APPENDIX B

UNIT COST FACTOR LISTING
(Power Block Structures Only)

Unit Cost Factor	Cost/Unit
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

APPENDIX B

UNIT COST FACTOR LISTING
(Power Block Structures Only)

Unit Cost Factor	Cost/Unit
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

APPENDIX B

UNIT COST FACTOR LISTING
(Power Block Structures Only)

Unit Cost Factor	Cost/Unit
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

APPENDIX B

UNIT COST FACTOR LISTING
(Power Block Structures Only)

Unit Cost Factor	Cost/Unit
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

APPENDIX B

UNIT COST FACTOR LISTING
(Power Block Structures Only)

Unit Cost Factor	Cost/Unit
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

APPENDIX C

DETAILED COST ANALYSIS

SCENARIO 1: DECON with 42 Year DFS

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 Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes 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 1a - Shutdown through Transition																					
Period 1a Direct Decommissioning Activities																					
1a.1.1	Prepare preliminary decommissioning cost	-	-	-	-	-	-	167	25	192	192	-	-	-	-	-	-	-	-	-	1,300
1a.1.2	Notification of Cessation of Operations									a											
1a.1.3	Remove fuel & source material									n/a											
1a.1.4	Notification of Permanent Defueling									a											
1a.1.5	Deactivate plant systems & process waste									a											
1a.1.6	Prepare and submit PSDAR	-	-	-	-	-	-	257	39	296	296	-	-	-	-	-	-	-	-	-	2,000
1a.1.7	Review plant dwgs & specs.	-	-	-	-	-	-	591	89	680	680	-	-	-	-	-	-	-	-	-	4,600
1a.1.8	Perform detailed rad survey									a											
1a.1.9	Estimate by-product inventory	-	-	-	-	-	-	129	19	148	148	-	-	-	-	-	-	-	-	-	1,000
1a.1.10	End product description	-	-	-	-	-	-	129	19	148	148	-	-	-	-	-	-	-	-	-	1,000
1a.1.11	Detailed by-product inventory	-	-	-	-	-	-	167	25	192	192	-	-	-	-	-	-	-	-	-	1,300
1a.1.12	Define major work sequence	-	-	-	-	-	-	964	145	1,108	1,108	-	-	-	-	-	-	-	-	-	7,500
1a.1.13	Perform SER and EA	-	-	-	-	-	-	398	60	458	458	-	-	-	-	-	-	-	-	-	3,100
1a.1.14	Prepare/submit Defueled Technical Specifications	-	-	-	-	-	-	964	145	1,108	1,108	-	-	-	-	-	-	-	-	-	7,500
1a.1.15	Perform Site-Specific Cost Study	-	-	-	-	-	-	643	96	739	739	-	-	-	-	-	-	-	-	-	5,000
1a.1.16	Prepare/submit Irradiated Fuel Management Plan	-	-	-	-	-	-	129	19	148	148	-	-	-	-	-	-	-	-	-	1,000
Activity Specifications																					
1a.1.17.1	Plant & temporary facilities	-	-	-	-	-	-	632	95	727	654	-	73	-	-	-	-	-	-	-	4,920
1a.1.17.2	Plant systems	-	-	-	-	-	-	536	80	616	554	-	62	-	-	-	-	-	-	-	4,167
1a.1.17.3	NSSS Decontamination Flush	-	-	-	-	-	-	64	10	74	74	-	-	-	-	-	-	-	-	-	500
1a.1.17.4	Reactor internals	-	-	-	-	-	-	912	137	1,049	1,049	-	-	-	-	-	-	-	-	-	7,100
1a.1.17.5	Reactor vessel	-	-	-	-	-	-	835	125	961	961	-	-	-	-	-	-	-	-	-	6,500
1a.1.17.6	Sacrificial shield	-	-	-	-	-	-	64	10	74	74	-	-	-	-	-	-	-	-	-	500
1a.1.17.7	Moisture separators/reheaters	-	-	-	-	-	-	129	19	148	148	-	-	-	-	-	-	-	-	-	1,000
1a.1.17.8	Reinforced concrete	-	-	-	-	-	-	206	31	236	118	-	118	-	-	-	-	-	-	-	1,600
1a.1.17.9	Main Turbine	-	-	-	-	-	-	268	40	309	309	-	-	-	-	-	-	-	-	-	2,088
1a.1.17.10	Main Condensers	-	-	-	-	-	-	268	40	309	309	-	-	-	-	-	-	-	-	-	2,088
1a.1.17.11	Pressure suppression structure	-	-	-	-	-	-	257	39	296	296	-	-	-	-	-	-	-	-	-	2,000
1a.1.17.12	Drywell	-	-	-	-	-	-	206	31	236	236	-	-	-	-	-	-	-	-	-	1,600
1a.1.17.13	Plant structures & buildings	-	-	-	-	-	-	401	60	461	231	-	231	-	-	-	-	-	-	-	3,120
1a.1.17.14	Waste management	-	-	-	-	-	-	591	89	680	680	-	-	-	-	-	-	-	-	-	4,600
1a.1.17.15	Facility & site closeout	-	-	-	-	-	-	116	17	133	67	-	67	-	-	-	-	-	-	-	900
1a.1.17	Total	-	-	-	-	-	-	5,486	823	6,308	5,759	-	550	-	-	-	-	-	-	-	42,683
Planning & Site Preparations																					
1a.1.18	Prepare dismantling sequence	-	-	-	-	-	-	308	46	355	355	-	-	-	-	-	-	-	-	-	2,400
1a.1.19	Plant prep. & temp. svces	-	-	-	-	-	-	3,500	525	4,025	4,025	-	-	-	-	-	-	-	-	-	-
1a.1.20	Design water clean-up system	-	-	-	-	-	-	180	27	207	207	-	-	-	-	-	-	-	-	-	1,400
1a.1.21	Rigging/Cont. Cntrl Envlps/tooling/etc.	-	-	-	-	-	-	2,400	360	2,760	2,760	-	-	-	-	-	-	-	-	-	-
1a.1.22	Procure casks/liners & containers	-	-	-	-	-	-	158	24	182	182	-	-	-	-	-	-	-	-	-	1,230
1a.1	Subtotal Period 1a Activity Costs	-	-	-	-	-	-	16,569	2,485	19,054	18,505	-	550	-	-	-	-	-	-	-	83,013
Period 1a Collateral Costs																					
1a.3.1	Spent Fuel Capital and Transfer	-	-	-	-	-	-	1,323	198	1,522	-	1,522	-	-	-	-	-	-	-	-	-
1a.3.2	Retention and Severance	-	-	-	-	-	-	9,892	1,484	11,376	11,376	-	-	-	-	-	-	-	-	-	-
1a.3	Subtotal Period 1a Collateral Costs	-	-	-	-	-	-	11,215	1,682	12,897	11,376	1,522	-	-	-	-	-	-	-	-	-
Period 1a Period-Dependent Costs																					
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 physics supplies	-	614	-	-	-	-	-	153	767	767	-	-	-	-	-	-	-	-	-	-
1a.4.4	Heavy equipment rental	-	753	-	-	-	-	-	113	866	866	-	-	-	-	-	-	-	-	-	-
1a.4.5	Disposal of DAW generated	-	-	12	6	-	50	-	15	83	83	-	-	-	610	-	-	-	12,190	20	-
1a.4.6	Plant energy budget	-	-	-	-	-	-	1,817	272	2,089	2,089	-	-	-	-	-	-	-	-	-	-
1a.4.7	NRC Fees	-	-	-	-	-	-	1,137	114	1,251	1,251	-	-	-	-	-	-	-	-	-	-
1a.4.8	Emergency Planning Fees	-	-	-	-	-	-	3,428	343	3,770	-	3,770	-	-	-	-	-	-	-	-	-
1a.4.9	Fixed Overhead	-	-	-	-	-	-	2,616	392	3,009	3,009	-	-	-	-	-	-	-	-	-	-
1a.4.10	Spent Fuel Pool O&M	-	-	-	-	-	-	845	127	971	-	971	-	-	-	-	-	-	-	-	-
1a.4.11	ISFSI Operating Costs	-	-	-	-	-	-	112	17	129	-	129	-	-	-	-	-	-	-	-	-
1a.4.12	Railroad Track Maintenance	-	-	-	-	-	-	125	19	144	144	-	-	-	-	-	-	-	-	-	-
1a.4.13	Security Staff Cost	-	-	-	-	-	-	16,372	2,456	18,827	18,827	-	-	-	-	-	-	-	-	-	245,440
1a.4.14	Utility Staff Cost	-	-	-	-	-	-	27,285	4,093	31,378	31,378	-	-	-	-	-	-	-	-	-	422,240
1a.4	Subtotal Period 1a Period-Dependent Costs	-	1,367	12	6	-	50	59,634	8,703	69,772	64,902	4,870	-	-	610	-	-	-	12,190	20	667,680

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 Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes 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
1a.0	TOTAL PERIOD 1a COST	-	1,367	12	6	-	50	87,418	12,871	101,724	94,783	6,392	550	-	610	-	-	-	12,190	20	750,693
PERIOD 1b - Decommissioning Preparations																					
Period 1b Direct Decommissioning Activities																					
Detailed Work Procedures																					
1b.1.1.1	Plant systems	-	-	-	-	-	-	608	91	700	630	-	70	-	-	-	-	-	-	-	4,733
1b.1.1.2	NSSS Decontamination Flush	-	-	-	-	-	-	129	19	148	148	-	-	-	-	-	-	-	-	-	1,000
1b.1.1.3	Reactor internals	-	-	-	-	-	-	514	77	591	591	-	-	-	-	-	-	-	-	-	4,000
1b.1.1.4	Remaining buildings	-	-	-	-	-	-	174	26	200	50	-	150	-	-	-	-	-	-	-	1,350
1b.1.1.5	CRD housings & NIs	-	-	-	-	-	-	129	19	148	148	-	-	-	-	-	-	-	-	-	1,000
1b.1.1.6	Incore instrumentation	-	-	-	-	-	-	129	19	148	148	-	-	-	-	-	-	-	-	-	1,000
1b.1.1.7	Removal primary containment	-	-	-	-	-	-	257	39	296	296	-	-	-	-	-	-	-	-	-	2,000
1b.1.1.8	Reactor vessel	-	-	-	-	-	-	467	70	537	537	-	-	-	-	-	-	-	-	-	3,630
1b.1.1.9	Facility closeout	-	-	-	-	-	-	154	23	177	89	-	89	-	-	-	-	-	-	-	1,200
1b.1.1.10	Sacrificial shield	-	-	-	-	-	-	154	23	177	177	-	-	-	-	-	-	-	-	-	1,200
1b.1.1.11	Reinforced concrete	-	-	-	-	-	-	129	19	148	74	-	74	-	-	-	-	-	-	-	1,000
1b.1.1.12	Main Turbine	-	-	-	-	-	-	267	40	307	307	-	-	-	-	-	-	-	-	-	2,080
1b.1.1.13	Main Condensers	-	-	-	-	-	-	268	40	309	309	-	-	-	-	-	-	-	-	-	2,088
1b.1.1.14	Moisture separators & reheaters	-	-	-	-	-	-	257	39	296	296	-	-	-	-	-	-	-	-	-	2,000
1b.1.1.15	Radwaste building	-	-	-	-	-	-	351	53	403	363	-	40	-	-	-	-	-	-	-	2,730
1b.1.1.16	Reactor building	-	-	-	-	-	-	351	53	403	363	-	40	-	-	-	-	-	-	-	2,730
1b.1.1	Total	-	-	-	-	-	-	4,336	650	4,987	4,524	-	463	-	-	-	-	-	-	-	33,741
1b.1.2	Decon NSSS	296	-	-	-	-	-	-	148	444	444	-	-	-	-	-	-	-	-	1,067	-
1b.1	Subtotal Period 1b Activity Costs	296	-	-	-	-	-	4,336	798	5,431	4,968	-	463	-	-	-	-	-	-	1,067	33,741
Period 1b Additional Costs																					
1b.2.1	Spent Fuel Pool Isolation	-	-	-	-	-	-	12,675	1,901	14,576	14,576	-	-	-	-	-	-	-	-	-	-
1b.2.2	Site Characterization	-	-	-	-	-	-	5,930	1,779	7,708	7,708	-	-	-	-	-	-	-	-	30,500	10,852
1b.2.3	Mixed & RCRA Waste	-	-	28	29	14	-	-	9	80	80	-	-	43	-	-	-	-	5,253	161	-
1b.2	Subtotal Period 1b Additional Costs	-	-	28	29	14	-	18,605	3,689	22,365	22,365	-	-	43	-	-	-	-	5,253	30,661	10,852
Period 1b Collateral Costs																					
1b.3.1	Decon equipment	1,055	-	-	-	-	-	-	158	1,213	1,213	-	-	-	-	-	-	-	-	-	-
1b.3.2	DOC staff relocation expenses	-	-	-	-	-	-	1,264	190	1,454	1,454	-	-	-	-	-	-	-	-	-	-
1b.3.3	Process decommissioning water waste	38	-	25	45	-	102	-	53	263	263	-	-	-	233	-	-	-	13,991	45	-
1b.3.4	Process decommissioning chemical flush waste	1	-	24	77	-	1,526	-	396	2,024	2,024	-	-	-	-	231	-	-	24,599	43	-
1b.3.5	Small tool allowance	-	2	-	-	-	-	-	0	2	2	-	-	-	-	-	-	-	-	-	-
1b.3.6	Pipe cutting equipment	-	1,200	-	-	-	-	-	180	1,380	1,380	-	-	-	-	-	-	-	-	-	-
1b.3.7	Decon rig	2,104	-	-	-	-	-	-	316	2,419	2,419	-	-	-	-	-	-	-	-	-	-
1b.3.8	Spent Fuel Capital and Transfer	-	-	-	-	-	-	391	59	450	-	450	-	-	-	-	-	-	-	-	-
1b.3.9	Retention and Severance	-	-	-	-	-	-	6,335	950	7,285	7,285	-	-	-	-	-	-	-	-	-	-
1b.3	Subtotal Period 1b Collateral Costs	3,197	1,202	49	122	-	1,628	7,990	2,302	16,490	16,040	450	-	-	233	231	-	-	38,589	89	-
Period 1b Period-Dependent Costs																					
1b.4.1	Decon supplies	39	-	-	-	-	-	-	10	48	48	-	-	-	-	-	-	-	-	-	-
1b.4.2	Insurance	-	-	-	-	-	-	1,161	116	1,277	1,277	-	-	-	-	-	-	-	-	-	-
1b.4.3	Property taxes	-	-	-	-	-	-	1,709	171	1,880	1,880	-	-	-	-	-	-	-	-	-	-
1b.4.4	Health physics supplies	-	344	-	-	-	-	-	86	430	430	-	-	-	-	-	-	-	-	-	-
1b.4.5	Heavy equipment rental	-	375	-	-	-	-	-	56	432	432	-	-	-	-	-	-	-	-	-	-
1b.4.6	Disposal of DAW generated	-	-	7	4	-	29	-	9	49	49	-	-	-	356	-	-	-	7,122	12	-
1b.4.7	Plant energy budget	-	-	-	-	-	-	1,812	272	2,083	2,083	-	-	-	-	-	-	-	-	-	-
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	Fixed Overhead	-	-	-	-	-	-	1,305	196	1,500	1,500	-	-	-	-	-	-	-	-	-	-
1b.4.11	Spent Fuel Pool O&M	-	-	-	-	-	-	421	63	484	-	484	-	-	-	-	-	-	-	-	-
1b.4.12	ISFSI Operating Costs	-	-	-	-	-	-	56	8	64	-	64	-	-	-	-	-	-	-	-	-
1b.4.13	Railroad Track Maintenance	-	-	-	-	-	-	62	9	72	72	-	-	-	-	-	-	-	-	-	-
1b.4.14	Security Staff Cost	-	-	-	-	-	-	8,163	1,225	9,388	9,388	-	-	-	-	-	-	-	-	-	122,384
1b.4.15	DOC Staff Cost	-	-	-	-	-	-	5,846	877	6,723	6,723	-	-	-	-	-	-	-	-	-	63,266
1b.4.16	Utility Staff Cost	-	-	-	-	-	-	13,682	2,052	15,734	15,734	-	-	-	-	-	-	-	-	-	211,579
1b.4	Subtotal Period 1b Period-Dependent Costs	39	719	7	4	-	29	35,955	5,323	42,076	39,970	2,106	-	-	356	-	-	-	7,122	12	397,229
1b.0	TOTAL PERIOD 1b COST	3,531	1,921	84	154	14	1,657	66,886	12,113	86,361	83,343	2,556	463	43	589	231	-	-	50,964	31,828	441,822
PERIOD 1 TOTALS		3,531	3,288	96	160	14	1,707	154,304	24,984	188,085	178,125	8,948	1,012	43	1,199	231	-	-	63,155	31,848	1,192,515

