Ia.4.1	Insurance	-	-	-	-	-	-	2,228	233	2,461	2,461	-	-	-	-	-	-	-	-	-	-
Ia.4.2	Heavy physics supplies	-	-	-	-	-	-	153	153	306	306	-	-	-	-	-	-	-	-	-	-
Ia.4.3	Heavy equipment rental	-	-	-	-	-	-	614	767	1,381	1,381	-	-	-	-	-	-	-	-	-	-
Ia.4.4	Disposal of DAW generated	-	-	-	-	-	-	50	15	65	65	-	-	-	-	-	-	-	-	-	20
Ia.4.5	Emergency budget	-	-	-	-	-	-	1,137	27	1,164	1,164	-	-	-	-	-	-	-	-	-	-
Ia.4.6	NRC Fees	-	-	-	-	-	-	114	114	228	228	-	-	-	-	-	-	-	-	-	-
Ia.4.7	Emergency Planning Fees	-	-	-	-	-	-	3,428	343	3,771	3,771	-	-	-	-	-	-	-	-	-	-
Ia.4.8	Fixed Overhead O&M	-	-	-	-	-	-	2,616	392	3,008	3,008	-	-	-	-	-	-	-	-	-	-
Ia.4.9	RSFS Operating Costs	-	-	-	-	-	-	112	112	224	224	-	-	-	-	-	-	-	-	-	-
Ia.4.10	Railroad/Truck Maintenance	-	-	-	-	-	-	125	19	144	144	-	-	-	-	-	-	-	-	-	-
Ia.4.11	Security Staff Cost	-	-	-	-	-	-	2,496	246	2,742	2,742	-	-	-	-	-	-	-	-	-	-
Ia.4.12	Subtotal Period Ia Period-Dependent Costs	-	-	-	-	-	-	50,424	6,703	57,127	57,127	4,870	-	-	-	-	-	-	-	-	29
Ia.1	Subtotal Period Ia Activity Costs	-	-	-	-	-	-	11,384	4,189	15,573	15,573	5,570	-	-	-	-	-	-	-	-	-

Monticello Nuclear Generating Plant  
 Decommissioning Cost Analysis

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Table D  
 Monticello Nuclear Generating Plant  
 DECON Decommissioning Cost Estimate with 60 Years of Spent Fuel Storage  
 (Thousands of 2020 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Contingency Costs	Total Contingency Costs	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes			Burial/Processed Mt. Lbs.	Craft Manhours	Utility and Contractor Manhours	
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet				
14.0	TOTAL PERIOD 1b COST	-	1,367	12	6	-	50	87,418	12,871	101,724	94,783	6,392	550	-	610	-	-	12,190	20	750,893	
<b>Period 1b - Decommissioning Preparations</b>																					
<b>Period 1b Direct Decommissioning Activities</b>																					
Detailed Work Procedures																					
1b.1.1	NSSS decontamination	-	-	-	-	-	-	608	91	700	620	-	-	-	-	-	-	-	-	4,733	1,000
1b.1.1.2	NSSS Decontamination Flush	-	-	-	-	-	-	129	10	148	-	-	-	-	-	-	-	-	-	-	4,000
1b.1.1.3	Reactor internals	-	-	-	-	-	-	514	77	591	591	-	-	-	-	-	-	-	-	-	1,350
1b.1.1.4	Remaining buildings	-	-	-	-	-	-	174	96	270	-	-	-	-	-	-	-	-	-	-	1,000
1b.1.1.5	Interior decontamination	-	-	-	-	-	-	129	10	148	-	-	-	-	-	-	-	-	-	-	2,000
1b.1.1.6	Incore decontamination	-	-	-	-	-	-	257	30	296	296	-	-	-	-	-	-	-	-	-	3,630
1b.1.1.7	Removal primary containment	-	-	-	-	-	-	467	70	537	537	-	-	-	-	-	-	-	-	-	1,200
1b.1.1.8	Reactor vessel	-	-	-	-	-	-	144	17	161	161	-	-	-	-	-	-	-	-	-	2,080
1b.1.1.9	Spent Fuel Cell	-	-	-	-	-	-	151	23	177	177	-	-	-	-	-	-	-	-	-	2,080
1b.1.1.10	Shielded hold	-	-	-	-	-	-	139	19	158	158	-	-	-	-	-	-	-	-	-	2,730
1b.1.1.11	Reinforced concrete	-	-	-	-	-	-	207	40	307	307	-	-	-	-	-	-	-	-	-	33,741
1b.1.1.12	Main Turbine	-	-	-	-	-	-	295	30	325	325	-	-	-	-	-	-	-	-	-	2,080
1b.1.1.13	Main Condensers	-	-	-	-	-	-	251	30	286	286	-	-	-	-	-	-	-	-	-	2,080
1b.1.1.14	Main Steam Generators & reheaters	-	-	-	-	-	-	351	63	413	413	-	-	-	-	-	-	-	-	-	2,730
1b.1.1.15	Reheater building	-	-	-	-	-	-	351	63	413	413	-	-	-	-	-	-	-	-	-	2,730
1b.1.1.16	Reactor building	-	-	-	-	-	-	4,306	690	4,987	4,524	-	-	-	-	-	-	-	-	-	33,741
1b.1.1	Total	-	-	-	-	-	-	6,148	798	5,431	4,968	-	-	-	-	-	-	-	-	-	33,741
1b.1.2	Decon NSSS	296	-	-	-	-	-	-	-	444	-	-	-	-	-	-	-	-	-	-	1,067
1b.1	Subtotal Period 1b Activity Costs	296	-	-	-	-	-	4,336	798	5,431	4,968	-	-	-	-	-	-	-	-	-	33,741
<b>Period 1b Additional Costs</b>																					
1b.2.1	Spent Fuel Pool Isolation	-	-	-	-	-	-	12,675	1,901	14,576	14,576	-	-	-	-	-	-	-	-	-	30,000
1b.2.2	Site Characterization	-	-	-	-	-	-	5,930	1,770	7,708	7,708	-	-	-	-	-	-	-	-	-	10,852
1b.2.3	Mixed & RCMA Waste	-	-	-	-	-	-	-	9	80	80	-	-	-	-	-	-	-	-	-	101
1b.2	Subtotal Period 1b Additional Costs	-	-	-	-	-	-	18,605	3,680	22,365	22,365	-	-	-	-	-	-	-	-	-	43,253
<b>Period 1b Collateral Costs</b>																					
1b.3.1	Decon equipment	1,005	-	-	-	-	-	188	188	1,213	1,213	-	-	-	-	-	-	-	-	-	-
1b.3.2	Decon support equipment	38	-	-	-	-	-	53	285	363	363	-	-	-	-	-	-	-	-	-	-
1b.3.3	Process decontaminating water waste	-	-	25	45	-	-	102	102	2,024	2,024	-	-	-	-	-	-	-	-	-	45
1b.3.4	Small tool allowance	-	-	24	77	-	-	396	2,024	2,024	2,024	-	-	-	-	-	-	-	-	-	43
1b.3.5	Decon equipment	-	-	-	-	-	-	1,200	0	1,200	1,200	-	-	-	-	-	-	-	-	-	-
1b.3.6	Decon equipment	-	-	-	-	-	-	316	316	2,419	2,419	-	-	-	-	-	-	-	-	-	-
1b.3.7	Spent Fuel Capital and Transfer	3,104	-	-	-	-	-	392	60	450	450	-	-	-	-	-	-	-	-	-	-
1b.3.8	Retention and Sewerage	-	-	-	-	-	-	6,340	931	7,291	7,291	-	-	-	-	-	-	-	-	-	-
1b.3.9	Subtotal Period 1b Collateral Costs	3,197	1,202	40	122	-	-	7,566	2,303	10,436	10,436	-	-	-	-	-	-	-	-	-	80
<b>Period 1b Period-Dependent Costs</b>																					
1b.4.1	Decon supplies	39	-	-	-	-	-	10	48	48	48	-	-	-	-	-	-	-	-	-	-
1b.4.2	Insurance	-	-	-	-	-	-	1,011	1,277	1,287	1,287	-	-	-	-	-	-	-	-	-	-
1b.4.3	Heavy physics supplies	-	-	-	-	-	-	1,170	1,284	1,284	1,284	-	-	-	-	-	-	-	-	-	-
1b.4.4	Heavy equipment rental	344	-	-	-	-	-	86	439	439	439	-	-	-	-	-	-	-	-	-	-
1b.4.5	Heavy equipment rental	375	-	-	-	-	-	96	432	432	432	-	-	-	-	-	-	-	-	-	-
1b.4.6	Disposal of DAW generated	-	-	7	4	-	-	29	29	2,085	2,085	-	-	-	-	-	-	-	-	-	-
1b.4.7	Contingency budget	-	-	-	-	-	-	1,812	97	2,009	2,009	-	-	-	-	-	-	-	-	-	-
1b.4.8	NRC Fees	-	-	-	-	-	-	323	32	355	355	-	-	-	-	-	-	-	-	-	-
1b.4.9	Emergency Planning Fees	-	-	-	-	-	-	1,416	1,416	1,557	1,557	-	-	-	-	-	-	-	-	-	-
1b.4.10	Fixed Overhead	-	-	-	-	-	-	1,305	1,305	1,500	1,500	-	-	-	-	-	-	-	-	-	-
1b.4.11	RFSH Operating Costs	-	-	-	-	-	-	64	64	64	64	-	-	-	-	-	-	-	-	-	-
1b.4.12	Railroad Track Maintenance	-	-	-	-	-	-	56	8	64	64	-	-	-	-	-	-	-	-	-	-
1b.4.13	Security Staff Cost	-	-	-	-	-	-	8,103	1,225	9,388	9,388	-	-	-	-	-	-	-	-	-	-
1b.4.14	Utility Staff Cost	-	-	-	-	-	-	13,682	2,022	15,734	15,734	-	-	-	-	-	-	-	-	-	-
1b.4.15	Utility Staff Cost	-	-	-	-	-	-	3,356	5,233	39,972	39,972	-	-	-	-	-	-	-	-	-	-
1b.4.16	Subtotal Period 1b Period-Dependent Costs	39	719	7	4	-	-	35,356	5,233	42,078	42,078	-	-	-	-	-	-	-	-	-	-
1b.0	TOTAL PERIOD 1b COST	3,531	1,921	84	154	14	1,057	60,893	12,114	86,389	83,350	2,556	463	43	589	231	-	50,904	31,528	441,822	
<b>PERIOD 1 TOTALS</b>																					
1b.0	TOTAL PERIOD 1b COST	3,531	3,288	96	100	14	1,707	154,311	24,985	188,093	178,133	8,548	1,012	43	1,190	231	-	63,105	31,848	1,162,515	



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 Decommissioning Cost Analysis

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Table D  
 Monticello Nuclear Generating Plant  
 DECON Decommissioning Cost Estimate with 60 Years of Spent Fuel Storage  
 (Thousands of 2020 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Cost	Transport Cost	Off-Site		LLRW		Total Contingency	Total Costs	NRC		Spent Fuel Management Costs	Site Restoration Costs	Processed Volume	Burial Volumes			Burial/Processed	Craft Manhours	Utility and Contractor Manhours
						Processing Costs	Disposal Costs	Other Costs	LRW			Disposal Costs	Lic. Term. Costs				Class A	Class B	Class C			
PERIOD 2a - Large Component Removal																						
Period 2a Direct Decommissioning Activities																						
Nuclear Steam Supply System Removal																						
2a.1.1.1	Recirculation System Piping & Valves	111	94	27	50	42	528	-	221	1,031	1,031	-	-	-	-	96,742	-	-	-	2,005	-	-
2a.1.1.2	Recirculation Pumps & Motors	40	63	16	51	42	539	-	186	538	538	-	-	-	-	112,200	-	-	-	1,563	-	-
2a.1.1.3	Reactor Vessel Internals	244	6,222	12,822	2,696	-	20,815	364	24,027	76,719	76,719	-	-	-	-	3,613,190	-	-	-	30,515	-	-
2a.1.1.4	Reactor Vessel	113	9,121	2,672	1,167	-	5,881	364	10,842	30,140	30,140	-	-	-	-	1,105,210	-	-	-	1,379	-	-
2a.1.1	Totals	702	17,020	15,982	4,069	42	37,903	728	35,973	112,149	112,149	-	-	-	96	23,536	1,481	1,178	-	1,871,002	63,207	2,758
Removal of Major Equipment																						
2a.1.2	Main Turbine/Generator	-	385	1,356	821	6139	439	-	1,341	10,182	10,182	-	-	-	24,835	1,383	-	-	-	1,577,959	5,138	-
2a.1.3	Main Condensers	-	1,347	300	194	3,225	244	-	947	6,317	6,317	-	-	-	17,396	727	-	-	-	829,955	18,831	-
Casinging Costs from Clean Building Demolition																						
2a.1.4.1	Reactor Building	-	332	-	-	-	-	-	50	381	381	-	-	-	-	-	-	-	-	2,217	-	-
2a.1.4.2	Rebar	-	25	-	-	-	-	-	4	28	28	-	-	-	-	-	-	-	-	127	-	-
2a.1.4.3	Rebar	-	187	-	-	-	-	-	46	46	46	-	-	-	-	-	-	-	-	1,254	-	-
2a.1.4	Totals	-	585	-	-	-	-	-	72	556	556	-	-	-	-	-	-	-	-	3,588	-	-
Disposal of Plant Systems																						
2a.1.5.1	Automatic Press Relief	-	118	7	12	134	51	-	1	410	410	-	-	-	83	295	-	-	-	6,852	-	-
2a.1.5.2	Chemistry Sampling - Insulated	-	2	0	0	2	0	-	1	3	3	-	-	-	5	1	-	-	-	72	-	-
2a.1.5.3	Circulating Water - RCA	-	207	14	62	1,114	-	-	230	1,626	1,626	-	-	-	6,656	-	-	-	-	270,307	2,800	-
2a.1.5.4	Condensate Gas Control - RCA	-	29	0	2	38	-	-	13	80	80	-	-	-	232	-	-	-	-	8,617	378	-
2a.1.5.5	Condensate & Feedwater	-	987	183	329	3,337	2,461	-	1,431	8,731	8,731	-	-	-	19,947	7,319	-	-	-	1,275,810	14,196	-
2a.1.5.6	Condensate & Feedwater - Insulated	-	34	63	492	639	408	-	343	2,038	2,038	-	-	-	4,176	1,207	-	-	-	246,683	6,984	-
2a.1.5.7	Condensate Dams	-	545	30	51	560	339	-	316	1,840	1,840	-	-	-	3,346	1,000	-	-	-	190,936	7,018	-
2a.1.5.8	Control Rod Drive	-	72	0	0	111	25	-	44	279	279	-	-	-	7,059	2,429	-	-	-	103,426	1,000	-
2a.1.5.11	Control Rod Drive Hydraulic	-	416	16	26	277	190	-	199	1,124	1,124	-	-	-	1,658	562	-	-	-	106,306	5,898	-
2a.1.5.13	Core Spray - Insulated	-	79	20	51	734	176	-	184	1,244	1,244	-	-	-	4,384	521	-	-	-	211,329	1,163	-
2a.1.5.14	Demn Water - RCA	-	15	0	1	14	-	-	6	38	38	-	-	-	85	294	-	-	-	3,445	181	-
2a.1.5.16	Demn Water - Insulated	-	15	0	1	14	-	-	6	38	38	-	-	-	23	25	-	-	-	10,278	508	-
2a.1.5.17	Dissol Oil - RCA	-	2	0	0	4	-	-	1	1	1	-	-	-	2	4	-	-	-	691	25	-
2a.1.5.18	Dissol Oil - Insulated	-	30	0	0	30	-	-	2	139	139	-	-	-	542	18	-	-	-	22,874	84	-
2a.1.5.19	EDG Br. Service Water - Inland - RCA	-	13	0	0	13	-	-	2	15	15	-	-	-	2	4	-	-	-	5544	281	-
2a.1.5.20	Electrical - Clean	-	21	0	1	23	-	-	9	55	55	-	-	-	137	137	-	-	-	432	24	-
2a.1.5.21	Emergency Service Water - Inland - RCA	-	2	0	0	2	-	-	4	25	25	-	-	-	3	5	-	-	-	436	48	-
2a.1.5.22	Emergency Service Water - RCA	-	3	0	0	17	-	-	4	25	25	-	-	-	3	5	-	-	-	436	48	-
2a.1.5.23	GEZIP - RCA	-	5	0	0	5	-	-	2	12	12	-	-	-	31	31	-	-	-	1,250	47	-
2a.1.5.24	Generator Physical Design - RCA	-	5	0	0	5	-	-	3	15	15	-	-	-	6	6	-	-	-	1,080	81	-
2a.1.5.25	HE-02 Control Assembly	-	6	0	0	1	5	-	1	13	13	-	-	-	5	5	-	-	-	62,790	965	-
2a.1.5.26	HE-02 Control Assembly - Insulated	-	67	0	0	67	-	-	63	383	383	-	-	-	975	249	-	-	-	82,770	965	-
2a.1.5.28	High Pressure Coolant Injection - Inland	-	219	14	24	267	163	-	141	839	839	-	-	-	1,598	481	-	-	-	95,733	3,079	-
2a.1.5.29	Hydrogen Cooling	-	7	0	0	7	-	-	1	10	10	-	-	-	39	39	-	-	-	1,690	79	-
2a.1.5.30	Hydrogen Cooling - RCA	-	17	0	0	17	-	-	3	17	17	-	-	-	67	67	-	-	-	2,500	279	-
2a.1.5.32	Hydrogen Water Chemistry - RCA	-	24	0	0	24	-	-	10	59	59	-	-	-	140	140	-	-	-	5,672	304	-
2a.1.5.33	Instrument & Service Air - RCA	-	225	4	17	296	644	-	103	644	644	-	-	-	1,768	1,768	-	-	-	71,810	2,733	-
2a.1.5.34	Main Condenser	-	196	12	20	225	339	-	122	712	712	-	-	-	3,353	411	-	-	-	80,439	2,746	-
2a.1.5.35	Main Turbine	-	205	335	335	335	335	-	1,573	9,350	9,350	-	-	-	19,760	6,857	-	-	-	1,351,661	14,733	-
2a.1.5.36	Main Turbine	-	1,012	214	423	225	214	-	180	1,097	1,097	-	-	-	2,330	667	-	-	-	145,208	3,089	-
2a.1.5.37	Main Turbine - Insulated	-	43	3	51	87	43	-	19	115	115	-	-	-	302	74	-	-	-	12,283	522	-
2a.1.5.38	Miscellaneous	-	387	19	27	229	210	-	107	1,100	1,100	-	-	-	1,366	709	-	-	-	100,933	5,585	-
2a.1.5.40	Off Gas Recombiner - Insulated	-	25	1	1	9	11	-	58	33	33	-	-	-	53	33	-	-	-	4,318	345	-
2a.1.5.41	Post Accident Sampling - Insulated	-	1	1	1	1	1	-	8	43	43	-	-	-	17	37	-	-	-	3,116	212	-
2a.1.5.42	Post Accident Sampling - Insulated	-	84	0	0	2,483	84	-	6	49	49	-	-	-	1,305	15	-	-	-	11,925	11,925	-
2a.1.5.44	RHR Service Water - RCA	-	0	0	0	0	-	-	2	12	12	-	-	-	35	35	-	-	-	1,400	57	-
2a.1.5.45	Reactor Feedwater Pump Seal	-	56	2	4	32	33	-	28	155	155	-	-	-	193	193	-	-	-	14,009	773	-

Monticello Nuclear Generating Plant  
Decommissioning Cost Analysis

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Table D  
Monticello Nuclear Generating Plant  
DECON Decommissioning Cost Estimate with 60 Years of Spent Fuel Storage  
(Thousands of 2020 Dollars)

Table with columns: Activity Index, Activity Description, Decon Cost, Removal Cost, Packaging, Transport, Off-Site Processing, LLRW Disposal, Other Contingency, Total Contingency, Total, NRC Lic. Term. Costs, Spent Fuel Management Costs, Site Restoration Costs, Processed Volume, Class A, Class B, Class C, Burial Volumes, GTRC, Craft, Utility and Contractor, Manhours.

PERIOD 2b - Site Decommissionation

Period 2b Direct Decommissioning Activities

Summary table for Period 2b Direct Decommissioning Activities, including sub-totals for Decon Cost, Removal Cost, Packaging, Transport, Off-Site Processing, LLRW Disposal, Other Contingency, Total Contingency, Total, NRC Lic. Term. Costs, Spent Fuel Management Costs, Site Restoration Costs, Processed Volume, Class A, Class B, Class C, Burial Volumes, GTRC, Craft, Utility and Contractor, Manhours.

**Monticello Nuclear Generating Plant  
 Decommissioning Cost Analysis**

**Table D  
 Monticello Nuclear Generating Plant  
 DECON Decommissioning Cost Estimate with 60 Years of Spent Fuel Storage  
 (Thousands of 2020 Dollars)**

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Cost	Transport Cost	Off-Site Processing Cost	LLRW Disposal Cost	Other Contingency Cost	Total Contingency	Total	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet	Barriall/Processed Mt. Lbs.	Craft Manhours	Utility and Contractor Manhours
2b1.1.1.7	Rx Bldg Closed Cing Water - Insal - RCA	-	114	2	66	9	163	-	54	343	343	-	-	977	-	-	-	-	36,675	1,481	-
2b1.1.1.8	Rx Bldg Closed Cing Water - RCA	184	-	-	-	-	-	-	235	1,687	1,687	-	-	7,093	629	-	-	-	288,031	2,489	-
2b1.1.1.9	Rx Bldg Casing Equipment	37	47	6	5	5	134	270	184	1,046	1,046	-	-	1,764	132	-	-	-	11,602	11	-
2b1.1.1.20	Rx Pressure Vessels	28	47	6	5	5	133	78	48	225	225	-	-	75	230	-	-	-	17,816	1,051	-
2b1.1.1.21	Rx Water Cleanup	265	19	16	22	251	170	86	222	905	905	-	-	1,300	737	-	-	-	52,670	5,736	-
2b1.1.1.22	Secondary Containment	172	124	7	14	170	86	81	483	483	483	-	-	1,017	255	-	-	-	57,567	1,763	-
2b1.1.1.23	Spent Fuel Pool Water - Insal - RCA	-	159	4	1	303	-	-	88	570	570	-	-	1,890	-	-	-	-	73,433	2,016	-
2b1.1.1.24	Service Air Blower - RCA	-	15	0	2	34	-	-	9	62	62	-	-	206	-	-	-	-	8,364	206	-
2b1.1.1.25	Solid Radioactive Waste	338	494	36	49	399	467	480	2,264	2,264	2,264	-	-	2,387	1,380	-	-	-	188,221	10,829	-
2b1.1.1.26	Waste Storage Buildings	-	10	-	-	-	29	-	18	47	47	-	-	357	80	-	-	-	19,535	144	-
2b1.1.1.27	Wells and Domestic Water	-	10	-	-	-	60	-	1	11	11	-	-	342	-	-	-	-	13,874	633	-
2b1.1.1.28	Wells and Domestic Water - RCA	1,153	7,860	315	804	11,068	2,667	-	5,107	29,653	29,653	-	-	69,735	7,859	-	-	-	3,334,244	122,835	-
2b1.1.1 Totals		-	2,831	28	16	239	38	-	758	3,909	3,909	-	-	1,287	114	-	-	-	65,139	28,205	-
2b1.2	Scaffolding in support of decommissioning	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Decommissioning of Site Buildings																					
2b1.2.1	Motor Building	5,392	2,902	178	516	8,044	1,161	-	4,924	22,818	22,818	-	-	48,077	7,014	-	-	-	2,317,470	112,618	-
2b1.2.2	HPC Room	6	6	1	3	20	14	-	29	123	123	-	-	118	103	-	-	-	10,759	789	-
2b1.2.3	HPC Room	29	4	1	2	2	11	-	12	46	46	-	-	-	-	-	-	-	4,860	288	-
2b1.2.4	Hot Shop	17	4	-	-	-	5	-	18	30	30	-	-	-	-	-	-	-	87,708	1,827	-
2b1.2.5	LLRW Storage & Shipping	98	54	7	8	295	45	-	318	1,289	1,289	-	-	1,341	133	-	-	-	85,706	1,437	-
2b1.2.6	Office Storage & Compressor	41	17	6	4	205	33	-	34	136	136	-	-	25	316	-	-	-	15,948	785	-
2b1.2.7	Office Storage & Compressor	41	17	6	4	205	33	-	34	136	136	-	-	25	316	-	-	-	15,948	785	-
2b1.2.8	Radiation	121	61	3	17	29	96	-	107	435	435	-	-	172	910	-	-	-	49,943	2,703	-
2b1.2.9	Radioactive Material Storage Warehouse	24	24	2	9	33	52	-	62	202	202	-	-	109	405	-	-	-	25,400	1,107	-
2b1.2.10	Radioactive Material Storage Warehouse	24	24	2	9	33	52	-	62	202	202	-	-	109	405	-	-	-	25,400	1,107	-
2b1.2.11	Turbine	705	353	21	100	215	564	-	632	2,594	2,594	-	-	1,293	5,209	-	-	-	303,190	14,433	-
2b1.2.12	Turbine Building Addition	58	21	8	8	8	45	-	42	181	181	-	-	47	434	-	-	-	20,478	1,087	-
2b1.2.13 Totals		6,709	3,796	218	704	8,574	2,164	-	9,288	28,483	28,483	-	-	51,247	16,159	-	-	-	2,880,206	145,889	-
2b1.4	Preparesubmitt License Termination Plan	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2b1.5	Receive NRC approval of termination plan	-	-	-	-	-	-	526	70	605	605	-	-	-	-	-	-	-	-	-	-
2b1	Subtotal Period 2b: Activity Costs	7,662	14,427	580	1,524	20,481	4,859	526	12,232	62,561	62,561	-	-	122,269	24,132	-	-	-	6,270,589	296,229	4,096
Period 2b: Additional Costs																					
2b.2.1	Operational Equipment	-	-	23	52	1,211	-	575	198	1,524	1,524	-	-	11,760	-	-	-	-	294,000	32	-
2b.2.2	Security Modification	-	-	-	-	-	-	8,696	1,304	10,000	10,000	-	-	-	-	-	-	-	-	12,155	-
2b.2.3	Security Modification	-	-	-	-	-	-	9,072	2,032	14,422	14,422	-	-	11,760	-	-	-	-	294,000	12,225	-
2b.2	Subtotal Period 2b: Additional Costs	-	-	23	92	4,211	-	9,072	2,032	14,422	14,422	-	-	11,760	-	-	-	-	294,000	12,225	-
Period 2b: Collateral Costs																					
2b.3.1	Process decommissioning water waste	108	-	135	240	-	546	-	285	1,404	1,404	-	-	-	1,233	-	-	-	75,186	244	-
2b.3.2	Process decommissioning chemical flush waste	1	-	43	138	-	319	-	105	607	607	-	-	-	413	-	-	-	43,978	77	-
2b.3.3	Small tool allowance	-	-	-	-	-	-	-	117	418	418	-	-	-	-	-	-	-	-	-	-
2b.3.4	Spent Fuel Capital and Transfer	-	-	-	-	-	-	117,968	17,596	135,564	135,564	-	-	-	-	-	-	-	-	-	-
2b.3.5	Spent Fuel Capital and Transfer	-	-	-	-	-	-	117,968	17,596	135,564	135,564	-	-	-	-	-	-	-	-	-	-
2b.3	Subtotal Period 2b: Collateral Costs	199	364	178	378	-	865	123,475	18,996	144,425	144,425	-	-	-	1,666	-	-	-	110,105	322	-
Period 2b: Period-Dependent Costs																					
2b.4.1	Insurance	1,400	-	-	-	-	-	-	369	1,769	1,769	-	-	-	-	-	-	-	-	-	-
2b.4.2	Insurance	-	-	-	-	-	-	742	816	816	816	-	-	-	-	-	-	-	-	-	-
2b.4.3	Property taxes	-	-	-	-	-	-	2,698	270	2,967	2,967	-	-	-	-	-	-	-	-	-	-
2b.4.4	Health physics supplies	-	-	-	-	-	-	594	2,970	2,970	2,970	-	-	-	-	-	-	-	-	-	-
2b.4.5	Health physics supplies	-	-	-	-	-	-	3,694	3,694	3,694	3,694	-	-	-	-	-	-	-	-	-	-
2b.4.6	Disposal of DAW generated	-	-	101	52	-	419	-	123	694	694	-	-	-	-	-	-	-	5,084	-	-
2b.4.7	Plant energy budget	-	-	-	-	-	-	1,437	216	1,653	1,653	-	-	-	-	-	-	-	101,679	166	-
2b.4.8	NRC Fees	-	-	-	-	-	-	623	62	685	685	-	-	-	-	-	-	-	-	-	-
2b.4.9	Plant Energy	-	-	-	-	-	-	2,235	335	2,570	2,570	-	-	-	-	-	-	-	-	-	-
2b.4.10	Fixed Overhead	-	-	-	-	-	-	801	134	1,024	1,024	-	-	-	-	-	-	-	-	-	-
2b.4.11	Spent Fuel Pool O&M	-	-	-	-	-	-	224	34	258	258	-	-	-	-	-	-	-	-	-	-
2b.4.12	Liquid Radioactive Processing Equipment/Services	-	-	-	-	-	-	458	69	527	527	-	-	-	-	-	-	-	-	-	-
2b.4.13	Radioactive Processing Equipment/Services	-	-	-	-	-	-	1,182	177	1,359	1,359	-	-	-	-	-	-	-	-	-	-
2b.4.14	Radioactive Processing Equipment/Services	-	-	-	-	-	-	1,182	177	1,359	1,359	-	-	-	-	-	-	-	-	-	-
2b.4.15	Remedial Actions Surveys	-	-	-	-	-	-	1,182	177	1,359	1,359	-	-	-	-	-	-	-	-	-	-

**Monticello Nuclear Generating Plant  
 Decommissioning Cost Analysis**

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**Table D  
 Monticello Nuclear Generating Plant  
 DECON Decommissioning Cost Estimate with 60 Years of Spent Fuel Storage  
 (Thousands of 2020 Dollars)**

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Cost	Transport Cost	Off-Site Processing Cost	LLRW Disposal Cost	Other Contingency Cost	Total Contingency Cost	Total Cost	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Class A Cu. Feet	Class B Cu. Feet	Burial Volumes Class C Cu. Feet	GTCC Cu. Feet	Burial/Processed Mt. Dbs	Craft Manhours	Utility and Contractor Manhours
<b>Period 2b Period-Dependent Costs (continued)</b>																					
24.1.16	Security Staff Cost	-	-	-	-	-	-	15,925	2,389	18,314	18,314	-	-	-	-	-	-	-	-	-	236,949
24.1.17	DOC Staff Cost	-	-	-	-	-	-	11,772	2,216	13,988	13,988	-	-	-	-	-	-	-	-	-	160,189
24.1.18	DOC Staff Cost	-	-	-	-	-	-	11,772	2,216	13,988	13,988	-	-	-	-	-	-	-	-	-	160,189
24.1	Subtotal Period 2b Period-Dependent Costs	1,440	5,087	101	52	-	419	63,741	10,691	81,259	77,076	4,455	-	-	5,084	-	-	-	101,679	166	694,392
24.0	TOTAL PERIOD 2b COST	9,591	21,850	861	2,046	21,692	6,143	136,814	45,941	392,357	163,694	199,232	11	131,029	30,682	-	-	-	6,794,433	309,941	698,488
<b>PERIOD 2d - Decommissionation Following Wet Fuel Storage</b>																					
<b>Period 2d Direct Decommissioning Activities</b>																					
24.1.1	Remove spent fuel racks	654	58	103	140	-	2,572	-	1,017	4,555	4,555	-	-	-	7,933	-	-	-	486,170	906	-
<b>Disposal of Plant Systems</b>																					
24.1.2.1	Cement/Heavy Loads/Rigging - RCA	-	3	0	1	17	-	-	4	25	25	-	-	103	-	-	-	-	4,184	-	48
24.1.2.2	Removal of Fuel Pool Area	-	2	0	2	4	-	-	1	12	12	-	-	2,477	9	-	-	-	6,665	-	84
24.1.2.3	Electrical - Decommission Fuel Pool Area	-	297	15	25	431	3	-	140	876	876	-	-	2,477	9	-	-	-	90,733	4,000	-
24.1.2.4	Fire - RCA - Fuel Pool Area	-	11	0	10	10	-	-	4	26	26	-	-	62	-	-	-	-	2,499	143	-
24.1.2.5	Fuel Pool Cooling & Cleanup	246	428	34	37	197	455	-	382	1,781	1,781	-	-	1,179	1,341	-	-	-	133,939	8,389	-
24.1.2.6	Removal of Fuel Pool Area	-	11	0	10	10	-	-	4	26	26	-	-	62	-	-	-	-	2,499	143	-
24.1.2.7	Fuel Pool Cooling & Cleanup - Insulated	27	33	3	3	17	40	-	15	108	108	-	-	286	117	-	-	-	12,733	625	-
24.1.2.8	HVAC/Chilled Water - RCA Fuel Pool Area	-	33	0	2	37	-	-	14	87	87	-	-	223	1	-	-	-	9,072	397	-
24.1.2.9	Instrument & Service Air-RCA Fuel Pool	-	29	1	2	45	-	-	14	91	91	-	-	267	-	-	-	-	10,841	337	-
24.1.2	Totals	273	924	45	75	819	592	-	691	3,268	3,268	-	-	4,894	1,479	-	-	-	245,606	13,385	-
<b>Decommissionation of Site Buildings</b>																					
24.1.3.1	Reactor (Post Fuel)	946	2,599	172	913	329	10,216	-	3,880	10,056	10,056	-	-	1,969	62,698	-	-	-	2,732,406	45,703	-
24.1.3.3	Totals	946	2,599	172	913	329	10,216	-	3,880	10,056	10,056	-	-	1,969	62,698	-	-	-	2,732,406	45,703	-
24.1.4	Scaffolding in support of decommissioning	-	666	6	3	48	8	-	192	782	782	-	-	257	23	-	-	-	13,028	5,641	-
24.1	Subtotal Period 2d Activity Costs	1,872	4,147	326	1,139	1,196	13,298	-	5,680	27,659	27,659	-	-	7,120	71,852	-	-	-	3,525,210	67,035	-
<b>Period 2d Additional Costs</b>																					
24.2.1	License Termination Survey Planning	-	-	-	-	-	-	1,458	437	1,896	1,896	-	-	-	-	-	-	-	-	-	12,480
24.2	Subtotal Period 2d Additional Costs	-	-	-	-	-	-	1,458	437	1,896	1,896	-	-	-	-	-	-	-	-	-	12,480
<b>Period 2d Collateral Costs</b>																					
24.3.1	Process decommissioning water waste	79	-	54	96	220	-	-	114	563	563	-	-	-	504	-	-	-	30,239	98	-
24.3.2	Process decommissioning chemical flush waste	-	1	26	84	193	-	-	64	396	396	-	-	-	249	-	-	-	26,553	47	-
24.3.3	Removal of Fuel Pool Area	-	91	130	82	1,112	178	-	237	1,739	1,739	-	-	6,000	529	-	-	-	303,608	147	-
24.3.5	Spent Fuel Capital and Transfer	-	-	-	-	-	-	-	4	32	32	-	-	-	-	-	-	-	-	-	-
24.3	Subtotal Period 2d Collateral Costs	80	91	210	262	1,112	500	27	432	2,895	2,773	32	-	6,000	1,282	-	-	-	380,400	292	-
<b>Period 2d Period-Dependent Costs</b>																					
24.4.1	Decom supplies	244	-	-	-	-	-	305	61	305	305	-	-	-	-	-	-	-	-	-	-
24.4.2	Insurance	-	-	-	-	-	-	530	53	583	583	-	-	-	-	-	-	-	-	-	-
24.4.3	Property taxes	-	-	-	-	-	-	1,062	96	1,158	1,158	-	-	-	-	-	-	-	-	-	-
24.4.3	Heavy equipment supplies	-	806	-	-	-	-	-	290	2,227	2,227	-	-	-	-	-	-	-	-	-	-
24.4.5	Heavy equipment rental	-	1,936	-	-	-	-	-	49	277	277	-	-	2,030	-	-	-	-	40,600	66	-
24.4.6	Disposal of DAW generated	-	-	40	21	-	167	-	62	639	639	-	-	-	-	-	-	-	-	-	-
24.4.7	Plant energy budget	-	-	-	-	-	-	547	62	609	609	-	-	-	-	-	-	-	-	-	-
24.4.8	Plant energy budget	-	-	-	-	-	-	112	66	178	178	-	-	-	-	-	-	-	-	-	-
24.4.9	Emergency Planning Fees	-	-	-	-	-	-	112	11	123	123	-	-	-	-	-	-	-	-	-	-
24.4.10	Fixed Overhead	-	-	-	-	-	-	1,597	239	1,836	1,836	-	-	-	-	-	-	-	-	-	-
24.4.11	Liquid Hazardous Processing Equipment/Services	-	-	-	-	-	-	320	48	368	368	-	-	-	-	-	-	-	-	-	-
24.4.12	Removal of Fuel Pool Area	-	-	-	-	-	-	94	14	108	108	-	-	-	-	-	-	-	-	-	-
24.4.13	Railroad Track Maintenance	-	-	-	-	-	-	84	14	98	98	-	-	-	-	-	-	-	-	-	-
24.4.14	Remedial Actions Surveys	-	-	-	-	-	-	84	14	98	98	-	-	-	-	-	-	-	-	-	-
24.4.15	Security Staff Cost	-	-	-	-	-	-	10,999	1,650	12,649	8,918	3,732	-	-	-	-	-	-	-	-	162,381
24.4.16	Utility Staff Cost	-	-	-	-	-	-	10,052	1,508	11,560	10,670	800	-	-	-	-	-	-	-	-	149,690
24.4.17	Utility Staff Cost	-	-	-	-	-	-	10,052	1,508	11,560	10,670	800	-	-	-	-	-	-	-	-	149,690
24.4	Subtotal Period 2d Period-Dependent Costs	244	2,743	40	21	167	34,577	5,632	43,444	38,692	4,842	2,030	-	-	40,600	-	-	-	40,600	66	330,997
24.0	TOTAL PERIOD 2d COST	2,196	6,891	576	1,422	2,308	14,055	36,062	12,292	75,805	70,939	4,873	-	13,120	75,164	-	-	-	3,929,210	67,995	403,477