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 Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes 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 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	-	528	-	221	1,031	1,031	-	-	-	1,430	-	-	-	99,742	2,905	-
2a.1.1.2	Recirculation Pumps & Motors	40	63	16	51	42	539	-	186	938	938	-	-	96	945	-	-	-	112,200	1,563	-
2a.1.1.3	CRDMs & NIs Removal	194	1,020	415	135	-	1,130	-	696	3,591	3,591	-	-	-	3,741	-	-	-	213,700	17,768	-
2a.1.1.4	Reactor Vessel Internals	244	6,722	12,852	2,696	-	29,845	364	24,027	76,749	76,749	-	-	-	1,252	1,761	898	-	343,150	30,515	1,379
2a.1.1.5	Reactor Vessel	113	9,121	2,672	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	4,099	42	37,903	728	35,973	112,449	112,449	-	-	96	23,536	1,761	898	-	1,874,002	83,267	2,758
Removal of Major Equipment																					
2a.1.2	Main Turbine/Generator	-	385	1,356	521	6,139	439	-	1,341	10,182	10,182	-	-	24,835	1,383	-	-	-	1,577,959	5,438	-
2a.1.3	Main Condensers	-	1,347	360	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	Radwaste	-	25	-	-	-	-	-	4	28	28	-	-	-	-	-	-	-	-	127	-
2a.1.4.3	Turbine	-	127	-	-	-	-	-	19	146	146	-	-	-	-	-	-	-	-	1,254	-
2a.1.4	Totals	-	483	-	-	-	-	-	72	556	556	-	-	-	-	-	-	-	-	3,598	-
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	-	27	1	2	26	13	-	14	83	83	-	-	156	37	-	-	-	8,681	400	-
2a.1.5.3	Chemistry Sampling - Insulated	-	2	0	0	-	0	-	1	3	3	-	-	-	1	-	-	-	72	28	-
2a.1.5.4	Circulating Water - RCA	-	207	14	62	1,114	-	-	230	1,626	1,626	-	-	6,656	-	-	-	-	270,307	2,860	-
2a.1.5.5	Combustible Gas Control - Insul - RCA	-	29	0	2	36	-	-	13	80	80	-	-	212	-	-	-	-	8,617	378	-
2a.1.5.6	Combustible Gas Control - RCA	-	18	1	3	48	-	-	12	81	81	-	-	285	-	-	-	-	11,577	245	-
2a.1.5.7	Condensate & Feedwater	-	987	183	329	3,337	2,464	-	1,431	8,731	8,731	-	-	19,947	7,319	-	-	-	1,275,810	14,196	-
2a.1.5.8	Condensate & Feedwater - Insulated	-	492	34	63	699	408	-	343	2,038	2,038	-	-	4,176	1,207	-	-	-	246,693	6,964	-
2a.1.5.9	Condensate Demin	-	545	30	51	560	339	-	316	1,840	1,840	-	-	3,346	1,000	-	-	-	199,936	7,618	-
2a.1.5.10	Condensate Storage	-	726	33	82	1,193	270	-	444	2,748	2,748	-	-	7,131	795	-	-	-	340,568	10,345	-
2a.1.5.11	Control Rod Drive	-	3	0	0	3	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	-	79	20	51	734	176	-	184	1,244	1,244	-	-	4,384	521	-	-	-	211,329	1,163	-
2a.1.5.14	Core Spray - Insulated	-	145	8	13	137	90	-	82	474	474	-	-	818	264	-	-	-	50,149	2,033	-
2a.1.5.15	Demin Water - Insulated - RCA	-	15	0	1	14	-	-	6	36	36	-	-	85	-	-	-	-	3,445	181	-
2a.1.5.16	Demin Water - RCA	-	41	1	2	42	-	-	17	104	104	-	-	253	-	-	-	-	10,278	508	-
2a.1.5.17	Diesel Oil - RCA	-	2	0	0	4	-	-	1	7	7	-	-	23	-	-	-	-	931	25	-
2a.1.5.18	Drywell Atmosphere Cooling - RCA	-	38	1	5	92	-	-	24	159	159	-	-	548	-	-	-	-	22,244	550	-
2a.1.5.19	EDG Emerg Service Water - Insul - RCA	-	0	0	0	0	-	-	0	1	1	-	-	2	-	-	-	-	84	4	-
2a.1.5.20	Electrical - Clean	-	13	-	-	-	-	-	2	15	-	-	15	-	-	-	-	-	-	182	-
2a.1.5.21	Emergency Service Water - Insul - RCA	-	21	0	1	23	-	-	9	55	55	-	-	137	-	-	-	-	5,544	281	-
2a.1.5.22	Emergency Service Water - RCA	-	2	0	0	2	-	-	1	5	5	-	-	13	-	-	-	-	512	22	-
2a.1.5.23	GEZIP - RCA	-	3	0	1	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	-	6	0	0	1	5	-	3	15	15	-	-	6	13	-	-	-	1,080	81	-
2a.1.5.26	H2-O2 Control Analyzing - Insulated	-	6	0	0	1	5	-	3	15	15	-	-	6	13	-	-	-	1,080	81	-
2a.1.5.27	High Pressure Coolant Injection	-	67	6	13	163	70	-	61	381	381	-	-	972	209	-	-	-	52,792	966	-
2a.1.5.28	High Pressure Coolant Injection - Insula	-	219	14	24	267	163	-	141	830	830	-	-	1,598	481	-	-	-	95,733	3,079	-
2a.1.5.29	Hydrogen Cooling	-	8	-	-	-	-	-	1	10	-	-	10	-	-	-	-	-	-	118	-
2a.1.5.30	Hydrogen Cooling - RCA	-	7	0	0	7	-	-	3	17	17	-	-	39	-	-	-	-	1,600	79	-
2a.1.5.31	Hydrogen Seal Oil - RCA	-	17	0	2	32	-	-	9	60	60	-	-	189	-	-	-	-	7,669	212	-
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	296	-	-	103	644	644	-	-	1,768	-	-	-	-	71,810	2,733	-
2a.1.5.34	Main Condenser	-	196	12	20	223	139	-	122	712	712	-	-	1,333	411	-	-	-	80,439	2,746	-
2a.1.5.35	Main Steam	-	249	17	32	359	201	-	173	1,029	1,029	-	-	2,148	594	-	-	-	125,135	3,512	-
2a.1.5.36	Main Turbine	-	1,012	205	353	3,306	2,921	-	1,553	9,350	9,350	-	-	19,760	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	-	-	-	145,208	3,069	-
2a.1.5.38	Miscellaneous	-	43	1	3	51	-	-	19	115	115	-	-	302	-	-	-	-	12,283	622	-
2a.1.5.39	Off Gas Recombiner	-	189	19	32	300	257	-	163	960	960	-	-	1,795	764	-	-	-	121,554	2,708	-
2a.1.5.40	Off Gas Recombiner - Insulated	-	387	19	27	229	240	-	197	1,100	1,100	-	-	1,366	709	-	-	-	100,933	5,385	-
2a.1.5.41	Post Accident Sampling	-	25	1	1	9	11	-	11	58	58	-	-	53	33	-	-	-	4,318	345	-
2a.1.5.42	Post Accident Sampling - Insulated	-	17	1	1	3	13	-	8	43	43	-	-	17	37	-	-	-	3,116	212	-
2a.1.5.43	RHR Service Water - Insulated - RCA	-	83	3	14	248	-	-	60	409	409	-	-	1,485	-	-	-	-	60,293	1,125	-
2a.1.5.44	RHR Service Water - RCA	-	4	0	0	6	-	-	2	12	12	-	-	35	-	-	-	-	1,410	57	-
2a.1.5.45	Reactor Feedwater Pump Seal	-	56	2	4	32	33	-	28	155	155	-	-	193	96	-	-	-	14,009	773	-

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 Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes 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
Disposal of Plant Systems (continued)																					
2a.1.5.46	Residual Heat Removal	362	252	172	178	1,072	2,051	-	962	5,049	5,049	-	-	6,406	6,012	-	-	-	647,941	4,135	-
2a.1.5.47	Residual Heat Removal - Insulated	622	554	61	82	563	880	-	772	3,535	3,535	-	-	3,367	2,607	-	-	-	303,087	10,340	-
2a.1.5.48	Rx Core Isolation Cooling	-	49	2	4	43	26	-	26	150	150	-	-	259	76	-	-	-	15,396	691	-
2a.1.5.49	Rx Core Isolation Cooling - Insulated	-	107	5	7	48	67	-	52	287	287	-	-	288	198	-	-	-	24,419	1,479	-
2a.1.5.50	Rx Recirculation	56	58	6	4	7	65	-	61	258	258	-	-	43	190	-	-	-	14,095	1,580	-
2a.1.5.51	Snubbers	-	169	2	5	63	30	-	60	331	331	-	-	377	90	-	-	-	21,009	2,548	-
2a.1.5.52	Standby Liquid Control - Insul - RCA	-	4	0	0	4	-	-	2	9	9	-	-	22	-	-	-	-	904	48	-
2a.1.5.53	Standby Liquid Control - RCA	-	26	1	2	41	-	-	13	83	83	-	-	245	-	-	-	-	9,969	341	-
2a.1.5.54	Stator Cooling - RCA	-	7	0	1	21	-	-	5	35	35	-	-	126	-	-	-	-	5,135	98	-
2a.1.5.55	Traversing Incore Probe	0	4	0	0	0	2	-	1	7	7	-	-	1	5	-	-	-	386	51	-
2a.1.5	Totals	1,040	8,221	924	1,572	16,339	11,425	-	8,209	47,730	47,706	-	24	97,654	33,808	-	-	-	6,125,515	119,943	-
2a.1.6	Scaffolding in support of decommissioning	-	2,265	22	12	191	31	-	607	3,127	3,127	-	-	1,030	91	-	-	-	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	180,360	180,336	-	24	141,010	59,545	1,761	898	-	10,458,540	253,640	2,758
Period 2a Collateral Costs																					
2a.3.1	Process decommissioning water waste	85	-	57	102	-	232	-	122	598	598	-	-	-	532	-	-	-	31,942	104	-
2a.3.2	Process decommissioning chemical flush waste	5	-	216	702	-	1,619	-	534	3,077	3,077	-	-	-	2,093	-	-	-	223,008	392	-
2a.3.3	Small tool allowance	-	324	-	-	-	-	-	49	373	336	-	37	-	-	-	-	-	-	-	-
2a.3.4	Spent Fuel Capital and Transfer	-	-	-	-	-	-	13,661	2,049	15,710	-	15,710	-	-	-	-	-	-	-	-	-
2a.3.5	Retention and Severance	-	-	-	-	-	-	13,127	1,969	15,097	15,097	-	-	-	-	-	-	-	-	-	-
2a.3	Subtotal Period 2a Collateral Costs	91	324	274	804	-	1,851	26,788	4,723	34,854	19,107	15,710	37	-	2,625	-	-	-	254,950	495	-
Period 2a Period-Dependent Costs																					
2a.4.1	Decon supplies	112	-	-	-	-	-	-	28	140	140	-	-	-	-	-	-	-	-	-	-
2a.4.2	Insurance	-	-	-	-	-	-	1,019	102	1,121	1,121	-	-	-	-	-	-	-	-	-	-
2a.4.3	Property taxes	-	-	-	-	-	-	4,377	438	4,814	4,814	-	-	-	-	-	-	-	-	-	-
2a.4.4	Health physics supplies	-	2,356	-	-	-	-	-	589	2,945	2,945	-	-	-	-	-	-	-	-	-	-
2a.4.5	Heavy equipment rental	-	3,627	-	-	-	-	-	544	4,171	4,171	-	-	-	-	-	-	-	-	-	-
2a.4.6	Disposal of DAW generated	-	-	110	57	-	457	-	134	758	758	-	-	-	5,551	-	-	-	111,023	181	-
2a.4.7	Plant energy budget	-	-	-	-	-	-	2,501	375	2,876	2,876	-	-	-	-	-	-	-	-	-	-
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	Spent Fuel Pool O&M	-	-	-	-	-	-	1,224	184	1,408	-	1,408	-	-	-	-	-	-	-	-	-
2a.4.12	ISFSI Operating Costs	-	-	-	-	-	-	162	24	187	-	187	-	-	-	-	-	-	-	-	-
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	Security Staff Cost	-	-	-	-	-	-	21,881	3,282	25,164	25,164	-	-	-	-	-	-	-	-	-	325,574
2a.4.16	DOC Staff Cost	-	-	-	-	-	-	21,021	3,153	24,174	24,174	-	-	-	-	-	-	-	-	-	229,108
2a.4.17	Utility Staff Cost	-	-	-	-	-	-	27,906	4,186	32,092	32,092	-	-	-	-	-	-	-	-	-	426,562
2a.4	Subtotal Period 2a Period-Dependent Costs	112	5,982	110	57	-	457	89,938	14,267	110,924	104,803	6,121	-	-	5,551	-	-	-	111,023	181	981,244
2a.0	TOTAL PERIOD 2a COST	1,945	36,028	19,028	7,259	25,937	52,350	117,455	66,138	326,139	304,246	21,831	62	141,010	67,722	1,761	898	-	10,824,520	254,317	984,002
PERIOD 2b - Site Decontamination																					
Period 2b Direct Decommissioning Activities																					
Disposal of Plant Systems																					
2b.1.1.1	ALARA/Radiological	-	18	0	1	6	3	-	6	35	35	-	-	35	10	-	-	-	2,060	277	-
2b.1.1.2	Alternate N2 - RCA	-	16	0	1	16	-	-	7	40	40	-	-	93	-	-	-	-	3,765	185	-
2b.1.1.3	Decontamination Projects	-	1	0	0	0	0	-	0	2	2	-	-	2	0	-	-	-	129	17	-
2b.1.1.4	Electrical - Contaminated	-	445	6	24	400	30	-	183	1,089	1,089	-	-	2,389	90	-	-	-	102,726	6,325	-
2b.1.1.5	Electrical - Decontaminated	-	2,698	48	218	3,906	-	-	1,298	8,167	8,167	-	-	23,344	-	-	-	-	948,013	37,107	-
2b.1.1.6	Fire - RCA	-	101	1	6	103	-	-	42	253	253	-	-	614	-	-	-	-	24,917	1,324	-
2b.1.1.7	HVAC Ductwork	-	305	7	27	446	34	-	156	975	975	-	-	2,665	100	-	-	-	114,598	4,111	-
2b.1.1.8	HVAC/Chilled Water - RCA	-	324	6	26	461	-	-	155	971	971	-	-	2,752	-	-	-	-	111,779	3,985	-
2b.1.1.9	Heating & Ventilation	-	483	16	61	1,007	76	-	302	1,945	1,945	-	-	6,018	227	-	-	-	258,789	7,101	-
2b.1.1.10	Heating Boiler - Insulated - RCA	-	3	0	0	4	-	-	1	9	9	-	-	26	-	-	-	-	1,058	35	-
2b.1.1.11	Liquid Radwaste	588	687	48	63	514	586	-	703	3,188	3,188	-	-	3,073	1,728	-	-	-	235,484	17,194	-
2b.1.1.12	Makeup Demin - RCA	-	103	3	14	246	-	-	65	431	431	-	-	1,471	-	-	-	-	59,747	1,412	-
2b.1.1.13	Non-Essential Diesel Generator - RCA	-	27	3	13	238	-	-	45	327	327	-	-	1,424	-	-	-	-	57,832	395	-
2b.1.1.14	Off Gas Holdup	-	342	21	38	461	214	-	216	1,291	1,291	-	-	2,755	630	-	-	-	152,277	4,769	-
2b.1.1.15	Primary Containment	-	455	42	87	1,038	507	-	414	2,543	2,543	-	-	6,201	1,506	-	-	-	347,704	6,454	-
2b.1.1.16	Process Radiation Monitors	-	46	2	2	24	18	-	20	111	111	-	-	142	52	-	-	-	9,115	649	-

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 Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes 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
Disposal of Plant Systems (continued)																					
2b.1.1.17	Rx Bldg Closed Clng Water - Insul - RCA	-	114	2	9	163	-	-	54	343	343	-	-	977	-	-	-	-	39,675	1,484	-
2b.1.1.18	Rx Bldg Closed Clng Water - RCA	-	184	15	66	1,187	-	-	235	1,687	1,687	-	-	7,093	-	-	-	-	288,031	2,489	-
2b.1.1.19	Rx Component Handling Equip	27	142	18	27	194	279	-	154	840	840	-	-	1,158	829	-	-	-	99,730	2,462	-
2b.1.1.20	Rx Pressure Vessel	28	47	6	5	13	78	-	48	225	225	-	-	75	230	-	-	-	17,816	1,051	-
2b.1.1.21	Rx Water Cleanup	172	265	19	16	22	251	-	222	965	965	-	-	130	737	-	-	-	52,670	5,736	-
2b.1.1.22	Secondary Containment	-	124	7	14	170	86	-	81	483	483	-	-	1,017	255	-	-	-	57,567	1,763	-
2b.1.1.23	Service & Seal Water - Insulated - RCA	-	120	2	11	197	-	-	62	392	392	-	-	1,180	-	-	-	-	47,917	1,565	-
2b.1.1.24	Service & Seal Water - RCA	-	159	4	17	303	-	-	88	570	570	-	-	1,809	-	-	-	-	73,453	2,016	-
2b.1.1.25	Service Air Blower - RCA	-	15	0	2	34	-	-	9	62	62	-	-	206	-	-	-	-	8,364	206	-
2b.1.1.26	Solid Radwaste	338	494	36	49	399	467	-	480	2,264	2,264	-	-	2,387	1,380	-	-	-	185,221	10,820	-
2b.1.1.27	Structures & Buildings	-	78	2	5	60	29	-	37	210	210	-	-	357	85	-	-	-	19,933	1,128	-
2b.1.1.28	Wells & Domestic Water	-	10	-	-	-	-	-	1	11	-	-	11	-	-	-	-	-	-	144	-
2b.1.1.29	Wells & Domestic Water - RCA	-	52	1	3	57	-	-	22	136	136	-	-	342	-	-	-	-	13,874	633	-
2b.1.1	Totals	1,153	7,860	315	804	11,668	2,657	-	5,107	29,563	29,552	-	11	69,735	7,859	-	-	-	3,334,244	122,835	-
2b.1.2	Scaffolding in support of decommissioning	-	2,831	28	16	239	38	-	758	3,909	3,909	-	-	1,287	114	-	-	-	65,139	28,205	-
Decontamination of Site Buildings																					
2b.1.3.1	Reactor Building	5,202	2,903	178	516	8,044	1,181	-	4,924	22,948	22,948	-	-	48,077	7,014	-	-	-	2,317,670	112,518	-
2b.1.3.2	Admin	106	6	0	3	-	15	-	59	189	189	-	-	-	145	-	-	-	6,840	1,600	-
2b.1.3.3	HPCI Room	29	28	1	3	20	14	-	29	123	123	-	-	118	125	-	-	-	10,759	789	-
2b.1.3.4	Hot Shop	17	4	0	2	-	11	-	12	46	46	-	-	-	103	-	-	-	4,860	286	-
2b.1.3.5	LLRW Storage & Shipping	58	24	2	8	5	45	-	48	191	191	-	-	31	433	-	-	-	21,708	1,127	-
2b.1.3.6	Offgas Stack	372	269	7	23	225	82	-	312	1,289	1,289	-	-	1,343	669	-	-	-	87,045	8,860	-
2b.1.3.7	Offgas Storage & Compressor	41	17	1	6	4	33	-	34	136	136	-	-	25	316	-	-	-	15,948	785	-
2b.1.3.8	Radwaste	121	61	3	17	29	96	-	107	435	435	-	-	172	910	-	-	-	49,943	2,503	-
2b.1.3.9	Radwaste Material Storage Warehouse	64	24	2	9	-	52	-	52	202	202	-	-	-	495	-	-	-	23,400	1,197	-
2b.1.3.10	Recombiner	27	25	1	5	33	24	-	32	148	148	-	-	199	216	-	-	-	18,405	695	-
2b.1.3.11	Turbine	705	353	21	104	215	564	-	632	2,594	2,594	-	-	1,283	5,299	-	-	-	303,150	14,443	-
2b.1.3.12	Turbine Building Addition	58	21	1	8	-	45	-	47	181	181	-	-	-	434	-	-	-	20,478	1,087	-
2b.1.3	Totals	6,799	3,736	218	704	8,574	2,164	-	6,288	28,483	28,483	-	-	51,247	16,159	-	-	-	2,880,206	145,889	-
2b.1.4	Prepare/submit License Termination Plan	-	-	-	-	-	-	526	79	605	605	-	-	-	-	-	-	-	-	-	4,096
2b.1.5	Receive NRC approval of termination plan									a											
2b.1	Subtotal Period 2b Activity Costs	7,952	14,427	560	1,524	20,481	4,859	526	12,232	62,561	62,549	-	11	122,269	24,132	-	-	-	6,279,589	296,929	4,096
Period 2b Additional Costs																					
2b.2.1	Operational Equipment	-	-	23	92	1,211	-	-	198	1,524	1,524	-	-	11,760	-	-	-	-	294,000	32	-
2b.2.2	Excavation of Underground Services	-	1,972	-	-	-	-	376	550	2,898	2,898	-	-	-	-	-	-	-	-	12,493	-
2b.2.3	Security Modifications	-	-	-	-	-	-	8,696	1,304	10,000	10,000	-	-	-	-	-	-	-	-	-	-
2b.2	Subtotal Period 2b Additional Costs	-	1,972	23	92	1,211	-	9,072	2,052	14,422	14,422	-	-	11,760	-	-	-	-	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	-	-	-	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	-	364	-	-	-	-	-	55	418	418	-	-	-	-	-	-	-	-	-	-
2b.3.4	Spent Fuel Capital and Transfer	-	-	-	-	-	-	117,254	17,588	134,843	-	134,843	-	-	-	-	-	-	-	-	-
2b.3.5	Retention and Severance	-	-	-	-	-	-	6,299	945	7,244	7,244	-	-	-	-	-	-	-	-	-	-
2b.3	Subtotal Period 2b Collateral Costs	199	364	178	378	-	865	123,554	18,978	144,516	9,673	134,843	-	-	1,666	-	-	-	119,165	322	-
Period 2b Period-Dependent Costs																					
2b.4.1	Decon supplies	1,440	-	-	-	-	-	-	360	1,799	1,799	-	-	-	-	-	-	-	-	-	-
2b.4.2	Insurance	-	-	-	-	-	-	742	74	816	816	-	-	-	-	-	-	-	-	-	-
2b.4.3	Property taxes	-	-	-	-	-	-	2,703	270	2,974	2,974	-	-	-	-	-	-	-	-	-	-
2b.4.4	Health physics supplies	-	2,376	-	-	-	-	-	594	2,970	2,970	-	-	-	-	-	-	-	-	-	-
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	-	-	-	5,084	-	-	-	101,679	166	-
2b.4.7	Plant energy budget	-	-	-	-	-	-	1,437	216	1,653	1,653	-	-	-	-	-	-	-	-	-	-
2b.4.8	NRC Fees	-	-	-	-	-	-	623	62	685	685	-	-	-	-	-	-	-	-	-	-
2b.4.9	Emergency Planning Fees	-	-	-	-	-	-	2,995	299	3,294	-	3,294	-	-	-	-	-	-	-	-	-
2b.4.10	Fixed Overhead	-	-	-	-	-	-	2,235	335	2,570	2,570	-	-	-	-	-	-	-	-	-	-
2b.4.11	Spent Fuel Pool O&M	-	-	-	-	-	-	891	134	1,024	-	1,024	-	-	-	-	-	-	-	-	-
2b.4.12	Liquid Radwaste Processing Equipment/Services	-	-	-	-	-	-	224	34	258	258	-	-	-	-	-	-	-	-	-	-
2b.4.13	ISFSI Operating Costs	-	-	-	-	-	-	118	18	136	-	136	-	-	-	-	-	-	-	-	-
2b.4.14	Railroad Track Maintenance	-	-	-	-	-	-	458	69	527	527	-	-	-	-	-	-	-	-	-	-
2b.4.15	Remedial Actions Surveys	-	-	-	-	-	-	1,182	177	1,359	1,359	-	-	-	-	-	-	-	-	-	-

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 Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes 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 Period-Dependent Costs (continued)																					
2b.4.16	Security Staff Cost	-	-	-	-	-	-	15,925	2,389	18,314	18,314	-	-	-	-	-	-	-	-	-	236,949
2b.4.17	DOC Staff Cost	-	-	-	-	-	-	14,772	2,216	16,988	16,988	-	-	-	-	-	-	-	-	-	160,160
2b.4.18	Utility Staff Cost	-	-	-	-	-	-	19,442	2,916	22,358	22,358	-	-	-	-	-	-	-	-	-	297,283
2b.4	Subtotal Period 2b Period-Dependent Costs	1,440	5,087	101	52	-	419	63,747	10,692	81,536	77,082	4,455	-	-	5,084	-	-	-	101,679	166	694,392
2b.0	TOTAL PERIOD 2b COST	9,591	21,850	861	2,046	21,692	6,143	196,899	43,954	303,035	163,726	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	Cranes/Heavy Loads/Rigging - RCA	-	3	0	1	17	-	-	4	25	25	-	-	103	-	-	-	-	4,184	48	-
2d.1.2.2	Electrical - Contaminated Fuel Pool	-	47	1	2	40	3	-	19	112	112	-	-	240	9	-	-	-	10,334	665	-
2d.1.2.3	Electrical - Decontam. Fuel Pool Area	-	297	5	23	411	-	-	140	876	876	-	-	2,457	-	-	-	-	99,783	4,090	-
2d.1.2.4	Fire - RCA - Fuel Pool Area	-	11	0	1	10	-	-	4	26	26	-	-	62	-	-	-	-	2,499	143	-
2d.1.2.5	Fuel Pool Cooling & Cleanup	246	428	34	37	197	455	-	382	1,781	1,781	-	-	1,179	1,341	-	-	-	133,939	8,380	-
2d.1.2.6	Fuel Pool Cooling & Cleanup - Insulated	27	41	3	3	11	40	-	36	161	161	-	-	67	117	-	-	-	10,220	848	-
2d.1.2.7	HVAC Ductwork - Fuel Pool Area	-	34	1	3	50	4	-	17	108	108	-	-	296	11	-	-	-	12,733	457	-
2d.1.2.8	HVAC/Chilled Water - RCA Fuel Pool Area	-	33	0	2	37	-	-	14	87	87	-	-	223	-	-	-	-	9,072	397	-
2d.1.2.9	Instrument & Service Air-RCA-Fuel Pool	-	29	1	2	45	-	-	14	91	91	-	-	267	-	-	-	-	10,841	357	-
2d.1.2	Totals	273	924	45	75	819	502	-	631	3,268	3,268	-	-	4,894	1,479	-	-	-	293,606	15,385	-
Decontamination of Site Buildings																					
2d.1.3.1	Reactor (Post Fuel)	946	2,599	172	913	329	10,216	-	3,880	19,056	19,056	-	-	1,969	62,698	-	-	-	2,732,406	45,703	-
2d.1.3	Totals	946	2,599	172	913	329	10,216	-	3,880	19,056	19,056	-	-	1,969	62,698	-	-	-	2,732,406	45,703	-
2d.1.4	Scaffolding in support of decommissioning	-	566	6	3	48	8	-	152	782	782	-	-	257	23	-	-	-	13,028	5,641	-
2d.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	67,635	-
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	-	-	-	504	-	-	-	30,239	98	-
2d.3.2	Process decommissioning chemical flush waste	1	-	26	84	-	193	-	64	366	366	-	-	-	249	-	-	-	26,553	47	-
2d.3.3	Small tool allowance	-	91	-	-	-	-	-	14	105	105	-	-	-	-	-	-	-	-	-	-
2d.3.4	Decommissioning Equipment Disposition	-	-	130	82	1,112	178	-	237	1,739	1,739	-	-	6,000	529	-	-	-	303,608	147	-
2d.3.5	Spent Fuel Capital and Transfer	-	-	-	-	-	-	27	4	32	-	32	-	-	-	-	-	-	-	-	-
2d.3	Subtotal Period 2d Collateral Costs	80	91	210	262	1,112	590	27	432	2,805	2,773	32	-	6,000	1,282	-	-	-	360,400	292	-
Period 2d Period-Dependent Costs																					
2d.4.1	Decon supplies	244	-	-	-	-	-	-	61	305	305	-	-	-	-	-	-	-	-	-	-
2d.4.2	Insurance	-	-	-	-	-	-	530	53	583	583	-	-	-	-	-	-	-	-	-	-
2d.4.3	Property taxes	-	-	-	-	-	-	1,664	166	1,830	1,830	-	-	-	-	-	-	-	-	-	-
2d.4.4	Health physics supplies	-	806	-	-	-	-	-	202	1,008	1,008	-	-	-	-	-	-	-	-	-	-
2d.4.5	Heavy equipment rental	-	1,936	-	-	-	-	-	290	2,227	2,227	-	-	-	-	-	-	-	-	-	-
2d.4.6	Disposal of DAW generated	-	-	40	21	-	167	-	49	277	277	-	-	-	2,030	-	-	-	40,600	66	-
2d.4.7	Plant energy budget	-	-	-	-	-	-	547	82	630	630	-	-	-	-	-	-	-	-	-	-
2d.4.8	NRC Fees	-	-	-	-	-	-	424	42	466	466	-	-	-	-	-	-	-	-	-	-
2d.4.9	Emergency Planning Fees	-	-	-	-	-	-	112	11	123	-	123	-	-	-	-	-	-	-	-	-
2d.4.10	Fixed Overhead	-	-	-	-	-	-	1,597	239	1,836	1,836	-	-	-	-	-	-	-	-	-	-
2d.4.11	Liquid Radwaste Processing Equipment/Services	-	-	-	-	-	-	320	48	368	368	-	-	-	-	-	-	-	-	-	-
2d.4.12	ISFSI Operating Costs	-	-	-	-	-	-	84	13	97	-	97	-	-	-	-	-	-	-	-	-
2d.4.13	Railroad Track Maintenance	-	-	-	-	-	-	94	14	108	108	-	-	-	-	-	-	-	-	-	-
2d.4.14	Remedial Actions Surveys	-	-	-	-	-	-	844	127	971	971	-	-	-	-	-	-	-	-	-	-
2d.4.15	Security Staff Cost	-	-	-	-	-	-	10,999	1,650	12,649	8,918	3,732	-	-	-	-	-	-	-	-	162,981
2d.4.16	DOC Staff Cost	-	-	-	-	-	-	7,311	1,097	8,408	8,408	-	-	-	-	-	-	-	-	-	78,356
2d.4.17	Utility Staff Cost	-	-	-	-	-	-	10,052	1,508	11,560	10,670	890	-	-	-	-	-	-	-	-	149,660
2d.4	Subtotal Period 2d Period-Dependent Costs	244	2,743	40	21	-	167	34,579	5,652	43,446	38,604	4,842	-	-	2,030	-	-	-	40,600	66	390,997
2d.0	TOTAL PERIOD 2d COST	2,196	6,981	576	1,422	2,308	14,055	36,065	12,202	75,806	70,932	4,873	-	13,120	75,164	-	-	-	3,926,210	67,993	403,477