**Monticello Nuclear Generating Plant  
 Decommissioning Cost Analysis**

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**Table D  
 Monticello Nuclear Generating Plant  
 DECON Decommissioning Cost Estimate with 60 Years of Spent Fuel Storage  
 (Thousands of 2020 Dollars)**

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes		Burial/Processed Mt. Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet			
<b>PERIOD 2f - License Termination</b>																			
Period 2f Direct Decommissioning Activities																			
2f1.1	Activity survey	-	-	-	-	-	-	166	50	216	-	-	-	-	-	-	-	-	-
2f1.2	Terminate license	-	-	-	-	-	-	-	-	-	216	-	-	-	-	-	-	-	-
2f1.3	Subtotal Period 2f Activity Costs	-	-	-	-	-	-	166	50	216	-	-	-	-	-	-	-	-	-
Period 2f Additional Costs																			
2f2.1	License Termination Survey	-	-	-	-	-	-	6,920	2,076	8,995	8,995	-	-	-	-	-	-	95,048	6,240
2f2.2	Subtotal Period 2f Additional Costs	-	-	-	-	-	-	6,920	2,076	8,995	8,995	-	-	-	-	-	-	95,048	6,240
Period 2f Collateral Costs																			
2f3.1	DOC staff relocation expenses	-	-	-	-	-	-	1,264	190	1,454	1,454	-	-	-	-	-	-	-	-
2f3.2	Spent Fuel Capital and Transfer	-	-	-	-	-	-	47	54	101	-	54	-	-	-	-	-	-	-
2f3.3	Subtotal Period 2f Collateral Costs	-	-	-	-	-	-	1,311	197	1,508	1,454	54	-	-	-	-	-	-	-
Period 2f Period-Dependent Costs																			
2f4.1	Insurance	-	-	-	-	-	-	530	53	583	583	-	-	-	-	-	-	-	-
2f4.2	Property taxes	-	-	-	-	-	-	1,471	147	1,618	1,618	-	-	-	-	-	-	-	-
2f4.3	Health plan supplies	-	-	-	-	-	-	177	43	220	220	-	-	-	-	-	-	-	-
2f4.4	Health plan premium	-	-	-	-	-	-	29	9	38	38	-	-	-	-	-	-	-	-
2f4.5	Plant energy budget	-	-	-	-	-	-	274	41	315	315	-	-	-	-	-	7,007	12	-
2f4.6	NRC Fees	-	-	-	-	-	-	426	43	468	468	-	-	-	-	-	-	-	-
2f4.7	Emergency Planning Fees	-	-	-	-	-	-	132	11	143	143	-	-	-	-	-	-	-	-
2f4.8	ISFSI Operating Costs	-	-	-	-	-	-	84	13	97	97	-	-	-	-	-	-	-	-
2f4.9	ISFSI Operating Costs	-	-	-	-	-	-	94	14	108	108	-	-	-	-	-	-	-	-
2f4.10	Railroad Track Maintenance	-	-	-	-	-	-	10,999	1,690	12,689	8,938	-	-	-	-	-	-	-	-
2f4.11	Security Staff Cost	-	-	-	-	-	-	5,762	864	6,626	5,738	-	-	-	-	-	-	-	-
2f4.12	Utility Staff Cost	-	-	-	-	-	-	26,711	4,070	30,781	26,719	-	-	-	-	-	-	-	-
2f4.13	Subtotal Period 2f Period-Dependent Costs	-	-	-	-	-	-	708	7	715	715	-	-	-	-	-	-	12	300,888
2f4	TOTAL PERIOD 2f COST	-	-	-	-	-	-	35,137	6,392	41,529	37,583	4,894	-	-	-	-	-	95,059	307,128
2f0	TOTAL PERIOD 2f COST	13,731	65,566	30,473	10,733	49,937	72,577	385,548	128,685	747,248	578,281	170,894	73	298,160	174,123	1,481	1,178	727,310	2,356,096
<b>PERIOD 3b - Site Restoration</b>																			
Period 3b Direct Decommissioning Activities																			
3b1.1.1	Demolition of Effluents Site Buildings	-	1,971	-	-	-	-	-	296	2,267	-	-	2,267	-	-	-	-	13,911	-
3b1.1.2	Reactor Building	-	10	-	-	-	-	-	1	11	-	-	11	-	-	-	-	50	-
3b1.1.3	Condensate Tanks Foundation	-	4	-	-	-	-	-	1	5	-	-	5	-	-	-	-	25	-
3b1.1.4	Discharge Retention Basin	-	16	-	-	-	-	-	2	18	-	-	18	-	-	-	-	177	-
3b1.1.5	Hot Shop	-	10	-	-	-	-	-	2	12	-	-	12	-	-	-	-	19	-
3b1.1.6	Hydrogen and Oxygen Storage	-	2	-	-	-	-	-	2	4	-	-	4	-	-	-	-	682	-
3b1.1.7	LLRW Storage & Shipping	-	83	-	-	-	-	-	12	95	-	-	95	-	-	-	-	13,042	-
3b1.1.8	MSW Structures 2017	-	1,410	-	-	-	-	-	212	1,622	-	-	1,622	-	-	-	-	544	-
3b1.1.9	MSW Structures 2017	-	108	-	-	-	-	-	16	124	-	-	124	-	-	-	-	199	-
3b1.1.10	Offgas Storage & Compressor	-	39	-	-	-	-	-	45	84	-	-	84	-	-	-	-	1,239	-
3b1.1.11	Offgas Storage & Compressor	-	228	-	-	-	-	-	292	520	-	-	520	-	-	-	-	933	-
3b1.1.12	Redwaste	-	186	-	-	-	-	-	28	214	-	-	214	-	-	-	-	618	-
3b1.1.13	Security Barrier	-	2,461	-	-	-	-	-	389	2,850	-	-	2,850	-	-	-	-	12,649	-
3b1.1.14	Security Barrier	-	228	-	-	-	-	-	45	273	-	-	273	-	-	-	-	1,199	-
3b1.1.15	Structures Greater than 2' Below Grade	-	1,825	-	-	-	-	-	183	2,008	-	-	2,008	-	-	-	-	13,042	-
3b1.1.16	Tank Farm	-	55	-	-	-	-	-	8	63	-	-	63	-	-	-	-	618	-
3b1.1.17	Turbine Building Addition	-	182	-	-	-	-	-	27	209	-	-	209	-	-	-	-	926	-
3b1.1.18	Turbine Pedestal	-	8,169	-	-	-	-	-	1,225	9,394	-	-	9,394	-	-	-	-	58,885	-
3b1.1.19	Turbine Pedestal	-	8,169	-	-	-	-	-	1,225	9,394	-	-	9,394	-	-	-	-	58,885	-
3b1.1.20	Totals	-	806	-	-	-	-	-	134	1,031	-	-	1,031	-	-	-	-	1,841	-
3b1.2	Grade & Landscapate	-	200	-	-	-	-	200	30	231	-	-	231	-	-	-	-	1,560	-
3b1.3	Final report to NRC	-	9,005	-	-	-	-	9,005	1,500	10,505	-	-	10,505	-	-	-	-	60,726	-
3b1	Subtotal Period 3b Activity Costs	-	9,005	-	-	-	-	9,005	1,500	10,505	-	-	10,505	-	-	-	-	60,726	-

**Monticello Nuclear Generating Plant  
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**Table D  
 Monticello Nuclear Generating Plant  
 DECON Decommissioning Cost Estimate with 60 Years of Spent Fuel Storage  
 (Thousands of 2020 Dollars)**

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Cost	Transport Cost	Off-Site Processing Cost	LLRW Disposal Cost	Other Contingency Cost	Total Contingency	Total	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Class A Cu. Feet	Class B Cu. Feet	Burial Volumes Class C Cu. Feet	GTCC Cu. Feet	Burial/Processed Mt. Lbs.	Craft Manhours	Utility and Contractor Manhours
<b>Period 3B Additional Costs</b>																					
3B.2.1	Clean Concrete Disposal	-	3,322	-	-	-	-	13	500	3,835	-	-	3,835	-	-	-	-	-	-	12	-
3B.2.2	Inadequate Cofferdam	-	335	-	-	-	-	1,170	1,505	385	-	-	1,505	-	-	-	-	-	-	2,084	-
3B.2.3	Backfill	-	5,683	-	-	-	-	837	6,421	6,421	-	-	6,421	-	-	-	-	-	-	5,422	-
3B.2.5	Discharge Structure Cofferdam	-	442	-	-	-	-	66	508	508	-	-	508	-	-	-	-	-	-	3,552	-
3B.2	Subtotal Period 3B Additional Costs	-	9,682	-	-	-	-	1,183	10,865	12,495	-	-	12,495	-	-	-	-	-	-	11,570	-
<b>Period 3B Collateral Costs</b>																					
3B.3.1	Small tool allowance	-	110	-	-	-	-	-	17	127	-	-	127	-	-	-	-	-	-	-	-
3B.3.2	Spent Fuel Capital and Transfer	-	-	-	-	-	-	100	33	135	-	-	135	-	-	-	-	-	-	-	-
3B.3	Subtotal Period 3B Collateral Costs	-	110	-	-	-	-	100	33	252	-	-	252	-	-	-	-	-	-	-	-
<b>Period 3B Period-Dependent Costs</b>																					
3B.4.1	Insurance	-	-	-	-	-	-	1,220	122	1,342	-	-	1,342	-	-	-	-	-	-	-	-
3B.4.2	Property taxes	-	-	-	-	-	-	2,513	876	3,389	-	-	3,389	-	-	-	-	-	-	-	-
3B.4.3	Plant management rental	-	5,842	-	-	-	-	315	47	6,219	-	-	6,219	-	-	-	-	-	-	-	-
3B.4.4	Plant energy budget	-	-	-	-	-	-	356	391	362	-	-	362	-	-	-	-	-	-	-	-
3B.4.5	NRC ISFSI Fees	-	-	-	-	-	-	356	391	362	-	-	362	-	-	-	-	-	-	-	-
3B.4.6	Emergency Planning Fees	-	-	-	-	-	-	1,220	122	1,342	-	-	1,342	-	-	-	-	-	-	-	-
3B.4.7	ISFSI Operating Costs	-	-	-	-	-	-	1,220	122	1,342	-	-	1,342	-	-	-	-	-	-	-	-
3B.4.8	ISFSI Operating Costs	-	-	-	-	-	-	1,220	122	1,342	-	-	1,342	-	-	-	-	-	-	-	-
3B.4.9	Railroad Track Maintenance	-	-	-	-	-	-	194	29	223	-	-	223	-	-	-	-	-	-	-	-
3B.4.10	Utility Staff Cost	-	-	-	-	-	-	45	81	624	-	-	624	-	-	-	-	-	-	-	-
3B.4.11	Decommissioning Staff Cost	-	-	-	-	-	-	1,220	122	1,342	-	-	1,342	-	-	-	-	-	-	-	-
3B.4.12	Utility Staff Cost	-	-	-	-	-	-	6,873	1,031	7,904	-	-	7,904	-	-	-	-	-	-	-	-
3B.4	Subtotal Period 3B Period-Dependent Costs	-	5,842	-	-	-	-	50,470	8,228	64,500	2,020	-	66,520	-	-	-	-	-	-	72,206	-
3B.0	TOTAL PERIOD 3B COST	-	21,700	-	-	-	-	51,862	11,290	87,912	4,251	-	92,163	-	-	-	-	-	-	-	-
<b>PERIOD 3C - Fuel Storage Operations/Shipping</b>																					
<b>Period 3C Direct Decommissioning Activities</b>																					
3C.3.1	Collateral Costs	-	-	-	-	-	-	86,394	13,409	102,804	-	-	102,804	-	-	-	-	-	-	-	-
3C.3	Subtotal Period 3C Collateral Costs	-	-	-	-	-	-	86,394	13,409	102,804	-	-	102,804	-	-	-	-	-	-	-	-
<b>Period 3C Period-Dependent Costs</b>																					
3C.4.1	Insurance	-	-	-	-	-	-	37,327	3,733	41,060	-	-	41,060	-	-	-	-	-	-	-	-
3C.4.2	Property taxes	-	-	-	-	-	-	48,218	4,822	53,040	-	-	53,040	-	-	-	-	-	-	-	-
3C.4.3	Plant energy budget	-	-	-	-	-	-	12,359	1,236	13,595	-	-	13,595	-	-	-	-	-	-	-	-
3C.4.4	NRC ISFSI Fees	-	-	-	-	-	-	787	8,655	9,442	-	-	9,442	-	-	-	-	-	-	-	-
3C.4.5	Emergency Planning Fees	-	-	-	-	-	-	1,410	1,410	2,820	-	-	2,820	-	-	-	-	-	-	-	-
3C.4.6	ISFSI Operating Costs	-	-	-	-	-	-	1,410	1,410	2,820	-	-	2,820	-	-	-	-	-	-	-	-
3C.4.7	ISFSI Operating Costs	-	-	-	-	-	-	1,410	1,410	2,820	-	-	2,820	-	-	-	-	-	-	-	-
3C.4.8	Railroad Track Maintenance	-	-	-	-	-	-	995	7,632	8,627	-	-	8,627	-	-	-	-	-	-	-	-
3C.4.9	Security Staff Cost	-	-	-	-	-	-	228,247	34,237	262,484	-	-	262,484	-	-	-	-	-	-	-	-
3C.4.10	Utility Staff Cost	-	-	-	-	-	-	61,730	62,705	124,435	-	-	124,435	-	-	-	-	-	-	-	-
3C.4	Subtotal Period 3C Period-Dependent Costs	-	-	-	-	-	-	66,934	70,003	136,937	-	-	136,937	-	-	-	-	-	-	-	-
3C.0	TOTAL PERIOD 3C COST	-	-	-	-	-	-	501,946	70,003	571,949	-	-	571,949	-	-	-	-	-	-	-	-
<b>PERIOD 3D - GTCC shipping</b>																					
<b>Period 3D Direct Decommissioning Activities</b>																					
3D.1.1.1	Nuclear Steam Supply System Removal	-	-	1,083	-	-	-	918	6,314	7,302	-	-	7,302	-	-	-	-	-	-	-	-
3D.1.1	Vessel & Internals GTCC Disposal	-	-	1,083	-	-	-	918	6,314	7,302	-	-	7,302	-	-	-	-	-	-	-	-
3D.1	Subtotal Period 3D Activity Costs	-	-	1,083	-	-	-	918	6,314	7,302	-	-	7,302	-	-	-	-	-	-	-	-
<b>Period 3D Collateral Costs</b>																					
3D.3.1	Spent Fuel Capital and Transfer	-	-	-	-	-	-	28	4	32	-	-	32	-	-	-	-	-	-	-	-
3D.3	Subtotal Period 3D Collateral Costs	-	-	-	-	-	-	28	4	32	-	-	32	-	-	-	-	-	-	-	-
3D.0	Subtotal Period 3D Period-Dependent Costs	-	-	-	-	-	-	28	4	32	-	-	32	-	-	-	-	-	-	-	-
3D.4.1	Insurance	-	-	-	-	-	-	27	3	30	-	-	30	-	-	-	-	-	-	-	-

**Monticello Nuclear Generating Plant  
 Decommissioning Cost Analysis**

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**Table D  
 Monticello Nuclear Generating Plant  
 DECON Decommissioning Cost Estimate with 60 Years of Spent Fuel Storage  
 (Thousands of 2020 Dollars)**

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Contingency Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes			Burial/Processed Mt. Lbs.	Craft Manhours	Utility and Contractor Manhours		
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet					
Period 3d Period-Dependent Costs (continued)																						
344.2	Property taxes	-	-	-	-	-	-	35	3	38	-	-	-	-	-	-	-	-	-	-	-	
344.4	NRC ISFSI Fees	-	-	-	-	-	-	8	1	9	-	-	-	-	-	-	-	-	-	-	-	
344.5	Plant energy budget	-	-	-	-	-	-	6	1	7	-	-	-	-	-	-	-	-	-	-	-	
344.6	Fixed Overhead	-	-	-	-	-	-	8	1	10	-	-	-	-	-	-	-	-	-	-	-	
344.7	Railroad Track Maintenance	-	-	-	-	-	-	5	1	6	-	-	-	-	-	-	-	-	-	-	-	
344.8	Security Staff Cost	-	-	-	-	-	-	165	25	190	-	-	-	-	-	-	-	-	-	-	2,074	
344.9	Utility Staff Cost	-	-	-	-	-	-	36	5	41	-	-	-	-	-	-	-	-	-	-	4,969	
344	Subtotal Period 3d Period-Dependent Costs	-	-	-	-	-	-	293	40	333	-	-	-	-	-	-	-	-	-	-	2,613	
340	TOTAL PERIOD 3d COST	-	-	1,083	-	-	4,313	321	962	6,678	6,652	47	-	-	1,100	225,765	-	-	-	-	2,613	
<b>PERIOD 3e - ISFSI Decommissionation</b>																						
Period 3e Direct Decommissioning Activities																						
3e.2.1	License Termination ISFSI	-	57	188	987	-	5,925	2,185	2,336	11,678	11,678	-	-	-	-	2,638,402	-	-	-	-	2,249	
3e.2	Subtotal Period 3e Additional Costs	-	57	188	987	-	5,925	2,185	2,336	11,678	11,678	-	-	-	-	2,638,402	-	-	-	-	2,249	
Period 3e Period-Dependent Costs																						
3e.4.1	Insurance	-	-	-	-	-	-	118	30	148	-	-	-	-	-	-	-	-	-	-	-	
3e.4.2	Property taxes	-	-	-	-	-	-	219	62	312	-	-	-	-	-	-	-	-	-	-	-	
3e.4.3	Plant energy budget	-	-	-	-	-	-	12	3	15	-	-	-	-	-	-	-	-	-	-	-	
3e.4.4	Fixed Overhead	-	-	-	-	-	-	7	1	8	-	-	-	-	-	-	-	-	-	-	-	
3e.4.5	Railroad Track Maintenance	-	-	-	-	-	-	41	10	52	-	-	-	-	-	-	-	-	-	-	-	
3e.4.6	Security Staff Cost	-	-	-	-	-	-	352	88	440	-	-	-	-	-	-	-	-	-	-	4,969	
3e.4.7	Utility Staff Cost	-	-	-	-	-	-	261	65	326	-	-	-	-	-	-	-	-	-	-	5,792	
3e.4	Subtotal Period 3e Period-Dependent Costs	-	-	-	-	-	-	1,105	270	1,381	1,391	-	-	-	-	-	-	-	-	-	6,792	
3e.0	TOTAL PERIOD 3e COST	-	57	188	987	-	5,925	3,290	2,612	13,059	13,070	-	-	-	-	2,638,402	-	-	-	-	11,041	
<b>PERIOD 3f - ISFSI Site Restoration</b>																						
Period 3f Direct Decommissioning Activities																						
3f.2.1	Demolition and Site Restoration of ISFSI	-	1,786	-	-	-	-	270	308	2,365	-	-	-	-	-	-	-	-	-	-	8,391	
3f.2	Subtotal Period 3f Additional Costs	-	1,786	-	-	-	-	270	308	2,365	-	-	-	-	-	-	-	-	-	-	8,391	
Period 3f Collateral Costs																						
3f.3.1	Small tool allowance	-	12	-	-	-	-	-	2	14	-	-	-	-	-	-	-	-	-	-	-	
3f.3	Subtotal Period 3f Collateral Costs	-	12	-	-	-	-	-	2	14	-	-	-	-	-	-	-	-	-	-	-	
Period 3f Period-Dependent Costs																						
3f.4.2	Heavy equipment rental	-	-	-	-	-	-	126	13	138	-	-	-	-	-	-	-	-	-	-	-	
3f.4.3	Plant energy budget	-	-	-	-	-	-	6	1	7	-	-	-	-	-	-	-	-	-	-	-	
3f.4.4	Fixed Overhead	-	-	-	-	-	-	30	3	33	-	-	-	-	-	-	-	-	-	-	-	
3f.4.5	Railroad Track Maintenance	-	-	-	-	-	-	177	27	204	-	-	-	-	-	-	-	-	-	-	2,520	
3f.4.6	Security Staff Cost	-	-	-	-	-	-	109	16	126	-	-	-	-	-	-	-	-	-	-	1,564	
3f.4.7	Utility Staff Cost	-	-	-	-	-	-	475	82	671	-	-	-	-	-	-	-	-	-	-	4,084	
3f.4	Subtotal Period 3f Period-Dependent Costs	-	-	-	-	-	-	745	393	3,053	-	-	-	-	-	-	-	-	-	-	8,391	
3f.0	TOTAL PERIOD 3f COST	-	1,915	-	-	-	10,238	558,264	85,550	682,682	21,542	588,649	72,691	-	1,100	2,850,167	-	-	-	-	4,214	
<b>PERIOD 3 TOTALS</b>																						
TOTAL COST TO DECOMMISSION		17,263	95,526	21,839	11,878	419,932	84,523	1,098,123	238,920	1,618,025	776,335	707,892	73,776	2,988,203	1,171	11,178	1,100	24,474,580	-	-	851,356	7,816,376

**Monticello Nuclear Generating Plant  
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**Table D  
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 DECON Decommissioning Cost Estimate with 60 Years of Spent Fuel Storage  
 (Thousands of 2020 Dollars)**

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes			Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet		
TOTAL COST TO DECOMMISSION WITH 17.31% CONTINGENCY:																			
	TOTAL NRC LICENSE TERMINATION COST IS 47.87% OR:																		
	SPENT FUEL MANAGEMENT COST IS 47.58% OR:				\$776,635	\$767,882													
	NON-NUCLEAR DEMOLITION COST IS 4.55% OR:				\$73,776														
	TOTAL LOW-LEVEL RADIOACTIVE WASTE BURIED (EXCLUDING GTCC):				200,100														
	TOTAL GREATER THAN CLASS C RADWASTE VOLUME GENERATED:					1,160													
	TOTAL SCRAP METAL REMOVED:					23,123													
	TOTAL CRAFT LABOR REQUIREMENTS:					851,356													

Foot Notes:  
 n/a - indicates that this activity not charged as decommissioning expense  
 a - indicates that this activity performed by decommissioning staff  
 0 - indicates that this value is less than 0.5 but is non-zero  
 A cell containing "--" indicates a zero value



***Monticello Nuclear Generating Plant  
Decommissioning Cost Analysis – 70 Year Lifetime***

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**APPENDIX E**  
**DETAILED COST ANALYSIS**  
**SCENARIO 3: DECON with 100 Year DFS**

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**Table E  
 Monticello Nuclear Generating Plant  
 DECON Decommissioning Cost Estimate with 100 Years of Spent Fuel Storage  
 (Thousands of 2020 Dollars)**

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes			Burial/Processed Mt. Ds.	Craft Manhours	Utility and Contractor Manhours	
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet				
<b>PERIOD Ia - Shutdown through Transition</b>																					
Period Ia Direct Decommissioning Activities																					
Ia.1.1	Notification of Cessation of Operations	-	-	-	-	-	-	167	25	192	192	-	-	-	-	-	-	-	-	-	1,300
Ia.1.2	Remove fuel & source material	-	-	-	-	-	-	-	n/a	n/a	-	-	-	-	-	-	-	-	-	-	-
Ia.1.3	Notification of Permanent De-fueling	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ia.1.4	Remove process waste	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ia.1.5	Prepare and submit PSD/MR	-	-	-	-	-	-	257	39	296	296	-	-	-	-	-	-	-	-	-	2,900
Ia.1.6	Perform detailed rad survey	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ia.1.7	End product description	-	-	-	-	-	-	130	19	148	148	-	-	-	-	-	-	-	-	-	1,000
Ia.1.8	Define major work sequence	-	-	-	-	-	-	964	145	1,108	1,108	-	-	-	-	-	-	-	-	-	1,300
Ia.1.9	Perform Site-Specific Cost Study	-	-	-	-	-	-	964	145	1,108	1,108	-	-	-	-	-	-	-	-	-	7,500
Ia.1.10	Perform Site-Specific Cost Study	-	-	-	-	-	-	964	145	1,108	1,108	-	-	-	-	-	-	-	-	-	2,200
Ia.1.11	Prepare/submit Irradiated Fuel Management Plan	-	-	-	-	-	-	129	19	148	148	-	-	-	-	-	-	-	-	-	1,000
<b>Activity Specifications</b>																					
Ia.1.17.1	Plant & temporary facilities	-	-	-	-	-	-	632	95	727	654	-	-	-	-	-	-	-	-	-	4,920
Ia.1.17.2	Plant systems	-	-	-	-	-	-	536	66	602	536	-	-	-	-	-	-	-	-	-	4,167
Ia.1.17.3	SSS Decontamination Flash	-	-	-	-	-	-	94	14	108	94	-	-	-	-	-	-	-	-	-	500
Ia.1.17.4	Reactor vessel	-	-	-	-	-	-	835	125	960	960	-	-	-	-	-	-	-	-	-	7,500
Ia.1.17.5	Sacrificial shield	-	-	-	-	-	-	64	10	74	74	-	-	-	-	-	-	-	-	-	500
Ia.1.17.6	Mixture separators/reheaters	-	-	-	-	-	-	129	19	148	148	-	-	-	-	-	-	-	-	-	1,000
Ia.1.17.7	Main Turbine	-	-	-	-	-	-	268	40	308	308	-	-	-	-	-	-	-	-	-	2,088
Ia.1.17.8	Pressure suppression structure	-	-	-	-	-	-	257	39	296	296	-	-	-	-	-	-	-	-	-	2,000
Ia.1.17.9	Plant structures & buildings	-	-	-	-	-	-	401	60	461	461	-	-	-	-	-	-	-	-	-	3,120
Ia.1.17.10	Waste management	-	-	-	-	-	-	591	89	680	680	-	-	-	-	-	-	-	-	-	4,800
Ia.1.17.11	Facility & site closure	-	-	-	-	-	-	116	17	133	67	-	-	-	-	-	-	-	-	-	900
Ia.1.17	Total	-	-	-	-	-	-	5,456	823	6,279	5,729	-	-	-	-	-	-	-	-	-	42,663
<b>Planning &amp; Site Preparations</b>																					
Ia.1.18	Prepare dismantling sequence	-	-	-	-	-	-	308	46	355	355	-	-	-	-	-	-	-	-	-	2,400
Ia.1.19	Disassemble equipment	-	-	-	-	-	-	180	27	207	207	-	-	-	-	-	-	-	-	-	1,400
Ia.1.20	Rigging/Cont. Crnt. Erylps/ooling/etc.	-	-	-	-	-	-	2,400	360	2,760	2,760	-	-	-	-	-	-	-	-	-	1,200
Ia.1.21	Procure cask/shelers & containers	-	-	-	-	-	-	158	24	182	182	-	-	-	-	-	-	-	-	-	8,013
Ia.1.22	Subtotal Period Ia Activity Costs	-	-	-	-	-	-	16,369	2,486	18,855	18,366	-	-	-	-	-	-	-	-	-	-
<b>Period Ia Collateral Costs</b>																					
Ia.3.1	Spent Fuel Capital and Transfer	-	-	-	-	-	-	1,323	198	1,522	1,522	-	-	-	-	-	-	-	-	-	-
Ia.3.2	Station and Sewerage	-	-	-	-	-	-	9,892	1,484	11,376	11,376	-	-	-	-	-	-	-	-	-	-
Ia.3	Subtotal Period Ia Collateral Costs	-	-	-	-	-	-	11,215	1,682	12,897	12,897	-	-	-	-	-	-	-	-	-	-
<b>Period Ia Period-Dependent Costs</b>																					
Ia.4.1	Insurance	-	-	-	-	-	-	2,228	223	2,451	2,451	-	-	-	-	-	-	-	-	-	-
Ia.4.2	Health physics supplies	-	-	-	-	-	-	3,670	133	3,803	3,803	-	-	-	-	-	-	-	-	-	-
Ia.4.3	Heavy equipment rental	-	-	-	-	-	-	614	113	727	727	-	-	-	-	-	-	-	-	-	-
Ia.4.4	Disposal of DAW generated	-	-	-	-	-	-	753	15	768	768	-	-	-	-	-	-	-	-	-	-
Ia.4.5	Emergency budget	-	-	-	-	-	-	50	50	100	100	-	-	-	-	-	-	-	-	-	20
Ia.4.6	NRC Fees	-	-	-	-	-	-	1,137	114	1,251	1,251	-	-	-	-	-	-	-	-	-	12,190
Ia.4.7	Emergency Planning Fees	-	-	-	-	-	-	3,428	343	3,771	3,771	-	-	-	-	-	-	-	-	-	-
Ia.4.8	Fixed Overhead O&M	-	-	-	-	-	-	2,616	392	3,008	3,008	-	-	-	-	-	-	-	-	-	-
Ia.4.9	RSFS Operating Costs	-	-	-	-	-	-	112	17	129	129	-	-	-	-	-	-	-	-	-	-
Ia.4.10	Railroad Track Maintenance	-	-	-	-	-	-	125	19	144	144	-	-	-	-	-	-	-	-	-	-
Ia.4.11	Security Staff Cost	-	-	-	-	-	-	2,496	246	2,742	2,742	-	-	-	-	-	-	-	-	-	26,440
Ia.4.12	Subtotal Period Ia Period-Dependent Costs	-	-	-	-	-	-	50,424	4,703	55,127	55,127	-	-	-	-	-	-	-	-	-	667,680
Ia.4	Subtotal Period Ia Activity Costs	-	-	-	-	-	-	66,908	8,793	75,701	75,701	-	-	-	-	-	-	-	-	-	-

**Monticello Nuclear Generating Plant  
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**Table E  
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 DECON Decommissioning Cost Estimate with 100 Years of Spent Fuel Storage  
 (Thousands of 2020 Dollars)**

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume	Burial Volumes			Burial/Processed	Craft Manhours	Utility and Contractor Materials	
															Class A	Class B	Class C				
														Cu. Feet	Cu. Feet	Cu. Feet	WT. Lbs.				
14.0	TOTAL PERIOD 1b COST	-	1,367	12	6	-	50	87,418	12,871	101,724	94,783	6,392	550	-	610	-	-	12,190	20	-	750,893
<b>Period 1b - Decommissioning Preparations</b>																					
<b>Period 1b Direct Decommissioning Activities</b>																					
Detailed Work Procedures																					
1b.1.1	SSSS Decommissionation	-	-	-	-	-	-	608	91	700	620	-	70	-	-	-	-	-	-	-	4,733
1b.1.1.1	Reactor internals	-	-	-	-	-	-	514	77	591	591	-	-	-	-	-	-	-	-	-	1,000
1b.1.1.2	Remaining buildings	-	-	-	-	-	-	174	56	230	230	-	150	-	-	-	-	-	-	-	1,350
1b.1.1.3	Incore instrumentation	-	-	-	-	-	-	120	19	139	139	-	-	-	-	-	-	-	-	-	1,000
1b.1.1.4	Removal primary containment	-	-	-	-	-	-	257	30	286	286	-	-	-	-	-	-	-	-	-	2,000
1b.1.1.5	Reactor vessel	-	-	-	-	-	-	467	70	537	537	-	80	-	-	-	-	-	-	-	3,630
1b.1.1.6	Spent fuel storage	-	-	-	-	-	-	154	23	177	177	-	-	-	-	-	-	-	-	-	1,200
1b.1.1.7	Reinforced concrete	-	-	-	-	-	-	139	19	158	158	-	-	-	-	-	-	-	-	-	1,000
1b.1.1.8	Main Turbine	-	-	-	-	-	-	207	40	247	247	-	-	-	-	-	-	-	-	-	2,080
1b.1.1.9	Main Condensers	-	-	-	-	-	-	308	30	338	338	-	-	-	-	-	-	-	-	-	2,080
1b.1.1.10	Main Steam Generators & reheaters	-	-	-	-	-	-	351	53	403	403	-	40	-	-	-	-	-	-	-	2,730
1b.1.1.11	Reactor building	-	-	-	-	-	-	351	53	403	403	-	40	-	-	-	-	-	-	-	2,730
1b.1.1.12	Total	-	-	-	-	-	-	4,306	690	4,997	4,524	-	463	-	-	-	-	-	-	-	33,741
1b.1.2	Decon NSSS	206	-	-	-	-	-	-	148	444	444	-	-	-	-	-	-	-	-	-	-
1b.1	Subtotal Period 1b Activity Costs	206	-	-	-	-	-	4,336	798	5,134	4,968	-	463	-	-	-	-	-	-	-	33,741
<b>Period 1b Additional Costs</b>																					
1b.2.1	Spent Fuel Pool Isolation	-	-	-	-	-	-	12,675	1,901	14,576	14,576	-	-	-	-	-	-	-	-	-	10,852
1b.2.2	Mixed & RCRA Waste	-	-	-	14	-	-	5,930	1,770	7,708	7,708	-	-	43	-	-	-	-	-	30,000	-
1b.2	Subtotal Period 1b Additional Costs	-	-	-	14	-	-	18,605	3,670	22,275	22,280	-	-	43	-	-	-	-	-	30,000	10,852
<b>Period 1b Collateral Costs</b>																					
1b.3.1	Decon equipment	1,005	-	-	-	-	-	1,204	188	1,213	1,213	-	-	-	-	-	-	-	-	-	-
1b.3.2	Process decommissioning equipment	38	-	-	-	-	-	53	285	323	323	-	-	-	-	-	-	-	-	-	-
1b.3.3	Process decommissioning chemical flash waste	1	-	-	-	-	-	1,526	396	2,024	2,024	-	-	-	-	-	-	-	-	-	-
1b.3.4	Small tool allowance	-	1,200	-	-	-	-	-	0	1,200	1,200	-	-	-	-	-	-	-	-	-	-
1b.3.5	Operating equipment	-	-	-	-	-	-	316	316	316	316	-	-	-	-	-	-	-	-	-	-
1b.3.6	Spent Fuel Capital and Transfer	3,104	-	-	-	-	-	2,712	411	3,153	3,153	-	-	-	-	-	-	-	-	-	-
1b.3.7	Retention and Sewerage	-	-	-	-	-	-	6,310	951	7,291	7,291	-	-	-	-	-	-	-	-	-	-
1b.3.8	Subtotal Period 1b Collateral Costs	3,107	1,202	-	-	-	-	10,346	2,055	13,158	13,166	-	-	-	-	-	-	-	-	-	-
<b>Period 1b Period-Dependent Costs</b>																					
1b.4.1	Decon supplies	39	-	-	-	-	-	1,101	10	1,211	1,211	-	-	-	-	-	-	-	-	-	-
1b.4.2	Insurance	-	-	-	-	-	-	1,247	17	1,264	1,264	-	-	-	-	-	-	-	-	-	-
1b.4.3	Health physics supplies	344	-	-	-	-	-	430	86	430	430	-	-	-	-	-	-	-	-	-	-
1b.4.4	Heavy equipment rental	375	-	-	-	-	-	432	56	432	432	-	-	-	-	-	-	-	-	-	-
1b.4.5	Disposal of DAW generated	-	-	-	-	-	-	29	29	29	29	-	-	-	-	-	-	-	-	-	-
1b.4.6	Operating budget	-	-	-	-	-	-	1,812	32	1,844	1,844	-	-	-	-	-	-	-	-	-	-
1b.4.7	NRC Fees	-	-	-	-	-	-	323	32	355	355	-	-	-	-	-	-	-	-	-	-
1b.4.8	Emergency Planning Fees	-	-	-	-	-	-	1,416	142	1,557	1,557	-	-	-	-	-	-	-	-	-	-
1b.4.9	Fixed Overhead O&M	-	-	-	-	-	-	1,305	186	1,500	1,500	-	-	-	-	-	-	-	-	-	-
1b.4.10	RFSH Operating Costs	-	-	-	-	-	-	64	8	72	72	-	-	-	-	-	-	-	-	-	-
1b.4.11	Railroad Track Maintenance	-	-	-	-	-	-	1,225	9,388	10,613	10,613	-	-	-	-	-	-	-	-	-	-
1b.4.12	Security Staff Cost	-	-	-	-	-	-	13,682	2,022	15,704	15,704	-	-	-	-	-	-	-	-	-	-
1b.4.13	Utility Staff Cost	-	-	-	-	-	-	5,323	5,323	5,323	5,323	-	-	-	-	-	-	-	-	-	-
1b.4.14	Subtotal Period 1b Period-Dependent Costs	39	719	7	4	-	29	33,556	5,323	39,972	39,972	-	2,106	-	356	-	-	-	-	-	122,384
1b.4	TOTAL PERIOD 1b COST	3,531	1,921	84	154	14	1,057	60,243	12,466	80,972	83,950	5,239	463	43	589	231	-	-	-	60,904	31,528
1b.0	TOTAL PERIOD 1b COST	3,531	3,288	96	160	14	1,707	156,661	25,337	190,796	178,133	11,650	1,012	43	1,199	231	-	-	-	63,105	31,548
<b>PERIOD 1 TOTALS</b>																					

Monticello Nuclear Generating Plant  
Decommissioning Cost Analysis

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Table E  
Monticello Nuclear Generating Plant  
DECON Decommissioning Cost Estimate with 100 Years of Spent Fuel Storage  
(Thousands of 2020 Dollars)

Table with columns: Activity Index, Activity Description, PERIOD 2a - Large Component Removal, and various cost categories (Decon Cost, Removal Cost, Packaging, Transport, Off-Site Processing, LIRW Disposal, Other Contingency, Total Contingency, Total Costs, NRC Lic. Term. Costs, Spent Fuel Management Costs, Site Restoration Costs, Processed Volume, Class A, Class B, Class C, Burial Volumes, GTCC, Craft, Contractor, Utility and Manhours).

**Monticello Nuclear Generating Plant  
 Decommissioning Cost Analysis**

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**Table E  
 Monticello Nuclear Generating Plant  
 DECON Decommissioning Cost Estimate with 100 Years of Spent Fuel Storage  
 (Thousands of 2020 Dollars)**

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging	Transport	Off-Site Processing	LLRW Disposal	Other Contingency	Total Contingency	Total	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume	Class A		Class B		Class C		Burial/Processed	Craft	Utility and Contractor
															Cu. Feet	Cu. Feet	Cu. Feet	Cu. Feet	Cu. Feet	Cu. Feet			
Disposal of Plant Systems (continued)																							
2a.1.5.46	Residual Heat Removal	362	252	172	178	1,072	2,061	-	962	5,049	5,049	-	-	6,406	6,012	-	-	647,941	-	-	4,135	-	-
2a.1.5.47	Residual Heat Removal - Insulated	554	622	61	82	563	880	-	772	3,355	3,355	-	-	3,397	2,807	-	-	302,087	-	-	10,340	-	-
2a.1.5.48	Rx Recirculation	-	-	5	5	4	67	-	82	67	67	-	-	298	188	-	-	24,439	-	-	1,479	-	-
2a.1.5.49	Rx Core Isolation Cooling - Insulated	-	-	107	48	48	67	-	52	287	287	-	-	298	188	-	-	24,439	-	-	1,479	-	-
2a.1.5.50	Rx Recirculation	56	58	6	4	65	30	-	61	258	258	-	-	43	190	-	-	14,056	-	-	1,580	-	-
2a.1.5.51	Submers	-	169	2	6	69	30	-	60	331	331	-	-	377	90	-	-	21,009	-	-	2,548	-	-
2a.1.5.52	Standby Liquid Control - Insul. - RCA	-	26	1	0	41	-	-	13	83	83	-	-	245	-	-	-	9,969	-	-	341	-	-
2a.1.5.53	Standby Liquid Control - RCA	-	7	0	1	21	-	-	5	35	35	-	-	126	-	-	-	5,135	-	-	98	-	-
2a.1.5.54	Stator Cooling - RCA	-	4	0	0	-	2	-	1	7	7	-	-	5	-	-	-	386	-	-	51	-	-
2a.1.5.55	Traversing Incore Probe	1,040	8,221	924	1,572	16,339	11,425	-	6,909	47,709	47,709	-	24	97,654	33,868	-	-	61,295,515	-	-	119,945	-	-
2a.1.6	Scaffolding in support of decommissioning	-	2,265	22	12	191	31	-	697	3,127	3,127	-	24	1,030	91	-	-	52,111	-	-	22,661	-	-
2a.1	Subtotal Period 2a: Activity Costs	1,752	29,721	19,645	6,398	25,937	50,042	728	47,148	180,360	180,360	-	24	141,010	50,545	1,481	1,178	10,155,540	-	-	293,640	-	2,758
Period 2b: Collateral Costs																							
2a.3.1	Process decommissioning water waste	85	-	57	102	-	232	-	122	508	508	-	-	-	532	-	-	31,942	-	-	104	-	-
2a.3.2	Process decommissioning chemical flush waste	5	-	216	702	-	1,619	-	4,365	3,677	3,677	-	-	-	2,093	-	-	225,008	-	-	392	-	-
2a.3.3	Spent Fuel Capital and Transfer	-	324	-	-	-	-	241,869	3,625	27,765	27,765	-	37	-	-	-	-	27,765	-	-	-	-	-
2a.3.5	Retention and Sovereign	-	-	-	-	-	-	13,145	1,972	15,117	15,117	-	-	-	-	-	-	-	-	-	-	-	-
2a.3	Subtotal Period 2a: Collateral Costs	91	324	274	804	-	1,861	37,314	6,302	46,959	46,959	-	37	-	2,825	-	-	251,590	-	-	495	-	-
Period 2b: Period-Dependent Costs																							
2a.4.1	Decon supplies	112	-	-	-	-	-	28	140	140	140	-	-	-	-	-	-	-	-	-	-	-	-
2a.4.2	Insurance	-	-	-	-	-	-	1,019	1,121	1,121	1,121	-	-	-	-	-	-	-	-	-	-	-	-
2a.4.3	Liability	-	-	-	-	-	-	4,365	4,365	4,365	4,365	-	-	-	-	-	-	-	-	-	-	-	-
2a.4.4	Health physics supplies	-	2,356	-	-	-	-	-	589	2,945	2,945	-	-	-	-	-	-	-	-	-	-	-	-
2a.4.5	Heavy equipment rental	-	3,827	-	-	-	-	-	544	4,171	4,171	-	-	-	-	-	-	-	-	-	-	-	-
2a.4.6	Disposal of DAW generated	-	110	110	57	-	457	-	134	758	758	-	-	-	5,551	-	-	111,023	-	-	181	-	-
2a.4.7	Emergency budget	-	-	-	-	-	-	856	86	942	942	-	-	-	-	-	-	-	-	-	-	-	-
2a.4.8	NRC Fees	-	-	-	-	-	-	-	412	4,827	4,827	-	-	-	-	-	-	-	-	-	-	-	-
2a.4.9	Emergency Planning Fees	-	-	-	-	-	-	1,115	461	4,827	4,827	-	-	-	-	-	-	-	-	-	-	-	-
2a.4.10	Fixed Overhead	-	-	-	-	-	-	3,071	661	3,532	3,532	-	-	-	-	-	-	-	-	-	-	-	-
2a.4.11	Specialty O&M	-	-	-	-	-	-	162	24	187	187	-	-	-	-	-	-	-	-	-	-	-	-
2a.4.12	ISFSI Operating Costs	-	-	-	-	-	-	181	27	208	208	-	-	-	-	-	-	-	-	-	-	-	-
2a.4.13	Railroad Track Maintenance	-	-	-	-	-	-	1,624	244	1,867	1,867	-	-	-	-	-	-	-	-	-	-	-	-
2a.4.14	Remedial Actions Surveys	-	-	-	-	-	-	21,821	3,674	25,495	25,495	-	-	-	-	-	-	-	-	-	-	-	-
2a.4.15	DOC Staff Cost	-	-	-	-	-	-	21,821	3,674	25,495	25,495	-	-	-	-	-	-	-	-	-	-	-	-
2a.4.16	DOC Staff Cost	-	-	-	-	-	-	21,821	3,674	25,495	25,495	-	-	-	-	-	-	-	-	-	-	-	-
2a.4.17	Utility Staff Cost	-	-	-	-	-	-	27,906	4,186	32,092	32,092	-	-	-	-	-	-	-	-	-	-	-	-
2a.4	Subtotal Period 2b: Period-Dependent Costs	112	5,982	110	57	-	457	89,914	14,288	110,931	110,931	-	-	-	5,551	-	-	111,023	-	-	181	-	-
2a.4	TOTAL PERIOD 2b: COST	1,945	36,028	10,928	7,250	25,937	52,350	127,987	67,717	398,250	398,250	-	62	141,010	67,722	1,481	1,178	10,824,520	-	-	254,317	-	984,002
PERIOD 2b - Site Decommissionation																							
Period 2b: Direct Decommissioning Activities																							
2b.1.1.1	ALARA/Radiological	-	18	0	1	6	3	-	5	35	35	-	-	35	10	-	-	2,000	-	-	272	-	-
2b.1.1.2	Decontamination Projects	-	1	0	0	0	0	-	0	2	2	-	-	2	0	-	-	129	-	-	17	-	-
2b.1.1.3	Electrical - Contaminated	-	445	6	24	400	30	-	1,298	1,089	1,089	-	-	2,389	90	-	-	102,726	-	-	6,325	-	-
2b.1.1.4	Electrical - Decontaminated	-	2,698	48	218	3,066	-	-	8,167	8,167	8,167	-	-	23,314	-	-	-	948,013	-	-	37,107	-	-
2b.1.1.5	HVAC Ductwork	-	305	7	27	446	34	-	196	975	975	-	-	2,665	100	-	-	114,568	-	-	4,111	-	-
2b.1.1.6	HVAC Ductwork	-	324	6	26	461	36	-	195	971	971	-	-	2,752	100	-	-	111,779	-	-	3,985	-	-
2b.1.1.7	Heating & Ventilation	-	483	16	61	1,007	76	-	302	1,945	1,945	-	-	6,018	227	-	-	258,789	-	-	7,101	-	-
2b.1.1.8	Liquid Refuse	-	687	48	62	514	586	-	703	3,188	3,188	-	-	3,073	128	-	-	235,484	-	-	17,194	-	-
2b.1.1.9	Makeup Demin. - RCA	-	103	3	14	246	-	-	65	431	431	-	-	1,471	-	-	-	60,747	-	-	1,412	-	-
2b.1.1.10	Non-Essential Diesel Generator - RCA	-	27	3	13	208	-	-	327	327	327	-	-	57,892	-	-	-	57,892	-	-	395	-	-
2b.1.1.11	Primary Containment	-	455	42	87	1,038	507	-	414	2,543	2,543	-	-	6,201	130	-	-	342,704	-	-	6,454	-	-
2b.1.1.12	Process Radiation Monitors	-	46	2	24	18	-	-	30	111	111	-	-	142	62	-	-	9,115	-	-	649	-	-

Monticello Nuclear Generating Plant  
 Decommissioning Cost Analysis

Table E  
 Monticello Nuclear Generating Plant  
 DECON Decommissioning Cost Estimate with 100 Years of Spent Fuel Storage  
 (Thousands of 2020 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Contingency Costs	Total Contingency	Total	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Class A Cu. Feet	Class B Cu. Feet	Burial Volumes Class C Cu. Feet	GTCC Cu. Feet	Burial/Processed Mt. Lbs.	Craft Manhours	Utility and Contractor Manhours	
Disposal of Plant Systems (continued)																						
2B.1.1.17	Rx Bldg Closed Cing Water - Insl - RCA	-	114	2	66	1,187	-	-	54	343	343	-	-	577	-	-	-	-	38,675	-	1,481	
2B.1.1.18	Rx Bldg Closed Cing Water - RCA	184	-	-	-	1,187	270	-	235	1,897	1,897	-	-	7,093	529	-	-	-	288,031	-	2,489	
2B.1.1.19	Rx Bldg Containing Equip	27	-	-	-	1,187	13	-	14	1,208	1,208	-	-	1,208	1,208	-	-	-	4,172	-	1,114	
2B.1.1.20	Rx Pressure Vessels	28	47	6	5	13	78	-	48	225	225	-	-	75	230	-	-	-	17,816	-	1,051	
2B.1.1.21	Rx Water Cleanup	265	19	16	22	251	-	-	222	905	905	-	-	1,300	737	-	-	-	52,670	-	5,736	
2B.1.1.22	Secondary Containment	-	124	7	14	170	86	-	81	483	483	-	-	1,017	255	-	-	-	57,567	-	1,783	
2B.1.1.23	Spent Fuel Pool Refueling - RCA	-	159	4	1	303	-	-	88	270	270	-	-	1,890	-	-	-	-	73,433	-	2,016	
2B.1.1.24	Service Air Blower - RCA	-	15	0	2	34	-	-	9	62	62	-	-	2,387	1,380	-	-	-	8,364	-	206	
2B.1.1.25	Solid Refwaste	338	494	36	49	399	467	-	480	2,264	2,264	-	-	2,387	1,380	-	-	-	188,221	-	10,829	
2B.1.1.26	Water Treatment Buildings	-	10	-	-	90	29	-	3	129	129	-	-	357	80	-	-	-	19,935	-	1,144	
2B.1.1.27	Wells and Domestic Water	-	10	-	-	60	-	-	1	11	11	-	-	342	-	-	-	-	13,874	-	633	
2B.1.1.28	Wells and Domestic Water - RCA	1,153	7,860	315	804	11,068	2,687	-	5,107	29,653	29,653	-	-	69,735	7,859	-	-	-	3,334,244	-	122,835	
2B.1.1	Totals	-	2,831	28	16	239	38	-	758	3,909	3,909	-	-	1,287	114	-	-	-	65,139	-	28,205	
2B.1.2	Scaffolding in support of decommissioning	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Decommissionation of Site Buildings																						
2B.1.3.1	Motor Building	5,395	2,905	178	516	8,044	1,181	-	4,954	22,648	22,648	-	-	48,077	7,044	-	-	-	2,317,470	-	112,618	
2B.1.3.2	HPCC Room	306	6	1	3	20	14	-	29	123	123	-	-	118	103	-	-	-	10,759	-	789	
2B.1.3.3	HPCC Room	29	28	1	2	5	11	-	12	46	46	-	-	-	-	-	-	-	4,880	-	298	
2B.1.3.4	Hot Shop	17	4	0	0	1	5	-	1	22	22	-	-	-	-	-	-	-	87,708	-	1,437	
2B.1.3.5	Lift Crane	348	64	7	8	45	40	-	34	189	189	-	-	1,341	133	-	-	-	8,700	-	1,227	
2B.1.3.6	Office Storage & Shipping	37	282	1	25	295	3	-	318	1,280	1,280	-	-	1,311	316	-	-	-	15,948	-	785	
2B.1.3.7	Office Storage & Compressor	41	17	6	4	33	33	-	34	136	136	-	-	25	316	-	-	-	49,943	-	2,503	
2B.1.3.8	Refwaste	121	61	3	17	29	86	-	107	435	435	-	-	172	910	-	-	-	25,400	-	1,197	
2B.1.3.9	Refwaste Material Storage Warehouse	24	24	2	2	32	32	-	62	202	202	-	-	109	405	-	-	-	303,190	-	14,433	
2B.1.3.10	Refwaste Material Storage Warehouse	52	2	0	0	53	53	-	106	359	359	-	-	1,283	5,209	-	-	-	20,478	-	1,087	
2B.1.3.11	Turbine	705	353	21	100	215	564	-	632	2,594	2,594	-	-	5,247	16,159	-	-	-	2,880,206	-	145,889	
2B.1.3.12	Turbine Building Addition	58	21	1	8	87	45	-	42	181	181	-	-	51,247	16,159	-	-	-	-	-	4,086	
2B.1.3	Totals	6,709	3,796	218	704	8,574	2,164	-	6,286	28,483	28,483	-	-	-	-	-	-	-	-	-	-	
2B.1.4	Prepare/submit License Termination Plan	-	-	-	-	-	-	526	70	605	605	-	-	-	-	-	-	-	-	-	-	
2B.1.5	Receive NRC approval of termination plan	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
2B.1	Subtotal Period 2b Activity Costs	7,662	14,427	580	1,524	20,481	4,859	526	12,332	62,561	62,561	-	11	122,269	24,132	-	-	-	6,270,589	-	296,229	4,086
Period 2b Additional Costs																						
2B.2.1	Operational Equipment	-	-	23	52	1,211	-	575	198	1,524	1,524	-	-	11,760	-	-	-	-	294,000	-	32	
2B.2.2	Operational Equipment	-	-	-	-	-	-	8,696	1,304	10,000	10,000	-	-	-	-	-	-	-	-	-	12,155	
2B.2.3	Security Modification	-	-	-	-	-	-	-	2,032	14,422	14,422	-	-	11,760	-	-	-	-	294,000	-	12,225	
2B.2	Subtotal Period 2b Additional Costs	-	-	23	52	1,211	-	9,072	2,032	14,422	14,422	-	-	11,760	-	-	-	-	294,000	-	12,225	
Period 2b Collateral Costs																						
2B.3.1	Process decommissioning water waste	108	-	135	240	-	546	-	285	1,404	1,404	-	-	-	-	-	-	-	76,186	-	244	
2B.3.2	Process decommissioning chemical flush waste	1	-	43	138	-	319	-	105	607	607	-	-	-	-	-	-	-	43,978	-	77	
2B.3.3	Small tool allowance	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
2B.3.4	Spent Fuel Capital and Transfer	-	-	-	-	-	-	-	117,98	134,778	134,778	-	-	-	-	-	-	-	-	-	-	
2B.3.5	Spent Fuel Capital and Transfer	-	-	-	-	-	-	-	89	7,218	7,218	-	-	-	-	-	-	-	-	-	-	
2B.3	Subtotal Period 2b Collateral Costs	109	364	178	378	-	865	-	18,966	144,425	144,425	-	-	-	-	-	-	-	110,105	-	322	
Period 2b Period-Dependent Costs																						
2B.4.1	Insurance	1,400	-	-	-	-	-	-	369	1,769	1,769	-	-	-	-	-	-	-	-	-	-	
2B.4.2	Insurance	-	-	-	-	-	-	742	816	816	816	-	-	-	-	-	-	-	-	-	-	
2B.4.3	Property taxes	-	-	-	-	-	-	2,698	270	2,967	2,967	-	-	-	-	-	-	-	-	-	-	
2B.4.4	Health physics supplies	-	2,376	-	-	-	-	-	594	2,970	2,970	-	-	-	-	-	-	-	-	-	-	
2B.4.5	Health physics supplies	-	2,711	-	-	-	-	-	3,694	6,405	6,405	-	-	-	-	-	-	-	-	-	-	
2B.4.6	Disposal of DAW generated	-	-	101	52	-	419	-	1,233	1,653	1,653	-	-	-	-	-	-	-	101,679	-	168	
2B.4.7	Plant energy budget	-	-	-	-	-	-	-	216	1,653	1,653	-	-	-	-	-	-	-	-	-	-	
2B.4.8	NRC Fees	-	-	-	-	-	-	1,437	216	1,653	1,653	-	-	-	-	-	-	-	-	-	-	
2B.4.9	Plant energy budget	-	-	-	-	-	-	623	62	685	685	-	-	-	-	-	-	-	-	-	-	
2B.4.10	Plant energy budget	-	-	-	-	-	-	2,235	335	2,570	2,570	-	-	-	-	-	-	-	-	-	-	
2B.4.11	Spent Fuel Pool O&M	-	-	-	-	-	-	801	134	1,024	1,024	-	-	-	-	-	-	-	-	-	-	
2B.4.12	Liquid Refwaste Processing Equipment/Services	-	-	-	-	-	-	224	34	258	258	-	-	-	-	-	-	-	-	-	-	
2B.4.13	Remedial Action Surveys	-	-	-	-	-	-	158	69	227	227	-	-	-	-	-	-	-	-	-	-	
2B.4.14	Remedial Action Surveys	-	-	-	-	-	-	1,182	177	1,359	1,359	-	-	-	-	-	-	-	-	-	-	
2B.4.15	Remedial Action Surveys	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	

**Monticello Nuclear Generating Plant  
 Decommissioning Cost Analysis**

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**Table E  
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 DECON Decommissioning Cost Estimate with 100 Years of Spent Fuel Storage  
 (Thousands of 2020 Dollars)**

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Class A Cu. Feet	Class B Cu. Feet	Burial Volumes Class C Cu. Feet	GTCC Cu. Feet	Burial/Processed Mt. Dbs	Craft Manhours	Utility and Contractor Manhours
Period 2b Period-Dependent Costs (continued)																					
24.1.16	Security Staff Cost	-	-	-	-	-	-	15,925	2,389	18,314	18,314	-	-	-	-	-	-	-	-	-	236,949
24.1.17	DOC Staff Cost	-	-	-	-	-	-	11,772	2,216	14,988	14,988	-	-	-	-	-	-	-	-	-	160,189
24.1.18	Subtotal Period 2b Period-Dependent Costs	1,440	5,087	101	52	-	419	63,741	10,691	81,259	77,076	4,455	-	-	5,084	-	-	-	101,679	166	694,392
24.0	TOTAL PERIOD 2b COST	9,501	21,850	861	2,046	21,692	6,143	136,814	45,941	392,537	163,694	199,232	11	131,029	30,682	-	-	-	6,794,433	309,941	698,488
PERIOD 2d - Decommissionation Following Wet Fuel Storage																					
Period 2d Direct Decommissioning Activities																					
24.1.1	Remove spent fuel racks	654	58	103	140	-	2,572	-	1,017	4,553	4,553	-	-	-	7,933	-	-	-	480,170	906	-
Disposal of Plant Systems																					
24.1.2.1	Crane/Hoist/Low/Lift/Rigging - RCA	-	3	0	1	17	-	-	4	25	25	-	-	103	-	-	-	-	4,184	-	48
24.1.2.2	Crane/Hoist/Low/Lift/Rigging - Fuel Pool Area	-	297	15	25	431	3	-	140	876	876	-	-	2,477	9	-	-	-	6,967	-	6,967
24.1.2.3	Electrical - Decommissionation - Fuel Pool Area	-	11	0	10	10	-	-	4	26	26	-	-	62	-	-	-	-	90,733	4,000	-
24.1.2.4	Fire - RCA - Fuel Pool Area	246	428	34	37	197	455	-	382	1,781	1,781	-	-	1,179	1,541	-	-	-	2,459	143	-
24.1.2.5	Fuel Pool Cooling & Cleanup	27	11	3	3	17	40	-	17	108	108	-	-	28	117	-	-	-	133,939	8,389	-
24.1.2.6	Fuel Pool Cooling & Cleanup - Insulated	-	11	3	3	17	40	-	17	108	108	-	-	28	117	-	-	-	12,733	657	-
24.1.2.7	HVAC/Chilled Water - RCA Fuel Pool Area	-	33	0	2	37	-	-	14	87	87	-	-	223	1	-	-	-	9,072	397	-
24.1.2.8	HVAC/Chilled Water - RCA Fuel Pool Area	-	29	1	2	45	-	-	14	91	91	-	-	287	-	-	-	-	10,841	337	-
24.1.2.9	Instrument & Service Air-RCA Fuel Pool	273	924	45	75	819	592	-	691	3,268	3,268	-	-	4,894	1,479	-	-	-	245,606	13,385	-
24.1.2	Totals	946	2,599	172	913	329	10,216	-	3,890	10,096	10,096	-	-	1,969	62,698	-	-	-	2,732,406	45,703	-
24.1.3.1	Reactor (Post Fuel)	946	2,599	172	913	329	10,216	-	3,890	10,096	10,096	-	-	1,969	62,698	-	-	-	2,732,406	45,703	-
24.1.3	Totals	-	666	6	3	48	8	-	192	782	782	-	-	257	23	-	-	-	13,028	5,641	-
24.1.4	Scaffolding in support of decommissioning	1,872	4,147	326	1,139	1,196	13,298	-	5,690	27,659	27,659	-	-	7,120	71,852	-	-	-	3,525,210	67,635	-
24.1	Subtotal Period 2d Activity Costs	-	-	-	-	-	-	1,458	437	1,896	1,896	-	-	-	-	-	-	-	-	-	12,480
Period 2d Additional Costs																					
24.2.1	License Termination Survey Planning	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
24.2	Subtotal Period 2d Additional Costs	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Period 2d Collateral Costs																					
24.3.1	Process decommissioning water waste	79	-	54	96	-	220	-	114	563	563	-	-	-	504	-	-	-	30,239	98	-
24.3.2	Process decommissioning chemical flush waste	1	-	26	84	-	193	-	64	396	396	-	-	-	249	-	-	-	26,553	47	-
24.3.3	Process decommissioning chemical flush waste	-	-	91	130	-	178	-	237	1,739	1,739	-	-	-	6,000	529	-	-	303,608	147	-
24.3.5	Spent Fuel Capital and Transfer	-	-	-	-	-	-	-	4	32	32	-	-	-	-	-	-	-	-	-	-
24.3	Subtotal Period 2d Collateral Costs	80	91	210	292	1,112	590	27	432	2,895	2,773	32	-	6,000	1,282	-	-	-	380,400	292	-
Period 2d Period-Dependent Costs																					
24.4.1	Decom supplies	244	-	-	-	-	-	530	61	305	305	-	-	-	-	-	-	-	-	-	-
24.4.2	Insurance	-	-	-	-	-	-	583	53	636	636	-	-	-	-	-	-	-	-	-	-
24.4.3	Property taxes	-	-	-	-	-	-	1,602	96	1,698	1,698	-	-	-	-	-	-	-	-	-	-
24.4.4	Heavy equipment supplies	-	-	-	-	-	-	2,227	290	2,517	2,517	-	-	-	-	-	-	-	-	-	-
24.4.5	Heavy equipment rental	-	-	-	-	-	-	2,227	290	2,517	2,517	-	-	-	-	-	-	-	-	-	-
24.4.6	Disposal of DAW generated	-	-	40	21	-	167	-	49	277	277	-	-	2,030	-	-	-	-	40,600	66	-
24.4.7	Plant energy budget	-	-	-	-	-	-	547	62	609	609	-	-	-	-	-	-	-	-	-	-
24.4.8	Plant energy budget	-	-	-	-	-	-	112	112	224	224	-	-	-	-	-	-	-	-	-	-
24.4.9	Emergency Planning Fees	-	-	-	-	-	-	112	112	224	224	-	-	-	-	-	-	-	-	-	-
24.4.10	Fixed Overhead	-	-	-	-	-	-	1,597	239	1,836	1,836	-	-	-	-	-	-	-	-	-	-
24.4.11	Liquid Hazardous Processing Equipment/Services	-	-	-	-	-	-	320	48	368	368	-	-	-	-	-	-	-	-	-	-
24.4.12	Remedial Actions	-	-	-	-	-	-	94	14	108	108	-	-	-	-	-	-	-	-	-	-
24.4.13	Remedial Trunk Maintenance	-	-	-	-	-	-	84	14	98	98	-	-	-	-	-	-	-	-	-	-
24.4.14	Remedial Actions Surveys	-	-	-	-	-	-	127	127	254	254	-	-	-	-	-	-	-	-	-	-
24.4.15	Security Staff Cost	-	-	-	-	-	-	10,999	1,690	12,689	12,689	-	-	-	-	-	-	-	-	-	162,981
24.4.16	Utility Staff Cost	-	-	-	-	-	-	10,052	1,508	11,560	11,560	-	-	-	-	-	-	-	-	-	149,690
24.4.17	Utility Staff Cost	-	-	-	-	-	-	10,052	1,508	11,560	11,560	-	-	-	-	-	-	-	-	-	149,690
24.4	Subtotal Period 2d Period-Dependent Costs	244	2,743	40	21	167	34,577	10,052	5,632	43,444	38,692	4,842	-	2,030	-	-	-	-	40,600	66	336,997
24.0	TOTAL PERIOD 2d COST	2,196	6,881	576	1,422	2,308	14,055	36,062	12,292	75,805	70,930	4,873	-	13,120	75,164	-	-	-	3,929,210	67,995	408,477

**Monticello Nuclear Generating Plant  
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**Table E  
 Monticello Nuclear Generating Plant  
 DECON Decommissioning Cost Estimate with 100 Years of Spent Fuel Storage  
 (Thousands of 2020 Dollars)**

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Cost	Transport Cost	Off-Site Processing Cost	LLRW Disposal Cost	Other Cost	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes			Burial/Processed Mt. Lbs.	Craft Manhours	Utility and Contractor Manhours	
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet				
<b>PERIOD 2f - License Termination</b>																					
Period 2f Direct Decommissioning Activities																					
2f1.1	Activity survey	-	-	-	-	-	-	166	50	216	-	-	-	-	-	-	-	-	-	-	-
2f1.2	Terminate license	-	-	-	-	-	-	-	-	-	216	-	-	-	-	-	-	-	-	-	-
2f1	Subtotal Period 2f Activity Costs	-	-	-	-	-	-	166	50	216	-	-	-	-	-	-	-	-	-	-	-
Period 2f Additional Costs																					
2f2.1	License Termination Survey	-	-	-	-	-	-	6,920	2,076	8,995	8,995	-	-	-	-	-	-	-	-	95,048	6,240
2f2	Subtotal Period 2f Additional Costs	-	-	-	-	-	-	6,920	2,076	8,995	8,995	-	-	-	-	-	-	-	-	95,048	6,240
Period 2f Collateral Costs																					
2f3.1	DOC staff relocation expenses	-	-	-	-	-	-	1,264	190	1,454	1,454	-	-	-	-	-	-	-	-	-	-
2f3.2	Spent Fuel Capital and Transfer	-	-	-	-	-	-	47	7	54	-	54	-	-	-	-	-	-	-	-	-
2f3	Subtotal Period 2f Collateral Costs	-	-	-	-	-	-	1,311	197	1,508	1,454	54	-	-	-	-	-	-	-	-	-
Period 2f Period-Dependent Costs																					
2f4.1	Insurance	-	-	-	-	-	-	530	53	583	583	-	-	-	-	-	-	-	-	-	-
2f4.2	Property taxes	-	-	-	-	-	-	1,471	147	1,618	1,618	-	-	-	-	-	-	-	-	-	-
2f4.3	Health and safety supplies	-	-	-	-	-	-	177	17	194	194	-	-	-	-	-	-	-	-	-	-
2f4.4	Health and safety services	708	-	-	-	-	-	-	9	88	88	-	-	-	-	-	-	-	-	-	-
2f4.5	Plant energy budget	-	-	7	-	4	29	-	9	48	48	-	-	-	-	-	-	-	-	-	-
2f4.6	NRC Fees	-	-	-	-	-	-	274	41	315	315	-	-	-	-	-	-	-	-	12	-
2f4.7	Emergency Planning Fees	-	-	-	-	-	-	426	43	468	468	-	-	-	-	-	-	-	-	-	-
2f4.8	ISFSI Construction	-	-	-	-	-	-	1,202	11	1,213	1,213	-	-	-	-	-	-	-	-	-	-
2f4.9	ISFSI Operating Costs	-	-	-	-	-	-	84	13	97	97	-	-	-	-	-	-	-	-	-	-
2f4.10	Railroad Track Maintenance	-	-	-	-	-	-	94	14	108	108	-	-	-	-	-	-	-	-	-	-
2f4.11	Security Staff Cost	-	-	-	-	-	-	10,999	1,690	12,689	8,938	3,752	-	-	-	-	-	-	-	-	102,881
2f4.12	Utility Staff Cost	-	-	-	-	-	-	5,762	864	6,626	5,738	888	-	-	-	-	-	-	-	-	80,707
2f4.13	Subtotal Period 2f Period-Dependent Costs	-	708	-	7	4	29	20,711	4,070	31,558	28,719	4,839	-	-	-	-	-	-	-	7,097	12
2f4	TOTAL PERIOD 2f COST	-	708	-	7	4	29	35,137	6,392	42,277	37,583	4,894	-	-	-	-	-	-	-	7,097	95,059
<b>PERIOD 3 - Site Restoration</b>																					
Period 3a Direct Decommissioning Activities																					
3a.1.1.1	Demolition of Effluents Site Buildings	-	1,971	-	-	-	-	-	296	2,267	-	-	2,267	-	-	-	-	-	-	-	13,911
3a.1.1.2	Reactor Building	-	10	-	-	-	-	-	1	11	-	-	11	-	-	-	-	-	-	-	50
3a.1.1.3	Condensate Tanks Foundation	-	4	-	-	-	-	-	1	5	-	-	5	-	-	-	-	-	-	-	25
3a.1.1.4	Discharge Retention Basin	-	16	-	-	-	-	-	2	18	-	-	18	-	-	-	-	-	-	-	177
3a.1.1.5	Hot Shop	-	10	-	-	-	-	-	2	12	-	-	12	-	-	-	-	-	-	-	19
3a.1.1.6	Hydrogen and Oxygen Storage	-	2	-	-	-	-	-	2	4	-	-	4	-	-	-	-	-	-	-	62
3a.1.1.7	LLRW Storage & Shipping	-	83	-	-	-	-	-	12	95	-	-	95	-	-	-	-	-	-	-	682
3a.1.1.8	MSW Structures 2017	-	108	-	-	-	-	-	12	120	-	-	120	-	-	-	-	-	-	-	13,042
3a.1.1.9	MSW Structures 2017	-	1,410	-	-	-	-	-	16	1,426	-	-	1,426	-	-	-	-	-	-	-	544
3a.1.1.10	Office Stack	-	108	-	-	-	-	-	16	124	-	-	124	-	-	-	-	-	-	-	199
3a.1.1.11	Office Storage & Compressor	-	39	-	-	-	-	-	6	45	-	-	45	-	-	-	-	-	-	-	1,239
3a.1.1.12	Redwaste	-	228	-	-	-	-	-	94	292	-	-	292	-	-	-	-	-	-	-	933
3a.1.1.13	Security Barrier	-	186	-	-	-	-	-	28	214	-	-	214	-	-	-	-	-	-	-	933
3a.1.1.14	Security Barrier	-	186	-	-	-	-	-	28	214	-	-	214	-	-	-	-	-	-	-	933
3a.1.1.15	Structures Greater than 2' Below Grade	-	2,461	-	-	-	-	-	369	2,830	-	-	2,830	-	-	-	-	-	-	-	12,649
3a.1.1.16	Tank Farm	-	4	-	-	-	-	-	1	5	-	-	5	-	-	-	-	-	-	-	21
3a.1.1.17	Turbine Building Addition	-	1,925	-	-	-	-	-	18	1,943	-	-	1,943	-	-	-	-	-	-	-	6,188
3a.1.1.18	Turbine Building Addition	-	55	-	-	-	-	-	8	63	-	-	63	-	-	-	-	-	-	-	618
3a.1.1.19	Turbine Pedestal	-	182	-	-	-	-	-	27	209	-	-	209	-	-	-	-	-	-	-	926
3a.1.1	Totals	-	8,169	-	-	-	-	-	1,225	9,394	-	-	9,394	-	-	-	-	-	-	-	58,885
Site Closeout Activities																					
3a.1.2	Grd. & landscape site	-	896	-	-	-	-	-	134	1,031	-	-	1,031	-	-	-	-	-	-	-	1,841
3a.1.3	Final report to NRC	-	200	-	-	-	-	200	30	231	-	-	231	-	-	-	-	-	-	-	1,560
3a.1	Subtotal Period 3a Activity Costs	-	9,065	-	-	-	-	200	1,300	10,655	231	-	10,425	-	-	-	-	-	-	-	60,726