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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 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 2f - License Termination																					
Period 2f Direct Decommissioning Activities																					
2f.1.1	ORISE confirmatory survey	-	-	-	-	-	-	166	50	216	216	-	-	-	-	-	-	-	-	-	-
2f.1.2	Terminate license									a											
2f.1	Subtotal Period 2f Activity Costs	-	-	-	-	-	-	166	50	216	216	-	-	-	-	-	-	-	-	-	-
Period 2f Additional Costs																					
2f.2.1	License Termination Survey	-	-	-	-	-	-	6,920	2,076	8,995	8,995	-	-	-	-	-	-	-	-	95,048	6,240
2f.2	Subtotal Period 2f Additional Costs	-	-	-	-	-	-	6,920	2,076	8,995	8,995	-	-	-	-	-	-	-	-	95,048	6,240
Period 2f Collateral Costs																					
2f.3.1	DOC staff relocation expenses	-	-	-	-	-	-	1,264	190	1,454	1,454	-	-	-	-	-	-	-	-	-	-
2f.3.2	Spent Fuel Capital and Transfer	-	-	-	-	-	-	526	79	605	-	605	-	-	-	-	-	-	-	-	-
2f.3	Subtotal Period 2f Collateral Costs	-	-	-	-	-	-	1,790	268	2,058	1,454	605	-	-	-	-	-	-	-	-	-
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	Disposal of DAW generated	-	-	7	4	-	29	-	9	48	48	-	-	-	355	-	-	-	7,097	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	11	123	-	123	-	-	-	-	-	-	-	-	-
2f.4.8	Fixed Overhead	-	-	-	-	-	-	1,597	239	1,836	1,836	-	-	-	-	-	-	-	-	-	-
2f.4.9	ISFSI Operating Costs	-	-	-	-	-	-	84	13	97	-	97	-	-	-	-	-	-	-	-	-
2f.4.10	Railroad Track Maintenance	-	-	-	-	-	-	94	14	108	108	-	-	-	-	-	-	-	-	-	-
2f.4.11	Security Staff Cost	-	-	-	-	-	-	10,999	1,650	12,649	8,918	3,732	-	-	-	-	-	-	-	-	162,981
2f.4.12	DOC Staff Cost	-	-	-	-	-	-	5,393	809	6,201	6,201	-	-	-	-	-	-	-	-	-	57,200
2f.4.13	Utility Staff Cost	-	-	-	-	-	-	5,742	864	6,626	5,738	888	-	-	-	-	-	-	-	-	80,707
2f.4	Subtotal Period 2f Period-Dependent Costs	-	708	7	4	-	29	26,740	4,070	31,557	26,718	4,839	-	-	355	-	-	-	7,097	12	300,888
2f.0	TOTAL PERIOD 2f COST	-	708	7	4	-	29	35,615	6,464	42,827	37,382	5,444	-	-	355	-	-	-	7,097	95,059	307,128
PERIOD 2 TOTALS		13,731	65,566	20,473	10,731	49,937	72,577	386,033	128,758	747,806	576,287	171,445	73	288,160	174,123	1,761	898	-	21,552,260	727,310	2,393,096
PERIOD 3b - Site Restoration																					
Period 3b Direct Decommissioning Activities																					
Demolition of Remaining Site Buildings																					
3b.1.1.1	Reactor Building	-	1,971	-	-	-	-	-	296	2,267	-	-	2,267	-	-	-	-	-	-	13,911	-
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	HPCI Room	-	19	-	-	-	-	-	3	22	-	-	22	-	-	-	-	-	-	97	-
3b.1.1.5	Hot Shop	-	16	-	-	-	-	-	2	19	-	-	19	-	-	-	-	-	-	177	-
3b.1.1.6	Hydrogen & Oxygen Storage	-	2	-	-	-	-	-	0	2	-	-	2	-	-	-	-	-	-	19	-
3b.1.1.7	LLRW Storage & Shipping	-	83	-	-	-	-	-	12	95	-	-	95	-	-	-	-	-	-	662	-
3b.1.1.8	MSIV	-	4	-	-	-	-	-	1	4	-	-	4	-	-	-	-	-	-	42	-
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	Radwaste	-	228	-	-	-	-	-	34	262	-	-	262	-	-	-	-	-	-	1,220	-
3b.1.1.13	Recombiner	-	128	-	-	-	-	-	19	147	-	-	147	-	-	-	-	-	-	713	-
3b.1.1.14	Security Barrier	-	186	-	-	-	-	-	28	214	-	-	214	-	-	-	-	-	-	933	-
3b.1.1.15	Structures Greater than 3' Below Grade	-	2,461	-	-	-	-	-	369	2,830	-	-	2,830	-	-	-	-	-	-	12,649	-
3b.1.1.16	Tank Farm	-	4	-	-	-	-	-	1	5	-	-	5	-	-	-	-	-	-	21	-
3b.1.1.17	Turbine	-	1,259	-	-	-	-	-	189	1,448	-	-	1,448	-	-	-	-	-	-	13,036	-
3b.1.1.18	Turbine Building Addition	-	55	-	-	-	-	-	8	63	-	-	63	-	-	-	-	-	-	618	-
3b.1.1.19	Turbine Pedestal	-	182	-	-	-	-	-	27	209	-	-	209	-	-	-	-	-	-	926	-
3b.1.1	Totals	-	8,169	-	-	-	-	-	1,225	9,394	-	-	9,394	-	-	-	-	-	-	58,885	-
Site Closeout Activities																					
3b.1.2	Grade & landscape site	-	896	-	-	-	-	-	134	1,031	-	-	1,031	-	-	-	-	-	-	1,841	-
3b.1.3	Final report to NRC	-	-	-	-	-	-	200	30	231	231	-	-	-	-	-	-	-	-	-	1,560
3b.1	Subtotal Period 3b Activity Costs	-	9,065	-	-	-	-	200	1,390	10,655	231	-	10,425	-	-	-	-	-	-	60,726	1,560

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 Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes 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 3b Additional Costs																					
3b.2.1	Clean Concrete Disposal	-	3,322	-	-	-	-	13	500	3,835	-	-	3,835	-	-	-	-	-	-	12	-
3b.2.2	Intake Structure Cofferdam	-	335	-	-	-	-	-	50	385	-	-	385	-	-	-	-	-	-	2,584	-
3b.2.3	Construction Debris	-	-	-	-	-	-	1,170	176	1,346	-	-	1,346	-	-	-	-	-	-	-	-
3b.2.4	Backfill	-	5,583	-	-	-	-	-	837	6,421	-	-	6,421	-	-	-	-	-	-	5,422	-
3b.2.5	Discharge Structure Cofferdam	-	442	-	-	-	-	-	66	508	-	-	508	-	-	-	-	-	-	3,552	-
3b.2	Subtotal Period 3b Additional Costs	-	9,682	-	-	-	-	1,183	1,630	12,495	-	-	12,495	-	-	-	-	-	-	11,570	-
Period 3b Collateral Costs																					
3b.3.1	Small tool allowance	-	110	-	-	-	-	-	17	127	-	-	127	-	-	-	-	-	-	-	-
3b.3.2	Spent Fuel Capital and Transfer	-	-	-	-	-	-	5,601	840	6,442	-	6,442	-	-	-	-	-	-	-	-	-
3b.3	Subtotal Period 3b Collateral Costs	-	110	-	-	-	-	5,601	857	6,568	-	6,442	127	-	-	-	-	-	-	-	-
Period 3b Period-Dependent Costs																					
3b.4.1	Insurance	-	-	-	-	-	-	1,220	122	1,342	1,342	-	-	-	-	-	-	-	-	-	-
3b.4.2	Property taxes	-	-	-	-	-	-	2,540	254	2,794	-	2,794	-	-	-	-	-	-	-	-	-
3b.4.3	Heavy equipment rental	-	5,842	-	-	-	-	-	876	6,719	-	-	6,719	-	-	-	-	-	-	-	-
3b.4.4	Plant energy budget	-	-	-	-	-	-	315	47	362	-	362	-	-	-	-	-	-	-	-	-
3b.4.5	NRC ISFSI Fees	-	-	-	-	-	-	356	36	391	-	391	-	-	-	-	-	-	-	-	-
3b.4.6	Emergency Planning Fees	-	-	-	-	-	-	257	26	283	-	283	-	-	-	-	-	-	-	-	-
3b.4.7	Fixed Overhead	-	-	-	-	-	-	1,122	168	1,290	429	860	-	-	-	-	-	-	-	-	-
3b.4.8	ISFSI Operating Costs	-	-	-	-	-	-	194	29	223	-	223	-	-	-	-	-	-	-	-	-
3b.4.9	Railroad Track Maintenance	-	-	-	-	-	-	543	81	624	249	375	-	-	-	-	-	-	-	-	-
3b.4.10	Security Staff Cost	-	-	-	-	-	-	25,319	3,798	29,117	0	8,589	20,527	-	-	-	-	-	-	-	375,152
3b.4.11	DOC Staff Cost	-	-	-	-	-	-	11,729	1,759	13,489	-	-	13,489	-	-	-	-	-	-	-	122,646
3b.4.12	Utility Staff Cost	-	-	-	-	-	-	6,873	1,031	7,904	-	2,047	5,857	-	-	-	-	-	-	-	98,297
3b.4	Subtotal Period 3b Period-Dependent Costs	-	5,842	-	-	-	-	50,467	8,228	64,537	2,020	15,926	46,591	-	-	-	-	-	-	-	596,095
3b.0	TOTAL PERIOD 3b COST	-	24,700	-	-	-	-	57,452	12,104	94,255	2,251	22,367	69,638	-	-	-	-	-	-	72,296	597,655
PERIOD 3c - Fuel Storage Operations/Shipping																					
Period 3c Direct Decommissioning Activities																					
Period 3c Collateral Costs																					
3c.3.1	Spent Fuel Capital and Transfer	-	-	-	-	-	-	35,783	5,367	41,150	-	41,150	-	-	-	-	-	-	-	-	-
3c.3	Subtotal Period 3c Collateral Costs	-	-	-	-	-	-	35,783	5,367	41,150	-	41,150	-	-	-	-	-	-	-	-	-
Period 3c Period-Dependent Costs																					
3c.4.1	Insurance	-	-	-	-	-	-	24,661	2,466	27,127	-	27,127	-	-	-	-	-	-	-	-	-
3c.4.2	Property taxes	-	-	-	-	-	-	31,866	3,187	35,053	-	35,053	-	-	-	-	-	-	-	-	-
3c.4.4	NRC ISFSI Fees	-	-	-	-	-	-	9,642	964	10,606	-	10,606	-	-	-	-	-	-	-	-	-
3c.4.5	Emergency Planning Fees	-	-	-	-	-	-	5,199	520	5,718	-	5,718	-	-	-	-	-	-	-	-	-
3c.4.6	Fixed Overhead	-	-	-	-	-	-	7,552	1,133	8,685	-	8,685	-	-	-	-	-	-	-	-	-
3c.4.7	ISFSI Operating Costs	-	-	-	-	-	-	3,925	589	4,513	-	4,513	-	-	-	-	-	-	-	-	-
3c.4.8	Railroad Track Maintenance	-	-	-	-	-	-	4,384	658	5,042	-	5,042	-	-	-	-	-	-	-	-	-
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	37,539	311,590	-	311,590	-	-	-	-	-	-	-	-	2,388,493
3c.0	TOTAL PERIOD 3c COST	-	-	-	-	-	-	309,834	42,907	352,740	-	352,740	-	-	-	-	-	-	-	-	2,388,493
PERIOD 3d - GTCC shipping																					
Period 3d Direct Decommissioning Activities																					
Nuclear Steam Supply System Removal																					
3d.1.1.1	Vessel & Internals GTCC Disposal	-	-	1,083	-	-	4,313	-	918	6,314	6,314	-	-	-	-	-	-	1,160	225,765	-	-
3d.1.1	Totals	-	-	1,083	-	-	4,313	-	918	6,314	6,314	-	-	-	-	-	-	1,160	225,765	-	-
3d.1	Subtotal Period 3d Activity Costs	-	-	1,083	-	-	4,313	-	918	6,314	6,314	-	-	-	-	-	-	1,160	225,765	-	-
Period 3d Collateral Costs																					
3d.3.1	Spent Fuel Capital and Transfer	-	-	-	-	-	-	55	8	64	-	64	-	-	-	-	-	-	-	-	-
3d.3	Subtotal Period 3d Collateral Costs	-	-	-	-	-	-	55	8	64	-	64	-	-	-	-	-	-	-	-	-

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 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	GTCC Cu. Feet			
Period 3d Period-Dependent Costs																					
3d.4.1	Insurance	-	-	-	-	-	-	27	3	30	30	-	-	-	-	-	-	-	-	-	-
3d.4.2	Property taxes	-	-	-	-	-	-	35	3	38	38	-	-	-	-	-	-	-	-	-	-
3d.4.4	NRC ISFSI Fees	-	-	-	-	-	-	8	1	9	-	9	-	-	-	-	-	-	-	-	-
3d.4.5	Emergency Planning Fees	-	-	-	-	-	-	6	1	6	-	6	-	-	-	-	-	-	-	-	-
3d.4.6	Fixed Overhead	-	-	-	-	-	-	8	1	10	10	-	-	-	-	-	-	-	-	-	-
3d.4.7	Railroad Track Maintenance	-	-	-	-	-	-	5	1	6	6	-	-	-	-	-	-	-	-	-	-
3d.4.8	Security Staff Cost	-	-	-	-	-	-	165	25	190	190	-	-	-	-	-	-	-	-	-	2,074
3d.4.9	Utility Staff Cost	-	-	-	-	-	-	39	6	45	45	-	-	-	-	-	-	-	-	-	539
3d.4	Subtotal Period 3d Period-Dependent Costs	-	-	-	-	-	-	293	40	333	318	15	-	-	-	-	-	-	-	-	2,613
3d.0	TOTAL PERIOD 3d COST	-	-	1,083	-	-	4,313	348	966	6,710	6,632	78	-	-	-	-	-	1,160	225,765	-	2,613
PERIOD 3e - ISFSI Decontamination																					
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	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	Plant energy budget	-	-	-	-	-	-	12	3	15	15	-	-	-	-	-	-	-	-	-	-
3e.4.4	Fixed Overhead	-	-	-	-	-	-	71	18	89	89	-	-	-	-	-	-	-	-	-	-
3e.4.5	Railroad Track Maintenance	-	-	-	-	-	-	41	10	52	52	-	-	-	-	-	-	-	-	-	-
3e.4.6	Security Staff Cost	-	-	-	-	-	-	352	88	440	440	-	-	-	-	-	-	-	-	-	4,999
3e.4.7	Utility Staff Cost	-	-	-	-	-	-	261	65	326	326	-	-	-	-	-	-	-	-	-	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	3,118	2,569	12,844	12,844	-	-	-	21,949	-	-	-	2,633,402	10,339	10,993
PERIOD 3f - ISFSI Site Restoration																					
Period 3f Direct Decommissioning Activities																					
Period 3f Additional Costs																					
3f.2.1	Demolition and Site Restoration of ISFSI	-	1,486	-	-	-	-	233	258	1,977	-	-	1,977	-	-	-	-	-	-	6,957	160
3f.2	Subtotal Period 3f Additional Costs	-	1,486	-	-	-	-	233	258	1,977	-	-	1,977	-	-	-	-	-	-	6,957	160
Period 3f Collateral Costs																					
3f.3.1	Small tool allowance	-	10	-	-	-	-	-	2	12	-	-	12	-	-	-	-	-	-	-	-
3f.3	Subtotal Period 3f Collateral Costs	-	10	-	-	-	-	-	2	12	-	-	12	-	-	-	-	-	-	-	-
Period 3f Period-Dependent Costs																					
3f.4.2	Property taxes	-	-	-	-	-	-	126	13	138	-	-	138	-	-	-	-	-	-	-	-
3f.4.3	Heavy equipment rental	-	117	-	-	-	-	-	17	134	-	-	134	-	-	-	-	-	-	-	-
3f.4.4	Plant energy budget	-	-	-	-	-	-	6	1	7	-	-	7	-	-	-	-	-	-	-	-
3f.4.5	Fixed Overhead	-	-	-	-	-	-	36	5	41	-	-	41	-	-	-	-	-	-	-	-
3f.4.6	Railroad Track Maintenance	-	-	-	-	-	-	21	3	24	-	-	24	-	-	-	-	-	-	-	-
3f.4.7	Security Staff Cost	-	-	-	-	-	-	177	27	204	-	-	204	-	-	-	-	-	-	-	2,520
3f.4.8	Utility Staff Cost	-	-	-	-	-	-	109	16	126	-	-	126	-	-	-	-	-	-	-	1,564
3f.4	Subtotal Period 3f Period-Dependent Costs	-	117	-	-	-	-	475	82	674	-	-	674	-	-	-	-	-	-	-	4,084
3f.0	TOTAL PERIOD 3f COST	-	1,613	-	-	-	-	709	342	2,663	-	-	2,663	-	-	-	-	-	-	6,957	4,244
PERIOD 3 TOTALS		-	26,369	1,271	987	-	10,238	371,460	58,888	469,213	21,726	375,186	72,301	-	21,949	-	-	1,160	2,859,167	89,592	3,003,998
TOTAL COST TO DECOMMISSION		17,263	95,223	21,839	11,878	49,952	84,523	911,797	212,629	1,405,104	776,139	555,579	73,386	288,203	197,270	1,992	898	1,160	24,474,580	848,750	6,589,608