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**Table E  
 Monticello Nuclear Generating Plant  
 DECON Decommissioning Cost Estimate with 100 Years of Spent Fuel Storage  
 (Thousands of 2020 Dollars)**

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Cost	Transport Cost	Off-Site Processing Cost	LLRW Disposal Cost	Other Contingency Cost	Total Contingency	Total	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet	Burial/Processed Mt. Lbs.	Craft Manhours	Utility and Contractor Manhours
<b>Period 3b: Additional Costs</b>																					
3b.2.1	Clean Concrete Disposal	-	3,322	-	-	-	-	13	500	3,835	-	-	3,835	-	-	-	-	-	-	12	-
3b.2.2	Inadequate Cofferdam	-	335	-	-	-	-	1,170	1,505	1,840	-	-	1,840	-	-	-	-	-	-	2,684	-
3b.2.3	Backfill	-	5,683	-	-	-	-	837	6,421	6,421	-	-	6,421	-	-	-	-	-	-	5,422	-
3b.2.5	Discharge Structure Cofferdam	-	442	-	-	-	-	66	508	508	-	-	508	-	-	-	-	-	-	3,552	-
3b.2.6	Disposition of Original MPC Canisters	-	-	-	954	-	5,641	1,649	8,244	8,244	-	-	8,244	-	21,097	-	-	-	2,501,800	-	-
3b.2	Subtotal Period 3b: Additional Costs	-	9,682	-	954	-	5,641	1,183	3,078	20,738	-	-	12,469	-	21,097	-	-	-	2,501,800	-	-
<b>Period 3b: Collateral Costs</b>																					
3b.3.1	Small fuel allowance	-	110	-	-	-	-	17	127	127	-	-	127	-	-	-	-	-	-	-	-
3b.3.2	Spent Fuel Transfer	-	-	-	-	-	-	100	100	100	-	-	100	-	-	-	-	-	-	-	-
3b.3	Subtotal Period 3b: Collateral Costs	-	110	-	-	-	-	117	117	244	-	-	244	-	-	-	-	-	-	-	-
<b>Period 3b: Period-Dependent Costs</b>																					
3b.4.1	Insurance taxes	-	-	-	-	-	-	1,290	1,290	1,290	-	-	1,290	-	-	-	-	-	-	-	-
3b.4.2	Heavy equipment rental	-	-	-	-	-	-	2,543	2,543	2,543	-	-	2,543	-	-	-	-	-	-	-	-
3b.4.3	Plant energy budget	-	5,842	-	-	-	-	876	6,718	6,718	-	-	6,718	-	-	-	-	-	-	-	-
3b.4.4	NRC ISFSI Fees	-	-	-	-	-	-	315	315	315	-	-	315	-	-	-	-	-	-	-	-
3b.4.5	Site Preparation Fees	-	-	-	-	-	-	36	36	36	-	-	36	-	-	-	-	-	-	-	-
3b.4.6	Fixed Overhead	-	-	-	-	-	-	1,122	1,122	1,122	-	-	1,122	-	-	-	-	-	-	-	-
3b.4.7	ISFSI Operating Costs	-	-	-	-	-	-	194	194	194	-	-	194	-	-	-	-	-	-	-	-
3b.4.8	Subtotal Track Maintenance	-	-	-	-	-	-	35,313	35,313	35,313	-	-	35,313	-	-	-	-	-	-	-	-
3b.4.9	DOC Staff Cost	-	-	-	-	-	-	17,729	17,729	17,729	-	-	17,729	-	-	-	-	-	-	-	-
3b.4.10	Utility Staff Cost	-	-	-	-	-	-	1,148	1,148	1,148	-	-	1,148	-	-	-	-	-	-	-	-
3b.4.11	Subtotal Period 3b: Period-Dependent Costs	-	5,842	-	-	-	-	50,715	56,557	61,857	-	-	66,826	-	-	-	-	-	-	-	-
3b.4	Subtotal Period 3b: Period-Dependent Costs	-	5,842	-	-	-	-	50,715	56,557	61,857	-	-	66,826	-	-	-	-	-	-	-	-
3b.4.12	Utility Staff Cost	-	-	-	-	-	-	1,148	1,148	1,148	-	-	1,148	-	-	-	-	-	-	-	-
3b.4	Subtotal Period 3b: Period-Dependent Costs	-	5,842	-	-	-	-	50,715	56,557	61,857	-	-	66,826	-	-	-	-	-	-	-	-
3b.4	Subtotal Period 3b: Period-Dependent Costs	-	5,842	-	-	-	-	50,715	56,557	61,857	-	-	66,826	-	-	-	-	-	-	-	-
3b.0	TOTAL PERIOD 3b: COST	-	24,700	-	954	-	5,641	62,237	12,971	96,502	10,495	16,135	69,872	-	21,097	-	-	2,501,800	72,296	-	601,262
<b>Period 3c: Fuel Storage Operations/Shipping</b>																					
<b>Period 3c: Direct Decommissioning Activities</b>																					
3c.0	Collateral Costs	-	-	-	-	-	-	631,735	631,735	631,735	-	-	631,735	-	-	-	-	-	-	-	-
3c.1	Spent Fuel Transfer	-	-	-	-	-	-	821,735	821,735	821,735	-	-	821,735	-	-	-	-	-	-	-	-
3c.3	Subtotal Period 3c: Collateral Costs	-	-	-	-	-	-	1,453,470	1,453,470	1,453,470	-	-	1,453,470	-	-	-	-	-	-	-	-
<b>Period 3c: Period-Dependent Costs</b>																					
3c.4.1	Insurance taxes	-	-	-	-	-	-	65,480	65,480	65,480	-	-	65,480	-	-	-	-	-	-	-	-
3c.4.2	Heavy equipment rental	-	-	-	-	-	-	84,464	84,464	84,464	-	-	84,464	-	-	-	-	-	-	-	-
3c.4.4	NRC ISFSI Fees	-	-	-	-	-	-	20,571	20,571	20,571	-	-	20,571	-	-	-	-	-	-	-	-
3c.4.5	Emergency Planning Fees	-	-	-	-	-	-	13,803	13,803	13,803	-	-	13,803	-	-	-	-	-	-	-	-
3c.4.6	Site Preparation Fees	-	-	-	-	-	-	36	36	36	-	-	36	-	-	-	-	-	-	-	-
3c.4.7	ISFSI Operating Costs	-	-	-	-	-	-	1,043	1,043	1,043	-	-	1,043	-	-	-	-	-	-	-	-
3c.4.8	Railroad Track Maintenance	-	-	-	-	-	-	17,466	17,466	17,466	-	-	17,466	-	-	-	-	-	-	-	-
3c.4.9	Security Staff Cost	-	-	-	-	-	-	400,396	400,396	400,396	-	-	400,396	-	-	-	-	-	-	-	-
3c.4.10	DOC Staff Cost	-	-	-	-	-	-	17,729	17,729	17,729	-	-	17,729	-	-	-	-	-	-	-	-
3c.4.11	Utility Staff Cost	-	-	-	-	-	-	1,148	1,148	1,148	-	-	1,148	-	-	-	-	-	-	-	-
3c.4	Subtotal Period 3c: Period-Dependent Costs	-	-	-	-	-	-	833,313	833,313	833,313	-	-	833,313	-	-	-	-	-	-	-	-
3c.0	TOTAL PERIOD 3c: COST	-	-	-	-	-	-	1,453,470	1,453,470	1,453,470	-	-	1,453,470	-	-	-	-	-	-	-	-
<b>Period 3d: GTCC shipping</b>																					
<b>Period 3d: Direct Decommissioning Activities</b>																					
3d.1.1.1	Vessel & Internals GTCC Disposal	-	-	1,083	-	-	-	918	6,314	6,314	-	-	6,314	-	-	-	-	-	-	-	-
3d.1.1	Totals	-	-	1,083	-	-	-	918	6,314	6,314	-	-	6,314	-	-	-	-	-	-	-	-
3d.1	Subtotal Period 3d: Activity Costs	-	-	1,083	-	-	-	918	6,314	6,314	-	-	6,314	-	-	-	-	-	-	-	-
<b>Period 3d: Collateral Costs</b>																					
3d.3.1	Spent Fuel Capital and Transfer	-	-	-	-	-	-	28	4	32	-	-	32	-	-	-	-	-	-	-	-
3d.3	Subtotal Period 3d: Collateral Costs	-	-	-	-	-	-	28	4	32	-	-	32	-	-	-	-	-	-	-	-
3d.0	TOTAL PERIOD 3d: COST	-	-	-	-	-	-	1,100	225,700	226,800	-	-	226,800	-	-	-	-	-	-	-	-

**Monticello Nuclear Generating Plant  
 Decommissioning Cost Analysis**

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**Table E  
 Monticello Nuclear Generating Plant  
 DECON Decommissioning Cost Estimate with 100 Years of Spent Fuel Storage  
 (Thousands of 2020 Dollars)**

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes			Burial/Processed Mt. Dbs.	Craft Manhours	Utility and Contractor Manhours	
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet				
344.1	Insurance	-	-	-	-	-	-	27	3	30	30	-	-	-	-	-	-	-	-	-	
344.2	Property taxes	-	-	-	-	-	-	35	3	38	38	-	-	-	-	-	-	-	-	-	
344.4	NRC ISFSI Fees	-	-	-	-	-	-	8	1	9	9	-	-	-	-	-	-	-	-	-	
344.5	Plant energy budget	-	-	-	-	-	-	6	1	7	7	-	-	-	-	-	-	-	-	-	
344.6	Fixed Overhead	-	-	-	-	-	-	8	1	10	10	-	-	-	-	-	-	-	-	-	
344.7	Railroad Track Maintenance	-	-	-	-	-	-	5	1	6	6	-	-	-	-	-	-	-	-	-	
344.8	Security Staff Cost	-	-	-	-	-	-	165	25	190	190	-	-	-	-	-	-	-	-	2,074	
344.9	Utility Staff Cost	-	-	-	-	-	-	36	5	41	41	-	-	-	-	-	-	-	-	4,969	
344	Subtotal Period 3d Period-Dependent Costs	-	-	-	-	-	-	293	40	333	318	15	-	-	-	-	-	-	-	24,613	
340	TOTAL PERIOD 3d COST	-	-	1,083	-	-	4,313	320	962	6,678	6,652	47	-	-	1,100	225,765	-	-	-	2,463	
<b>PERIOD 3e - ISFSI Decommissionation</b>																					
Period 3e Direct Decommissioning Activities																					
Period 3e Additional Costs																					
3e.2.1	License Termination ISFSI	-	0	3	33	-	283	2,223	636	3,178	3,178	-	-	-	-	131,507	-	-	11,351	2,273	
3e.2	Subtotal Period 3e Additional Costs	-	0	3	33	-	283	2,223	636	3,178	3,178	-	-	-	-	131,507	-	-	11,351	2,273	
Period 3e Period-Dependent Costs																					
3e.4.1	Insurance	-	-	-	-	-	-	118	30	148	148	-	-	-	-	-	-	-	-	-	
3e.4.2	Property taxes	-	-	-	-	-	-	219	62	312	312	-	-	-	-	-	-	-	-	-	
3e.4.3	Plant energy budget	-	-	-	-	-	-	12	3	15	15	-	-	-	-	-	-	-	-	-	
3e.4.4	Fixed Overhead	-	-	-	-	-	-	7	1	8	8	-	-	-	-	-	-	-	-	-	
3e.4.5	Railroad Track Maintenance	-	-	-	-	-	-	41	10	52	52	-	-	-	-	-	-	-	-	-	
3e.4.6	Security Staff Cost	-	-	-	-	-	-	352	88	440	440	-	-	-	-	-	-	-	-	4,969	
3e.4.7	Utility Staff Cost	-	-	-	-	-	-	261	65	326	326	-	-	-	-	-	-	-	-	3,792	
3e.4	Subtotal Period 3e Period-Dependent Costs	-	-	-	-	-	-	1,105	270	1,381	1,391	-	-	-	-	-	-	-	-	8,792	
3e.0	TOTAL PERIOD 3e COST	-	0	3	33	-	283	3,328	912	4,550	4,550	-	-	-	-	131,507	-	-	11,351	11,065	
<b>PERIOD 3f - ISFSI Site Restoration</b>																					
Period 3f Direct Decommissioning Activities																					
Period 3f Additional Costs																					
3f.2.1	Demolition and Site Restoration of ISFSI	-	1,864	-	-	-	-	293	324	2,480	-	-	2,480	-	-	-	-	-	-	8,713	160
3f.2	Subtotal Period 3f Additional Costs	-	1,864	-	-	-	-	293	324	2,480	-	-	2,480	-	-	-	-	-	-	8,713	160
Period 3f Collateral Costs																					
3f.3.1	Small tool allowance	-	13	-	-	-	-	-	2	15	-	-	-	-	-	-	-	-	-	-	-
3f.3	Subtotal Period 3f Collateral Costs	-	13	-	-	-	-	-	2	15	-	-	-	-	-	-	-	-	-	-	-
Period 3f Period-Dependent Costs																					
3f.4.2	Heavy equipment rental	-	-	-	-	-	-	126	13	138	-	-	-	-	-	-	-	-	-	-	
3f.4.3	Plant energy budget	-	-	-	-	-	-	6	1	7	-	-	-	-	-	-	-	-	-	-	
3f.4.4	Fixed Overhead	-	-	-	-	-	-	30	3	34	-	-	-	-	-	-	-	-	-	-	
3f.4.5	Railroad Track Maintenance	-	-	-	-	-	-	177	27	204	-	-	-	-	-	-	-	-	-	2,520	
3f.4.6	Security Staff Cost	-	-	-	-	-	-	109	16	126	-	-	-	-	-	-	-	-	-	1,564	
3f.4.7	Utility Staff Cost	-	-	-	-	-	-	475	82	671	-	-	-	-	-	-	-	-	-	4,084	
3f.4	Subtotal Period 3f Period-Dependent Costs	-	-	-	-	-	-	768	408	3,169	-	-	-	-	-	-	-	-	-	8,713	
3f.0	TOTAL PERIOD 3f COST	-	1,993	-	-	-	10,238	1,511,731	224,293	1,776,028	21,686	1,680,300	73,911	-	1,100	2,850,072	-	-	92,580	8,413,401	
<b>PERIOD 3 TOTALS</b>																					
TOTAL COST TO DECOMMISSION		17,263	95,603	21,839	11,878	419,952	84,952	2,064,392	379,943	2,224,392	776,400	1,874,995	74,127	2,988,203	1,178	1,100	244,756,380	-	-	851,355	11,999,010

**Monticello Nuclear Generating Plant  
 Decommissioning Cost Analysis**

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**Table E  
 Monticello Nuclear Generating Plant  
 DECON Decommissioning Cost Estimate with 100 Years of Spent Fuel Storage  
 (Thousands of 2020 Dollars)**

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes			Burial/Processed Mt., Lbs.	Craft Manhours	Utility and Contractor Manhours	
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet				
<b>TOTAL COST TO DECOMMISSION WITH 100 YEARS OF SPENT FUEL STORAGE:</b>																					
	TOTAL NRC LICENSE TERMINATION COST IS 28.41% OR:																				
	SPENT FUEL MANAGEMENT COST IS 68.84% OR:																				
	NON-NUCLEAR DEMOLITION COST IS 2.72% OR:																				
	TOTAL LOW-LEVEL RADIOACTIVE WASTE VOLUME BURIED (EXCLUDING GTCC):																				
	TOTAL GREATER THAN CLASS C RADWASTE VOLUME GENERATED:																				
	TOTAL SCRAP METAL REMOVED:																				
	TOTAL CRAFT LABOR REQUIREMENTS:																				

Foot Notes:  
 n/a - indicates that this activity not charged as decommissioning expense  
 a - indicates that this activity performed by decommissioning staff  
 0 - indicates that this value is less than 0.5 but is non-zero  
 A cell containing "--" indicates a zero value

***Monticello Nuclear Generating Plant  
Decommissioning Cost Analysis – 70 Year Lifetime***

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## **APPENDIX F**

### **DETAILED COST ANALYSIS**

#### **SCENARIO 4: DECON with 200 Year DFS**

**Monticello Nuclear Generating Plant  
 Decommissioning Cost Analysis**

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**Table F  
 Monticello Nuclear Generating Plant  
 DECON Decommissioning Cost Estimate with 200 Years of Spent Fuel Storage  
 (Thousands of 2020 Dollars)**

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Cost	Transport Cost	Off-Site Processing Cost	LLRW Disposal Cost	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet	Burial/Processed Mt. Lbs.	Craft Manhours	Utility and Contractor Manhours	
<b>PERIOD Ia - Shutdown through Transition</b>																						
Period Ia Direct Decommissioning Activities																						
Ia.1.1	Notification of Cessation of Operations	-	-	-	-	-	-	167	25	162	192	-	-	-	-	-	-	-	-	-	-	1,300
Ia.1.2	Remove fuel & source material	-	-	-	-	-	-	-	-	n/a	-	-	-	-	-	-	-	-	-	-	-	-
Ia.1.3	Notification of Permanent Defueling	-	-	-	-	-	-	-	-	a	-	-	-	-	-	-	-	-	-	-	-	-
Ia.1.4	Remove and store process waste	-	-	-	-	-	-	-	-	-	286	-	-	-	-	-	-	-	-	-	-	2,900
Ia.1.5	Prepare and submit PSD/AR	-	-	-	-	-	-	257	39	296	286	-	-	-	-	-	-	-	-	-	-	4,800
Ia.1.6	Perform detailed rad survey	-	-	-	-	-	-	-	-	a	-	-	-	-	-	-	-	-	-	-	-	-
Ia.1.7	End product description	-	-	-	-	-	-	129	19	148	148	-	-	-	-	-	-	-	-	-	-	1,000
Ia.1.8	Define major work sequence	-	-	-	-	-	-	964	145	1,108	1,108	-	-	-	-	-	-	-	-	-	-	1,300
Ia.1.9	Perform Site-Specific Cost Study	-	-	-	-	-	-	964	145	1,108	1,108	-	-	-	-	-	-	-	-	-	-	7,500
Ia.1.10	Prepare/submit Irradiated Fuel Management Plan	-	-	-	-	-	-	964	145	1,108	1,108	-	-	-	-	-	-	-	-	-	-	2,200
Ia.1.11	Activity Specifications	-	-	-	-	-	-	129	19	148	148	-	-	-	-	-	-	-	-	-	-	1,000
Ia.1.12	Plant systems	-	-	-	-	-	-	632	95	727	654	-	-	-	-	-	-	-	-	-	-	4,920
Ia.1.13	SSSS Decommissionation Flash	-	-	-	-	-	-	436	66	502	554	-	-	-	-	-	-	-	-	-	-	4,167
Ia.1.14	Reactor vessel	-	-	-	-	-	-	835	125	960	960	-	-	-	-	-	-	-	-	-	-	7,500
Ia.1.15	Sacrificial shield	-	-	-	-	-	-	64	10	74	74	-	-	-	-	-	-	-	-	-	-	6,500
Ia.1.16	Mixture separators/reheaters	-	-	-	-	-	-	129	19	148	148	-	-	-	-	-	-	-	-	-	-	1,000
Ia.1.17	Main Turbine	-	-	-	-	-	-	268	40	308	309	-	-	-	-	-	-	-	-	-	-	2,088
Ia.1.18	Pressure suppression structure	-	-	-	-	-	-	257	39	296	296	-	-	-	-	-	-	-	-	-	-	2,000
Ia.1.19	Plant structures & buildings	-	-	-	-	-	-	401	60	461	431	-	-	-	-	-	-	-	-	-	-	3,120
Ia.1.20	Facility & site closure	-	-	-	-	-	-	116	17	133	67	-	-	-	-	-	-	-	-	-	-	4,800
Ia.1.21	Total	-	-	-	-	-	-	5,456	823	6,279	5,729	-	-	-	-	-	-	-	-	-	-	42,663
<b>Planning &amp; Site Preparations</b>																						
Ia.1.22	Prepare dismantling sequence	-	-	-	-	-	-	308	46	355	355	-	-	-	-	-	-	-	-	-	-	2,400
Ia.1.23	Disassemble containment system	-	-	-	-	-	-	180	27	207	207	-	-	-	-	-	-	-	-	-	-	1,400
Ia.1.24	Rigging/Cont. Cont. Erylps/soiling/etc.	-	-	-	-	-	-	2,400	360	2,760	2,760	-	-	-	-	-	-	-	-	-	-	1,200
Ia.1.25	Procure cask/shelves & containers	-	-	-	-	-	-	158	24	182	182	-	-	-	-	-	-	-	-	-	-	8,013
Ia.1	Subtotal Period Ia Activity Costs	-	-	-	-	-	-	10,369	2,486	13,054	13,056	-	-	-	-	-	-	-	-	-	-	85,013
<b>Period Ia Collateral Costs</b>																						
Ia.3.1	Spent Fuel Capital and Transfer	-	-	-	-	-	-	1,323	198	1,522	1,522	-	-	-	-	-	-	-	-	-	-	-
Ia.3.2	Station and Sewerage	-	-	-	-	-	-	9,892	1,484	11,376	11,376	-	-	-	-	-	-	-	-	-	-	-
Ia.3	Subtotal Period Ia Collateral Costs	-	-	-	-	-	-	11,215	1,682	12,897	12,898	-	-	-	-	-	-	-	-	-	-	-
<b>Period Ia Period-Dependent Costs</b>																						
Ia.4.1	Insurance	-	-	-	-	-	-	2,228	223	2,451	2,451	-	-	-	-	-	-	-	-	-	-	-
Ia.4.2	Health physics supplies	-	-	-	-	-	-	3,670	133	3,803	3,803	-	-	-	-	-	-	-	-	-	-	-
Ia.4.3	Heavy equipment rental	-	-	-	-	-	-	614	753	1,367	1,367	-	-	-	-	-	-	-	-	-	-	-
Ia.4.4	Disposal of DAW generated	-	-	-	-	-	-	50	15	65	65	-	-	-	-	-	-	-	-	-	-	20
Ia.4.5	Emergency budget	-	-	-	-	-	-	1,137	27	1,164	1,164	-	-	-	-	-	-	-	-	-	-	-
Ia.4.6	NRC Fees	-	-	-	-	-	-	3,428	343	3,770	3,770	-	-	-	-	-	-	-	-	-	-	-
Ia.4.7	Emergency Planning Fees	-	-	-	-	-	-	2,616	392	3,008	3,009	-	-	-	-	-	-	-	-	-	-	-
Ia.4.8	Fixed Overhead O&M	-	-	-	-	-	-	112	17	129	129	-	-	-	-	-	-	-	-	-	-	-
Ia.4.9	RFSH Operating Costs	-	-	-	-	-	-	125	19	144	144	-	-	-	-	-	-	-	-	-	-	-
Ia.4.10	Railroad/Truck Maintenance	-	-	-	-	-	-	2,496	346	2,842	2,842	-	-	-	-	-	-	-	-	-	-	-
Ia.4.11	Security Staff Cost	-	-	-	-	-	-	4,703	610	5,313	5,313	-	-	-	-	-	-	-	-	-	-	-
Ia.4.12	Subtotal Period Ia Period-Dependent Costs	-	-	-	-	-	-	13,367	1,367	14,734	14,734	-	-	-	-	-	-	-	-	-	-	-
Ia.4	Subtotal Period Ia Activity Costs	-	-	-	-	-	-	24,186	4,353	28,539	28,539	-	-	-	-	-	-	-	-	-	-	-
Ia.1	Subtotal Period Ia Activity Costs	-	-	-	-	-	-	34,555	6,839	41,394	41,394	-	-	-	-	-	-	-	-	-	-	-

**Monticello Nuclear Generating Plant  
 Decommissioning Cost Analysis**

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**Table F  
 Monticello Nuclear Generating Plant  
 DECON Decommissioning Cost Estimate with 200 Years of Spent Fuel Storage  
 (Thousands of 2020 Dollars)**

Activity Index	Activity Description	Decon Cost	Removal Costs	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Contingency	Total Contingency	Total	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume	Burial Volumes		Burial/Processed Waste	Craft Manhours	Utility and Contractor Materials
															Class A Cu. Feet	Class B Cu. Feet			
14.0	TOTAL PERIOD 1b COST	-	1,367	12	6	6	50	58,118	58,841	101,621	94,783	6,302	550	-	-	-	12,130	20	750,693
14.0	TOTAL PERIOD 1b COST	-	1,367	12	6	6	50	58,295	58,841	102,658	94,783	7,357	550	-	-	-	12,130	20	750,693
<b>PERIOD 1b - Decommissioning Preparations</b>																			
<b>Period 1b Direct Decommissioning Activities</b>																			
<b>Detailed Work Procedures</b>																			
1b.1.1.1	NSRS Decommissionation Flush	-	-	-	-	-	-	608	608	700	620	-	70	-	-	-	-	-	4,733
1b.1.1.2	Reactor internals	-	-	-	-	-	-	514	514	501	501	-	-	-	-	-	-	-	1,000
1b.1.1.3	Remaining buildings	-	-	-	-	-	-	174	174	200	200	-	150	-	-	-	-	-	1,350
1b.1.1.4	Removal of spent fuel	-	-	-	-	-	-	129	129	100	100	-	-	-	-	-	-	-	1,000
1b.1.1.5	Incore instrumentation	-	-	-	-	-	-	257	257	296	296	-	-	-	-	-	-	-	2,000
1b.1.1.7	Removal primary containment	-	-	-	-	-	-	407	407	537	537	-	-	-	-	-	-	-	3,650
1b.1.1.8	Reactor vessel	-	-	-	-	-	-	154	154	177	177	-	-	-	-	-	-	-	1,200
1b.1.1.9	Shielding	-	-	-	-	-	-	129	129	148	148	-	-	-	-	-	-	-	1,000
1b.1.1.10	Sterilized shield	-	-	-	-	-	-	297	297	307	307	-	-	-	-	-	-	-	2,080
1b.1.1.11	Reinforced concrete	-	-	-	-	-	-	38	38	296	296	-	-	-	-	-	-	-	2,000
1b.1.1.12	Main Turbine	-	-	-	-	-	-	257	257	307	307	-	-	-	-	-	-	-	2,730
1b.1.1.13	Reactor building	-	-	-	-	-	-	351	351	403	403	-	-	-	-	-	-	-	35,741
1b.1.1.14	Measurements & rebates	-	-	-	-	-	-	351	351	363	363	-	-	-	-	-	-	-	-
1b.1.1.15	Reactor building	-	-	-	-	-	-	436	436	463	463	-	-	-	-	-	-	-	-
1b.1.1.16	Reactor building	-	-	-	-	-	-	660	660	4,387	4,324	-	-	-	-	-	-	-	-
1b.1.1	Total	-	-	-	-	-	-	4,336	4,336	444	444	-	-	-	-	-	-	-	-
1b.1.2	Decon NSSS	206	-	-	-	-	-	798	798	5,431	4,908	-	-	-	-	-	-	-	1,087
1b.1	Subtotal Period 1b Activity Costs	206	-	-	-	-	-	4,336	4,336	5,431	4,908	-	-	-	-	-	-	-	1,087
<b>Period 1b Additional Costs</b>																			
1b.2.1	Spent Fuel Pool Isolation	-	-	-	-	-	-	12,675	12,675	14,576	14,576	-	-	-	-	-	-	-	-
1b.2.2	Site Characterization	-	-	-	-	-	-	9	9	7,708	7,708	-	-	-	-	-	-	-	10,852
1b.2.3	Mixed & RCRA Waste	-	-	-	-	-	-	80	80	80	80	-	-	-	-	-	-	-	101
1b.2	Subtotal Period 1b Additional Costs	-	-	-	-	-	-	18,605	18,605	22,365	22,365	-	-	-	-	-	-	-	5,253
<b>Period 1b Collateral Costs</b>																			
1b.3.1	Decon equipment	1,005	-	-	-	-	-	1,264	1,264	1,213	1,213	-	-	-	-	-	-	-	-
1b.3.2	Process decommissioning equipment	38	-	-	-	-	-	53	53	263	263	-	-	-	-	-	-	-	-
1b.3.3	Process decommissioning water waste	1	-	-	-	-	-	396	396	2,024	2,024	-	-	-	-	-	-	-	13,991
1b.3.4	Small fuel allowance	2	-	-	-	-	-	1,908	1,908	1,362	1,362	-	-	-	-	-	-	-	24,569
1b.3.5	Spent fuel equipment	2,104	-	-	-	-	-	316	316	2,419	2,419	-	-	-	-	-	-	-	-
1b.3.6	Spent Fuel Capital and Transfer	-	-	-	-	-	-	2,742	2,742	411	411	-	-	-	-	-	-	-	-
1b.3.7	Retention and Sewerage	-	-	-	-	-	-	6,340	6,340	951	951	-	-	-	-	-	-	-	-
1b.3.8	Retention and Sewerage	-	-	-	-	-	-	1,028	1,028	10,046	10,046	-	-	-	-	-	-	-	80,580
1b.3	Subtotal Period 1b Collateral Costs	3,107	1,202	40	122	-	-	10,346	10,346	13,138	13,138	-	-	-	-	-	-	-	80,580
<b>Period 1b Period-Dependent Costs</b>																			
1b.4.1	Decon supplies	39	-	-	-	-	-	1,711	1,711	48	48	-	-	-	-	-	-	-	-
1b.4.2	Insurance taxes	-	-	-	-	-	-	1,710	1,710	1,881	1,881	-	-	-	-	-	-	-	-
1b.4.3	Health physics supplies	-	-	-	-	-	-	86	86	430	430	-	-	-	-	-	-	-	-
1b.4.4	Heavy equipment rental	344	-	-	-	-	-	492	492	492	492	-	-	-	-	-	-	-	-
1b.4.5	Depend of DWG generated	375	-	-	-	-	-	2,085	2,085	2,085	2,085	-	-	-	-	-	-	-	-
1b.4.6	Permitting budget	-	-	-	-	-	-	29	29	2,085	2,085	-	-	-	-	-	-	-	12
1b.4.8	NRC Fees	-	-	-	-	-	-	32	32	355	355	-	-	-	-	-	-	-	-
1b.4.9	Emergency Planning Fees	-	-	-	-	-	-	142	142	1,557	1,557	-	-	-	-	-	-	-	-
1b.4.10	Fixed Overhead	-	-	-	-	-	-	186	186	1,000	1,000	-	-	-	-	-	-	-	-
1b.4.11	Operating O&M	-	-	-	-	-	-	6	6	64	64	-	-	-	-	-	-	-	-
1b.4.12	RSFS Operating Costs	-	-	-	-	-	-	62	62	72	72	-	-	-	-	-	-	-	-
1b.4.13	Railroad Track Maintenance	-	-	-	-	-	-	1,225	1,225	9,388	9,388	-	-	-	-	-	-	-	-
1b.4.14	Security Staff Cost	-	-	-	-	-	-	13,682	13,682	15,734	15,734	-	-	-	-	-	-	-	-
1b.4.15	Utility Staff Cost	-	-	-	-	-	-	2,032	2,032	15,734	15,734	-	-	-	-	-	-	-	-
1b.4.16	Utility Staff Cost	-	-	-	-	-	-	5,233	5,233	42,078	42,078	-	-	-	-	-	-	-	-
1b.4	Subtotal Period 1b Period-Dependent Costs	39	719	7	4	4	29	35,566	35,566	39,972	39,972	-	-	-	-	-	-	-	12
1b.0	TOTAL PERIOD 1b COST	3,531	1,921	84	154	14	1,057	60,245	60,245	80,072	83,350	5,839	463	-	-	-	-	-	50,904
PERIOD 1 TOTALS		3,531	3,288	96	100	14	1,707	156,961	156,961	253,337	178,133	11,650	1,012	43	1,190	231	-	-	63,105
																			31,848
																			1,166,315

**Monticello Nuclear Generating Plant  
 Decommissioning Cost Analysis**

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**Table F  
 Monticello Nuclear Generating Plant  
 DECON Decommissioning Cost Estimate with 200 Years of Spent Fuel Storage  
 (Thousands of 2020 Dollars)**

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Cost	Transport Cost	Off-Site Processing Cost	LLRW Disposal Cost	Other Contingency Cost	Total Contingency Cost	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Class A		Class B		GTRC Cu. Feet	Burial/Processed Mt. Dbs	Craft Manhours	Utility and Contractor Manhours
															Cu. Feet	Cu. Feet	Cu. Feet	Cu. Feet				
<b>PERIOD 2a - Large Component Removal</b>																						
Period 2a Direct Decommissioning Activities																						
Nuclear Steam Supply System Removal																						
2a.1.1.1	Recirculation System Piping & Valves	111	94	27	50		528		221	1,031	1,031					1,430				96,742	2,905	
2a.1.1.2	Recirculation Pumps & Motors	10	63	16	51	42	186		186	508	508					3,495				112,600	1,563	
2a.1.1.3	Reactor Vessel Internals	304	1,672	412	2,696		20,815		24,027	76,749	76,749					1,252				343,190	30,315	1,379
2a.1.1.5	Reactor Vessel Internals	113	9,121	2,672	1,167		5,881		364	30,140	30,140					14,169				1,105,210	30,315	1,379
2a.1.1	Totals	702	17,020	15,982	4,009	42	37,003		728	112,449	112,449					23,536				1,871,002	83,207	2,758
Removal of Major Equipment																						
2a.1.2	Main Turbine/Generator		385	1,356	521	6,139	439		1,341	10,182	10,182					1,383				1,577,559	5,438	
2a.1.3	Main Condensers		1,347	300	194	3,225	214		947	6,317	6,317					727				828,955	18,831	
Cascading Costs from Clean Building Demolition																						
2a.1.4.1	Reactor Building		332						90	381	381										2,217	
2a.1.4.2	Radiation		25						4	28	28										127	
2a.1.4.3	Other		175						15	165	165										1,001	
2a.1.4	Totals		483						72	556	556										3,245	
Disposal of Plant Systems																						
2a.1.5.1	Automatic Recycle Relief		116	7	12	154	50		70	410	410					205				45,552	1,026	
2a.1.5.2	Chemistry Sampling - Insulated		2	0	2	26	13		1	48	48					15				37	28	
2a.1.5.3	Chemistry Sampling - Insulated		2	0	0	1,114			1	3	3										72	
2a.1.5.4	Condensate Control - Insulated		207	14	62	1,114			290	1,626	1,626					6,656				270,307	2,809	
2a.1.5.5	Condensate Control - Insulated		13	0	3	38			13	80	80					32				1,177	35	
2a.1.5.6	Condensate Control - Insulated		17	1	5	38			17	81	81					38				1,177	245	
2a.1.5.7	Condensate & Feedwater		987	183	329	3,337	2,464		1,431	8,731	8,731					10,917				1,275,810	14,196	
2a.1.5.8	Condensate & Feedwater - Insulated		492	34	63	690	468		343	2,038	2,038					4,176				246,683	6,904	
2a.1.5.9	Condensate Drain		515	30	51	600	329		316	1,840	1,840					3,345				109,936	7,018	
2a.1.5.10	Control Rod Drive		729	3	0	1,114	251		44	2,743	2,743					7,793				103,306	10,614	
2a.1.5.11	Control Rod Drive		3	0	0	3			2	9	9					19				1,009	41	
2a.1.5.12	Control Rod Drive Hydraulic		416	16	26	277	190		199	1,124	1,124					1,658				103,306	5,898	
2a.1.5.13	Core Spray - Insulated		79	20	51	734	176		184	1,244	1,244					4,384				211,329	1,163	
2a.1.5.14	Demin Water - Insulated		6	1	1	14	6		6	36	36					85				3,445	181	
2a.1.5.15	Demin Water - Insulated		15	0	1	14			17	104	104					253				10,278	508	
2a.1.5.16	Demin Water - Insulated		41	1	2	42			1	104	104					23				931	25	
2a.1.5.17	Dissolved Oil - RCA		2	0	0	4			2	1	1					0				28	5	
2a.1.5.18	EDG Energy Service Water - Insal - RCA		0	0	0	0			0	16	16					0				84	4	
2a.1.5.19	EDG Energy Service Water - Insal - RCA		0	0	0	0			2	15	15					1				84	4	
2a.1.5.20	Electrical - Clean		13	0	0	23			1	1	1					15					182	
2a.1.5.21	Emergency Service Water - Insal - RCA		21	0	1	23			9	55	55					137				5,544	281	
2a.1.5.22	Emergency Service Water - Insal - RCA		5	0	0	5			5	25	25					5				48	48	
2a.1.5.23	GEZIP - RCA		0	0	17	17			4	25	25					103				4,184	48	
2a.1.5.24	Generator Physical Design - RCA		5	0	0	5			2	12	12					31				1,250	67	
2a.1.5.25	H2-O2 Control Analyzing - Insulated		6	0	0	1	5		3	15	15					6				1,080	81	
2a.1.5.26	H2-O2 Control Analyzing - Insulated		6	0	0	1	5		3	15	15					6				1,080	81	
2a.1.5.27	High Pressure Coolant Injection - Insal		67	6	15	88	70		61	381	381					972				52,792	608	
2a.1.5.28	High Pressure Coolant Injection - Insal		219	14	24	267	163		141	830	830					1,298				95,733	3,079	
2a.1.5.29	Hydrogen Cooling - RCA		0	0	0	0			1	10	10					10					118	
2a.1.5.30	Hydrogen Cooling - RCA		17	0	0	32			0	67	67					99				7,690	212	
2a.1.5.31	Hydrogen Cooling - RCA		17	0	0	32			0	67	67					99				7,690	212	
2a.1.5.32	Hydrogen Water Chemistry - RCA		0	0	2	2			10	59	59					180				6,672	304	
2a.1.5.33	Instrument & Service Air - RCA		225	4	17	296			103	644	644					1,768				71,810	2,733	
2a.1.5.34	Main Condenser		196	17	39	325	39		122	1,032	1,032					2,768				85,139	2,749	
2a.1.5.35	Main Turbine		1,012	205	353	3,306	2,821		1,553	9,350	9,350					19,760				135,461	14,733	
2a.1.5.36	Main Turbine		214	18	37	423	225		180	1,097	1,097					2,300				148,208	3,069	
2a.1.5.37	Main Turbine - Insulated		13	0	0	51			19	115	115					392				12,283	622	
2a.1.5.38	Miscellaneous		18	1	32	51	37		10	74	74					1,365				100,933	5,385	
2a.1.5.39	Miscellaneous		13	1	22	35	27		197	1,100	1,100					709				4,318	345	
2a.1.5.40	Off Gas Recombiner - Insulated		25	1	1	9	11		11	58	58					17				316	212	
2a.1.5.41	Post Accident Sampling - Insulated		17	1	1	1	43		8	43	43					5				316	212	
2a.1.5.42	Post Accident Sampling - Insulated		94	0	0	2	8		4	10	10					35				1,142	1,142	
2a.1.5.43	RHR Service Water - RCA		0	0	0	0			2	12	12					1				14,100	773	
2a.1.5.44	RHR Service Water - RCA		0	0	0	0			28	155	155					96				14,100	773	
2a.1.5.45	Reactor Feedwater Pump Seal		56	2	4	32	33		28	155	155					96				14,100	773	

Monticello Nuclear Generating Plant  
Decommissioning Cost Analysis

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Table F  
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DECON Decommissioning Cost Estimate with 200 Years of Spent Fuel Storage  
(Thousands of 2020 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging	Transport	Off-Site Processing	LLRW Disposal	Other Contingency	Total	NRC Lic. Term. Costs	Spent Fuel Management	Site Restoration	Processed Volume	Class A	Class B	Burial Volumes			Burial/Processed	Utility and Contractor	
																Class A	Class B	Class C			Cu. Feet
Disposal of Plant Systems (continued)																					
24.1.5.46	Residual Heat Removal	362	252	172	178	1,072	2,061	962	5,049	5,049	5,049	0	6,406	6,012	0	0	0	647,941	4,135		
24.1.5.47	Residual Heat Removal - Insulated	622	554	61	82	663	880	72	3,555	3,555	3,555	0	3,577	2,697	0	0	0	305,087	10,460		
24.1.5.48	Rx Core Isolation Cooling - Insulated	5	5	4	5	4	67	52	287	287	287	0	298	198	0	0	0	24,419	1,479		
24.1.5.50	Rx Recirculation	56	58	6	4	65	30	61	258	258	258	0	43	190	0	0	14,085	1,580			
24.1.5.51	Submersibles	169	169	2	0	69	30	60	331	331	331	0	377	90	0	0	21,009	2,548			
24.1.5.52	Standby Liquid Control - RCA	0	26	1	2	41	0	13	83	83	83	0	245	0	0	0	9,969	341			
24.1.5.54	Starter Cooling - RCA	0	7	1	0	21	0	5	35	35	35	0	126	0	0	0	5,135	98			
24.1.5.55	Traversing Incore Probe	1,000	8,221	924	1,572	16,339	11,425	6,209	47,730	47,730	47,730	0	97,654	83,869	0	0	61,253,515	119,945			
24.1.5	Totals		2,205	22	12	191	31	607	3,127	3,127	3,127	0	1,030	91	0	0	62,111	22,561			
24.1	Subtotal Period 2a: Activity Costs	1,712	29,721	16,645	6,398	25,037	50,042	471,488	180,330	180,330	180,330	0	141,010	50,645	1,481	1,178	10,156,540	253,640	2,758		
Period 2a: Collateral Costs																					
24.3.1	Process decommissioning water waste	85	0	57	102	0	232	122	598	598	0	0	0	0	0	0	0	31,942	104		
24.3.2	Small residual chemical tank waste	5	0	216	702	0	1,619	49	3,275	3,275	0	0	0	0	0	0	0	223,006	392		
24.3.3	Spent Fuel Capital and Transfer	0	324	0	0	0	24,169	3,625	27,765	27,765	27,765	0	0	0	0	0	0	0	0		
24.3.5	Retention and Seepage	0	0	0	0	0	19,145	1,972	15,117	15,117	0	0	0	0	0	0	0	0	0		
24.3	Subtotal Period 2a: Collateral Costs	91	324	274	804	0	1,851	37,314	46,959	46,959	46,959	0	0	0	0	0	0	251,950	495		
Period 2a: Period-Dependent Costs																					
24.4.1	Decon supplies	112	0	0	0	0	140	28	140	140	0	0	0	0	0	0	0	0	0		
24.4.2	Insurance	0	0	0	0	0	1,119	438	4,821	4,821	0	0	0	0	0	0	0	0	0		
24.4.3	Health physics supplies	0	2,356	0	0	0	580	2,945	2,945	2,945	0	0	0	0	0	0	0	0	0		
24.4.4	Heavy equipment rental	0	3,627	0	0	0	544	4,171	4,171	4,171	0	0	0	0	0	0	0	0	0		
24.4.5	Disposal of DMW generated	0	0	110	57	0	2,501	334	2,758	2,758	0	0	0	0	0	0	0	11,023	181		
24.4.6	Emergency Planning	0	0	0	0	0	856	86	942	942	0	0	0	0	0	0	0	0	0		
24.4.7	Fixed Overhead	0	0	0	0	0	4,115	412	4,527	4,527	0	0	0	0	0	0	0	0	0		
24.4.8	RFSD Operating Costs	0	0	0	0	0	3,071	461	3,532	3,532	0	0	0	0	0	0	0	0	0		
24.4.9	RFSD Operating Costs	0	0	0	0	0	1,162	24	1,187	1,187	0	0	0	0	0	0	0	0	0		
24.4.10	Railroad Track Maintenance	0	0	0	0	0	181	27	208	208	0	0	0	0	0	0	0	0	0		
24.4.11	Remedial Actions Surveys	0	0	0	0	0	1,624	244	1,867	1,867	0	0	0	0	0	0	0	0	0		
24.4.12	DOC Staff Cost	0	0	0	0	0	21,021	3,153	24,174	24,174	0	0	0	0	0	0	0	0	0		
24.4.13	Utility Staff Cost	112	5,982	110	57	0	27,906	11,208	104,931	104,931	0	0	0	0	0	0	0	0	0		
24.4	Subtotal Period 2a: Period-Dependent Costs	195	36,028	19,028	7,239	25,037	52,350	127,987	388,230	388,230	388,230	0	141,010	67,722	1,481	1,178	10,824,250	254,317	984,002		
24.0	TOTAL PERIOD 2a: COST	1,905	30,049	16,845	6,398	25,037	50,042	471,488	180,330	180,330	180,330	0	141,010	50,645	1,481	1,178	10,156,540	253,640	2,758		
PERIOD 2b: Site Decommissionation																					
Period 2b: Direct Decommissionation Activities																					
Disposal of Plant Systems																					
25.1.1.1	LIBRARY/Geological	0	16	0	0	0	3	0	35	35	0	0	0	0	0	0	0	0	0		
25.1.1.2	ALCANTARA/RCA	16	0	0	1	6	0	7	40	40	0	0	35	10	0	0	0	6,450	677		
25.1.1.3	Decommissionation Projects	0	1	0	0	0	0	0	2	2	0	0	2	0	0	0	0	3,765	185		
25.1.1.4	Electrical - Contaminated	445	0	0	24	400	30	183	1,089	1,089	0	0	2,389	90	0	0	0	102,726	6,325		
25.1.1.5	Electrical - Decontaminated	2,698	0	218	3,068	0	0	1,288	8,167	8,167	0	0	23,314	0	0	0	0	9,801,513	37,107		
25.1.1.6	Facilities - Contaminated	305	0	7	6	446	34	156	975	975	0	0	2,655	100	0	0	0	114,568	4,311		
25.1.1.7	HVAC Ductwork	0	324	6	26	461	0	105	971	971	0	0	2,752	0	0	0	0	1,117,779	3,985		
25.1.1.8	HVAC Chilled Water - RCA	0	483	16	61	1,007	76	302	1,945	1,945	0	0	6,018	0	0	0	0	258,789	7,101		
25.1.1.9	Heating & Ventilation	687	0	0	0	0	0	703	3,188	3,188	0	0	3,073	128	0	0	0	235,484	17,194		
25.1.1.10	Liquid Refractory - Insulated - RCA	0	0	0	0	0	514	586	0	0	0	0	0	0	0	0	0	0	0		
25.1.1.11	Makeup Demin. - RCA	103	3	3	14	246	0	65	431	431	0	0	1,471	0	0	0	0	69,747	1,412		
25.1.1.12	Non-Essential Diesel Generator - RCA	27	0	0	0	0	0	1,424	327	327	0	0	0	0	0	0	0	55,852	395		
25.1.1.13	Non-Essential Diesel Generator	445	0	0	0	0	0	639	1,327	1,327	0	0	0	0	0	0	0	1,500	6,651		
25.1.1.14	Primary Containment	0	46	0	0	0	0	414	2,543	2,543	0	0	6,201	1,908	0	0	0	347,704	6,451		
25.1.1.15	Process Radiation Monitors	0	46	2	2	24	18	30	111	111	0	0	142	62	0	0	0	9,115	649		





**Monticello Nuclear Generating Plant  
 Decommissioning Cost Analysis**

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**Table F  
 Monticello Nuclear Generating Plant  
 DECON Decommissioning Cost Estimate with 200 Years of Spent Fuel Storage  
 (Thousands of 2020 Dollars)**

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Cost	Transport Cost	Off-Site Processing Cost	LLRW Disposal Cost	Other Contingency Cost	Total Contingency Cost	Total Cost	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet	Burial/Processed Mt. Dbs	Craft Manhours	Utility and Contractor Manhours
Period 20: Period-Dependent Costs (continued)																					
24.1.16	Security Staff Cost	-	-	-	-	-	-	15,025	2,380	18,314	18,314	-	-	-	-	-	-	-	-	-	238,949
24.1.17	Utility Staff Cost	-	-	-	-	-	-	10,172	2,216	12,388	12,388	-	-	-	-	-	-	-	-	-	101,679
24.1.18	Utility Staff Cost	-	-	-	-	-	-	10,691	2,388	13,079	13,079	-	-	-	-	-	-	-	-	-	101,679
24.1	Subtotal Period 20: Period-Dependent Costs	1,440	5,087	101	52	-	419	63,741	10,691	81,539	77,078	4,455	-	-	5,084	-	-	-	101,679	166	694,392
24.0	TOTAL PERIOD 20: COST	9,591	21,850	861	2,046	21,692	6,113	136,814	43,941	392,937	163,694	139,232	11	134,029	30,882	-	-	-	6,794,433	309,941	698,488
PERIOD 24 - Decontamination Following Wet Fuel Storage																					
Period 24: Direct Decommissioning Activities																					
24.1.1	Remove spent fuel casks	654	58	103	140	-	2,372	-	1,017	4,553	4,553	-	-	-	7,053	-	-	-	480,170	906	-
Disposal of Plant Systems																					
24.1.2.1	Cranes/Heavy Lifting/Rigging - RCA	-	3	0	1	17	-	-	4	25	25	-	-	103	-	-	-	-	4,184	-	48
24.1.2.2	Electrical - Decommissioning Fuel Pool Area	-	297	5	23	411	3	-	140	876	876	-	-	2,457	9	-	-	-	90,783	4,000	-
24.1.2.3	Fire - RCA - Fuel Pool Area	-	11	0	1	10	-	-	4	26	26	-	-	62	-	-	-	-	2,499	143	-
24.1.2.5	Fuel Pool Cooling & Cleanup	246	428	34	37	197	455	-	382	1,781	1,781	-	-	1,179	1,341	-	-	-	133,939	8,389	-
24.1.2.7	Insulated Fuel Pool Area	27	34	1	3	19	40	-	17	108	108	-	-	295	311	-	-	-	12,733	437	-
24.1.2.8	HVAC/Chilled Water - RCA Fuel Pool Area	-	33	0	2	37	-	-	14	87	87	-	-	223	-	-	-	-	9,072	397	-
24.1.2.9	Instrument & Service Air-RCA Fuel Pool	-	29	1	2	45	-	-	14	91	91	-	-	267	-	-	-	-	10,841	337	-
24.1.2	Totals	273	924	45	75	819	592	-	631	3,208	3,208	-	-	4,894	1,479	-	-	-	245,606	13,388	-
Decommissionation of Site Buildings																					
24.1.3.1	Reactor (Post Fuel)	946	2,599	172	913	329	10,216	-	3,880	10,006	10,006	-	-	1,969	62,698	-	-	-	2,732,106	45,703	-
24.1.3	Totals	946	2,599	172	913	329	10,216	-	3,880	10,006	10,006	-	-	1,969	62,698	-	-	-	2,732,106	45,703	-
24.1.4	Scaffolding in support of decommissioning	-	566	6	3	48	8	-	132	782	782	-	-	257	23	-	-	-	13,028	5,641	-
24.1	Subtotal Period 24: Activity Costs	1,872	4,147	326	1,139	1,196	13,298	-	5,690	27,659	27,659	-	-	7,120	71,822	-	-	-	3,325,210	67,035	-
Period 24: Additional Costs																					
24.2.1	License Termination Survey Planning	-	-	-	-	-	-	1,458	437	1,896	1,896	-	-	-	-	-	-	-	-	-	-
24.2	Subtotal Period 24: Additional Costs	-	-	-	-	-	-	1,458	437	1,896	1,896	-	-	-	-	-	-	-	-	-	-
Period 24: Collateral Costs																					
24.3.1	Process decommissioning water waste	79	-	54	96	-	220	-	114	563	563	-	-	-	504	-	-	-	30,239	98	-
24.3.2	Process decommissioning chemical flush waste	1	-	26	84	-	193	-	64	396	396	-	-	-	249	-	-	-	26,553	47	-
24.3.3	Decommissioning Equipment Disposition	-	91	-	130	82	1,112	178	237	1,739	1,739	-	-	6,000	529	-	-	-	303,608	147	-
24.3.5	Spent Fuel Capital and Transfer	-	-	-	-	-	-	27	4	32	32	-	-	-	-	-	-	-	-	-	-
24.3	Subtotal Period 24: Collateral Costs	80	91	210	292	1,112	590	27	432	2,805	2,773	32	-	6,000	1,282	-	-	-	390,400	292	-
Period 24: Period-Dependent Costs																					
24.4.1	Decon supplies	244	-	-	-	-	-	305	61	305	305	-	-	-	-	-	-	-	-	-	-
24.4.2	Insurance	-	-	-	-	-	-	583	83	666	666	-	-	-	-	-	-	-	-	-	-
24.4.3	Health physics supplies	-	-	-	-	-	-	1,062	292	1,354	1,354	-	-	-	-	-	-	-	-	-	-
24.4.5	Heavy equipment rental	-	1,936	-	-	-	-	2,227	290	2,227	2,227	-	-	-	-	-	-	-	-	-	-
24.4.6	Disposal of DAW generated	-	-	40	21	-	167	-	49	277	277	-	-	-	-	-	-	-	40,600	66	-
24.4.7	Site energy budget	-	-	-	-	-	-	42	62	104	104	-	-	-	-	-	-	-	-	-	-
24.4.8	NRC emergency planning	-	-	-	-	-	-	112	11	123	123	-	-	-	-	-	-	-	-	-	-
24.4.9	Emergency Planning Fees	-	-	-	-	-	-	1,507	239	1,836	1,836	-	-	-	-	-	-	-	-	-	-
24.4.10	Fixed Overhead	-	-	-	-	-	-	380	48	428	428	-	-	-	-	-	-	-	-	-	-
24.4.11	Special Materials Processing Equipment/Services	-	-	-	-	-	-	94	14	108	108	-	-	-	-	-	-	-	-	-	-
24.4.13	Railroad Track Maintenance	-	-	-	-	-	-	844	127	971	971	-	-	-	-	-	-	-	-	-	-
24.4.14	Remedial Actions Surveys	-	-	-	-	-	-	10,999	1,690	12,689	12,689	-	-	-	-	-	-	-	-	-	-
24.4.15	Security Staff Cost	-	-	-	-	-	-	10,052	1,598	11,650	11,650	-	-	-	-	-	-	-	-	-	-
24.4.17	Utility Staff Cost	-	-	-	-	-	-	10,052	1,598	11,650	11,650	-	-	-	-	-	-	-	-	-	-
24.4	Subtotal Period 24: Period-Dependent Costs	244	2,743	40	21	167	1,817	34,577	5,032	43,444	38,692	4,842	-	6,000	2,030	-	-	-	40,600	66	330,997
24.0	TOTAL PERIOD 24: COST	2,196	6,981	576	1,422	2,308	14,055	36,062	12,292	75,865	70,939	4,873	-	13,120	75,064	-	-	-	3,395,210	67,993	408,477

**Monticello Nuclear Generating Plant  
Decommissioning Cost Analysis**

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**Table F  
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DECON Decommissioning Cost Estimate with 200 Years of Spent Fuel Storage  
(Thousands of 2020 Dollars)**

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes			Burial/Processed Mt. Lbs.	Craft Manhours	Utility and Contractor Manhours	
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet				
<b>PERIOD 2f - License Termination</b>																					
Period 2f Direct Decommissioning Activities																					
2f1.1	NRC Decommissioning survey	-	-	-	-	-	-	-	50	216	216	-	-	-	-	-	-	-	-	-	-
2f1.2	Terminate license	-	-	-	-	-	-	-	50	216	216	-	-	-	-	-	-	-	-	-	-
2f1	Subtotal Period 2f Activity Costs	-	-	-	-	-	-	-	50	216	216	-	-	-	-	-	-	-	-	-	-
Period 2f Additional Costs																					
2f2.1	License Termination Survey	-	-	-	-	-	-	6,920	2,076	8,995	8,995	-	-	-	-	-	-	-	-	95,048	6,240
2f2	Subtotal Period 2f Additional Costs	-	-	-	-	-	-	6,920	2,076	8,995	8,995	-	-	-	-	-	-	-	-	95,048	6,240
Period 2f Collocated Costs																					
2f3.1	DOC staff relocation expenses	-	-	-	-	-	-	1,264	100	1,454	1,454	-	-	-	-	-	-	-	-	-	-
2f3.2	Spent Fuel Capital and Transfer	-	-	-	-	-	-	47	7	54	54	-	-	-	-	-	-	-	-	-	-
2f3	Subtotal Period 2f Collocated Costs	-	-	-	-	-	-	1,311	107	1,508	1,454	54	-	-	-	-	-	-	-	-	-
Period 2f Period-Dependent Costs																					
2f4.1	Insurance	-	-	-	-	-	-	530	83	583	583	-	-	-	-	-	-	-	-	-	-
2f4.2	Property taxes	-	-	-	-	-	-	1,471	147	1,618	1,618	-	-	-	-	-	-	-	-	-	-
2f4.3	Professional fees	-	-	-	-	-	-	177	53	230	230	-	-	-	-	-	-	-	-	-	-
2f4.4	Disposal of DAW equipment	-	-	-	-	-	-	29	9	48	48	-	-	-	-	-	-	-	-	-	-
2f4.5	Plant energy budget	-	-	-	-	-	-	274	41	315	315	-	-	-	-	-	-	-	-	-	-
2f4.6	NRC Fees	-	-	-	-	-	-	426	43	468	468	-	-	-	-	-	-	-	-	-	-
2f4.7	Emergency Planning Fees	-	-	-	-	-	-	1,022	122	1,182	1,182	-	-	-	-	-	-	-	-	-	-
2f4.8	ES/FS Planning Costs	-	-	-	-	-	-	1,200	230	1,826	1,826	-	-	-	-	-	-	-	-	-	-
2f4.9	ES/FS Operating Costs	-	-	-	-	-	-	84	13	97	97	-	-	-	-	-	-	-	-	-	-
2f4.10	Railroad Track Maintenance	-	-	-	-	-	-	94	14	108	108	-	-	-	-	-	-	-	-	-	-
2f4.11	DOC Staff Cost	-	-	-	-	-	-	10,980	1,090	12,070	12,070	-	-	-	-	-	-	-	-	-	-
2f4.12	DOC Staff Off Cost	-	-	-	-	-	-	5,360	536	5,896	5,896	-	-	-	-	-	-	-	-	-	-
2f4.13	Utility Staff Cost	-	-	-	-	-	-	5,752	864	6,629	6,629	-	-	-	-	-	-	-	-	-	-
2f4	Subtotal Period 2f Period-Dependent Costs	-	-	-	-	-	-	26,711	4,070	31,558	28,719	4,839	-	-	-	-	-	-	-	7,007	300,888
2f0	TOTAL PERIOD 2f COST	-	-	-	-	-	-	35,137	6,392	42,277	37,583	4,894	-	-	-	-	-	-	-	7,007	307,128
<b>PERIOD 2 TOTALS</b>																					
13,731		65,566	20,473	10,731	40,937	72,577	386,000	130,233	750,268	576,281	182,314	1,481	1,178	2,983,160	174,123	1,481	21,552,290	727,310	2,336,096	1,841	1,560
<b>PERIOD 3b - Site Restoration</b>																					
Period 3b Direct Decommissioning Activities																					
3b1.1.1	Demolition of Buildings	1,971	-	-	-	-	-	-	286	2,257	-	-	2,257	-	-	-	-	-	-	13,311	-
3b1.1.2	Reactor Building	10	-	-	-	-	-	-	1	11	-	-	11	-	-	-	-	-	-	50	-
3b1.1.3	Condensate Tanks Foundation	4	-	-	-	-	-	-	1	5	-	-	5	-	-	-	-	-	-	25	-
3b1.1.4	Discharge Retention Basin	16	-	-	-	-	-	-	2	18	-	-	18	-	-	-	-	-	-	177	-
3b1.1.5	Hot Shop	16	-	-	-	-	-	-	2	18	-	-	18	-	-	-	-	-	-	177	-
3b1.1.6	Hydrogen & Oxygen Storage	2	-	-	-	-	-	-	2	2	-	-	2	-	-	-	-	-	-	19	-
3b1.1.7	LLRW Storage & Shipping	83	-	-	-	-	-	-	12	95	-	-	95	-	-	-	-	-	-	682	-
3b1.1.8	LLRW Storage & Shipping	83	-	-	-	-	-	-	12	95	-	-	95	-	-	-	-	-	-	682	-
3b1.1.9	Misc Structures 2017	1,410	-	-	-	-	-	-	212	1,622	-	-	1,622	-	-	-	-	-	-	13,042	-
3b1.1.10	Office Stack	108	-	-	-	-	-	-	16	124	-	-	124	-	-	-	-	-	-	544	-
3b1.1.11	Office Storage & Compressor	39	-	-	-	-	-	-	6	45	-	-	45	-	-	-	-	-	-	189	-
3b1.1.12	Refrigerator	128	-	-	-	-	-	-	3	131	-	-	131	-	-	-	-	-	-	1,233	-
3b1.1.13	Refrigerator	128	-	-	-	-	-	-	3	131	-	-	131	-	-	-	-	-	-	1,233	-
3b1.1.14	Security Barrier	186	-	-	-	-	-	-	28	214	-	-	214	-	-	-	-	-	-	933	-
3b1.1.15	Structures Greater than 2' Below Grade	2,461	-	-	-	-	-	-	369	2,830	-	-	2,830	-	-	-	-	-	-	12,649	-
3b1.1.16	Tank Farm	1,255	-	-	-	-	-	-	180	1,435	-	-	1,435	-	-	-	-	-	-	13,026	-
3b1.1.17	Turbine Building Addition	55	-	-	-	-	-	-	8	63	-	-	63	-	-	-	-	-	-	618	-
3b1.1.18	Turbine Pedestal	182	-	-	-	-	-	-	27	209	-	-	209	-	-	-	-	-	-	926	-
3b1.1	Totals	8,169	-	-	-	-	-	-	1,225	9,394	-	-	9,394	-	-	-	-	-	-	58,885	-
Site Closeout Activities																					
3b1.2	Grade & Inadequate	806	-	-	-	-	-	-	134	1,031	-	-	1,031	-	-	-	-	-	-	1,841	-
3b1.3	Final report to NRC	200	-	-	-	-	-	-	200	200	-	-	200	-	-	-	-	-	-	60,726	-
3b1	Subtotal Period 3b Activity Costs	9,005	-	-	-	-	-	-	1,559	10,655	231	-	10,424	-	-	-	-	-	-	60,726	-

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 Monticello Nuclear Generating Plant  
 DECON Decommissioning Cost Estimate with 200 Years of Spent Fuel Storage  
 (Thousands of 2020 Dollars)**

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet	Burial/Processed Mt. Dbs.	Craft Manhours	Utility and Contractor Manhours
<b>Period 3a: Additional Costs</b>																					
3a.2.1	Clean Concrete Disposal	-	3,322	-	-	-	-	13	500	3,835	-	-	3,835	-	-	-	-	-	-	12	-
3a.2.2	Intake Structure Cofferdam	-	335	-	-	-	-	-	30	365	-	-	365	-	-	-	-	-	-	2,081	-
3a.2.3	Backfill	-	5,583	-	-	-	-	1,170	1,170	6,753	-	-	6,753	-	-	-	-	-	-	5,422	-
3a.2.4	Discharge Structure Cofferdam	-	442	-	-	-	-	-	66	508	-	-	508	-	-	-	-	-	-	3,352	-
3a.2.5	Disposition of Original MFC Containers	-	954	-	954	-	5,611	-	1,949	8,214	8,244	-	8,244	-	21,097	-	-	-	2,501,800	-	-
3a.2	Subtotal Period 3a: Additional Costs	-	9,692	-	954	-	5,611	1,183	3,629	20,733	8,244	-	12,485	-	21,097	-	-	-	2,501,800	-	-
<b>Period 3b: Collateral Costs</b>																					
3b.3.1	Small tool allowance	-	110	-	-	-	-	17	17	127	-	-	127	-	-	-	-	-	-	-	-
3b.3.2	Small tool allowance	-	110	-	-	-	-	100	100	227	-	-	227	-	-	-	-	-	-	-	-
3b.3	Subtotal Period 3b: Collateral Costs	-	220	-	-	-	-	117	117	454	-	-	454	-	-	-	-	-	-	-	-
<b>Period 3c: Period-Dependent Costs</b>																					
3c.4.2	Property taxes	-	-	-	-	-	-	1,200	192	1,392	1,912	-	1,912	-	-	-	-	-	-	-	-
3c.4.3	Heavy equipment rental	-	-	-	-	-	-	2,513	254	2,767	-	-	2,767	-	-	-	-	-	-	-	-
3c.4.4	Plant energy budget	-	5,842	-	-	-	-	315	47	362	-	-	362	-	-	-	-	-	-	-	-
3c.4.5	Site Insurance	-	-	-	-	-	-	382	382	764	-	-	764	-	-	-	-	-	-	-	-
3c.4.6	Emergency Planning Fees	-	-	-	-	-	-	257	36	293	-	-	293	-	-	-	-	-	-	-	-
3c.4.7	Fixed Overhead	-	-	-	-	-	-	1,122	168	1,290	420	-	1,710	-	-	-	-	-	-	-	-
3c.4.8	ISFSI Operating Costs	-	-	-	-	-	-	194	29	223	-	-	223	-	-	-	-	-	-	-	-
3c.4.9	ISFSI Maintenance	-	-	-	-	-	-	375	57	432	-	-	432	-	-	-	-	-	-	-	-
3c.4.10	Subtotal Period 3c: Period-Dependent Costs	-	5,842	-	954	-	5,611	3,117	3,788	20,117	2,400	-	23,517	-	-	-	-	-	-	-	375,132
3c.4.11	DOC Staff Cost	-	-	-	-	-	-	11,729	1,709	13,438	-	-	13,438	-	-	-	-	-	-	-	101,904
3c.4.12	Utility Staff Cost	-	-	-	-	-	-	7,148	1,072	8,220	-	-	8,220	-	-	-	-	-	-	-	122,646
3c.4	Subtotal Period 3c: Period-Dependent Costs	-	5,842	-	954	-	5,611	90,715	8,269	61,857	2,020	-	66,820	-	-	-	-	-	-	-	380,702
3c.0	TOTAL PERIOD 3c: COST	-	24,700	-	954	-	5,611	62,237	12,971	96,562	10,405	-	69,872	-	21,097	-	-	-	2,501,800	72,296	601,282
<b>Period 3c: Fuel Storage Operations/Shipping</b>																					
<b>Period 3c: Direct Decommissioning Activities</b>																					
<b>Period 3c: Collateral Costs</b>																					
3c.3	Subtotal Period 3c: Collateral Costs	-	-	-	-	-	-	1,852,263	237,834	1,823,397	-	-	1,823,397	-	-	-	-	-	-	-	-
<b>Period 3c: Period-Dependent Costs</b>																					
3c.4.2	Property taxes	-	-	-	-	-	-	135,800	19,586	155,386	-	-	155,386	-	-	-	-	-	-	-	-
3c.4.3	Plant energy budget	-	-	-	-	-	-	175,827	17,583	193,410	-	-	193,410	-	-	-	-	-	-	-	-
3c.4.4	NRC ISFSI Fees	-	-	-	-	-	-	41,009	4,100	45,209	-	-	45,209	-	-	-	-	-	-	-	-
3c.4.5	Site Insurance	-	-	-	-	-	-	41,007	4,100	45,207	-	-	45,207	-	-	-	-	-	-	-	-
3c.4.6	Emergency Planning Fees	-	-	-	-	-	-	4,007	421	4,428	-	-	4,428	-	-	-	-	-	-	-	-
3c.4.7	Fixed Overhead	-	-	-	-	-	-	3,243	324	3,567	-	-	3,567	-	-	-	-	-	-	-	-
3c.4.8	ISFSI Operating Costs	-	-	-	-	-	-	21,621	2,162	23,783	-	-	23,783	-	-	-	-	-	-	-	-
3c.4.9	ISFSI Maintenance	-	-	-	-	-	-	24,154	3,623	27,777	-	-	27,777	-	-	-	-	-	-	-	-
3c.4.10	Subtotal Period 3c: Period-Dependent Costs	-	-	-	-	-	-	303,616	30,362	333,978	-	-	333,978	-	-	-	-	-	-	-	-
3c.4.11	DOC Staff Cost	-	-	-	-	-	-	60,231	8,883	69,114	-	-	69,114	-	-	-	-	-	-	-	10,146,200
3c.4.12	Utility Staff Cost	-	-	-	-	-	-	383,061	55,339	424,420	-	-	424,420	-	-	-	-	-	-	-	401,782
3c.4	Subtotal Period 3c: Period-Dependent Costs	-	-	-	-	-	-	1,727,440	240,065	1,967,505	-	-	1,967,505	-	-	-	-	-	-	-	5,325,611
3c.0	TOTAL PERIOD 3c: COST	-	-	-	-	-	-	3,313,003	477,899	3,790,902	-	-	3,790,902	-	-	-	-	-	-	-	-
<b>Period 3d: GTCC shipping</b>																					
<b>Period 3d: Direct Decommissioning Activities</b>																					
<b>Nuclear Steam Supply System Removal</b>																					
3d.1.1	Vessel & Internals GTCC Disposal	-	-	1,083	-	-	4,313	-	918	6,314	6,314	-	6,314	-	-	-	-	1,100	225,705	-	-
3d.1	Subtotal Period 3d: Activity Costs	-	-	1,083	-	-	4,313	-	918	6,314	6,314	-	6,314	-	-	-	-	1,100	225,705	-	-
<b>Period 3d: Collateral Costs</b>																					
3d.1	Subtotal Period 3d: Collateral Costs	-	-	-	-	-	-	38	4	42	-	-	42	-	-	-	-	-	-	-	-
3d.3	Subtotal Period 3d: Collateral Costs	-	-	-	-	-	-	28	4	32	-	-	32	-	-	-	-	-	-	-	-