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 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	GTCC Cu. Feet			

TOTAL COST TO DECOMMISSION WITH 17.83% CONTINGENCY:	$1,405,104	thousands of 2020 dollars
TOTAL NRC LICENSE TERMINATION COST IS 55.24% OR:	$776,139	thousands of 2020 dollars
SPENT FUEL MANAGEMENT COST IS 39.54% OR:	$555,579	thousands of 2020 dollars
NON-NUCLEAR DEMOLITION COST IS 5.22% OR:	$73,386	thousands of 2020 dollars
TOTAL LOW-LEVEL RADIOACTIVE WASTE VOLUME BURIED (EXCLUDING GTCC):	200,160	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:	848,750	Man-hours

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

APPENDIX D

DETAILED COST ANALYSIS

SCENARIO 2: DECON with 60 Year DFS

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 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 1a - Shutdown through Transition																					
Period 1a Direct Decommissioning Activities																					
1a.1.1	Prepare preliminary decommissioning cost	-	-	-	-	-	-	167	25	192	192	-	-	-	-	-	-	-	-	-	1,300
1a.1.2	Notification of Cessation of Operations									a											
1a.1.3	Remove fuel & source material									n/a											
1a.1.4	Notification of Permanent Defueling									a											
1a.1.5	Deactivate plant systems & process waste									a											
1a.1.6	Prepare and submit PSDAR	-	-	-	-	-	-	257	39	296	296	-	-	-	-	-	-	-	-	-	2,000
1a.1.7	Review plant dwgs & specs.	-	-	-	-	-	-	591	89	680	680	-	-	-	-	-	-	-	-	-	4,600
1a.1.8	Perform detailed rad survey									a											
1a.1.9	Estimate by-product inventory	-	-	-	-	-	-	129	19	148	148	-	-	-	-	-	-	-	-	-	1,000
1a.1.10	End product description	-	-	-	-	-	-	129	19	148	148	-	-	-	-	-	-	-	-	-	1,000
1a.1.11	Detailed by-product inventory	-	-	-	-	-	-	167	25	192	192	-	-	-	-	-	-	-	-	-	1,300
1a.1.12	Define major work sequence	-	-	-	-	-	-	964	145	1,108	1,108	-	-	-	-	-	-	-	-	-	7,500
1a.1.13	Perform SER and EA	-	-	-	-	-	-	398	60	458	458	-	-	-	-	-	-	-	-	-	3,100
1a.1.14	Prepare/submit Defueled Technical Specifications	-	-	-	-	-	-	964	145	1,108	1,108	-	-	-	-	-	-	-	-	-	7,500
1a.1.15	Perform Site-Specific Cost Study	-	-	-	-	-	-	643	96	739	739	-	-	-	-	-	-	-	-	-	5,000
1a.1.16	Prepare/submit Irradiated Fuel Management Plan	-	-	-	-	-	-	129	19	148	148	-	-	-	-	-	-	-	-	-	1,000
Activity Specifications																					
1a.1.17.1	Plant & temporary facilities	-	-	-	-	-	-	632	95	727	654	-	73	-	-	-	-	-	-	-	4,920
1a.1.17.2	Plant systems	-	-	-	-	-	-	536	80	616	554	-	62	-	-	-	-	-	-	-	4,167
1a.1.17.3	NSSS Decontamination Flush	-	-	-	-	-	-	64	10	74	74	-	-	-	-	-	-	-	-	-	500
1a.1.17.4	Reactor internals	-	-	-	-	-	-	912	137	1,049	1,049	-	-	-	-	-	-	-	-	-	7,100
1a.1.17.5	Reactor vessel	-	-	-	-	-	-	835	125	961	961	-	-	-	-	-	-	-	-	-	6,500
1a.1.17.6	Sacrificial shield	-	-	-	-	-	-	64	10	74	74	-	-	-	-	-	-	-	-	-	500
1a.1.17.7	Moisture separators/reheaters	-	-	-	-	-	-	129	19	148	148	-	-	-	-	-	-	-	-	-	1,000
1a.1.17.8	Reinforced concrete	-	-	-	-	-	-	206	31	236	118	-	118	-	-	-	-	-	-	-	1,600
1a.1.17.9	Main Turbine	-	-	-	-	-	-	268	40	309	309	-	-	-	-	-	-	-	-	-	2,088
1a.1.17.10	Main Condensers	-	-	-	-	-	-	268	40	309	309	-	-	-	-	-	-	-	-	-	2,088
1a.1.17.11	Pressure suppression structure	-	-	-	-	-	-	257	39	296	296	-	-	-	-	-	-	-	-	-	2,000
1a.1.17.12	Drywell	-	-	-	-	-	-	206	31	236	236	-	-	-	-	-	-	-	-	-	1,600
1a.1.17.13	Plant structures & buildings	-	-	-	-	-	-	401	60	461	231	-	231	-	-	-	-	-	-	-	3,120
1a.1.17.14	Waste management	-	-	-	-	-	-	591	89	680	680	-	-	-	-	-	-	-	-	-	4,600
1a.1.17.15	Facility & site closeout	-	-	-	-	-	-	116	17	133	67	-	67	-	-	-	-	-	-	-	900
1a.1.17	Total	-	-	-	-	-	-	5,486	823	6,308	5,759	-	550	-	-	-	-	-	-	-	42,683
Planning & Site Preparations																					
1a.1.18	Prepare dismantling sequence	-	-	-	-	-	-	308	46	355	355	-	-	-	-	-	-	-	-	-	2,400
1a.1.19	Plant prep. & temp. svces	-	-	-	-	-	-	3,500	525	4,025	4,025	-	-	-	-	-	-	-	-	-	-
1a.1.20	Design water clean-up system	-	-	-	-	-	-	180	27	207	207	-	-	-	-	-	-	-	-	-	1,400
1a.1.21	Rigging/Cont. Cntrl Envlps/tooling/etc.	-	-	-	-	-	-	2,400	360	2,760	2,760	-	-	-	-	-	-	-	-	-	-
1a.1.22	Procure casks/liners & containers	-	-	-	-	-	-	158	24	182	182	-	-	-	-	-	-	-	-	-	1,230
1a.1	Subtotal Period 1a Activity Costs	-	-	-	-	-	-	16,569	2,485	19,054	18,505	-	550	-	-	-	-	-	-	-	83,013
Period 1a Collateral Costs																					
1a.3.1	Spent Fuel Capital and Transfer	-	-	-	-	-	-	1,323	198	1,522	-	1,522	-	-	-	-	-	-	-	-	-
1a.3.2	Retention and Severance	-	-	-	-	-	-	9,892	1,484	11,376	11,376	-	-	-	-	-	-	-	-	-	-
1a.3	Subtotal Period 1a Collateral Costs	-	-	-	-	-	-	11,215	1,682	12,897	11,376	1,522	-	-	-	-	-	-	-	-	-
Period 1a Period-Dependent Costs																					
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 physics supplies	-	614	-	-	-	-	-	153	767	767	-	-	-	-	-	-	-	-	-	-
1a.4.4	Heavy equipment rental	-	753	-	-	-	-	-	113	866	866	-	-	-	-	-	-	-	-	-	-
1a.4.5	Disposal of DAW generated	-	-	12	6	-	50	-	15	83	83	-	-	-	610	-	-	-	12,190	20	-
1a.4.6	Plant energy budget	-	-	-	-	-	-	1,817	272	2,089	2,089	-	-	-	-	-	-	-	-	-	-
1a.4.7	NRC Fees	-	-	-	-	-	-	1,137	114	1,251	1,251	-	-	-	-	-	-	-	-	-	-
1a.4.8	Emergency Planning Fees	-	-	-	-	-	-	3,428	343	3,770	-	3,770	-	-	-	-	-	-	-	-	-
1a.4.9	Fixed Overhead	-	-	-	-	-	-	2,616	392	3,009	3,009	-	-	-	-	-	-	-	-	-	-
1a.4.10	Spent Fuel Pool O&M	-	-	-	-	-	-	845	127	971	-	971	-	-	-	-	-	-	-	-	-
1a.4.11	ISFSI Operating Costs	-	-	-	-	-	-	112	17	129	-	129	-	-	-	-	-	-	-	-	-
1a.4.12	Railroad Track Maintenance	-	-	-	-	-	-	125	19	144	144	-	-	-	-	-	-	-	-	-	-
1a.4.13	Security Staff Cost	-	-	-	-	-	-	16,372	2,456	18,827	18,827	-	-	-	-	-	-	-	-	-	245,440
1a.4.14	Utility Staff Cost	-	-	-	-	-	-	27,285	4,093	31,378	31,378	-	-	-	-	-	-	-	-	-	422,240
1a.4	Subtotal Period 1a Period-Dependent Costs	-	1,367	12	6	-	50	59,634	8,703	69,772	64,902	4,870	-	-	610	-	-	-	12,190	20	667,680

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 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
1a.0	TOTAL PERIOD 1a COST	-	1,367	12	6	-	50	87,418	12,871	101,724	94,783	6,392	550	-	610	-	-	-	12,190	20	750,693
PERIOD 1b - Decommissioning Preparations																					
Period 1b Direct Decommissioning Activities																					
Detailed Work Procedures																					
1b.1.1.1	Plant systems	-	-	-	-	-	-	608	91	700	630	-	70	-	-	-	-	-	-	-	4,733
1b.1.1.2	NSSS Decontamination Flush	-	-	-	-	-	-	129	19	148	148	-	-	-	-	-	-	-	-	-	1,000
1b.1.1.3	Reactor internals	-	-	-	-	-	-	514	77	591	591	-	-	-	-	-	-	-	-	-	4,000
1b.1.1.4	Remaining buildings	-	-	-	-	-	-	174	26	200	50	-	150	-	-	-	-	-	-	-	1,350
1b.1.1.5	CRD housings & NIs	-	-	-	-	-	-	129	19	148	148	-	-	-	-	-	-	-	-	-	1,000
1b.1.1.6	Incore instrumentation	-	-	-	-	-	-	129	19	148	148	-	-	-	-	-	-	-	-	-	1,000
1b.1.1.7	Removal primary containment	-	-	-	-	-	-	257	39	296	296	-	-	-	-	-	-	-	-	-	2,000
1b.1.1.8	Reactor vessel	-	-	-	-	-	-	467	70	537	537	-	-	-	-	-	-	-	-	-	3,630
1b.1.1.9	Facility closeout	-	-	-	-	-	-	154	23	177	89	-	89	-	-	-	-	-	-	-	1,200
1b.1.1.10	Sacrificial shield	-	-	-	-	-	-	154	23	177	177	-	-	-	-	-	-	-	-	-	1,200
1b.1.1.11	Reinforced concrete	-	-	-	-	-	-	129	19	148	74	-	74	-	-	-	-	-	-	-	1,000
1b.1.1.12	Main Turbine	-	-	-	-	-	-	267	40	307	307	-	-	-	-	-	-	-	-	-	2,080
1b.1.1.13	Main Condensers	-	-	-	-	-	-	268	40	309	309	-	-	-	-	-	-	-	-	-	2,088
1b.1.1.14	Moisture separators & reheaters	-	-	-	-	-	-	257	39	296	296	-	-	-	-	-	-	-	-	-	2,000
1b.1.1.15	Radwaste building	-	-	-	-	-	-	351	53	403	363	-	40	-	-	-	-	-	-	-	2,730
1b.1.1.16	Reactor building	-	-	-	-	-	-	351	53	403	363	-	40	-	-	-	-	-	-	-	2,730
1b.1.1	Total	-	-	-	-	-	-	4,336	650	4,987	4,524	-	463	-	-	-	-	-	-	-	33,741
1b.1.2	Decon NSSS	296	-	-	-	-	-	-	148	444	444	-	-	-	-	-	-	-	-	1,067	-
1b.1	Subtotal Period 1b Activity Costs	296	-	-	-	-	-	4,336	798	5,431	4,968	-	463	-	-	-	-	-	-	1,067	33,741
Period 1b Additional Costs																					
1b.2.1	Spent Fuel Pool Isolation	-	-	-	-	-	-	12,675	1,901	14,576	14,576	-	-	-	-	-	-	-	-	-	-
1b.2.2	Site Characterization	-	-	-	-	-	-	5,930	1,779	7,708	7,708	-	-	-	-	-	-	-	-	30,500	10,852
1b.2.3	Mixed & RCRA Waste	-	-	28	29	14	-	-	9	80	80	-	-	43	-	-	-	-	5,253	161	-
1b.2	Subtotal Period 1b Additional Costs	-	-	28	29	14	-	18,605	3,689	22,365	22,365	-	-	43	-	-	-	-	5,253	30,661	10,852
Period 1b Collateral Costs																					
1b.3.1	Decon equipment	1,055	-	-	-	-	-	-	158	1,213	1,213	-	-	-	-	-	-	-	-	-	-
1b.3.2	DOC staff relocation expenses	-	-	-	-	-	-	1,264	190	1,454	1,454	-	-	-	-	-	-	-	-	-	-
1b.3.3	Process decommissioning water waste	38	-	25	45	-	102	-	53	263	263	-	-	-	233	-	-	-	13,991	45	-
1b.3.4	Process decommissioning chemical flush waste	1	-	24	77	-	1,526	-	396	2,024	2,024	-	-	-	-	231	-	-	24,599	43	-
1b.3.5	Small tool allowance	-	2	-	-	-	-	-	0	2	2	-	-	-	-	-	-	-	-	-	-
1b.3.6	Pipe cutting equipment	-	1,200	-	-	-	-	-	180	1,380	1,380	-	-	-	-	-	-	-	-	-	-
1b.3.7	Decon rig	2,104	-	-	-	-	-	-	316	2,419	2,419	-	-	-	-	-	-	-	-	-	-
1b.3.8	Spent Fuel Capital and Transfer	-	-	-	-	-	-	391	59	450	-	450	-	-	-	-	-	-	-	-	-
1b.3.9	Retention and Severance	-	-	-	-	-	-	6,335	950	7,285	7,285	-	-	-	-	-	-	-	-	-	-
1b.3	Subtotal Period 1b Collateral Costs	3,197	1,202	49	122	-	1,628	7,990	2,302	16,490	16,040	450	-	-	233	231	-	-	38,589	89	-
Period 1b Period-Dependent Costs																					
1b.4.1	Decon supplies	39	-	-	-	-	-	-	10	48	48	-	-	-	-	-	-	-	-	-	-
1b.4.2	Insurance	-	-	-	-	-	-	1,161	116	1,277	1,277	-	-	-	-	-	-	-	-	-	-
1b.4.3	Property taxes	-	-	-	-	-	-	1,709	171	1,880	1,880	-	-	-	-	-	-	-	-	-	-
1b.4.4	Health physics supplies	-	344	-	-	-	-	-	86	430	430	-	-	-	-	-	-	-	-	-	-
1b.4.5	Heavy equipment rental	-	375	-	-	-	-	-	56	432	432	-	-	-	-	-	-	-	-	-	-
1b.4.6	Disposal of DAW generated	-	-	7	4	-	29	-	9	49	49	-	-	-	356	-	-	-	7,122	12	-
1b.4.7	Plant energy budget	-	-	-	-	-	-	1,812	272	2,083	2,083	-	-	-	-	-	-	-	-	-	-
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	Fixed Overhead	-	-	-	-	-	-	1,305	196	1,500	1,500	-	-	-	-	-	-	-	-	-	-
1b.4.11	Spent Fuel Pool O&M	-	-	-	-	-	-	421	63	484	-	484	-	-	-	-	-	-	-	-	-
1b.4.12	ISFSI Operating Costs	-	-	-	-	-	-	56	8	64	-	64	-	-	-	-	-	-	-	-	-
1b.4.13	Railroad Track Maintenance	-	-	-	-	-	-	62	9	72	72	-	-	-	-	-	-	-	-	-	-
1b.4.14	Security Staff Cost	-	-	-	-	-	-	8,163	1,225	9,388	9,388	-	-	-	-	-	-	-	-	-	122,384
1b.4.15	DOC Staff Cost	-	-	-	-	-	-	5,846	877	6,723	6,723	-	-	-	-	-	-	-	-	-	63,266
1b.4.16	Utility Staff Cost	-	-	-	-	-	-	13,682	2,052	15,734	15,734	-	-	-	-	-	-	-	-	-	211,579
1b.4	Subtotal Period 1b Period-Dependent Costs	39	719	7	4	-	29	35,955	5,323	42,076	39,970	2,106	-	-	356	-	-	-	7,122	12	397,229
1b.0	TOTAL PERIOD 1b COST	3,531	1,921	84	154	14	1,657	66,886	12,113	86,361	83,343	2,556	463	43	589	231	-	-	50,964	31,828	441,822
PERIOD 1 TOTALS		3,531	3,288	96	160	14	1,707	154,304	24,984	188,085	178,125	8,948	1,012	43	1,199	231	-	-	63,155	31,848	1,192,515

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 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 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	-	528	-	221	1,031	1,031	-	-	-	1,430	-	-	-	99,742	2,905	-
2a.1.1.2	Recirculation Pumps & Motors	40	63	16	51	42	539	-	186	938	938	-	-	96	945	-	-	-	112,200	1,563	-
2a.1.1.3	CRDMs & NIs Removal	194	1,020	415	135	-	1,130	-	696	3,591	3,591	-	-	-	3,741	-	-	-	213,700	17,768	-
2a.1.1.4	Reactor Vessel Internals	244	6,722	12,852	2,696	-	29,845	364	24,027	76,749	76,749	-	-	-	1,252	1,761	898	-	343,150	30,515	1,379
2a.1.1.5	Reactor Vessel	113	9,121	2,672	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	4,099	42	37,903	728	35,973	112,449	112,449	-	-	96	23,536	1,761	898	-	1,874,002	83,267	2,758
Removal of Major Equipment																					
2a.1.2	Main Turbine/Generator	-	385	1,356	521	6,139	439	-	1,341	10,182	10,182	-	-	24,835	1,383	-	-	-	1,577,959	5,438	-
2a.1.3	Main Condensers	-	1,347	360	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	Radwaste	-	25	-	-	-	-	-	4	28	28	-	-	-	-	-	-	-	-	127	-
2a.1.4.3	Turbine	-	127	-	-	-	-	-	19	146	146	-	-	-	-	-	-	-	-	1,254	-
2a.1.4	Totals	-	483	-	-	-	-	-	72	556	556	-	-	-	-	-	-	-	-	3,598	-
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	-	27	1	2	26	13	-	14	83	83	-	-	156	37	-	-	-	8,681	400	-
2a.1.5.3	Chemistry Sampling - Insulated	-	2	0	0	-	0	-	1	3	3	-	-	-	1	-	-	-	72	28	-
2a.1.5.4	Circulating Water - RCA	-	207	14	62	1,114	-	-	230	1,626	1,626	-	-	6,656	-	-	-	-	270,307	2,860	-
2a.1.5.5	Combustible Gas Control - Insul - RCA	-	29	0	2	36	-	-	13	80	80	-	-	212	-	-	-	-	8,617	378	-
2a.1.5.6	Combustible Gas Control - RCA	-	18	1	3	48	-	-	12	81	81	-	-	285	-	-	-	-	11,577	245	-
2a.1.5.7	Condensate & Feedwater	-	987	183	329	3,337	2,464	-	1,431	8,731	8,731	-	-	19,947	7,319	-	-	-	1,275,810	14,196	-
2a.1.5.8	Condensate & Feedwater - Insulated	-	492	34	63	699	408	-	343	2,038	2,038	-	-	4,176	1,207	-	-	-	246,693	6,964	-
2a.1.5.9	Condensate Demin	-	545	30	51	560	339	-	316	1,840	1,840	-	-	3,346	1,000	-	-	-	199,936	7,618	-
2a.1.5.10	Condensate Storage	-	726	33	82	1,193	270	-	444	2,748	2,748	-	-	7,131	795	-	-	-	340,568	10,345	-
2a.1.5.11	Control Rod Drive	-	3	0	0	3	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	-	79	20	51	734	176	-	184	1,244	1,244	-	-	4,384	521	-	-	-	211,329	1,163	-
2a.1.5.14	Core Spray - Insulated	-	145	8	13	137	90	-	82	474	474	-	-	818	264	-	-	-	50,149	2,033	-
2a.1.5.15	Demin Water - Insulated - RCA	-	15	0	1	14	-	-	6	36	36	-	-	85	-	-	-	-	3,445	181	-
2a.1.5.16	Demin Water - RCA	-	41	1	2	42	-	-	17	104	104	-	-	253	-	-	-	-	10,278	508	-
2a.1.5.17	Diesel Oil - RCA	-	2	0	0	4	-	-	1	7	7	-	-	23	-	-	-	-	931	25	-
2a.1.5.18	Drywell Atmosphere Cooling - RCA	-	38	1	5	92	-	-	24	159	159	-	-	548	-	-	-	-	22,244	550	-
2a.1.5.19	EDG Emerg Service Water - Insul - RCA	-	0	0	0	0	-	-	0	1	1	-	-	2	-	-	-	-	84	4	-
2a.1.5.20	Electrical - Clean	-	13	-	-	-	-	-	2	15	-	-	15	-	-	-	-	-	-	182	-
2a.1.5.21	Emergency Service Water - Insul - RCA	-	21	0	1	23	-	-	9	55	55	-	-	137	-	-	-	-	5,544	281	-
2a.1.5.22	Emergency Service Water - RCA	-	2	0	0	2	-	-	1	5	5	-	-	13	-	-	-	-	512	22	-
2a.1.5.23	GEZIP - RCA	-	3	0	1	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	-	6	0	0	1	5	-	3	15	15	-	-	6	13	-	-	-	1,080	81	-
2a.1.5.26	H2-O2 Control Analyzing - Insulated	-	6	0	0	1	5	-	3	15	15	-	-	6	13	-	-	-	1,080	81	-
2a.1.5.27	High Pressure Coolant Injection	-	67	6	13	163	70	-	61	381	381	-	-	972	209	-	-	-	52,792	966	-
2a.1.5.28	High Pressure Coolant Injection - Insula	-	219	14	24	267	163	-	141	830	830	-	-	1,598	481	-	-	-	95,733	3,079	-
2a.1.5.29	Hydrogen Cooling	-	8	-	-	-	-	-	1	10	-	-	10	-	-	-	-	-	-	118	-
2a.1.5.30	Hydrogen Cooling - RCA	-	7	0	0	7	-	-	3	17	17	-	-	39	-	-	-	-	1,600	79	-
2a.1.5.31	Hydrogen Seal Oil - RCA	-	17	0	2	32	-	-	9	60	60	-	-	189	-	-	-	-	7,669	212	-
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	296	-	-	103	644	644	-	-	1,768	-	-	-	-	71,810	2,733	-
2a.1.5.34	Main Condenser	-	196	12	20	223	139	-	122	712	712	-	-	1,333	411	-	-	-	80,439	2,746	-
2a.1.5.35	Main Steam	-	249	17	32	359	201	-	173	1,029	1,029	-	-	2,148	594	-	-	-	125,135	3,512	-
2a.1.5.36	Main Turbine	-	1,012	205	353	3,306	2,921	-	1,553	9,350	9,350	-	-	19,760	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	-	-	-	145,208	3,069	-
2a.1.5.38	Miscellaneous	-	43	1	3	51	-	-	19	115	115	-	-	302	-	-	-	-	12,283	622	-
2a.1.5.39	Off Gas Recombiner	-	189	19	32	300	257	-	163	960	960	-	-	1,795	764	-	-	-	121,554	2,708	-
2a.1.5.40	Off Gas Recombiner - Insulated	-	387	19	27	229	240	-	197	1,100	1,100	-	-	1,366	709	-	-	-	100,933	5,385	-
2a.1.5.41	Post Accident Sampling	-	25	1	1	9	11	-	11	58	58	-	-	53	33	-	-	-	4,318	345	-
2a.1.5.42	Post Accident Sampling - Insulated	-	17	1	1	3	13	-	8	43	43	-	-	17	37	-	-	-	3,116	212	-
2a.1.5.43	RHR Service Water - Insulated - RCA	-	83	3	14	248	-	-	60	409	409	-	-	1,485	-	-	-	-	60,293	1,125	-
2a.1.5.44	RHR Service Water - RCA	-	4	0	0	6	-	-	2	12	12	-	-	35	-	-	-	-	1,410	57	-
2a.1.5.45	Reactor Feedwater Pump Seal	-	56	2	4	32	33	-	28	155	155	-	-	193	96	-	-	-	14,009	773	-

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 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
Disposal of Plant Systems (continued)																					
2a.1.5.46	Residual Heat Removal	362	252	172	178	1,072	2,051	-	962	5,049	5,049	-	-	6,406	6,012	-	-	-	647,941	4,135	-
2a.1.5.47	Residual Heat Removal - Insulated	622	554	61	82	563	880	-	772	3,535	3,535	-	-	3,367	2,607	-	-	-	303,087	10,340	-
2a.1.5.48	Rx Core Isolation Cooling	-	49	2	4	43	26	-	26	150	150	-	-	259	76	-	-	-	15,396	691	-
2a.1.5.49	Rx Core Isolation Cooling - Insulated	-	107	5	7	48	67	-	52	287	287	-	-	288	198	-	-	-	24,419	1,479	-
2a.1.5.50	Rx Recirculation	56	58	6	4	7	65	-	61	258	258	-	-	43	190	-	-	-	14,095	1,580	-
2a.1.5.51	Snubbers	-	169	2	5	63	30	-	60	331	331	-	-	377	90	-	-	-	21,009	2,548	-
2a.1.5.52	Standby Liquid Control - Insul - RCA	-	4	0	0	4	-	-	2	9	9	-	-	22	-	-	-	-	904	48	-
2a.1.5.53	Standby Liquid Control - RCA	-	26	1	2	41	-	-	13	83	83	-	-	245	-	-	-	-	9,969	341	-
2a.1.5.54	Stator Cooling - RCA	-	7	0	1	21	-	-	5	35	35	-	-	126	-	-	-	-	5,135	98	-
2a.1.5.55	Traversing Incore Probe	0	4	0	0	0	2	-	1	7	7	-	-	1	5	-	-	-	386	51	-
2a.1.5	Totals	1,040	8,221	924	1,572	16,339	11,425	-	8,209	47,730	47,706	-	24	97,654	33,808	-	-	-	6,125,515	119,943	-
2a.1.6	Scaffolding in support of decommissioning	-	2,265	22	12	191	31	-	607	3,127	3,127	-	-	1,030	91	-	-	-	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	180,360	180,336	-	24	141,010	59,545	1,761	898	-	10,458,540	253,640	2,758
Period 2a Collateral Costs																					
2a.3.1	Process decommissioning water waste	85	-	57	102	-	232	-	122	598	598	-	-	-	532	-	-	-	31,942	104	-
2a.3.2	Process decommissioning chemical flush waste	5	-	216	702	-	1,619	-	534	3,077	3,077	-	-	-	2,093	-	-	-	223,008	392	-
2a.3.3	Small tool allowance	-	324	-	-	-	-	-	49	373	336	-	37	-	-	-	-	-	-	-	-
2a.3.4	Spent Fuel Capital and Transfer	-	-	-	-	-	-	13,661	2,049	15,710	-	15,710	-	-	-	-	-	-	-	-	-
2a.3.5	Retention and Severance	-	-	-	-	-	-	13,127	1,969	15,097	15,097	-	-	-	-	-	-	-	-	-	-
2a.3.6	On-site survey and release of 0.0 tons clean metallic waste	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2a.3	Subtotal Period 2a Collateral Costs	91	324	274	804	-	1,851	26,788	4,723	34,854	19,107	15,710	37	-	2,625	-	-	-	254,950	495	-
Period 2a Period-Dependent Costs																					
2a.4.1	Decon supplies	112	-	-	-	-	-	-	28	140	140	-	-	-	-	-	-	-	-	-	-
2a.4.2	Insurance	-	-	-	-	-	-	1,019	102	1,121	1,121	-	-	-	-	-	-	-	-	-	-
2a.4.3	Property taxes	-	-	-	-	-	-	4,377	438	4,814	4,814	-	-	-	-	-	-	-	-	-	-
2a.4.4	Health physics supplies	-	2,356	-	-	-	-	-	589	2,945	2,945	-	-	-	-	-	-	-	-	-	-
2a.4.5	Heavy equipment rental	-	3,627	-	-	-	-	-	544	4,171	4,171	-	-	-	-	-	-	-	-	-	-
2a.4.6	Disposal of DAW generated	-	-	110	57	-	457	-	134	758	758	-	-	-	5,551	-	-	-	111,023	181	-
2a.4.7	Plant energy budget	-	-	-	-	-	-	2,501	375	2,876	2,876	-	-	-	-	-	-	-	-	-	-
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	Spent Fuel Pool O&M	-	-	-	-	-	-	1,224	184	1,408	-	1,408	-	-	-	-	-	-	-	-	-
2a.4.12	ISFSI Operating Costs	-	-	-	-	-	-	162	24	187	-	187	-	-	-	-	-	-	-	-	-
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	Security Staff Cost	-	-	-	-	-	-	21,881	3,282	25,164	25,164	-	-	-	-	-	-	-	-	-	325,574
2a.4.16	DOC Staff Cost	-	-	-	-	-	-	21,021	3,153	24,174	24,174	-	-	-	-	-	-	-	-	-	229,108
2a.4.17	Utility Staff Cost	-	-	-	-	-	-	27,906	4,186	32,092	32,092	-	-	-	-	-	-	-	-	-	426,562
2a.4	Subtotal Period 2a Period-Dependent Costs	112	5,982	110	57	-	457	89,938	14,267	110,924	104,803	6,121	-	-	5,551	-	-	-	111,023	181	981,244
2a.0	TOTAL PERIOD 2a COST	1,945	36,028	19,028	7,259	25,937	52,350	117,455	66,138	326,139	304,246	21,831	62	141,010	67,722	1,761	898	-	10,824,520	254,317	984,002
PERIOD 2b - Site Decontamination																					
Period 2b Direct Decommissioning Activities																					
Disposal of Plant Systems																					
2b.1.1.1	ALARA/Radiological	-	18	0	1	6	3	-	6	35	35	-	-	35	10	-	-	-	2,060	277	-
2b.1.1.2	Alternate N2 - RCA	-	16	0	1	16	-	-	7	40	40	-	-	93	-	-	-	-	3,765	185	-
2b.1.1.3	Decontamination Projects	-	1	0	0	0	0	-	0	2	2	-	-	2	0	-	-	-	129	17	-
2b.1.1.4	Electrical - Contaminated	-	445	6	24	400	30	-	183	1,089	1,089	-	-	2,389	90	-	-	-	102,726	6,325	-
2b.1.1.5	Electrical - Decontaminated	-	2,698	48	218	3,906	-	-	1,298	8,167	8,167	-	-	23,344	-	-	-	-	948,013	37,107	-
2b.1.1.6	Fire - RCA	-	101	1	6	103	-	-	42	253	253	-	-	614	-	-	-	-	24,917	1,324	-
2b.1.1.7	HVAC Ductwork	-	305	7	27	446	34	-	156	975	975	-	-	2,665	100	-	-	-	114,598	4,111	-
2b.1.1.8	HVAC/Chilled Water - RCA	-	324	6	26	461	-	-	155	971	971	-	-	2,752	-	-	-	-	111,779	3,985	-
2b.1.1.9	Heating & Ventilation	-	483	16	61	1,007	76	-	302	1,945	1,945	-	-	6,018	227	-	-	-	258,789	7,101	-
2b.1.1.10	Heating Boiler - Insulated - RCA	-	3	0	0	4	-	-	1	9	9	-	-	26	-	-	-	-	1,058	35	-
2b.1.1.11	Liquid Radwaste	588	687	48	63	514	586	-	703	3,188	3,188	-	-	3,073	1,728	-	-	-	235,484	17,194	-
2b.1.1.12	Makeup Demin - RCA	-	103	3	14	246	-	-	65	431	431	-	-	1,471	-	-	-	-	59,747	1,412	-
2b.1.1.13	Non-Essential Diesel Generator - RCA	-	27	3	13	238	-	-	45	327	327	-	-	1,424	-	-	-	-	57,832	395	-
2b.1.1.14	Off Gas Holdup	-	342	21	38	461	214	-	216	1,291	1,291	-	-	2,755	630	-	-	-	152,277	4,769	-
2b.1.1.15	Primary Containment	-	455	42	87	1,038	507	-	414	2,543	2,543	-	-	6,201	1,506	-	-	-	347,704	6,454	-