**Monticello Nuclear Generating Plant  
 Decommissioning Cost Analysis**

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**Table F  
 Monticello Nuclear Generating Plant  
 DECON Decommissioning Cost Estimate with 200 Years of Spent Fuel Storage  
 (Thousands of 2020 Dollars)**

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Cost	Transport Cost	Off-Site Processing Cost	LLRW Disposal Cost	Other Contingency Cost	Total Contingency Cost	Total	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes			Burial/Processed Mt. Lbs.	Craft Manhours	Utility and Contractor Manhours	
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet				
<b>Period 3d: Period-Dependent Costs</b>																					
3d4.1	Insurance	-	-	-	-	-	-	27	3	30	30	-	-	-	-	-	-	-	-	-	-
3d4.2	Property taxes	-	-	-	-	-	-	35	3	38	38	-	-	-	-	-	-	-	-	-	-
3d4.3	Plant energy budget	-	-	-	-	-	-	8	1	9	9	-	-	-	-	-	-	-	-	-	-
3d4.4	NRC ISFSI Fees	-	-	-	-	-	-	6	1	6	6	-	-	-	-	-	-	-	-	-	-
3d4.5	Emergency Planning Fees	-	-	-	-	-	-	8	1	9	9	-	-	-	-	-	-	-	-	-	-
3d4.6	Fixed Overhead	-	-	-	-	-	-	10	1	10	10	-	-	-	-	-	-	-	-	-	-
3d4.7	Railroad Track Maintenance	-	-	-	-	-	-	165	25	190	190	-	-	-	-	-	-	-	-	-	-
3d4.8	Security Staff Cost	-	-	-	-	-	-	39	6	45	45	-	-	-	-	-	-	-	-	-	2,074
3d4.9	Utility Staff Cost	-	-	-	-	-	-	293	40	333	318	-	-	-	-	-	-	-	-	-	-
3d4	Subtotal Period 3d: Period-Dependent Costs	-	-	1,083	-	-	4,313	320	902	6,078	6,632	47	-	-	-	-	1,100	225,705	-	-	2,613
3d0	TOTAL PERIOD 3d COST	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<b>PERIOD 3e - ISFSI Decontamination</b>																					
Period 3e Direct Decommissioning Activities																					
3e.1	Additional Costs	-	0	3	33	-	283	2,293	636	3,178	3,178	-	-	-	-	-	-	-	-	-	9,270
3e.2	Subtotal Period 3e: Additional Costs	-	0	3	33	-	283	2,223	636	3,178	3,178	-	-	-	-	-	-	-	-	-	-
Period 3e: Period-Dependent Costs																					
3e.1	Insurance	-	-	-	-	-	-	116	50	165	165	-	-	-	-	-	-	-	-	-	-
3e.2	Property taxes	-	-	-	-	-	-	246	32	278	278	-	-	-	-	-	-	-	-	-	-
3e.3	Plant energy budget	-	-	-	-	-	-	12	3	15	15	-	-	-	-	-	-	-	-	-	-
3e.4	Fixed Overhead	-	-	-	-	-	-	71	18	89	89	-	-	-	-	-	-	-	-	-	-
3e.5	Railroad Track Maintenance	-	-	-	-	-	-	11	2	13	13	-	-	-	-	-	-	-	-	-	-
3e.6	Security Staff Cost	-	-	-	-	-	-	351	88	439	422	-	-	-	-	-	-	-	-	-	-
3e.7	Utility Staff Cost	-	-	-	-	-	-	261	65	326	326	-	-	-	-	-	-	-	-	-	-
3e.4	Subtotal Period 3e: Period-Dependent Costs	-	-	-	-	-	-	1,105	276	1,381	1,381	-	-	-	-	-	-	-	-	-	-
3e.0	TOTAL PERIOD 3e COST	-	0	3	33	-	283	3,328	912	4,550	4,550	-	-	-	-	-	-	-	-	-	11,065
<b>PERIOD 3f - ISFSI Site Restoration</b>																					
Period 3f Direct Decommissioning Activities																					
3f.1	Additional Costs	-	1,864	-	-	-	293	324	324	2,480	2,480	-	-	-	-	-	-	-	-	-	-
3f.2	Subtotal Period 3f: Additional Costs	-	1,864	-	-	-	293	324	324	2,480	2,480	-	-	-	-	-	-	-	-	-	-
Period 3f: Collateral Costs																					
3f.1	Small tool allowance	-	13	-	-	-	-	2	2	15	15	-	-	-	-	-	-	-	-	-	-
3f.3	Subtotal Period 3f: Collateral Costs	-	13	-	-	-	-	2	2	15	15	-	-	-	-	-	-	-	-	-	-
Period 3f: Period-Dependent Costs																					
3f.2	Property taxes	-	-	-	-	-	-	126	13	138	138	-	-	-	-	-	-	-	-	-	-
3f.3	Heavy equipment rental	-	-	-	-	-	-	1	1	14	14	-	-	-	-	-	-	-	-	-	-
3f.4	Fixed Overhead	-	-	-	-	-	-	6	5	41	41	-	-	-	-	-	-	-	-	-	-
3f.5	Railroad Track Maintenance	-	-	-	-	-	-	36	5	41	41	-	-	-	-	-	-	-	-	-	-
3f.6	Security Staff Cost	-	-	-	-	-	-	21	2	24	24	-	-	-	-	-	-	-	-	-	-
3f.7	Utility Staff Cost	-	-	-	-	-	-	107	16	123	123	-	-	-	-	-	-	-	-	-	-
3f.8	Subtotal Period 3f: Period-Dependent Costs	-	-	-	-	-	-	197	36	233	233	-	-	-	-	-	-	-	-	-	-
3f.4	Subtotal Period 3f: Period-Dependent Costs	-	-	-	-	-	-	117	82	674	674	-	-	-	-	-	-	-	-	-	-
3f.0	TOTAL PERIOD 3f COST	-	1,993	-	-	-	768	408	408	3,169	3,169	-	-	-	-	-	-	-	-	-	8,713
<b>PERIOD 3 TOTALS</b>																					
TOTAL COST TO DECOMMISSION		17,263	56,603	21,839	11,878	43,952	84,322	3,922,317	648,801	4,882,175	776,400	4,000,648	74,127	288,203	197,266	1,711	1,178	24,478,380	851,855	263,760,320	16,760,910

**Monticello Nuclear Generating Plant  
 Decommissioning Cost Analysis**

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**Table F  
 Monticello Nuclear Generating Plant  
 DECON Decommissioning Cost Estimate with 200 Years of Spent Fuel Storage  
 (Thousands of 2020 Dollars)**

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs		Spent Fuel Management Costs		Site Restoration Costs		Processed Volume Cu. Feet	Burial Volumes			Utility and Contractor Manhours	
											Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet		GTCC Cu. Feet	Burial/Processed Mt. Lbs.	Craft Manhours	Manufacturer Manhours	
TOTAL COST TO DECOMMISSION WITH 15.43% CONTINGENCY:																						
	TOTAL NRC LICENSE TERMINATION COST IS 15.98% OR:				\$4,832,175	thousands of 2020 dollars																
	SPENT FUEL MANAGEMENT COST IS 82.49% OR:				\$776,400	thousands of 2020 dollars																
	NON-NUCLEAR DEMOLITION COST IS 1.53% OR:				\$4,001,648	thousands of 2020 dollars																
	TOTAL GREATER THAN CLASS C RADWASTE VOLUME BURIED (EXCLUDING GTCC):				\$74,127	thousands of 2020 dollars																
	TOTAL SCRAP METAL REMOVED:				200,105	Cubic Feet																
	TOTAL CRAFT LABOR REQUIREMENTS:				1,160	Cubic Feet																
					23,123	Tons																
					851,518	Man-hours																

Foot Notes:  
 n/a - indicates that this activity not charged as decommissioning expense  
 a - indicates that this activity performed by decommissioning staff  
 0 - indicates that this value is less than 0.5 but is non-zero  
 A cell containing "--" indicates a zero value

**Monticello Nuclear Generating Plant  
Decommissioning Cost Analysis – 70 Year Lifetime**

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**APPENDIX G**

**ISFSI DECOMMISSIONING**

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Monticello Nuclear Generating Plant – Scenarios 3 and 4 .....	G-3

Monticello Nuclear Generating Plant  
 Decommissioning Cost Analysis

**Table G-1**  
**Monticello Nuclear Generating Plant**  
**ISFSI Decommissioning Cost Estimate**  
**Scenarios 1 and 2**  
 (thousands of 2020 dollars)

Activity Description	Removal Costs	Packaging Costs	Transport Costs	LLRW Disposal Costs	Other Costs	Total Costs	Burial Volume Class A (cubic feet)	Craft Manhours	Oversight and Contractor Manhours
<b>Decommissioning Contractor</b>									
Planning (characterization, specs and procedures)	-	-	-	-	240	240	-	-	1,096
Decontamination (activated disposition)	57	188	987	5,925	-	7,157	21,949	366	-
License Termination (radiological surveys)	-	-	-	-	1,475	1,475	-	11,175	-
<b>Subtotal</b>	<b>57</b>	<b>188</b>	<b>987</b>	<b>5,925</b>	<b>1,715</b>	<b>8,872</b>	<b>21,949</b>	<b>11,541</b>	<b>1,096</b>
<b>Supporting Costs</b>									
NRC and NRC Contractor Fees and Costs	-	-	-	-	470	470	-	-	1,153
Insurance	-	-	-	-	118	118	-	-	-
Property taxes	-	-	-	-	249	249	-	-	-
Plant energy budget	-	-	-	-	12	12	-	-	-
Fixed Overhead	-	-	-	-	71	71	-	-	-
Railroad/Track Maintenance	-	-	-	-	41	41	-	-	-
Security Staff Cost	-	-	-	-	352	352	-	-	3,792
Utility Staff Cost	-	-	-	-	261	261	-	-	8,792
<b>Subtotal</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>1,575</b>	<b>1,575</b>	<b>-</b>	<b>-</b>	<b>13,737</b>
<b>Total (w/o contingency)</b>	<b>57</b>	<b>188</b>	<b>987</b>	<b>5,925</b>	<b>3,290</b>	<b>10,447</b>	<b>21,949</b>	<b>11,541</b>	<b>14,833</b>
<b>Total (w/25% contingency)</b>	<b>71</b>	<b>235</b>	<b>1,234</b>	<b>7,406</b>	<b>4,112</b>	<b>13,059</b>			

The application of contingency (25%) is consistent with the evaluation criteria referenced by the NRC in NUREG-1757 ("Consolidated Decommissioning Guidance, Financial Assurance, Recordkeeping, and Timeliness," U.S. NRC's Office of Nuclear Material Safety and Safeguards, NUREG-1757, Vol. 3, Rev. 1, February 2012)



**Table G-2**  
**Monticello Nuclear Generating Plant**  
**ISFSI Decommissioning Cost Estimate**  
**Scenarios 3 and 4**  
 (thousands of 2020 dollars)

Activity Description	Removal Costs	Packaging Costs	Transport Costs	LLRW Disposal Costs	Other Costs	Total Costs	Burial Volume Class A (cubic feet)	Craft Manhours	Oversight and Contractor Manhours
<b>Decommissioning Contractor</b>									
Planning (characterization, specs and procedures)	-	-	-	-	251	251	-	-	1,120
Decontamination (activated disposition)	0	3	33	283	-	320	848	29	-
License Termination (radiological surveys)	-	-	-	-	1,500	1,500	-	11,322	-
<b>Subtotal</b>	<b>0</b>	<b>3</b>	<b>33</b>	<b>283</b>	<b>1,751</b>	<b>2,071</b>	<b>848</b>	<b>11,351</b>	<b>1,120</b>
<b>Supporting Costs</b>									
NRC and NRC Contractor Fees and Costs	-	-	-	-	471	471	-	-	1,153
Insurance	-	-	-	-	118	118	-	-	-
Property taxes	-	-	-	-	249	249	-	-	-
Plant energy budget	-	-	-	-	12	12	-	-	-
Fixed Overhead	-	-	-	-	71	71	-	-	-
Railroad/Track Maintenance	-	-	-	-	41	41	-	-	-
Security Staff Cost	-	-	-	-	352	352	-	-	4,999
Utility Staff Cost	-	-	-	-	261	261	-	-	3,792
<b>Subtotal</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>1,576</b>	<b>1,576</b>	<b>-</b>	<b>-</b>	<b>9,945</b>
<b>Total (w/o contingency)</b>	<b>0</b>	<b>3</b>	<b>33</b>	<b>283</b>	<b>3,328</b>	<b>3,648</b>	<b>848</b>	<b>11,351</b>	<b>11,065</b>
<b>Total (w/25% contingency)</b>	<b>0</b>	<b>4</b>	<b>41</b>	<b>354</b>	<b>4,160</b>	<b>4,559</b>			

The application of contingency (25%) is consistent with the evaluation criteria referenced by the NRC in NUREG-1757 ("Consolidated Decommissioning Guidance, Financial Assurance, Recordkeeping, and Timeliness," U.S. NRC's Office of Nuclear Material Safety and Safeguards, NUREG-1757, Vol. 3, Rev. 1, February 2012)

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**DECOMMISSIONING COST ANALYSIS**  
**for the**  
**PRAIRIE ISLAND NUCLEAR GENERATING PLANT**



*prepared for*

**Xcel Energy**

*prepared by*

**TLG Services, LLC**  
Bridgewater, Connecticut

**October 2020**

***Prairie Island Nuclear Generating Plant  
Decommissioning Cost Analysis***

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**APPROVALS**

**Project Manager**

*Francis W. Seymore*      10/21/2020  
Francis W. Seymore      Date

**Project Engineer**

*Christopher R. Koriniskie*      10/21/2020  
Christopher R. Koriniskie      Date

**Technical Manager**

*Roderick W. Knight*      10/21/2020  
Roderick W. Knight      Date

***Prairie Island Nuclear Generating Plant  
 Decommissioning Cost Analysis***

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**REVISION LOG**

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Page viii of xxx*****EXECUTIVE SUMMARY**

This report presents estimates of the cost to decommission the Prairie Island Nuclear Generating Plant (Prairie Island) for the identified decommissioning scenarios following a cessation of plant operations and the operation and eventual decommissioning of the on-site Independent Spent Fuel Storage Installation (ISFSI). The estimates are designed to provide Xcel Energy with the information to assess its current decommissioning liability, as it relates to Prairie Island.

The analysis relies upon site-specific, technical information from an evaluation prepared in 2017, <sup>[1]</sup> updated to reflect current assumptions pertaining to the disposition of the nuclear plant and relevant industry experience in undertaking such projects. The costs are based on several key assumptions in areas of regulation, component characterization, high-level radioactive waste management, low-level radioactive waste disposal, performance uncertainties (contingency) and site restoration requirements.

While the analysis is not a detailed engineering evaluation, it represents the estimates prepared in advance of the detailed engineering required to carry out the decommissioning of the nuclear units. It may also not reflect the actual plan to decommission Prairie Island; the plan may differ from the assumptions made in this analysis based on facts that exist at the time of decommissioning.

The primary goal of the decommissioning is the removal and disposal of the contaminated systems and structures so that the plant's operating licenses can be terminated. The analysis recognizes that spent fuel will be stored at the site in the plant's storage pool and/or in an Independent Spent Fuel Storage Installation (ISFSI) until such time that it can be transferred to a Department of Energy (DOE) facility. Consequently, the estimates also include those costs to manage and subsequently decommission these storage facilities.

The current cost estimates assume that Prairie Island Unit 1 ceases operations in 2033, and 2034 for Unit 2. The cost estimates assume that the shutdown dates of the nuclear units are scheduled and pre-planned (i.e., there is no delay in transitioning the plant and workforce from operations or in obtaining regulatory relief from operating requirements, etc.). This estimate includes additional resources to support the engineering, planning, and licensing efforts for the station; this is done to support a decommissioning schedule similar to the prior estimate. The estimates include the continued operation of the auxiliary building as an interim wet fuel storage facility for

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<sup>1</sup> "Decommissioning Cost Analysis for the Prairie Island Nuclear Generating Plant," Document No. X01-1725-001, Rev. 0, TLG Services, Inc., October 2017

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approximately four years after operations cease. The spent fuel will remain in the ISFSI until the DOE is able to complete the transfer of the fuel to a federal facility (e.g., a monitored retrievable storage facility).<sup>[2]</sup> The estimates also include the dismantling of non-essential structures and limited restoration of the site.

The 2017 plant inventory, the basis for the decontamination and dismantling requirements and cost, and the decommissioning waste streams, was reviewed for this analysis. Over the three-year period between estimates the plant confirmed there were no substantive changes to the configuration of the plant or site facilities (that would significantly impact decommissioning).

The costs to decommission Prairie Island, for the scenarios evaluated, are tabulated at the end of this section. Costs are reported in 2020 dollars and include monies anticipated to be spent for radiological remediation and operating license termination, spent fuel management, and site restoration activities.

A complete discussion of the assumptions relied upon in this analysis is provided in Section 3, along with schedules of annual expenditures for each scenario. A sequence of significant project activities is provided in Section 4 along with a timeline for each scenario. Detailed cost reports used to generate the summary tables contained within this document are provided in Appendices C through J.

### Alternatives and Regulations

The ultimate objective of the decommissioning process is to reduce the inventory of contaminated and activated material so that the licenses can be terminated. The Nuclear Regulatory Commission (NRC or Commission) provided initial decommissioning requirements in its rule adopted on June 27, 1988.<sup>[3]</sup> In this rule, the NRC set forth technical and financial criteria for decommissioning licensed nuclear power facilities. The regulations addressed planning needs, timing, funding methods, and environmental review requirements for decommissioning. The rule also defined three decommissioning alternatives as being acceptable to the NRC: DECON, SAFSTOR, and ENTOMB.

DECON is defined as "the alternative in which the equipment, structures, and portions of a facility and site containing radioactive contaminants are

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<sup>2</sup> Projected expenditures for spent fuel management identified in the cost analysis do not consider any compensation for damages with regard to the delays incurred by Xcel Energy in the timely removal of spent fuel by the DOE.

<sup>3</sup> U.S. Code of Federal Regulations, Title 10, Parts 30, 40, 50, 51, 70 and 72, "General Requirements for Decommissioning Nuclear Facilities," Nuclear Regulatory Commission, 53 Fed. Reg. 24018, June 27, 1988

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removed or decontaminated to a level that permits the property to be released for unrestricted use shortly after cessation of operations."<sup>[4]</sup>

SAFSTOR is defined as "the alternative in which the nuclear facility is placed and maintained in a condition that allows the nuclear facility to be safely stored and subsequently decontaminated (deferred decontamination) to levels that permit release for unrestricted use."<sup>[5]</sup> Decommissioning is to be completed within 60 years, although longer time periods will be considered when necessary to protect public health and safety.

ENTOMB is defined as "the alternative in which radioactive contaminants are encased in a structurally long-lived material, such as concrete; the entombed structure is appropriately maintained and continued surveillance is carried out until the radioactivity decays to a level permitting unrestricted release of the property."<sup>[6]</sup> As with the SAFSTOR alternative, decommissioning is currently required to be completed within 60 years, although longer time periods will also be considered when necessary to protect public health and safety.

The 60-year restriction has limited the practicality for the ENTOMB alternative at commercial reactors that generate significant amounts of long-lived radioactive material. In 1997, the Commission directed its staff to re-evaluate this alternative and identify the technical requirements and regulatory actions that would be necessary for entombment to become a viable option. The resulting evaluation provided several recommendations, however, rulemaking has been deferred based upon several factors (e.g., no licensee has committed to pursuing the entombment option, the unresolved issues associated with the disposition of greater-than-Class C material (GTCC), and the NRC's current priorities) at least until after the additional research studies are complete. The Commission concurred with the staff's recommendation. In a draft regulatory basis document published in March 2017 in support of rulemaking that would amend NRC regulations concerning nuclear plant decommissioning, the NRC staff proposes removing any discussion of the ENTOMB option from existing guidance documents since the method is not deemed practically feasible.

In 1996, the NRC published revisions to its general requirements for decommissioning nuclear power plants to clarify ambiguities and codify procedures and terminology as a

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<sup>4</sup> Ibid. Page FR24022, Column 3

<sup>5</sup> Ibid.

<sup>6</sup> Ibid. Page FR24023, Column 2

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means of enhancing efficiency and uniformity in the decommissioning process.<sup>[7]</sup> The amendments allow for greater public participation and better define the transition process from operations to decommissioning. Regulatory Guide 1.184 Revision 1, issued in October 2013, further described the methods and procedures that are acceptable to the NRC staff for implementing the requirements of the 1996 revised rule that relate to the initial activities and the major phases of the decommissioning process. The costs and schedules presented in this analysis follow the general guidance and sequence in the amended regulations. The format and content of the estimates is also consistent with the recommendations of Regulatory Guide 1.202, issued February 2005.<sup>[8]</sup>

In 2011, the NRC published amended regulations to improve decommissioning planning and thereby reduce the likelihood that any current operating facility will become a legacy site.<sup>[9]</sup> The regulations require licensees to report additional details in their decommissioning cost estimate, including a decommissioning estimate for the ISFSI. This estimate is provided in Appendix K.

**Decommissioning Scenarios**

The following scenarios were evaluated and are intended to bound the liability associated with the removal of spent fuel from the site. The current operating licenses expire in 2033 and 2034 for Units 1 and 2, respectively. The scenarios consist of four spent fuel management scenarios, each with a DECON and a SAFSTOR decommissioning alternative for eight total scenarios. The duration of the spent fuel scenarios has little impact to the decommissioning costs and timing of the power block systems and structures. The spent fuel in the plant's spent fuel storage pool is transferred to the ISFSI within the first four years. The equipment, structures, and portions of the plant containing radioactive contaminants are removed or decontaminated to a level that permits the facility to be released for unrestricted use. Remaining site structures are then demolished. Spent fuel storage operations continue at the ISFSI until the transfer of the fuel to the DOE is completed (as shown in the "Last Spent Fuel Assembly" column in the following table).

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<sup>7</sup> U.S. Code of Federal Regulations, Title 10, Parts 2, 50 and 51, "Decommissioning of Nuclear Power Reactors," Nuclear Regulatory Commission, 61 Fed. Reg. 39278, July 29, 1996

<sup>8</sup> "Standard Format and Content of Decommissioning Cost Estimates for Nuclear Power Reactors," Regulatory Guide 1.202, Nuclear Regulatory Commission, February 2005

<sup>9</sup> U.S. Code of Federal Regulations, Title 10, Parts 20, 30, 40, 50, 70, and 72, "Decommissioning Planning," Nuclear Regulatory Commission, Federal Register Volume 76, (p 35512 et seq.), June 17, 2011

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Scenario	1 <sup>st</sup> Spent Fuel Canister Replacement	1 <sup>st</sup> Spent Fuel Assembly Removed from Prairie Island	Last Spent Fuel Assembly Removed from Prairie Island	Scenario Identification
1	n/a	2037	2074	DECON with 42 Year DFS <sup>+</sup>
2	n/a	2053	2077	DECON with 60 Year DFS
3	2045	2093	2117	DECON with 100 Year DFS
4	2045	2193	2217	DECON with 200 Year DFS
5	n/a	2037	2074	SAFSTOR with 42 Year DFS
6	n/a	2053	2077	SAFSTOR with 60 Year DFS
7	2045	2093	2117	SAFSTOR with 100 Year DFS
8	2045	2193	2217	SAFSTOR with 200 Year DFS

+ Dry Fuel Storage

For Scenarios 1 and 5, although they only provide a total fuel storage period of 42 years following Unit 2 shutdown, some of the Prairie Island casks have been in storage since 1995. Xcel Energy directed TLG Services to not include the cost of transferring the spent fuel in dry storage to new canisters for those casks that exceed 50 years. The assumption to not transfer spent fuel at 50-years total storage duration for these two scenarios was premised on the likelihood that the life of the canisters could be successfully extended for the additional years.

For Scenarios 2 and 6, although they provide a total fuel storage period of nominally 60 years following shutdown, Xcel Energy directed TLG Services to not include the cost of transferring the spent fuel in dry storage to new canisters at the 50-year mark.

In Scenarios 3, 4, 7 and 8, the Dry Shielded Canisters (DSCs) are assumed to be replaced after fifty years of use. Since the auxiliary building spent fuel storage pool and fuel handling facilities are removed by the year 2037, a dry fuel transfer facility is assumed to be constructed on site to perform the transfers from the old to the new DSCs. For Scenarios 3 and 7, two such transfers are needed over the time frame assumed. For Scenarios 4 and 8, the spent fuel will be transferred four times following initial placement in the ISFSI.

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Page xiii of xxx*****Methodology**

The methodology used to develop the estimates follows the basic approach originally presented in the cost estimating guidelines <sup>[10]</sup> developed by the Atomic Industrial Forum (now Nuclear Energy Institute). This reference describes a unit cost factor method for estimating decommissioning activity costs. The unit cost factors used in this analysis incorporate site-specific costs and the latest available information about worker productivity in decommissioning.

An activity duration critical path is used to determine the total decommissioning program schedule. This is required for calculating the carrying costs, which include program management, administration, field engineering, equipment rental, quality assurance, and security. This systematic approach for assembling decommissioning estimates ensures a high degree of confidence in the reliability of the resulting costs.

The estimates also reflect lessons learned from TLG's involvement in the Shippingport Station Decommissioning Project, completed in 1989, as well as the decommissioning of the Cintichem reactor, hot cells and associated facilities, completed in 1997. In addition, the planning and engineering for the Rancho Seco, Trojan, Yankee Rowe, Big Rock Point, Maine Yankee, Humboldt Bay-3, Oyster Creek, Connecticut Yankee, Crystal River, Vermont Yankee, Fort Calhoun, Pilgrim, and Indian Point nuclear units have provided additional insight into the process, the regulatory aspects, and the technical challenges of decommissioning commercial nuclear units.

**Contingency**

Consistent with cost estimating practice, contingencies are applied to the decontamination and dismantling costs developed as "specific provision for unforeseeable elements of cost within the defined project scope, particularly important where previous experience relating estimates and actual costs has shown that unforeseeable events which will increase costs are likely to occur."<sup>[11]</sup> The cost elements in the estimates are based on ideal conditions; therefore, the types of unforeseeable events that are almost certain to occur in decommissioning, based on industry experience, are addressed through a percentage contingency applied on a line-item basis. This contingency factor is a nearly universal element in all large-scale construction and demolition projects. It should be noted that contingency, as used in this analysis, does not account for price escalation and inflation in the cost of

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<sup>10</sup> T.S. LaGuardia et al., "Guidelines for Producing Commercial Nuclear Power Plant Decommissioning Cost Estimates," AIF/NESP-036, May 1986

<sup>11</sup> Project and Cost Engineers' Handbook, Second Edition, American Association of Cost Engineers, Marcel Dekker, Inc., New York, New York, p. 239

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decommissioning over the remaining operating life of the station, or duration of the decommissioning program and dry fuel storage period.

Contingency funds are expected to be fully expended throughout the program. As such, inclusion of contingency is necessary to provide assurance that sufficient funding will be available to accomplish the intended tasks.

**Low-Level Radioactive Waste Disposal**

The contaminated and neutron-activated material generated in the decontamination and dismantling of a commercial nuclear reactor is classified as low-level (radioactive) waste, although not all of the material is suitable for “shallow-land” disposal. With the passage of the “Low-Level Radioactive Waste Policy Act” in 1980, <sup>[12]</sup> and its Amendments of 1985, <sup>[13]</sup> the states became ultimately responsible for the disposition of low-level radioactive waste generated within their own borders. It was expected that groups of states would combine together to jointly deal with their radioactive wastes; these organizations are referred to as waste disposal compacts.

With the exception of Texas, no new compact facilities have been successfully sited, licensed, and constructed. The Texas Compact disposal facility is now operational and waste is being accepted from generators within the Compact by the operator, Waste Control Specialists (WCS). The facility is also able to accept limited quantities of non-Compact waste.

Disposition of the various waste streams produced by the decommissioning process considered all options and services currently available to Xcel Energy. The majority of the low-level radioactive waste designated for direct disposal (Class A <sup>[14]</sup>) can be sent to EnergySolutions’ facility in Clive, Utah. Therefore, disposal costs for Class A waste were based upon current contract rates. This facility is not licensed to receive the higher activity portion of the decommissioning waste stream (Classes B and C resins and activated metal from the reactor vessel<sup>[15]</sup>).

The Texas facility is licensed to receive the higher activity waste forms (Classes B and C). As such, for this analysis, disposal costs for the Class B and C waste were based upon the Xcel-provided information on the cost for such from WCS.

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<sup>12</sup> “Low-Level Radioactive Waste Policy Act,” Public Law 96-573, 1980

<sup>13</sup> “Low-Level Radioactive Waste Policy Amendments Act of 1985,” Public Law 99-240, 1986

<sup>14</sup> Waste is classified in accordance with U.S. Code of Federal Regulations, Title 10, Part 61.55

<sup>15</sup> U.S. Code of Federal Regulations, Title 10, Part 61, “Licensing Requirements for Land Disposal of Radioactive Waste”

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The dismantling of the components residing closest to the reactor core generates radioactive waste considered unsuitable for shallow-land disposal (i.e., low-level radioactive waste with concentrations of radionuclides that exceed the limits established by the NRC for Class C radioactive waste (GTCC)). The Low-Level Radioactive Waste Policy Amendments Act of 1985 assigned the federal government the responsibility for the disposal of this material. The Act also stated that the beneficiaries of the activities resulting in the generation of such radioactive waste bear all reasonable costs of disposing of such waste.

The DOE issued its final Environmental Impact Statement for the disposal of GTCC on January 2016.<sup>[16]</sup> The study evaluated the potential environmental impacts associated with constructing and operating a new facility or using an existing facility, disposal methods, and locations. DOE is awaiting Congressional action on the report and its recommendations. At this time, the federal government has not identified a specific cost for disposing of GTCC or a schedule for acceptance.

For purposes of this analysis, the GTCC radioactive waste is assumed to be packaged and disposed of in a similar manner as high-level waste and at a cost equivalent to that envisioned for the spent fuel. The GTCC is packaged in the same canisters used for spent fuel and either stored on site or shipped directly to a DOE facility as it is generated (depending upon the timing of the decommissioning and whether the spent fuel has been removed from the site prior to the start of physical decommissioning).

A significant portion of the waste material generated during decommissioning may only be potentially contaminated by radioactive materials. This waste can be analyzed on site or shipped off site to licensed facilities for further analysis, for processing and/or for conditioning/recovery. Reduction in the volume of low-level radioactive waste requiring disposal in a licensed low-level radioactive waste disposal facility can be accomplished through a variety of methods, including analyses and surveys or decontamination to isolate the portion of waste that does not require disposal as radioactive waste, compaction, incineration or metal melt. The estimates reflect the savings from waste recovery/volume reduction.

### High-Level Radioactive Waste Management

Congress passed the “Nuclear Waste Policy Act” <sup>[17]</sup> (NWPA) in 1982, assigning the federal government’s long-standing responsibility for disposal of the spent nuclear fuel created by the commercial nuclear generating plants to the DOE. The DOE was to

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<sup>16</sup> “Final Environmental Impact Statement for the Disposal of Greater-Than-Class C (GTCC) Low-Level Radioactive Waste and GTCC-Like Waste (DOE/EIS-0375),” January 2016

<sup>17</sup> “Nuclear Waste Policy Act of 1982 and Amendments,” DOE’s Office of Civilian Radioactive Management, 1982



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begin accepting spent fuel by January 31, 1998; however, to date no progress in the removal of spent fuel from commercial generating sites has been made.

Today, the country is at an impasse on high-level waste disposal, even with the License Application for a geologic repository submitted by the DOE to the NRC in 2008. The Obama administration cut the budget for the repository program while promising to “conduct a comprehensive review of policies for managing the back end of the nuclear fuel cycle ... and make recommendations for a new plan.”<sup>[18]</sup> Towards this goal, the administration appointed a Blue Ribbon Commission on America’s Nuclear Future (Blue Ribbon Commission) to make recommendations for a new plan for nuclear waste disposal. The Blue Ribbon Commission’s charter includes a requirement that it consider “[o]ptions for safe storage of used nuclear fuel while final disposition pathways are selected and deployed.”<sup>[19]</sup>

On January 26, 2012, the Blue Ribbon Commission issued its “Report to the Secretary of Energy” containing a number of recommendations on nuclear waste disposal. Two of the recommendations that may impact decommissioning planning are:

- “[T]he United States [should] establish a program that leads to the timely development of one or more consolidated storage facilities”<sup>[20]</sup>
- “[T]he United States should undertake an integrated nuclear waste management program that leads to the timely development of one or more permanent deep geological facilities for the safe disposal of spent fuel and high-level nuclear waste.”<sup>[21]</sup>

In January 2013, the DOE issued the “Strategy for the Management and Disposal of Used Nuclear Fuel and High-Level Radioactive Waste,” in response to the recommendations made by the Blue Ribbon Commission and as “a framework for moving toward a sustainable program to deploy an integrated system capable of transporting, storing, and disposing of used nuclear fuel...”<sup>[22]</sup> This document states:

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<sup>18</sup> Blue Ribbon Commission on America’s Nuclear Future’s Charter, <http://cybercemetery.unt.edu/archive/brc/20120620215336/http://brc.gov/index.php?q=page/charter>

<sup>19</sup> *Ibid.*

<sup>20</sup> “Blue Ribbon Commission on America’s Nuclear Future, Report to the Secretary of Energy,” p. 32, January 2012

<sup>21</sup> *Ibid.*, p.27

<sup>22</sup> “Strategy for the Management and Disposal of Used Nuclear Fuel and High-Level Radioactive Waste,” U.S. DOE, January 11, 2013

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“With the appropriate authorizations from Congress, the Obama Administration planned to implement a program over the next 10 years that would have:

- Sites, designs and licenses, constructs and begins operations of a pilot interim storage facility by 2021 with an initial focus on accepting used nuclear fuel from shut-down reactor sites;
- Advances toward the siting and licensing of a larger interim storage facility to be available by 2025 that will have sufficient capacity to provide flexibility in the waste management system and allows for acceptance of enough used nuclear fuel to reduce expected government liabilities; and
- Makes demonstrable progress on the siting and characterization of repository sites to facilitate the availability of a geologic repository by 2048.”<sup>[23]</sup>

The NRC’s review of DOE’s license application to construct a geologic repository at Yucca Mountain was suspended in 2011 when the Obama Administration significantly reduced the budget for completing that work. However, the US Court of Appeals for the District of Columbia Circuit issued a writ of mandamus (in August 2013) <sup>[24]</sup> ordering NRC to comply with federal law and restart its review of DOE’s Yucca Mountain repository license application to the extent of previously appropriated funding for the review. That review is now complete with the publication of the five-volume safety evaluation report. A supplement to DOE’s environmental impact statement and an adjudicatory hearing on the contentions filed by interested parties must be completed before a licensing decision can be made. Although the DOE proposed it would start fuel acceptance in 2025, no progress has been made in the repository program since DOE’s 2013 strategy was issued except for the completion of the Yucca Mountain safety evaluation report.

Holtec International submitted a license application to the NRC on March 30, 2017 for a consolidated interim spent fuel storage facility in southeast New Mexico called HI-STORE CIS (Consolidated Interim Storage) under the provisions of 10 CFR Part 72. The application is currently under NRC review.

A centralized interim storage project was initiated by Waste Control Specialists (WCS) for a site in Andrews County, Texas, adjacent to WCS’s existing low-level radioactive waste and hazardous waste storage and disposal facilities. The NRC license application for this project was filed in April 2016. In April 2017, WCS

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<sup>23</sup> *Ibid.*, p.2

<sup>24</sup> United States Court of Appeals for the District Of Columbia Circuit, In Re: Aiken County, et al, August 2013

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asked the NRC to suspend the review of this application. Subsequently, WCS and Orano USA (formerly Areva Nuclear Materials) formed a joint venture to license the facility. In response to letters to the NRC in June and July 2018 from the joint venture, Interim Storage Partners, the NRC restarted its review of the application

On May 10, 2018, the U.S. House of Representatives passed H.R. 3053, the “Nuclear Waste Policy Amendments Act of 2018.” Proposed to amend the Nuclear Waste Policy Act of 1982, the legislation, if approved by the Senate and signed by the President, would provide the DOE the authority to site, construct, and operate one or more Monitored Retrieval Storage (MRS) facilities while a permanent repository is licensed and constructed and/or to enter into an MRS agreement with a non-Federal entity for temporary storage.

Completion of the decommissioning process is dependent upon the DOE’s ability to remove spent fuel from the site in a timely manner. DOE’s repository program had originally assumed that spent fuel allocations would be accepted for disposal from the nation’s commercial nuclear plants, with limited exceptions, in the order (the “queue”) in which it was discharged from the reactor.<sup>[25]</sup> However, the Blue Ribbon Commission, in its final report, noted that: “[A]ccepting spent fuel according to the OFF [Oldest Fuel First] priority ranking instead of giving priority to shutdown reactor sites could greatly reduce the cost savings that could be achieved through consolidated storage if priority could be given to accepting spent fuel from shutdown reactor sites before accepting fuel from still-operating plants. .... The magnitude of the cost savings that could be achieved by giving priority to shutdown sites appears to be large enough (i.e., in the billions of dollars) to warrant DOE exercising its right under the Standard Contract to move this fuel first.”

The state of Minnesota directed the Public Utilities Commission, “when considering approval of a plan for the accrual of funds for the decommissioning of nuclear facilities” ...to “include an evaluation of the costs, if any, arising from storage of used nuclear fuel that may be incurred by the state of Minnesota, and any tribal community, county, city, or township where used nuclear fuel is located following the cessation of operations at a nuclear plant.”<sup>[26]</sup>

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<sup>25</sup> U.S. Code of Federal Regulations, Title 10, Part 961.11, Article IV – Responsibilities of the Parties, B. DOE Responsibilities, 5.(a) ... DOE shall issue an annual acceptance priority ranking for receipt of SNF and/or HLW at the DOE repository. This priority ranking shall be based on the age of SNF and/or HLW as calculated from the date of discharge of such materials from the civilian nuclear power reactor. The oldest fuel or waste will have the highest priority for acceptance ...”

<sup>26</sup> Minnesota Statute 216B.2445, “Nuclear Power Plant Decommissioning and Storage of Used Nuclear Fuel”

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The state of Minnesota statute also prescribed the parameters to be used in evaluating spent fuel management costs. “To assist the commission in making the determination ... the filing shall provide cost estimates, including ratepayer impacts, assuming used nuclear fuel will be stored in the state for 60 years, 100 years, and 200 years following the cessation of operation of the nuclear plant.”<sup>[27]</sup>

Xcel Energy’s current spent fuel management plan for the Prairie Island spent fuel is based in general upon:

- 1) Fuel transferred from the pool to the ISFSI within 4 years of shutdown;
- 2) Exchange of Prairie Island and Monticello spent fuel acceptance rights to best manage the overall cost of spent fuel storage for both plants;
- 3) Fuel will be shipped in the existing Transnuclear TN-40 casks, plus NUHOMS DSCs for fuel removed after final plant shutdown (Scenarios 1, 2, 5, and 6); the canisters and NUHOMS are periodically replaced in Scenarios 3, 4, 7 and 8. Spent fuel assemblies from TN-40 casks that are replaced will be put into NUHOMS DSCs. Canisters that are unloaded in the spent fuel transfer operation will be surveyed for neutron activation.
- 4) As an allowance, some of these canisters and NUHOMS modules from the first off-load operation are assumed to be mildly neutron activated and therefore must be disposed of as radioactive waste.
- 5) For the 100 and 200 year dry fuel storage scenarios (Scenarios 3, 4, 7 and 8) the canisters and casks will be replaced on a 50 year schedule using a dry transfer facility.<sup>[28]</sup>

The NRC requires that licensees establish a program to manage and provide funding for the caretaking of all irradiated fuel at the reactor site until title of the fuel is transferred to the Secretary of Energy, pursuant to 10 CFR Part 50.54(bb).<sup>[29]</sup> This requirement is prepared for through inclusion of certain cost elements in the decommissioning estimates, for example, associated with the isolation and continued operation of the spent fuel pool and the ISFSI.

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<sup>27</sup> *Ibid.*

<sup>28</sup> “Order Approving Nuclear Decommissioning Study, Assumptions, and Annual Accrual, and Setting Filing Requirements”, Page 8, Items 12e and 12g, Minnesota Public Utilities Commission Docket E-002/M-14-761 October 4, 2015

<sup>29</sup> U.S. Code of Federal Regulations, Title 10, Part 50, “Domestic Licensing of Production and Utilization Facilities,” Subpart 54 (bb), “Conditions of Licenses”

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The spent fuel pool is expected to contain freshly discharged assemblies (from the most recent refueling cycles) as well as the final reactor cores at shutdown. The assemblies are packaged into dry shielded canisters (DSCs) over the first four years after shutdown for transfer to the ISFSI for interim storage. It is assumed that this period provides the necessary cooling for the final cores to meet the transport and/or storage requirements for decay heat.

An ISFSI, operated under a Part 72 Site Specific License (in accordance with 10 CFR 72<sup>(30)</sup>), has been constructed to support continued plant operations. The facility is assumed to be expanded to support decommissioning. This will allow decommissioning activities to proceed within the auxiliary building.

DOE has breached its obligations to remove fuel from reactor sites, and has also failed to provide the plant owners with information about how it will ultimately perform. DOE officials have stated that DOE does not have an obligation to accept already-canistered fuel without an amendment to DOE's contracts with plant licensees to remove the fuel (the "Standard Contract"), but DOE has not explained what any such amendment would involve. Consequently, Xcel Energy has no information or expectations on how DOE will remove fuel from the site in the future. In the absence of information about how DOE will perform, and for purposes of this analysis only, it is assumed that DOE will accept already-canistered fuel. If this assumption is incorrect, it is assumed that DOE will have liability for costs incurred to transfer the fuel to DOE-supplied containers.

Xcel Energy's position is that the DOE has a contractual obligation to accept Prairie Island's fuel earlier than the projections set out above consistent with its contract commitments. No assumption made in this study should be interpreted to be inconsistent with this claim. However, including the cost of storing spent fuel in this study is appropriate to ensure the availability of sufficient decommissioning funds at the end of the station's life if the DOE has not met its obligation. The cost for the interim storage of spent fuel has been calculated and is separately presented as "Spent Fuel Management" expenditures in this report.

**Site Restoration**

The efficient removal of the contaminated materials at the site may result in damage to many of the site structures. Blasting, coring, drilling, and the other decontamination activities can substantially damage power block structures, potentially weakening the footings and structural supports. It is unreasonable to anticipate that these structures would be repaired and preserved after the radiological contamination is removed. The cost to dismantle site structures with a

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<sup>30</sup> U.S. Code of Federal Regulations, Title 10, Part 72.40

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work force already mobilized is more efficient and less costly than if the process were deferred. Experience at shutdown generating stations has shown that plant facilities quickly degrade without maintenance, adding additional expense and creating potential hazards to the public and the demolition work force.

This estimate assumes that some site features will remain following the decommissioning project. These include the existing electrical switchyard, which is assumed to remain functional in support of the regional electrical distribution system. The existing shoreline will also be left intact.

Consequently, non-essential site structures addressed by this analysis are completely removed (including foundations) as required by Minnesota statute <sup>[31]</sup>. The site is then graded and stabilized. The cost for the site restoration of non-essential and/or non-contaminated structures has been calculated and is separately presented as "Site Restoration" expenditures in this report.

### Summary

The costs to decommission the Prairie Island station were evaluated for several spent fuel removal scenarios, and using both the DECON and SAFSTOR decommissioning alternatives. Regardless of the timing of the decommissioning activities, the estimates to decommission Prairie Island assume the removal of all contaminated and activated plant components and structural materials such that Xcel Energy may then have unrestricted use of the site with no further requirements for any operating license. In most of the scenarios, spent fuel remains on site following the decommissioning and site restoration of the power block structures. The spent fuel remains in storage at the site until such time that the transfer to a DOE facility can be completed. Once the transfer is complete, the storage facilities are also decommissioned.

The alternatives evaluated in this analysis are described in Section 2. The assumptions are presented in Section 3, along with schedules of annual expenditures. The major cost contributors are identified in Section 6, with detailed activity costs, waste volumes, and associated manpower requirements delineated in Appendices C through J. The major cost components are also identified in the cost summary provided at the end of this section.

The estimates presented in this document reflect the total cost to decontaminate the nuclear units, manage the spent fuel until the DOE is able to complete the transfer to a federal facility, dismantle the plant and restore the site for alternative use.

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<sup>31</sup> Minnesota Administrative Rule part 7035.0400 "General Requirements"

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The cost elements in the estimates for the four spent fuel scenarios DECON and SAFSTOR alternatives are assigned to one of three subcategories: NRC License Termination (radiological remediation), Spent Fuel Management, and Site Restoration. The subcategory “NRC License Termination” is used to accumulate costs that are consistent with “decommissioning” as defined by the NRC in its financial assurance regulations (i.e., 10 CFR §50.75). The cost reported for this subcategory is generally sufficient to terminate the unit’s operating license, recognizing that there may be some additional cost impact from spent fuel management. The License Termination cost subcategory also includes costs to decommission the ISFSI (as required by 10 CFR §72.30). Section 3.4.1 provides the basis for the ISFSI decommissioning cost.

The “Spent Fuel Management” subcategory contains costs associated with the containerization and transfer of spent fuel from the wet storage pool to the ISFSI, as well as the transfer of the spent fuel in storage at the ISFSI to the DOE. Costs are included for the operation of the storage pool and the management of the ISFSI until such time that the transfer is complete. It does not include any spent fuel management expenses incurred prior to the cessation of plant operations, nor does it include any costs related to the final disposal of the spent fuel.

“Site Restoration” is used to capture costs associated with the dismantling and demolition of buildings and facilities demonstrated to be free from contamination. This includes structures never exposed to radioactive materials, as well as those facilities that have been decontaminated to appropriate levels. Structures are completely removed (including foundations) and backfilled to conform to local surface elevation.

It should be noted that the costs assigned to these subcategories are allocations. Delegation of cost elements is for the purposes of comparison (e.g., with NRC financial guidelines) or to permit specific financial treatment (e.g., Asset Retirement Obligation determinations). In reality, there can be considerable interaction between the activities in the three subcategories. For example, Xcel Energy may decide to remove non-contaminated structures early in the project to improve access to highly contaminated facilities or plant components. In these instances, the non-contaminated removal costs could be reassigned from Site Restoration to an NRC License Termination support activity. However, in general, the allocations represent a reasonable accounting of those costs that can be expected to be incurred for the specific subcomponents of the total estimated program cost, if executed as described.

As noted within this document, the estimates were developed and costs are presented in 2020 dollars. As such, the estimates do not reflect the escalation of costs (due to inflationary and market forces) over the remaining operating life of the plant or during the decommissioning period.

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DECOMMISSIONING COST ELEMENTS**  
(thousands of 2020 dollars)

Cost Element	Unit 1	Unit 2	Total
Decontamination	12,109	19,308	31,417
Removal	111,005	147,842	258,847
Packaging	27,756	28,136	55,892
Transportation	9,509	10,116	19,625
Waste Disposal	75,656	79,069	154,725
Off-site Waste Processing	26,049	30,811	56,860
Program Management <sup>[1]</sup>	239,340	227,121	466,461
Site Security	148,214	136,512	284,726
Spent Fuel Pool Isolation	14,576	9,718	24,294
Spent Fuel Storage (Direct Costs) <sup>[2]</sup>	114,819	111,649	226,467
Insurance and Regulatory Fees	19,822	16,763	36,586
Energy	10,742	9,033	19,775
Characterization and Licensing Surveys	14,531	16,907	31,438
Property Taxes	77,623	72,753	150,376
Miscellaneous	7,729	7,430	15,159
Railroad Track Maintenance	3,543	3,455	6,998
Retention and Severance	26,985	26,985	53,970
Security Modifications	5,000	5,000	10,000
Prairie Island Indian Community	51,745	50,219	101,964
<b>Total <sup>[3]</sup></b>	<b>996,753</b>	<b>1,008,829</b>	<b>2,005,582</b>

Cost Element	Unit 1	Unit 2	Total
NRC License Termination	595,962	590,962	1,186,924
Spent Fuel Management	349,793	345,097	694,890
Site Restoration	50,998	72,770	123,768
<b>Total <sup>[3]</sup></b>	<b>996,753</b>	<b>1,008,829</b>	<b>2,005,582</b>

<sup>[1]</sup> Includes engineering costs<sup>[2]</sup> Includes costs for the dry storage system components, spent fuel loading and transfer, spent fuel pool O&M and EP fees, but excludes program management costs (staffing), security and other related costs<sup>[3]</sup> Columns may not add due to rounding



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DECOMMISSIONING COST ELEMENTS**  
(thousands of 2020 dollars)

Cost Element	Unit 1	Unit 2	Total
Decontamination	12,109	19,308	31,417
Removal	111,005	147,842	258,847
Packaging	27,756	28,136	55,892
Transportation	9,509	10,116	19,625
Waste Disposal	75,656	79,069	154,725
Off-site Waste Processing	26,049	30,811	56,860
Program Management <sup>[1]</sup>	241,656	229,438	471,094
Site Security	155,731	144,029	299,759
Spent Fuel Pool Isolation	14,576	9,718	24,294
Spent Fuel Storage (Direct Costs) <sup>[2]</sup>	116,766	113,596	230,362
Insurance and Regulatory Fees	20,622	17,563	38,185
Energy	10,742	9,033	19,775
Characterization and Licensing Surveys	14,531	16,907	31,438
Property Taxes	82,188	77,319	159,507
Miscellaneous	7,729	7,430	15,159
Railroad Track Maintenance	3,759	3,671	7,430
Retention and Severance	26,985	26,985	53,970
Security Modifications	5,000	5,000	10,000
Prairie Island Indian Community	55,496	53,970	109,466
<b>Total <sup>[3]</sup></b>	<b>1,017,865</b>	<b>1,029,941</b>	<b>2,047,805</b>

Cost Element	Unit 1	Unit 2	Total
NRC License Termination	595,962	590,962	1,186,924
Spent Fuel Management	370,904	366,208	737,113
Site Restoration	50,998	72,770	123,768
<b>Total <sup>[3]</sup></b>	<b>1,017,865</b>	<b>1,029,941</b>	<b>2,047,805</b>

<sup>[1]</sup> Includes engineering costs<sup>[2]</sup> Includes costs for the dry storage system components, spent fuel loading and transfer, spent fuel pool O&M and EP fees, but excludes program management costs (staffing), security and other related costs<sup>[3]</sup> Columns may not add due to rounding

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DECOMMISSIONING COST ELEMENTS**  
(thousands of 2020 dollars)

Cost Element	Unit 1	Unit 2	Total
Decontamination	12,109	19,308	31,417
Removal	111,707	148,543	260,249
Packaging	27,756	28,136	55,892
Transportation	9,509	10,116	19,625
Waste Disposal	75,656	79,069	154,724
Off-site Waste Processing	26,049	30,811	56,860
Program Management <sup>[1]</sup>	323,909	311,690	635,599
Site Security	255,921	244,219	500,140
Spent Fuel Pool Isolation	14,576	9,718	24,294
Spent Fuel Storage (Direct Costs) <sup>[2]</sup>	425,553	422,384	847,937
Insurance and Regulatory Fees	31,282	28,223	59,505
Energy	10,742	9,033	19,775
Characterization and Licensing Surveys	14,531	16,907	31,438
Property Taxes	143,057	138,187	281,244
Miscellaneous	7,729	7,430	15,159
Railroad Track Maintenance	6,637	6,549	13,185
Retention and Severance	26,985	26,985	53,970
Security Modifications	5,000	5,000	10,000
Prairie Island Indian Community	105,493	103,966	209,459
<b>Total <sup>[3]</sup></b>	<b>1,634,199</b>	<b>1,646,275</b>	<b>3,280,474</b>

Cost Element	Unit 1	Unit 2	Total
NRC License Termination	596,408	591,409	1,187,817
Spent Fuel Management	985,833	981,137	1,966,970
Site Restoration	51,958	73,730	125,688
<b>Total <sup>[3]</sup></b>	<b>1,634,199</b>	<b>1,646,275</b>	<b>3,280,474</b>

<sup>[1]</sup> Includes engineering costs<sup>[2]</sup> Includes costs for the dry storage system components, spent fuel loading and transfer, spent fuel pool O&M and EP fees, but excludes program management costs (staffing), security and other related costs<sup>[3]</sup> Columns may not add due to rounding

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DECOMMISSIONING COST ELEMENTS**  
(thousands of 2020 dollars)

Cost Element	Unit 1	Unit 2	Total
Decontamination	12,109	19,308	31,417
Removal	111,707	148,543	260,249
Packaging	27,756	28,136	55,892
Transportation	9,509	10,116	19,625
Waste Disposal	75,656	79,069	154,724
Off-site Waste Processing	26,049	30,811	56,860
Program Management <sup>[1]</sup>	468,903	456,684	925,587
Site Security	506,407	494,705	1,001,112
Spent Fuel Pool Isolation	14,576	9,718	24,294
Spent Fuel Storage (Direct Costs) <sup>[2]</sup>	859,315	856,146	1,715,461
Insurance and Regulatory Fees	57,933	54,874	112,807
Energy	10,742	9,033	19,775
Characterization and Licensing Surveys	14,531	16,907	31,438
Property Taxes	295,229	290,360	585,589
Miscellaneous	7,729	7,430	15,159
Railroad Track Maintenance	13,831	13,743	27,575
Retention and Severance	26,985	26,985	53,970
Security Modifications	5,000	5,000	10,000
Prairie Island Indian Community	230,489	228,963	459,452
<b>Total <sup>[3]</sup></b>	<b>2,774,456</b>	<b>2,786,532</b>	<b>5,560,987</b>

Cost Element	Unit 1	Unit 2	Total
NRC License Termination	596,408	591,409	1,187,817
Spent Fuel Management	2,126,089	2,121,393	4,247,483
Site Restoration	51,958	73,730	125,688
<b>Total <sup>[3]</sup></b>	<b>2,774,456</b>	<b>2,786,532</b>	<b>5,560,987</b>

<sup>[1]</sup> Includes engineering costs<sup>[2]</sup> Includes costs for the dry storage system components, spent fuel loading and transfer, spent fuel pool O&M and EP fees, but excludes program management costs (staffing), security and other related costs<sup>[3]</sup> Columns may not add due to rounding

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DECOMMISSIONING COST ELEMENTS**  
(thousands of 2020 dollars)

Cost Element	Unit 1	Unit 2	Total
Decontamination	8,262	17,629	25,891
Removal	118,236	154,208	272,444
Packaging	21,286	21,654	42,940
Transportation	7,988	8,587	16,575
Waste Disposal	59,926	62,040	121,966
Off-site Waste Processing	26,624	31,387	58,012
Program Management <sup>[1]</sup>	321,644	315,246	636,891
Site Security	216,744	170,639	387,383
Spent Fuel Pool Isolation	14,576	9,718	24,294
Spent Fuel Storage (Direct Costs) <sup>[2]</sup>	109,664	106,495	216,159
Insurance and Regulatory Fees	47,122	43,899	91,021
Energy	21,571	21,262	42,833
Characterization and Licensing Surveys	15,797	18,173	33,970
Property Taxes	214,410	209,541	423,951
Miscellaneous	18,316	22,688	41,004
Railroad Track Maintenance	4,733	4,645	9,377
Retention and Severance	26,985	26,985	53,970
Security Modifications	5,000	5,000	10,000
Prairie Island Indian Community	51,745	50,219	101,964
<b>Total <sup>[3]</sup></b>	<b>1,310,629</b>	<b>1,300,016</b>	<b>2,610,645</b>

Cost Element	Unit 1	Unit 2	Total
NRC License Termination	970,442	944,187	1,914,629
Spent Fuel Management	281,510	275,338	556,848
Site Restoration	58,677	80,490	139,167
<b>Total <sup>[3]</sup></b>	<b>1,310,629</b>	<b>1,300,016</b>	<b>2,610,645</b>

<sup>[1]</sup> Includes engineering costs<sup>[2]</sup> Includes costs for the dry storage system components, spent fuel loading and transfer, spent fuel pool O&M and EP fees, but excludes program management costs (staffing), security and other related costs<sup>[3]</sup> Columns may not add due to rounding

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DECOMMISSIONING COST ELEMENTS**  
(thousands of 2020 dollars)

Cost Element	Unit 1	Unit 2	Total
Decontamination	8,262	17,629	25,891
Removal	118,240	154,230	272,471
Packaging	21,286	21,654	42,940
Transportation	7,988	8,588	16,575
Waste Disposal	59,926	62,042	121,968
Off-site Waste Processing	26,624	31,387	58,012
Program Management <sup>[1]</sup>	322,356	318,247	640,604
Site Security	218,124	180,276	398,401
Spent Fuel Pool Isolation	14,576	9,718	24,294
Spent Fuel Storage (Direct Costs) <sup>[2]</sup>	111,541	108,372	219,913
Insurance and Regulatory Fees	47,872	44,607	92,479
Energy	21,571	21,262	42,833
Characterization and Licensing Surveys	15,797	18,173	33,970
Property Taxes	218,698	213,829	432,527
Miscellaneous	18,316	22,688	41,004
Railroad Track Maintenance	4,733	4,645	9,377
Retention and Severance	26,985	26,985	53,970
Security Modifications	5,000	5,000	10,000
Prairie Island Indian Community	55,496	53,970	109,466
<b>Total <sup>[3]</sup></b>	<b>1,323,393</b>	<b>1,323,304</b>	<b>2,646,697</b>

Cost Element	Unit 1	Unit 2	Total
NRC License Termination	968,306	952,576	1,920,882
Spent Fuel Management	296,410	290,238	586,648
Site Restoration	58,677	80,490	139,167
<b>Total <sup>[3]</sup></b>	<b>1,323,393</b>	<b>1,323,304</b>	<b>2,646,697</b>

<sup>[1]</sup> Includes engineering costs<sup>[2]</sup> Includes costs for the dry storage system components, spent fuel loading and transfer, spent fuel pool O&M and EP fees, but excludes program management costs (staffing), security and other related costs<sup>[3]</sup> Columns may not add due to rounding

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DECOMMISSIONING COST ELEMENTS**  
(thousands of 2020 dollars)

Cost Element	Unit 1	Unit 2	Total
Decontamination	8,262	17,447	25,709
Removal	119,002	155,038	274,040
Packaging	25,596	25,964	51,560
Transportation	7,988	8,588	16,576
Waste Disposal	59,928	62,049	121,977
Off-site Waste Processing	26,624	31,387	58,012
Program Management <sup>[1]</sup>	359,684	363,609	723,293
Site Security	279,245	272,250	551,495
Spent Fuel Pool Isolation	14,576	9,718	24,294
Spent Fuel Storage (Direct Costs) <sup>[2]</sup>	420,010	416,736	836,746
Insurance and Regulatory Fees	57,899	54,267	112,167
Energy	21,590	21,282	42,872
Characterization and Licensing Surveys	15,797	18,173	33,970
Property Taxes	278,005	273,136	551,141
Miscellaneous	18,316	22,688	41,004
Railroad Track Maintenance	6,373	6,285	12,659
Retention and Severance	26,985	26,985	53,970
Security Modifications	5,000	5,000	10,000
Prairie Island Indian Community	105,493	103,966	209,459
<b>Total <sup>[3]</sup></b>	<b>1,856,374</b>	<b>1,894,569</b>	<b>3,750,943</b>

Cost Element	Unit 1	Unit 2	Total
NRC License Termination	963,420	983,908	1,947,327
Spent Fuel Management	836,113	832,007	1,668,119
Site Restoration	56,842	78,655	135,496
<b>Total <sup>[3]</sup></b>	<b>1,856,374</b>	<b>1,894,569</b>	<b>3,750,943</b>

<sup>[1]</sup> Includes engineering costs<sup>[2]</sup> Includes costs for the dry storage system components, spent fuel loading and transfer, spent fuel pool O&M and EP fees, but excludes program management costs (staffing), security and other related costs<sup>[3]</sup> Columns may not add due to rounding

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DECOMMISSIONING COST ELEMENTS**  
(thousands of 2020 dollars)

Cost Element	Unit 1	Unit 2	Total
Decontamination	8,262	17,447	25,709
Removal	119,002	155,038	274,040
Packaging	25,596	25,964	51,560
Transportation	7,988	8,588	16,576
Waste Disposal	59,928	62,049	121,977
Off-site Waste Processing	26,624	31,387	58,012
Program Management <sup>[1]</sup>	504,679	508,603	1,013,282
Site Security	501,598	494,603	996,201
Spent Fuel Pool Isolation	14,576	9,718	24,294
Spent Fuel Storage (Direct Costs) <sup>[2]</sup>	853,529	850,323	1,703,853
Insurance and Regulatory Fees	84,550	80,918	165,469
Energy	21,590	21,282	42,872
Characterization and Licensing Surveys	15,797	18,173	33,970
Property Taxes	430,177	425,308	855,485
Miscellaneous	18,316	22,688	41,004
Railroad Track Maintenance	13,568	13,480	27,048
Retention and Severance	26,985	26,985	53,970
Security Modifications	5,000	5,000	10,000
Prairie Island Indian Community	230,489	228,963	459,452
<b>Total <sup>[3]</sup></b>	<b>2,968,256</b>	<b>3,006,518</b>	<b>5,974,774</b>

Cost Element	Unit 1	Unit 2	Total
NRC License Termination	963,419	983,907	1,947,327
Spent Fuel Management	1,947,994	1,943,956	3,891,950
Site Restoration	56,842	78,655	135,496
<b>Total <sup>[3]</sup></b>	<b>2,968,256</b>	<b>3,006,518</b>	<b>5,974,774</b>

<sup>[1]</sup> Includes engineering costs<sup>[2]</sup> Includes costs for the dry storage system components, spent fuel loading and transfer, spent fuel pool O&M and EP fees, but excludes program management costs (staffing), security and other related costs<sup>[3]</sup> Columns may not add due to rounding

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## 1. INTRODUCTION

This report presents estimates of the cost to decommission the Prairie Island Nuclear Generating Plant (Prairie Island) and the operation and eventual decommissioning of the on-site Independent Spent Fuel Storage Installation (ISFSI) for the selected decommissioning scenarios following the scheduled cessation of plant operations. The estimates are designed to provide Xcel Energy with the information to assess its current decommissioning liability, as it relates to Prairie Island.

The analysis relies upon site-specific, technical information from an earlier evaluation prepared in 2017, <sup>[1]\*</sup> updated to reflect current assumptions pertaining to the disposition of the nuclear plant and relevant industry experience in undertaking such projects. The costs are based on several key assumptions in areas of regulation, component characterization, high-level radioactive waste management, low-level radioactive waste disposal, performance uncertainties (contingency) and site restoration requirements.

The analysis is not a detailed engineering evaluation, but an estimate prepared in advance of the detailed engineering required to carry out the decommissioning of the nuclear units. It may also not reflect the actual plan to decommission Prairie Island; the plan may differ from the assumptions made in this analysis based on facts that exist at the time of decommissioning.

The 2017 plant inventory was reviewed for this analysis. It serves as the basis for the decontamination and dismantling requirements, cost, and the decommissioning waste streams. The review confirmed that there were no substantive changes to the configuration of the plant or site facilities that would impact decommissioning over the last three years.

### 1.1 OBJECTIVES OF STUDY

The objectives of this study are to prepare comprehensive estimates of the cost to decommission Prairie Island, to provide a sequence or schedule for the associated activities, and to develop waste stream projections from the decontamination and dismantling activities.

The operating licenses were originally issued for the plant in August 1973 and October 1974 for Units 1 and 2, respectively, and were valid for a period of 40

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\* Annotated references for citations in Sections 1-6 are provided in Section 7



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years. In April 2008, Nuclear Management Company (as agent for Xcel Energy), submitted an application for renewed licenses (i.e., 20 year extensions). The application was approved by the NRC in June 2011. Therefore, for the purposes of this study, final shutdown dates (license expiration) for Unit 1 and Unit 2 are August 9, 2033 and October 29, 2034, respectively, assuming a 60-year operating life (the current operating licenses' expiration dates).

**1.2 SITE DESCRIPTION**

Prairie Island is located in Goodhue County Minnesota, on the west bank of the Mississippi River, approximately 26 miles southeast of the Twin City Metropolitan Area and within the city limits of Red Wing.

The Nuclear Steam Supply System (NSSS) consists of a pressurized water reactor and a two-loop reactor coolant system. The system is comprised of the reactor vessel and two closed reactor coolant loops connected in parallel to the reactor vessel, each containing a reactor coolant pump and a steam generator. An electrically heated pressurizer is connected to one of the loops.

The system is housed within the reactor containment vessel, a free-standing cylindrical steel shell with a hemispherical dome and ellipsoidal bottom designed to withstand the internal pressure accompanying a loss-of-coolant accident. The reactor containment vessel is surrounded by a cylindrical shield building constructed of reinforced concrete, which serves as a radiation shielding for normal operations and for the loss-of-coolant condition.

Heat produced in the reactor is converted to electrical energy by the plant's power conversion system. A turbine-generator converts the thermal energy of steam produced in the steam generators into mechanical shaft power and then into electrical energy. The turbine-generator consists of one high-pressure, double-flow and two low-pressure, double-flow elements driving a direct-coupled generator at 1800 rpm. The turbines are operated in a closed feedwater cycle in which the steam is condensed and returned to the steam generators by the feedwater system.

Heat rejected in the main condensers is removed by the circulating water system, which provides the heat sink for the removal of the waste heat in the power plant's thermal cycle. The majority of the heat is removed through dilution with river water in the discharge canal. Forced draft cooling towers provide supplemental heat removal.

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Section 1, Page 3 of 15*****1.3 REGULATORY GUIDANCE**

The Nuclear Regulatory Commission (NRC or Commission) provided initial decommissioning requirements in its rule "General Requirements for Decommissioning Nuclear Facilities," issued in June 1988.<sup>[2]</sup> This rule set forth financial criteria for decommissioning licensed nuclear power facilities. The regulation addressed decommissioning planning needs, timing, funding methods, and environmental review requirements. The intent of the rule was to ensure that decommissioning would be accomplished in a safe and timely manner and that adequate funds would be available for this purpose. Subsequent to the rule, the NRC issued Regulatory Guide 1.159, "Assuring the Availability of Funds for Decommissioning Nuclear Reactors,<sup>[3]</sup>" which provided additional guidance to the licensees of nuclear facilities on the financial methods acceptable to the NRC staff for complying with the requirements of the rule. The regulatory guide addressed the funding requirements and provided guidance on the content and form of the financial assurance mechanisms indicated in the rule.

The rule defined three decommissioning alternatives as being acceptable to the NRC: DECON, SAFSTOR, and ENTOMB. The DECON alternative assumes that any contaminated or activated portion of the plant's systems, structures, and facilities are removed or decontaminated to levels that permit the site to be released for unrestricted use shortly after the cessation of plant operations while the SAFSTOR and ENTOMB alternatives defer the process.

The rule also placed limits on the time allowed to complete the decommissioning process. For the SAFSTOR alternative, the process is restricted in overall duration to 60 years, unless it can be shown that a longer duration is necessary to protect public health and safety. The guidelines for ENTOMB are similar, providing the NRC with both sufficient leverage and flexibility to ensure that these deferred options are only used in situations where it is reasonable and consistent with the definition of decommissioning. At the conclusion of a 50 to 60-year dormancy period (or longer for ENTOMB if the NRC approves such a case), the site would still require significant remediation to meet the unrestricted release limits for license termination.

The ENTOMB alternative has not been viewed as a viable option for power reactors due to the significant time required to isolate the long-lived radionuclides for decay to permissible levels. However, with rulemaking permitting the controlled release of a site,<sup>[4]</sup> the NRC did re-evaluate the alternative. The resulting feasibility study, based upon an assessment by Pacific Northwest National Laboratory, concluded that the method did have conditional merit for some, if not most reactors. The staff also found that

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additional rulemaking would be needed before this option could be treated as a generic alternative.

The NRC had considered rulemaking to alter the 60-year time for completing decommissioning and to clarify the use of engineered barriers for reactor entombments.<sup>[5]</sup> However, the NRC's staff has recommended that rulemaking be deferred, based upon several factors, e.g., no licensee has committed to pursuing the entombment option, the unresolved issues associated with the disposition of greater-than-Class C material (GTCC), and the NRC's current priorities, at least until after the additional research studies are complete. The Commission concurred with the staff's recommendation. In a draft regulatory basis document published in March 2017 in support of rulemaking that would amend NRC regulations concerning nuclear plant decommissioning, the NRC staff proposes removing any discussion of the ENTOMB option from existing guidance documents since the method is not deemed practically feasible.

In 1996, the NRC published revisions to the general requirements for decommissioning nuclear power plants. <sup>[6]</sup> When the regulations were originally adopted in 1988, it was assumed that the majority of licensees would decommission at the end of the facility's operating licensed life. Since that time, several licensees permanently and prematurely ceased operations. Exemptions from certain operating requirements were required once the reactor was defueled to facilitate the decommissioning. Each case was handled individually, without clearly defined generic requirements. The NRC amended the decommissioning regulations in 1996 to clarify ambiguities and codify procedures and terminology as a means of enhancing efficiency and uniformity in the decommissioning process. The new amendments allow for greater public participation and better define the transition process from operations to decommissioning.