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 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
Disposal 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 Clng Water - Insul - RCA	-	114	2	9	163	-	-	54	343	343	-	-	977	-	-	-	-	39,675	1,484	-
2b.1.1.18	Rx Bldg Closed Clng Water - RCA	-	184	15	66	1,187	-	-	235	1,687	1,687	-	-	7,093	-	-	-	-	288,031	2,489	-
2b.1.1.19	Rx Component Handling Equip	27	142	18	27	194	279	-	154	840	840	-	-	1,158	829	-	-	-	99,730	2,462	-
2b.1.1.20	Rx Pressure Vessel	28	47	6	5	13	78	-	48	225	225	-	-	75	230	-	-	-	17,816	1,051	-
2b.1.1.21	Rx Water Cleanup	172	265	19	16	22	251	-	222	965	965	-	-	130	737	-	-	-	52,670	5,736	-
2b.1.1.22	Secondary Containment	-	124	7	14	170	86	-	81	483	483	-	-	1,017	255	-	-	-	57,567	1,763	-
2b.1.1.23	Service & Seal Water - Insulated - RCA	-	120	2	11	197	-	-	62	392	392	-	-	1,180	-	-	-	-	47,917	1,565	-
2b.1.1.24	Service & Seal Water - RCA	-	159	4	17	303	-	-	88	570	570	-	-	1,809	-	-	-	-	73,453	2,016	-
2b.1.1.25	Service Air Blower - RCA	-	15	0	2	34	-	-	9	62	62	-	-	206	-	-	-	-	8,364	206	-
2b.1.1.26	Solid Radwaste	338	494	36	49	399	467	-	480	2,264	2,264	-	-	2,387	1,380	-	-	-	185,221	10,820	-
2b.1.1.27	Structures & Buildings	-	78	2	5	60	29	-	37	210	210	-	-	357	85	-	-	-	19,933	1,128	-
2b.1.1.28	Wells & Domestic Water	-	10	-	-	-	-	-	1	11	-	-	11	-	-	-	-	-	-	144	-
2b.1.1.29	Wells & Domestic Water - RCA	-	52	1	3	57	-	-	22	136	136	-	-	342	-	-	-	-	13,874	633	-
2b.1.1	Totals	1,153	7,860	315	804	11,668	2,657	-	5,107	29,563	29,552	-	11	69,735	7,859	-	-	-	3,334,244	122,835	-
2b.1.2	Scaffolding in support of decommissioning	-	2,831	28	16	239	38	-	758	3,909	3,909	-	-	1,287	114	-	-	-	65,139	28,205	-
Decontamination of Site Buildings																					
2b.1.3.1	Reactor Building	5,202	2,903	178	516	8,044	1,181	-	4,924	22,948	22,948	-	-	48,077	7,014	-	-	-	2,317,670	112,518	-
2b.1.3.2	Admin	106	6	0	3	-	15	-	59	189	189	-	-	-	145	-	-	-	6,840	1,600	-
2b.1.3.3	HPCI Room	29	28	1	3	20	14	-	29	123	123	-	-	118	125	-	-	-	10,759	789	-
2b.1.3.4	Hot Shop	17	4	0	2	-	11	-	12	46	46	-	-	-	103	-	-	-	4,860	286	-
2b.1.3.5	LLRW Storage & Shipping	58	24	2	8	5	45	-	48	191	191	-	-	31	433	-	-	-	21,708	1,127	-
2b.1.3.6	Offgas Stack	372	269	7	23	225	82	-	312	1,289	1,289	-	-	1,343	669	-	-	-	87,045	8,860	-
2b.1.3.7	Offgas Storage & Compressor	41	17	1	6	4	33	-	34	136	136	-	-	25	316	-	-	-	15,948	785	-
2b.1.3.8	Radwaste	121	61	3	17	29	96	-	107	435	435	-	-	172	910	-	-	-	49,943	2,503	-
2b.1.3.9	Radwaste Material Storage Warehouse	64	24	2	9	-	52	-	52	202	202	-	-	-	495	-	-	-	23,400	1,197	-
2b.1.3.10	Recombiner	27	25	1	5	33	24	-	32	148	148	-	-	199	216	-	-	-	18,405	695	-
2b.1.3.11	Turbine	705	353	21	104	215	564	-	632	2,594	2,594	-	-	1,283	5,299	-	-	-	303,150	14,443	-
2b.1.3.12	Turbine Building Addition	58	21	1	8	-	45	-	47	181	181	-	-	-	434	-	-	-	20,478	1,087	-
2b.1.3	Totals	6,799	3,736	218	704	8,574	2,164	-	6,288	28,483	28,483	-	-	51,247	16,159	-	-	-	2,880,206	145,889	-
2b.1.4	Prepare/submit License Termination Plan	-	-	-	-	-	-	526	79	605	605	-	-	-	-	-	-	-	-	-	4,096
2b.1.5	Receive NRC approval of termination plan									a											
2b.1	Subtotal Period 2b Activity Costs	7,952	14,427	560	1,524	20,481	4,859	526	12,232	62,561	62,549	-	11	122,269	24,132	-	-	-	6,279,589	296,929	4,096
Period 2b Additional Costs																					
2b.2.1	Operational Equipment	-	-	23	92	1,211	-	-	198	1,524	1,524	-	-	11,760	-	-	-	-	294,000	32	-
2b.2.2	Excavation of Underground Services	-	1,972	-	-	-	-	376	550	2,898	2,898	-	-	-	-	-	-	-	-	12,493	-
2b.2.3	Security Modifications	-	-	-	-	-	-	8,696	1,304	10,000	10,000	-	-	-	-	-	-	-	-	-	-
2b.2	Subtotal Period 2b Additional Costs	-	1,972	23	92	1,211	-	9,072	2,052	14,422	14,422	-	-	11,760	-	-	-	-	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	-	-	-	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	-	364	-	-	-	-	-	55	418	418	-	-	-	-	-	-	-	-	-	-
2b.3.4	Spent Fuel Capital and Transfer	-	-	-	-	-	-	117,254	17,588	134,843	-	134,843	-	-	-	-	-	-	-	-	-
2b.3.5	Retention and Severance	-	-	-	-	-	-	6,299	945	7,244	7,244	-	-	-	-	-	-	-	-	-	-
2b.3	Subtotal Period 2b Collateral Costs	199	364	178	378	-	865	123,554	18,978	144,516	9,673	134,843	-	-	1,666	-	-	-	119,165	322	-
Period 2b Period-Dependent Costs																					
2b.4.1	Decon supplies	1,440	-	-	-	-	-	-	360	1,799	1,799	-	-	-	-	-	-	-	-	-	-
2b.4.2	Insurance	-	-	-	-	-	-	742	74	816	816	-	-	-	-	-	-	-	-	-	-
2b.4.3	Property taxes	-	-	-	-	-	-	2,703	270	2,974	2,974	-	-	-	-	-	-	-	-	-	-
2b.4.4	Health physics supplies	-	2,376	-	-	-	-	-	594	2,970	2,970	-	-	-	-	-	-	-	-	-	-
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	-	-	-	5,084	-	-	-	101,679	166	-
2b.4.7	Plant energy budget	-	-	-	-	-	-	1,437	216	1,653	1,653	-	-	-	-	-	-	-	-	-	-
2b.4.8	NRC Fees	-	-	-	-	-	-	623	62	685	685	-	-	-	-	-	-	-	-	-	-
2b.4.9	Emergency Planning Fees	-	-	-	-	-	-	2,995	299	3,294	-	3,294	-	-	-	-	-	-	-	-	-
2b.4.10	Fixed Overhead	-	-	-	-	-	-	2,235	335	2,570	2,570	-	-	-	-	-	-	-	-	-	-
2b.4.11	Spent Fuel Pool O&M	-	-	-	-	-	-	891	134	1,024	-	1,024	-	-	-	-	-	-	-	-	-
2b.4.12	Liquid Radwaste Processing Equipment/Services	-	-	-	-	-	-	224	34	258	258	-	-	-	-	-	-	-	-	-	-
2b.4.13	ISFSI Operating Costs	-	-	-	-	-	-	118	18	136	-	136	-	-	-	-	-	-	-	-	-
2b.4.14	Railroad Track Maintenance	-	-	-	-	-	-	458	69	527	527	-	-	-	-	-	-	-	-	-	-

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 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 Period-Dependent Costs (continued)																					
2b.4.15	Remedial Actions Surveys	-	-	-	-	-	-	1,182	177	1,359	1,359	-	-	-	-	-	-	-	-	-	-
2b.4.16	Security Staff Cost	-	-	-	-	-	-	15,925	2,389	18,314	18,314	-	-	-	-	-	-	-	-	-	236,949
2b.4.17	DOC Staff Cost	-	-	-	-	-	-	14,772	2,216	16,988	16,988	-	-	-	-	-	-	-	-	-	160,160
2b.4.18	Utility Staff Cost	-	-	-	-	-	-	19,442	2,916	22,358	22,358	-	-	-	-	-	-	-	-	-	297,283
2b.4	Subtotal Period 2b Period-Dependent Costs	1,440	5,087	101	52	-	419	63,747	10,692	81,536	77,082	4,455	-	-	5,084	-	-	-	101,679	166	694,392
2b.0	TOTAL PERIOD 2b COST	9,591	21,850	861	2,046	21,692	6,143	196,899	43,954	303,035	163,726	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	Cranes/Heavy Loads/Rigging - RCA	-	3	0	1	17	-	-	4	25	25	-	-	103	-	-	-	-	4,184	48	-
2d.1.2.2	Electrical - Contaminated Fuel Pool	-	47	1	2	40	3	-	19	112	112	-	-	240	9	-	-	-	10,334	665	-
2d.1.2.3	Electrical - Decontam. Fuel Pool Area	-	297	5	23	411	-	-	140	876	876	-	-	2,457	-	-	-	-	99,783	4,090	-
2d.1.2.4	Fire - RCA - Fuel Pool Area	-	11	0	1	10	-	-	4	26	26	-	-	62	-	-	-	-	2,499	143	-
2d.1.2.5	Fuel Pool Cooling & Cleanup	246	428	34	37	197	455	-	382	1,781	1,781	-	-	1,179	1,341	-	-	-	133,939	8,380	-
2d.1.2.6	Fuel Pool Cooling & Cleanup - Insulated	27	41	3	3	11	40	-	36	161	161	-	-	67	117	-	-	-	10,220	848	-
2d.1.2.7	HVAC Ductwork - Fuel Pool Area	-	34	1	3	50	4	-	17	108	108	-	-	296	11	-	-	-	12,733	457	-
2d.1.2.8	HVAC/Chilled Water - RCA Fuel Pool Area	-	33	0	2	37	-	-	14	87	87	-	-	223	-	-	-	-	9,072	397	-
2d.1.2.9	Instrument & Service Air-RCA-Fuel Pool	-	29	1	2	45	-	-	14	91	91	-	-	267	-	-	-	-	10,841	357	-
2d.1.2	Totals	273	924	45	75	819	502	-	631	3,268	3,268	-	-	4,894	1,479	-	-	-	293,606	15,385	-
Decontamination of Site Buildings																					
2d.1.3.1	Reactor (Post Fuel)	946	2,599	172	913	329	10,216	-	3,880	19,056	19,056	-	-	1,969	62,698	-	-	-	2,732,406	45,703	-
2d.1.3	Totals	946	2,599	172	913	329	10,216	-	3,880	19,056	19,056	-	-	1,969	62,698	-	-	-	2,732,406	45,703	-
2d.1.4	Scaffolding in support of decommissioning	-	566	6	3	48	8	-	152	782	782	-	-	257	23	-	-	-	13,028	5,641	-
2d.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	67,635	-
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	-	-	-	504	-	-	-	30,239	98	-
2d.3.2	Process decommissioning chemical flush waste	1	-	26	84	-	193	-	64	366	366	-	-	-	249	-	-	-	26,553	47	-
2d.3.3	Small tool allowance	-	91	-	-	-	-	-	14	105	105	-	-	-	-	-	-	-	-	-	-
2d.3.4	Decommissioning Equipment Disposition	-	-	130	82	1,112	178	-	237	1,739	1,739	-	-	6,000	529	-	-	-	303,608	147	-
2d.3.5	Spent Fuel Capital and Transfer	-	-	-	-	-	-	27	4	32	-	32	-	-	-	-	-	-	-	-	-
2d.3	Subtotal Period 2d Collateral Costs	80	91	210	262	1,112	590	27	432	2,805	2,773	32	-	6,000	1,282	-	-	-	360,400	292	-
Period 2d Period-Dependent Costs																					
2d.4.1	Decon supplies	244	-	-	-	-	-	-	61	305	305	-	-	-	-	-	-	-	-	-	-
2d.4.2	Insurance	-	-	-	-	-	-	530	53	583	583	-	-	-	-	-	-	-	-	-	-
2d.4.3	Property taxes	-	-	-	-	-	-	1,664	166	1,830	1,830	-	-	-	-	-	-	-	-	-	-
2d.4.4	Health physics supplies	-	806	-	-	-	-	-	202	1,008	1,008	-	-	-	-	-	-	-	-	-	-
2d.4.5	Heavy equipment rental	-	1,936	-	-	-	-	-	290	2,227	2,227	-	-	-	-	-	-	-	-	-	-
2d.4.6	Disposal of DAW generated	-	-	40	21	-	167	-	49	277	277	-	-	-	2,030	-	-	-	40,600	66	-
2d.4.7	Plant energy budget	-	-	-	-	-	-	547	82	630	630	-	-	-	-	-	-	-	-	-	-
2d.4.8	NRC Fees	-	-	-	-	-	-	424	42	466	466	-	-	-	-	-	-	-	-	-	-
2d.4.9	Emergency Planning Fees	-	-	-	-	-	-	112	11	123	-	123	-	-	-	-	-	-	-	-	-
2d.4.10	Fixed Overhead	-	-	-	-	-	-	1,597	239	1,836	1,836	-	-	-	-	-	-	-	-	-	-
2d.4.11	Liquid Radwaste Processing Equipment/Services	-	-	-	-	-	-	320	48	368	368	-	-	-	-	-	-	-	-	-	-
2d.4.12	ISFSI Operating Costs	-	-	-	-	-	-	84	13	97	-	97	-	-	-	-	-	-	-	-	-
2d.4.13	Railroad Track Maintenance	-	-	-	-	-	-	94	14	108	108	-	-	-	-	-	-	-	-	-	-
2d.4.14	Remedial Actions Surveys	-	-	-	-	-	-	844	127	971	971	-	-	-	-	-	-	-	-	-	-
2d.4.15	Security Staff Cost	-	-	-	-	-	-	10,999	1,650	12,649	8,918	3,732	-	-	-	-	-	-	-	-	162,981
2d.4.16	DOC Staff Cost	-	-	-	-	-	-	7,311	1,097	8,408	8,408	-	-	-	-	-	-	-	-	-	78,356
2d.4.17	Utility Staff Cost	-	-	-	-	-	-	10,052	1,508	11,560	10,670	890	-	-	-	-	-	-	-	-	149,660
2d.4	Subtotal Period 2d Period-Dependent Costs	244	2,743	40	21	-	167	34,579	5,652	43,446	38,604	4,842	-	-	2,030	-	-	-	40,600	66	390,997
2d.0	TOTAL PERIOD 2d COST	2,196	6,981	576	1,422	2,308	14,055	36,065	12,202	75,806	70,932	4,873	-	13,120	75,164	-	-	-	3,926,210	67,993	403,477