Under the revised regulations, licensees will submit written certification to the NRC within 30 days after permanent shutdown. Certification will also be required once the fuel is permanently removed from the reactor vessels. Submittal of these notices will entitle the licensee to a fee reduction and eliminate the obligation to follow certain requirements needed only during operation of the reactor. Prior to or within two years following permanent cessation of operations, the licensee is required to submit a Post-Shutdown Decommissioning Activities Report (PSDAR) to the NRC, and a copy to the affected State(s) (10 CFR 50.82(a)(4)(i)). The PSDAR describes the planned decommissioning activities, the associated sequence and schedule, and an estimate of expected costs. Prior to completing decommissioning, the licensee is required to submit applications to the NRC to terminate the license, which will include a License Termination Plan (LTP).

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In 2011, the NRC published amended regulations to improve decommissioning planning and thereby reduce the likelihood that any current operating facility will become a legacy site.<sup>[7]</sup> The regulations require licensees to report additional details in their decommissioning cost estimate including a decommissioning estimate for the ISFSI. This estimate is provided in Appendix K.

### 1.3.1 High-Level Radioactive Waste Management

Congress passed the “Nuclear Waste Policy Act” <sup>[8]</sup> (NWPA) in 1982, assigning the federal government’s long-standing responsibility for disposal of the spent nuclear fuel created by the commercial nuclear generating plants to the DOE. The DOE was to begin accepting spent fuel by January 31, 1998; however, to date no progress in the removal of spent fuel from commercial generating sites has been made.

Today, the country is at an impasse on high-level waste disposal, even with the License Application for a geologic repository submitted by the DOE to the NRC in 2008. The Obama administration cut the budget for the repository program while promising to “conduct a comprehensive review of policies for managing the back end of the nuclear fuel cycle ... and make recommendations for a new plan.” Towards this goal, the administration appointed a Blue Ribbon Commission on America’s Nuclear Future (Blue Ribbon Commission) to make recommendations for a new plan for nuclear waste disposal. The Blue Ribbon Commission’s charter includes a requirement that it consider “[o]ptions for safe storage of used nuclear fuel while final disposition pathways are selected and deployed.”<sup>[9]</sup>

On January 26, 2012, the Blue Ribbon Commission issued its “Report to the Secretary of Energy” containing a number of recommendations on nuclear waste disposal. Two of the recommendations that may impact decommissioning planning are:

- “[T]he United States [should] establish a program that leads to the timely development of one or more consolidated storage facilities”<sup>[10]</sup>
- “[T]he United States should undertake an integrated nuclear waste management program that leads to the timely development of one or more permanent deep geological facilities for the safe disposal of spent fuel and high-level nuclear waste.”

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In January 2013, the DOE issued the “Strategy for the Management and Disposal of Used Nuclear Fuel and High-Level Radioactive Waste,” in response to the recommendations made by the Blue Ribbon Commission and as “a framework for moving toward a sustainable program to deploy an integrated system capable of transporting, storing, and disposing of used nuclear fuel...”<sup>[11]</sup> This document states:

“With the appropriate authorizations from Congress, the Obama Administration planned to implement a program over the next 10 years that would have:

- Sites, designs and licenses, constructs and begins operations of a pilot interim storage facility by 2021 with an initial focus on accepting used nuclear fuel from shut-down reactor sites;
- Advances toward the siting and licensing of a larger interim storage facility to be available by 2025 that will have sufficient capacity to provide flexibility in the waste management system and allows for acceptance of enough used nuclear fuel to reduce expected government liabilities; and
- Makes demonstrable progress on the siting and characterization of repository sites to facilitate the availability of a geologic repository by 2048.”

The NRC’s review of DOE’s license application to construct a geologic repository at Yucca Mountain was suspended in 2011 when the Obama Administration significantly reduced the budget for completing that work. However, the US Court of Appeals for the District of Columbia Circuit issued a writ of mandamus (in August 2013)<sup>[12]</sup> ordering NRC to comply with federal law and restart its review of DOE’s Yucca Mountain repository license application to the extent of previously appropriated funding for the review. That review is now complete with the publication of the five-volume safety evaluation report. A supplement to DOE’s environmental impact statement and an adjudicatory hearing on the contentions filed by interested parties must be completed before a licensing decision can be made. Although the DOE proposed it would start fuel acceptance in 2025, no progress has been made in the repository program since DOE’s 2013 strategy was issued except for the completion of the Yucca Mountain safety evaluation report.

Holtec International submitted a license application to the NRC on March 30, 2017 for a consolidated interim spent fuel storage facility in southeast New Mexico called HI-STORE CIS (Consolidated Interim

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Storage) under the provisions of 10 CFR Part 72. The application is currently under NRC review.

A centralized interim storage project was initiated by Waste Control Specialists (WCS) for a site in Andrews County, Texas, adjacent to WCS's existing low-level radioactive waste and hazardous waste storage and disposal facilities. The NRC license application for this project was filed in April 2016. In April 2017, WCS asked the NRC to suspend the review of this application. Subsequently, WCS and Orano USA (formerly Areva Nuclear Materials) formed a joint venture to license the facility. In response to letters to the NRC in June and July 2018 from the joint venture, Interim Storage Partners, the NRC restarted its review of the application.

On May 10, 2018, the U.S. House of Representatives passed H.R. 3053, the "Nuclear Waste Policy Amendments Act of 2018." Proposed to amend the Nuclear Waste Policy Act of 1982, the legislation, if approved by the Senate and signed by the President, would provide the DOE the authority to site, construct, and operate one or more Monitored Retrieval Storage (MRS) facilities while a permanent repository is licensed and constructed and/or to enter into an MRS agreement with a non-Federal entity for temporary storage.

Completion of the decommissioning process is dependent upon the DOE's ability to remove spent fuel from the site in a timely manner. DOE's repository program had originally assumed that spent fuel allocations would be accepted for disposal from the nation's commercial nuclear plants, with limited exceptions, in the order (the "queue") in which it was discharged from the reactor.<sup>[13]</sup> However, the Blue Ribbon Commission, in its final report, noted that: "[A]ccepting spent fuel according to the OFF [Oldest Fuel First] priority ranking instead of giving priority to shutdown reactor sites could greatly reduce the cost savings that could be achieved through consolidated storage if priority could be given to accepting spent fuel from shutdown reactor sites before accepting fuel from still-operating plants. .... The magnitude of the cost savings that could be achieved by giving priority to shutdown sites appears to be large enough (i.e., in the billions of dollars) to warrant DOE exercising its right under the Standard Contract to move this fuel first."

The state of Minnesota directed the Public Utilities Commission, "when considering approval of a plan for the accrual of funds for the decommissioning of nuclear facilities" ...to "include an evaluation of the

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costs, if any, arising from storage of used nuclear fuel that may be incurred by the state of Minnesota, and any tribal community, county, city, or township where used nuclear fuel is located following the cessation of operations at a nuclear plant.”<sup>[14]</sup>

The state of Minnesota statute also prescribed the parameters to be used in evaluating spent fuel management costs. “To assist the commission in making the determination ... the filing shall provide cost estimates, including ratepayer impacts, assuming used nuclear fuel will be stored in the state for 60 years, 100 years, and 200 years following the cessation of operation of the nuclear plant.”

Xcel Energy’s current spent fuel management plan for the Prairie Island spent fuel is based in general upon:

- 1) Fuel transferred from the pool to the ISFSI within 4 years of shutdown;
- 2) Exchange of Prairie Island and Monticello spent fuel acceptance rights to best manage the overall cost of spent fuel storage for both plants;
- 3) Fuel will be shipped in the existing Transnuclear TN-40 casks, plus NUHOMS DSCs for fuel removed after final plant shutdown (Scenarios 1, 2, 5, and 6); the canisters and NUHOMS are periodically replaced in Scenarios 3, 4, 7 and 8. Spent fuel assemblies from TN-40 casks that are replaced will be put into NUHOMS DSCs. Canisters that are unloaded in the spent fuel transfer operation will be surveyed for neutron activation.
- 4) As an allowance, some of these canisters and NUHOMS modules from the first off-load operation are assumed to be mildly neutron activated and therefore must be disposed of as radioactive waste.
- 5) For the 100 and 200 year dry fuel storage scenarios (Scenarios 3, 4, 7 and 8) the canisters and casks will be replaced on a 50 year schedule using a dry transfer facility. <sup>[15]</sup>

The NRC requires that licensees establish a program to manage and provide funding for the caretaking of all irradiated fuel at the reactor site until title of the fuel is transferred to the Secretary of Energy, pursuant to 10 CFR Part 50.54(bb). <sup>[16]</sup> This requirement is prepared for through inclusion of certain cost elements in the decommissioning estimates, for example, associated with the isolation and continued operation of the spent fuel pool and the ISFSI.

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The spent fuel pool is expected to contain freshly discharged assemblies (from the most recent refueling cycles) as well as the final reactor cores at shutdown. In the DECON and SAFSTOR scenarios, the assemblies are packaged into dry shielded canisters (DSCs) over the first four years after shutdown for transfer to the ISFSI for interim storage. It is assumed that this period provides the necessary cooling for the final cores to meet the transport and/or storage requirements for decay heat.

An ISFSI, operated under a Part 72 Site Specific License (in accordance with 10 CFR 72<sup>(17)</sup>), has been constructed to support continued plant operations. The facility is assumed to be expanded to support decommissioning. This will allow decommissioning activities to proceed within the auxiliary building.

DOE has breached its obligations to remove fuel from reactor sites, and has also failed to provide the plant owners with information about how it will ultimately perform. DOE officials have stated that DOE does not have an obligation to accept already-canistered fuel without an amendment to DOE's contracts with plant licensees to remove the fuel (the "Standard Contract"), but DOE has not explained what any such amendment would involve. Consequently, Xcel Energy has no information or expectations on how DOE will remove fuel from the site in the future. In the absence of information about how DOE will perform, and for purposes of this analysis only, it is assumed that DOE will accept already-canistered fuel. If this assumption is incorrect, it is assumed that DOE will have liability for costs incurred to transfer the fuel to DOE-supplied containers.

Xcel Energy's position is that the DOE has a contractual obligation to accept Prairie Island's fuel earlier than the projections set out above, consistent with its contract commitments. No assumption made in this study should be interpreted to be inconsistent with this claim. However, including the cost of storing spent fuel in this study is appropriate to ensure the availability of sufficient decommissioning funds at the end of the station's life if the DOE has not met its obligation. The cost for the interim storage of spent fuel has been calculated and is separately presented as "Spent Fuel Management" expenditures in this report.

### 1.3.2 Low-Level Radioactive Waste Disposal

The contaminated and activated material generated in the decontamination and dismantling of a commercial nuclear reactor is classified as low-level (radioactive) waste, although not all of the material is suitable for "shallow-land" disposal. With the passage of the



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“Low-Level Radioactive Waste Policy Act” in 1980, <sup>[18]</sup> and its Amendments of 1985, <sup>[19]</sup> the states became ultimately responsible for the disposition of low-level radioactive waste generated within their own borders. It was expected that groups of states would combine together to jointly deal with their radioactive wastes; these organizations are referred to as waste disposal compacts.

With the exception of Texas, no new compact facilities have been successfully sited, licensed, and constructed. The Texas Compact disposal facility is now operational and waste is being accepted from generators within the Compact by the operator, Waste Control Specialists (WCS). The facility is also able to accept limited quantities of non-Compact waste.

Disposition of the various waste streams produced by the decommissioning process considered all options and services currently available to Xcel Energy. The majority of the low-level radioactive waste designated for direct disposal (Class A <sup>[20]</sup>) can be sent to EnergySolutions’ facility in Clive, Utah. Therefore, disposal costs for Class A waste were based upon current contract rates. This facility is not licensed to receive the higher activity portion (Classes B and C) of the decommissioning waste stream.

The Texas facility is licensed to receive the higher activity waste forms (Classes B and C). As such, for this analysis, disposal costs for the Class B and C waste were based upon the preliminary and indicative information on the cost for such from WCS.

The dismantling of the components residing closest to the reactor core generates radioactive waste considered unsuitable for shallow-land disposal (i.e., low-level radioactive waste with concentrations of radionuclides that exceed the limits established by the NRC for Class C radioactive waste (GTCC)). The Low-Level Radioactive Waste Policy Amendments Act of 1985 assigned the federal government the responsibility for the disposal of this material. The Act also stated that the beneficiaries of the activities resulting in the generation of such radioactive waste bear all reasonable costs of disposing of such waste.

The DOE issued its final Environmental Impact Statement for the disposal of GTCC on January 2016.<sup>[21]</sup> The study evaluated the potential environmental impacts associated with constructing and operating a new facility or using an existing facility, disposal methods, and locations. DOE is awaiting Congressional action on the report and its recommendations. At this time, the federal government has not

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identified a specific cost for disposing of GTCC or a schedule for acceptance.

For purposes of this analysis, the GTCC radioactive waste is assumed to be packaged and disposed of in a similar manner as high-level waste and at a cost equivalent to that envisioned for the spent fuel. The GTCC is packaged in the same canisters used for spent fuel and either stored on site or shipped directly to a DOE facility as it is generated (depending upon the timing of the decommissioning and whether the spent fuel has been removed from the site prior to the start of decommissioning).

A significant portion of the metallic waste material generated during decommissioning may only be potentially contaminated by radioactive materials. This waste can be surveyed on site or shipped off site to licensed facilities for further analysis, for processing and/or for conditioning/recovery. Reduction in the volume of low-level radioactive waste requiring disposal in a licensed low-level radioactive waste disposal facility can be accomplished through a variety of methods, including analyses and surveys or decontamination to isolate the portion of waste that does not require disposal as radioactive waste, compaction, incineration or metal melt. The estimates reflect the savings from waste recovery/volume reduction.

### 1.3.3 Radiological Criteria for License Termination

In 1997, the NRC published Subpart E, “Radiological Criteria for License Termination,” [22] amending 10 CFR §20. This subpart provides radiological criteria for releasing a facility for unrestricted use. The regulation states that the site can be released for unrestricted use if radioactivity levels are such that the average member of a critical group would not receive a Total Effective Dose Equivalent (TEDE) in excess of 25 millirem per year, and provided that residual radioactivity has been reduced to levels that are As Low As Reasonably Achievable (ALARA). The decommissioning estimates assume that the Prairie Island site will be remediated to a residual level consistent with the NRC-prescribed level.

It should be noted that the NRC and the Environmental Protection Agency (EPA) differ on the amount of residual radioactivity considered acceptable in site remediation. The EPA has two limits that apply to radioactive materials. An EPA limit of 15 millirem per year is derived from criteria established by the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA or Superfund). [23]

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An additional and separate limit of 4 millirem per year, as defined in 40 CFR §141.66, is applied to drinking water. <sup>[24]</sup>

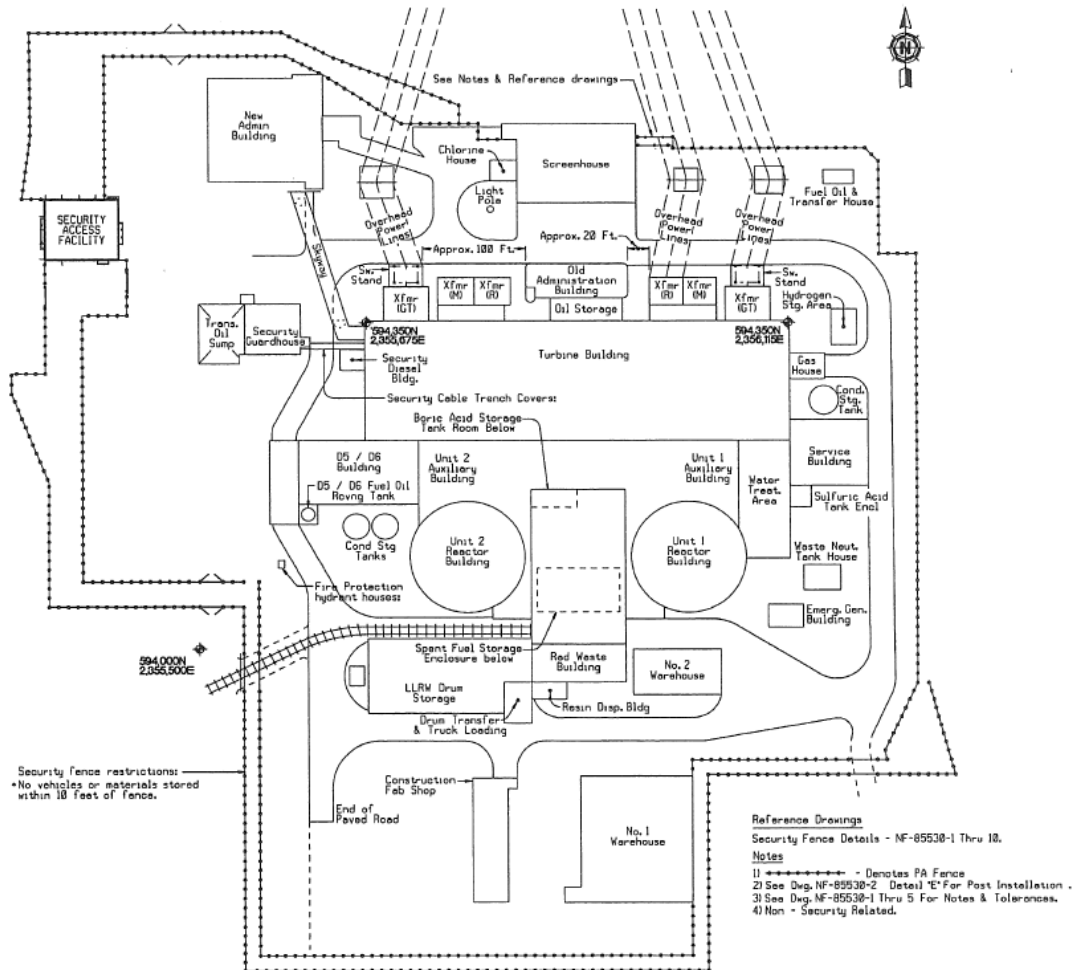
On October 9, 2002, the NRC signed an agreement with the EPA on the radiological decommissioning and decontamination of NRC-licensed sites. The Memorandum of Understanding (MOU) <sup>[25]</sup> provides that EPA will defer exercise of authority under CERCLA for the majority of facilities decommissioned under NRC authority. The MOU also includes provisions for NRC and EPA consultation for certain sites when, at the time of license termination, (1) groundwater contamination exceeds EPA-permitted levels; (2) NRC contemplates restricted release of the site; and/or (3) residual radioactive soil concentrations exceed levels defined in the MOU.

The MOU does not impose any new requirements on NRC licensees and should reduce the involvement of the EPA with NRC licensees who are decommissioning. Most sites are expected to meet the NRC criteria for unrestricted use, and the NRC believes that only a few sites will have groundwater or soil contamination in excess of the levels specified in the MOU that trigger consultation with the EPA. However, if there are other hazardous materials on the site, the EPA may be involved in the cleanup. As such, the possibility of dual regulation remains for certain licensees. The present study does not include any costs for this occurrence.

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**FIGURE 1.1  
PRAIRIE ISLAND NUCLEAR GENERATING PLANT  
GENERAL PLAN**



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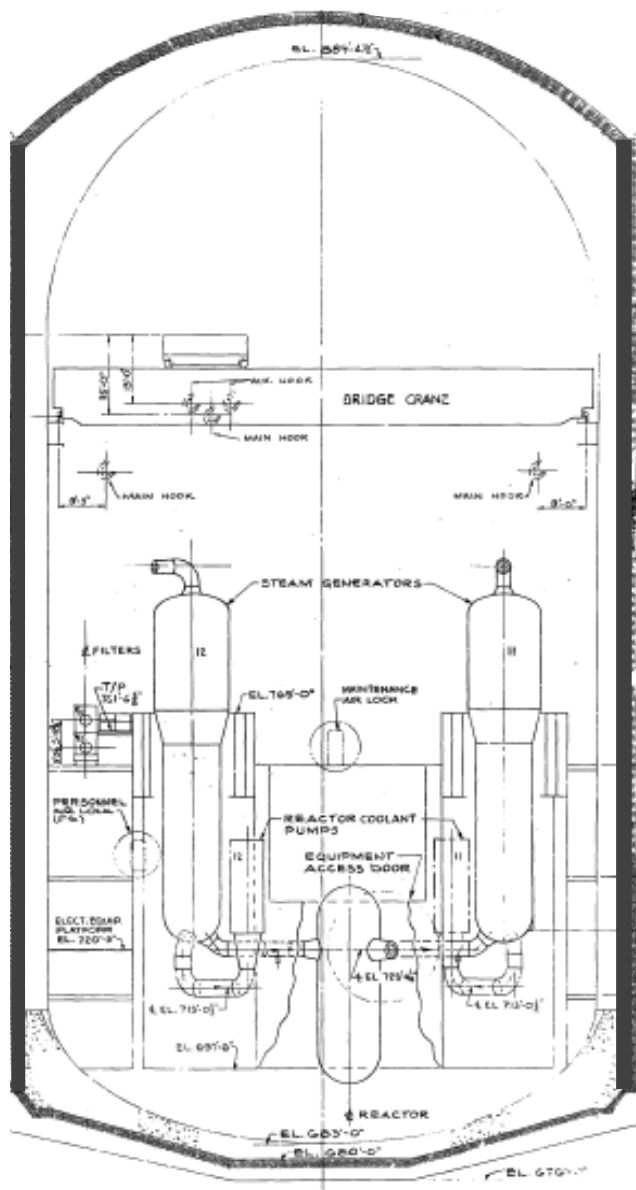
**FIGURE 1.2  
PRAIRIE ISLAND NUCLEAR GENERATING PLANT  
AERIAL VIEW**



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**FIGURE 1.3  
PRAIRIE ISLAND NUCLEAR GENERATING PLANT  
REACTOR BUILDING SECTION**



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Section 2, Page 1 of 15*****2. DECOMMISSIONING ALTERNATIVES**

Detailed cost estimates were developed to decommission Prairie Island based upon the approved decommissioning alternatives: DECON and SAFSTOR. Although the alternatives differ with respect to technique, process, cost, and schedule, they attain the same result: the ultimate release of the site for unrestricted use.

The following scenarios were evaluated and are intended to bound the liability associated with the removal of spent fuel from the site. The current operating licenses expire in 2033 and 2034. The scenarios consist of four spent fuel management scenarios, each with a DECON and a SAFSTOR decommissioning scenario for eight total scenarios. The duration of the spent fuel scenarios has little impact to the decommissioning costs and timing of the power block systems and structures. The spent fuel in the plant's spent fuel storage pool is transferred to the ISFSI within the first four years. The equipment, structures, and portions of the plant containing radioactive contaminants are removed or decontaminated to a level that permits the facility to be released for unrestricted use. Non-essential structures are then demolished. Spent fuel storage operations continue at the ISFSI until the transfer of the fuel to the DOE is completed (as shown in the "Last Spent Fuel Assembly" column in the following table).

Scenario	1 <sup>st</sup> Spent Fuel Canister Replacement	1 <sup>st</sup> Spent Fuel Assembly Removed from Prairie Island	Last Spent Fuel Assembly Removed from Prairie Island	Scenario Identification
1	n/a	2037	2074	DECON with 42 Year DFS <sup>+</sup>
2	n/a	2053	2077	DECON with 60 Year DFS
3	2045	2093	2117	DECON with 100 Year DFS
4	2045	2193	2217	DECON with 200 Year DFS
5	n/a	2037	2074	SAFSTOR with 42 Year DFS
6	n/a	2053	2077	SAFSTOR with 60 Year DFS
7	2045	2093	2117	SAFSTOR with 100 Year DFS
8	2045	2193	2217	SAFSTOR with 200 Year DFS

<sup>+</sup> Dry Fuel Storage

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For Scenarios 1 and 5, although they only provide a total fuel storage period of 42 years following Unit 2 shutdown, some of the Prairie Island casks have been in storage since 1995. Xcel Energy directed TLG Services to not include the cost of transferring the spent fuel in dry storage to new canisters for those casks that exceed 50 years. The assumption to not transfer spent fuel at 50-years total storage duration for these two scenarios was premised on the likelihood that the life of the canisters could be successfully extended for the additional years.

For Scenarios 2 and 6, although they provide a total fuel storage period of nominally 60 years following shutdown, Xcel Energy directed TLG Services to not include the cost of transferring the spent fuel in dry storage to new canisters at the 50-year mark.

In Scenarios 3, 4, 7 and 8, the Dry Shielded Canisters (DSCs) are assumed to be replaced after fifty years of use. Since the auxiliary building spent fuel storage pool and fuel handling facilities are removed by the year 2037, a dry fuel transfer facility is assumed to be constructed on site to perform the transfers from the old to the new DSCs. For Scenarios 3 and 7, two such transfers are needed over the time frame assumed. For Scenarios 4 and 8, the spent fuel will be transferred four times following initial placement in the ISFSI.

The following sections describe the basic activities associated with each alternative. Although detailed procedures for each activity identified are not provided, and the actual sequence of work may vary, the activity descriptions provide a basis not only for estimating but also for the expected scope of work (i.e., engineering and planning at the time of decommissioning).

The conceptual approach that the NRC has described in its regulations divides decommissioning into three phases. The initial phase commences with the effective date of permanent cessation of operations and involves the transition of both plant and licensee from reactor operations (i.e., power production) to facilitate deactivation and closure. During the first phase, notification is to be provided to the NRC certifying the permanent cessation of operations and the removal of fuel from the reactor vessels. The licensee would then be prohibited from reactor operation.

The second phase encompasses activities during the storage period or during major decommissioning activities, or a combination of the two. The third phase pertains to the activities involved in license termination. The decommissioning estimates developed for Prairie Island are also divided into phases or periods; however, demarcation of the phases is based upon major milestones within the project or significant changes in the projected expenditures.



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Section 2, Page 3 of 15*****2.1 DECON**

The DECON alternative, as defined by the NRC, is "the alternative in which the equipment, structures, and portions of a facility and site containing radioactive contaminants are removed or decontaminated to a level that permits the property to be released for unrestricted use shortly after cessation of operations." This study does not address the cost to dispose of the spent fuel residing at the site; such costs are funded through a surcharge on electrical generation. However, the study does estimate the costs incurred with the interim on-site storage of the fuel pending shipment by the DOE to an off-site disposal facility. Those costs are separately presented as "Spent Fuel Management" expenditures in this report.

**2.1.1 Period 1 - Preparations**

In anticipation of the cessation of plant operations, detailed preparations are undertaken to provide a smooth transition from plant operations to site decommissioning. Through implementation of a staffing transition plan, the organization required to manage the intended decommissioning activities is assembled from available plant staff and outside resources. Preparations include the planning for permanent defueling of the reactor, revision of technical specifications applicable to the operating conditions and requirements, a characterization of the facility and major components, and the development of the PSDAR.

**Engineering and Planning**

The PSDAR, required prior to, or within two years of permanent cessation of operations, provides a description of the licensee's planned decommissioning activities, a timetable, a site-specific decommissioning cost estimate, and the associated financial requirements of the intended decommissioning program. Upon receipt of the PSDAR, the NRC will make the document available to the public for comment in a local meeting to be held in the vicinity of the reactor site. Ninety days following submittal and NRC receipt of the PSDAR, the licensee may begin to perform major decommissioning activities under a modified 10 CFR §50.59 procedure, (10 CFR §50.59 establishes the conditions under which licensees may make changes to the facility or procedures and conduct test or experiments, i.e., without prior NRC approval). Major activities are defined as any activity that results in permanent removal of major radioactive components, permanently modifies the structure of the containment, or results in dismantling components (for shipment)

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containing GTCC, as defined by 10 CFR §61. Major components are further defined as comprising the reactor vessel and internals, large bore reactor coolant system piping, and other large components that are radioactive. The NRC includes the following additional criteria for use of the §50.59 process in decommissioning. The proposed activity must not:

- foreclose release of the site for possible unrestricted use,
- significantly increase decommissioning costs,
- cause any significant environmental impact not previously reviewed, or
- result in there no longer being reasonable assurance that adequate funds will be available for decommissioning

Existing operational technical specifications are reviewed and modified to reflect plant conditions and the safety concerns associated with permanent cessation of operations. The environmental impact associated with the planned decommissioning activities is also considered. Typically, a licensee will not be allowed to proceed if the consequences of a particular decommissioning activity are greater than that bounded by previously evaluated environmental assessments or impact statements. In this instance, the licensee would have to submit a license amendment for the specific activity and update the environmental report.

The decommissioning program outlined in the PSDAR will be designed to accomplish the required tasks within the ALARA guidelines (as defined in 10 CFR §20) for protection of personnel from exposure to radiation hazards. It will also address the continued protection of the health and safety of the public and the environment during the dismantling activity. Consequently, with the development of the PSDAR, activity specifications, cost-benefit and safety analyses, and work packages and procedures, would be assembled to support the proposed decontamination and dismantling activities.

**Site Preparations**

Following final plant shutdown, and in preparation for actual decommissioning activities, the following activities are initiated:

- Characterization of the site and surrounding environs. This includes radiation surveys of work areas, major components (including the

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reactor vessel and its internals), internal piping, and primary shield cores.

- An ISFSI has been constructed to support continued plant operation and will need to be expanded following the cessation of operations to offload the spent fuel pool in support of the decommissioning program.
- Isolation of the spent fuel storage pool and fuel handling systems, such that decommissioning operations can commence on the balance of the plant. Decommissioning operations are scheduled around the fuel handling area to optimize the overall project schedule. It is assumed that the fuel pool remains operational for the transfer of fuel for approximately four years following the cessation of operations.
- Specification of transport and disposal requirements for activated materials and/or hazardous materials, including shielding and waste stabilization.
- Development of procedures for occupational exposure control, control and release of liquid and gaseous effluent, processing of radwaste (including dry-active waste, resins, filter media, metallic and non-metallic components generated in decommissioning), site security and emergency programs, and industrial safety.
- Perform chemical decontamination of the NSSS to reduce radiation levels in support of removal operations.

### **2.1.2 Period 2 - Decommissioning Operations**

This period includes the physical decommissioning activities associated with the removal and disposal of contaminated and activated components and structures, including the successful amendment of the 10 CFR §50 operating licenses (releasing the site, exclusive of the ISFSI). Significant decommissioning activities in this phase include:

- Construction of temporary facilities and/or modification of existing facilities to support dismantling activities. This may include a centralized processing area to facilitate equipment removal and component preparations for off-site disposal.
- Reconfiguration and modification of site structures and facilities as needed to support decommissioning operations. This may include the upgrading of roads (on- and off-site) to facilitate hauling and transport. Modifications may be required to the containment

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structure to facilitate access of large/heavy equipment. Modifications may also be required to the refueling area of the building to support the segmentation of the reactor vessel internals and component extraction.

- Transfer of the spent fuel from the spent fuel storage pool to the ISFSI pad for interim storage.
- Design and fabrication of temporary and permanent shielding to support removal and transportation activities, construction of contamination control envelopes, and the procurement of specialty tooling.
- Procurement (lease or purchase) of shipping canisters, cask liners, and industrial packages.
- Decontamination of components and piping systems as required to control (minimize) worker exposure.
- Removal of piping and components no longer essential to support decommissioning operations.
- Removal of control rod drive housings and the head service structure from reactor vessel head. Segment the vessel closure head.
- Removal and segmentation of the upper internals assemblies. Segmentation will maximize the loading of the shielded transport casks, (i.e., by weight and activity). The operations are conducted under water using remotely operated tooling and contamination controls.
- Disassembly and segmentation of the remaining reactor internals, including the core former and lower core support assembly. Some material is expected to exceed Class C disposal requirements. As such, the segments will be packaged in modified spent fuel storage canisters for geologic disposal.
- Segmentation of the reactor vessel. A shielded platform is installed for segmentation as cutting operations are performed in air using remotely operated equipment within a contamination control envelope. The water level is maintained just below the cut to minimize the working area dose rates. Segments are transferred in-air to containers that are stored under water, for example, in an isolated area of the refueling canal.
- Removal of the activated portions of the concrete biological shield and accessible contaminated concrete surfaces. If dictated by the steam generator and pressurizer removal scenarios, those portions of the

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associated cubicles necessary for access and component extraction are removed.

- Removal of the steam generators and pressurizer for material recovery and controlled disposal. The generators will be moved to an on-site processing center, the steam domes are removed and the internal components segregated for off-site processing. The lower shell and tube bundle will be packaged for direct disposal. These components can serve as their own burial containers provided that all penetrations are properly sealed and the internal contaminants are stabilized. Steel shielding is added, as necessary, to those external areas of the steam generators to meet transportation limits and regulations.
- Expansion of the ISFSI and transfer of the spent fuel from the storage pool to the ISFSI pad for interim storage. Spent fuel storage operations continue throughout the active decommissioning period. Fuel transfer to DOE is expected to be completed by the end of the year 2074 (Scenario 1).

At least two years prior to the anticipated date of license termination, an LTP is required. Submitted as a supplement to the Final Safety Analysis Report (FSAR) or its equivalent, the plan must include: a site characterization, description of the remaining dismantling activities, plans for site remediation, procedures for the final radiation survey, designation of the end use of the site, an updated cost estimate to complete the decommissioning, and any associated environmental concerns. The NRC will notice the receipt of the plan, make the plan available for public comment, and schedule a local meeting. LTP approval will be subject to any conditions and limitations as deemed appropriate by the Commission. The licensee may then commence with the final remediation of site facilities and services, including:

- Removal of remaining plant systems and associated components as they become nonessential to the decommissioning program or worker health and safety (e.g., waste collection and treatment systems, electrical power and ventilation systems).
- Removal of the steel liners from the refueling canal, disposing of the activated and contaminated sections as radioactive waste. Removal of any activated/contaminated concrete.
- Surveys of the decontaminated areas of the containment structure.
- Removal of the contaminated equipment and material from the auxiliary building and any other contaminated facility. Use radiation

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and contamination control techniques until radiation surveys indicate that the structures can be released for unrestricted access and conventional demolition. This activity may necessitate the dismantling and disposition of most of the systems and components (both clean and contaminated) located within these buildings. This activity will facilitate surface decontamination and subsequent verification surveys required prior to obtaining release for demolition.

- Removal of the remaining components, equipment, and plant services in support of the area release survey(s).
- Routing of material removed in the decontamination and dismantling to a central processing area. Material certified to be free of contamination is released for unrestricted disposition, e.g., as scrap, recycle, or general disposal. Contaminated material is characterized and segregated for additional off-site processing (disassembly, chemical cleaning, volume reduction, and waste treatment), and/or packaged for controlled disposal at a low-level radioactive waste disposal facility.

Incorporated into the LTP is the Final Survey Plan. This plan identifies the radiological surveys to be performed once the decontamination activities are completed and is developed using the guidance provided in the “Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM).”<sup>[26]</sup> This document incorporates the statistical approaches to survey design and data interpretation used by the EPA. It also identifies commercially available instrumentation and procedures for conducting radiological surveys. Use of this guidance ensures that the surveys are conducted in a manner that provides a high degree of confidence that applicable NRC criteria are satisfied. Once the survey is complete, the results are provided to the NRC in a format that can be verified. The NRC then reviews and evaluates the information, performs an independent confirmation of radiological site conditions, and makes a determination on the requested change to the operating licenses (that would release the property, exclusive of the ISFSI, for unrestricted use).

The NRC will amend the operating licenses to reduce the licensed area to the ISFSI area if it determines that site remediation has been performed in accordance with the LTP, and that the terminal radiation survey and associated documentation demonstrate that the property (exclusive of the ISFSI) is suitable for release.