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 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 2f - License Termination																					
Period 2f Direct Decommissioning Activities																					
2f.1.1	ORISE confirmatory survey	-	-	-	-	-	-	166	50	216	216	-	-	-	-	-	-	-	-	-	-
2f.1.2	Terminate license									a											
2f.1	Subtotal Period 2f Activity Costs	-	-	-	-	-	-	166	50	216	216	-	-	-	-	-	-	-	-	-	-
Period 2f Additional Costs																					
2f.2.1	License Termination Survey	-	-	-	-	-	-	6,920	2,076	8,995	8,995	-	-	-	-	-	-	-	-	95,048	6,240
2f.2	Subtotal Period 2f Additional Costs	-	-	-	-	-	-	6,920	2,076	8,995	8,995	-	-	-	-	-	-	-	-	95,048	6,240
Period 2f Collateral Costs																					
2f.3.1	DOC staff relocation expenses	-	-	-	-	-	-	1,264	190	1,454	1,454	-	-	-	-	-	-	-	-	-	-
2f.3.2	Spent Fuel Capital and Transfer	-	-	-	-	-	-	47	7	54	-	54	-	-	-	-	-	-	-	-	-
2f.3	Subtotal Period 2f Collateral Costs	-	-	-	-	-	-	1,311	197	1,508	1,454	54	-	-	-	-	-	-	-	-	-
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	Disposal of DAW generated	-	-	7	4	-	29	-	9	48	48	-	-	-	355	-	-	-	7,097	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	11	123	-	123	-	-	-	-	-	-	-	-	-
2f.4.8	Fixed Overhead	-	-	-	-	-	-	1,597	239	1,836	1,836	-	-	-	-	-	-	-	-	-	-
2f.4.9	ISFSI Operating Costs	-	-	-	-	-	-	84	13	97	-	97	-	-	-	-	-	-	-	-	-
2f.4.10	Railroad Track Maintenance	-	-	-	-	-	-	94	14	108	108	-	-	-	-	-	-	-	-	-	-
2f.4.11	Security Staff Cost	-	-	-	-	-	-	10,999	1,650	12,649	8,918	3,732	-	-	-	-	-	-	-	-	162,981
2f.4.12	DOC Staff Cost	-	-	-	-	-	-	5,393	809	6,201	6,201	-	-	-	-	-	-	-	-	-	57,200
2f.4.13	Utility Staff Cost	-	-	-	-	-	-	5,762	864	6,626	5,738	888	-	-	-	-	-	-	-	-	80,707
2f.4	Subtotal Period 2f Period-Dependent Costs	-	708	7	4	-	29	26,740	4,070	31,557	26,718	4,839	-	-	355	-	-	-	7,097	12	300,888
2f.0	TOTAL PERIOD 2f COST	-	708	7	4	-	29	35,137	6,392	42,276	37,382	4,893	-	-	355	-	-	-	7,097	95,059	307,128
PERIOD 2 TOTALS		13,731	65,566	20,473	10,731	49,937	72,577	385,554	128,686	747,255	576,287	170,895	73	288,160	174,123	1,761	898	-	21,552,260	727,310	2,393,096
PERIOD 3b - Site Restoration																					
Period 3b Direct Decommissioning Activities																					
Demolition of Remaining Site Buildings																					
3b.1.1.1	Reactor Building	-	1,971	-	-	-	-	-	296	2,267	-	-	2,267	-	-	-	-	-	-	13,911	-
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	HPCI Room	-	19	-	-	-	-	-	3	22	-	-	22	-	-	-	-	-	-	97	-
3b.1.1.5	Hot Shop	-	16	-	-	-	-	-	2	19	-	-	19	-	-	-	-	-	-	177	-
3b.1.1.6	Hydrogen & Oxygen Storage	-	2	-	-	-	-	-	0	2	-	-	2	-	-	-	-	-	-	19	-
3b.1.1.7	LLRW Storage & Shipping	-	83	-	-	-	-	-	12	95	-	-	95	-	-	-	-	-	-	662	-
3b.1.1.8	MSIV	-	4	-	-	-	-	-	1	4	-	-	4	-	-	-	-	-	-	42	-
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	Radwaste	-	228	-	-	-	-	-	34	262	-	-	262	-	-	-	-	-	-	1,220	-
3b.1.1.13	Recombiner	-	128	-	-	-	-	-	19	147	-	-	147	-	-	-	-	-	-	713	-
3b.1.1.14	Security Barrier	-	186	-	-	-	-	-	28	214	-	-	214	-	-	-	-	-	-	933	-
3b.1.1.15	Structures Greater than 3' Below Grade	-	2,461	-	-	-	-	-	369	2,830	-	-	2,830	-	-	-	-	-	-	12,649	-
3b.1.1.16	Tank Farm	-	4	-	-	-	-	-	1	5	-	-	5	-	-	-	-	-	-	21	-
3b.1.1.17	Turbine	-	1,259	-	-	-	-	-	189	1,448	-	-	1,448	-	-	-	-	-	-	13,036	-
3b.1.1.18	Turbine Building Addition	-	55	-	-	-	-	-	8	63	-	-	63	-	-	-	-	-	-	618	-
3b.1.1.19	Turbine Pedestal	-	182	-	-	-	-	-	27	209	-	-	209	-	-	-	-	-	-	926	-
3b.1.1	Totals	-	8,169	-	-	-	-	-	1,225	9,394	-	-	9,394	-	-	-	-	-	-	58,885	-
Site Closeout Activities																					
3b.1.2	Grade & landscape site	-	896	-	-	-	-	-	134	1,031	-	-	1,031	-	-	-	-	-	-	1,841	-
3b.1.3	Final report to NRC	-	-	-	-	-	-	200	30	231	231	-	-	-	-	-	-	-	-	-	1,560
3b.1	Subtotal Period 3b Activity Costs	-	9,065	-	-	-	-	200	1,390	10,655	231	-	10,425	-	-	-	-	-	-	60,726	1,560

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 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 3b Additional Costs																					
3b.2.1	Clean Concrete Disposal	-	3,322	-	-	-	-	13	500	3,835	-	-	3,835	-	-	-	-	-	-	12	-
3b.2.2	Intake Structure Cofferdam	-	335	-	-	-	-	-	50	385	-	-	385	-	-	-	-	-	-	2,584	-
3b.2.3	Construction Debris	-	-	-	-	-	-	1,170	176	1,346	-	-	1,346	-	-	-	-	-	-	-	-
3b.2.4	Backfill	-	5,583	-	-	-	-	-	837	6,421	-	-	6,421	-	-	-	-	-	-	5,422	-
3b.2.5	Discharge Structure Cofferdam	-	442	-	-	-	-	-	66	508	-	-	508	-	-	-	-	-	-	3,552	-
3b.2	Subtotal Period 3b Additional Costs	-	9,682	-	-	-	-	1,183	1,630	12,495	-	-	12,495	-	-	-	-	-	-	11,570	-
Period 3b Collateral Costs																					
3b.3.1	Small tool allowance	-	110	-	-	-	-	-	17	127	-	-	127	-	-	-	-	-	-	-	-
3b.3.2	Spent Fuel Capital and Transfer	-	-	-	-	-	-	108	16	125	-	125	-	-	-	-	-	-	-	-	-
3b.3	Subtotal Period 3b Collateral Costs	-	110	-	-	-	-	108	33	252	-	125	127	-	-	-	-	-	-	-	-
Period 3b Period-Dependent Costs																					
3b.4.1	Insurance	-	-	-	-	-	-	1,220	122	1,342	1,342	-	-	-	-	-	-	-	-	-	-
3b.4.2	Property taxes	-	-	-	-	-	-	2,540	254	2,794	-	2,794	-	-	-	-	-	-	-	-	-
3b.4.3	Heavy equipment rental	-	5,842	-	-	-	-	-	876	6,719	-	-	6,719	-	-	-	-	-	-	-	-
3b.4.4	Plant energy budget	-	-	-	-	-	-	315	47	362	-	362	-	-	-	-	-	-	-	-	-
3b.4.5	NRC ISFSI Fees	-	-	-	-	-	-	356	36	391	-	391	-	-	-	-	-	-	-	-	-
3b.4.6	Emergency Planning Fees	-	-	-	-	-	-	257	26	283	-	283	-	-	-	-	-	-	-	-	-
3b.4.7	Fixed Overhead	-	-	-	-	-	-	1,122	168	1,290	429	860	-	-	-	-	-	-	-	-	-
3b.4.8	ISFSI Operating Costs	-	-	-	-	-	-	194	29	223	-	223	-	-	-	-	-	-	-	-	-
3b.4.9	Railroad Track Maintenance	-	-	-	-	-	-	543	81	624	249	375	-	-	-	-	-	-	-	-	-
3b.4.10	Security Staff Cost	-	-	-	-	-	-	25,319	3,798	29,117	0	8,589	20,527	-	-	-	-	-	-	-	375,152
3b.4.11	DOC Staff Cost	-	-	-	-	-	-	11,729	1,759	13,489	-	-	13,489	-	-	-	-	-	-	-	122,646
3b.4.12	Utility Staff Cost	-	-	-	-	-	-	6,873	1,031	7,904	-	2,047	5,857	-	-	-	-	-	-	-	98,297
3b.4	Subtotal Period 3b Period-Dependent Costs	-	5,842	-	-	-	-	50,467	8,228	64,537	2,020	15,926	46,591	-	-	-	-	-	-	-	596,095
3b.0	TOTAL PERIOD 3b COST	-	24,700	-	-	-	-	51,959	11,280	87,939	2,251	16,050	69,638	-	-	-	-	-	-	72,296	597,655
PERIOD 3c - Fuel Storage Operations/Shipping																					
Period 3c Direct Decommissioning Activities																					
Period 3c Collateral Costs																					
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	-	-	-	-	-	-	-	-	-
Period 3c Period-Dependent Costs																					
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	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3c.4.4	NRC ISFSI Fees	-	-	-	-	-	-	12,360	1,236	13,596	-	13,596	-	-	-	-	-	-	-	-	-
3c.4.5	Emergency Planning Fees	-	-	-	-	-	-	7,869	787	8,656	-	8,656	-	-	-	-	-	-	-	-	-
3c.4.6	Fixed Overhead	-	-	-	-	-	-	11,432	1,715	13,147	-	13,147	-	-	-	-	-	-	-	-	-
3c.4.7	ISFSI Operating Costs	-	-	-	-	-	-	5,940	891	6,832	-	6,832	-	-	-	-	-	-	-	-	-
3c.4.8	Railroad Track Maintenance	-	-	-	-	-	-	6,636	995	7,632	-	7,632	-	-	-	-	-	-	-	-	-
3c.4.9	Security Staff Cost	-	-	-	-	-	-	228,259	34,239	262,498	-	262,498	-	-	-	-	-	-	-	-	2,870,241
3c.4.10	Utility Staff Cost	-	-	-	-	-	-	54,527	8,179	62,706	-	62,706	-	-	-	-	-	-	-	-	745,159
3c.4	Subtotal Period 3c Period-Dependent Costs	-	-	-	-	-	-	412,574	56,597	469,171	-	469,171	-	-	-	-	-	-	-	-	3,615,399
3c.0	TOTAL PERIOD 3c COST	-	-	-	-	-	-	497,902	69,396	567,298	-	567,298	-	-	-	-	-	-	-	-	3,615,399
PERIOD 3d - GTCC shipping																					
Period 3d Direct Decommissioning Activities																					
Nuclear Steam Supply System Removal																					
3d.1.1.1	Vessel & Internals GTCC Disposal	-	-	1,083	-	-	4,313	-	918	6,314	6,314	-	-	-	-	-	-	1,160	225,765	-	-
3d.1.1	Totals	-	-	1,083	-	-	4,313	-	918	6,314	6,314	-	-	-	-	-	-	1,160	225,765	-	-
3d.1	Subtotal Period 3d Activity Costs	-	-	1,083	-	-	4,313	-	918	6,314	6,314	-	-	-	-	-	-	1,160	225,765	-	-
Period 3d Collateral Costs																					
3d.3.1	Spent Fuel Capital and Transfer	-	-	-	-	-	-	28	4	32	-	32	-	-	-	-	-	-	-	-	-
3d.3	Subtotal Period 3d Collateral Costs	-	-	-	-	-	-	28	4	32	-	32	-	-	-	-	-	-	-	-	-

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 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 3d Period-Dependent Costs																					
3d.4.1	Insurance	-	-	-	-	-	-	27	3	30	30	-	-	-	-	-	-	-	-	-	-
3d.4.2	Property taxes	-	-	-	-	-	-	35	3	38	38	-	-	-	-	-	-	-	-	-	-
3d.4.4	NRC ISFSI Fees	-	-	-	-	-	-	8	1	9	-	9	-	-	-	-	-	-	-	-	-
3d.4.5	Emergency Planning Fees	-	-	-	-	-	-	6	1	6	-	6	-	-	-	-	-	-	-	-	-
3d.4.6	Fixed Overhead	-	-	-	-	-	-	8	1	10	10	-	-	-	-	-	-	-	-	-	-
3d.4.7	Railroad Track Maintenance	-	-	-	-	-	-	5	1	6	6	-	-	-	-	-	-	-	-	-	-
3d.4.8	Security Staff Cost	-	-	-	-	-	-	165	25	190	190	-	-	-	-	-	-	-	-	-	2,074
3d.4.9	Utility Staff Cost	-	-	-	-	-	-	39	6	45	45	-	-	-	-	-	-	-	-	-	539
3d.4	Subtotal Period 3d Period-Dependent Costs	-	-	-	-	-	-	293	40	333	318	15	-	-	-	-	-	-	-	-	2,613
3d.0	TOTAL PERIOD 3d COST	-	-	1,083	-	-	4,313	321	962	6,678	6,632	47	-	-	-	-	-	1,160	225,765	-	2,613
PERIOD 3e - ISFSI Decontamination																					
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	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	Plant energy budget	-	-	-	-	-	-	12	3	15	15	-	-	-	-	-	-	-	-	-	-
3e.4.4	Fixed Overhead	-	-	-	-	-	-	71	18	89	89	-	-	-	-	-	-	-	-	-	-
3e.4.5	Railroad Track Maintenance	-	-	-	-	-	-	41	10	52	52	-	-	-	-	-	-	-	-	-	-
3e.4.6	Security Staff Cost	-	-	-	-	-	-	352	88	440	440	-	-	-	-	-	-	-	-	-	4,999
3e.4.7	Utility Staff Cost	-	-	-	-	-	-	261	65	326	326	-	-	-	-	-	-	-	-	-	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	3,118	2,569	12,844	12,844	-	-	-	21,949	-	-	-	2,633,402	10,339	10,993
PERIOD 3f - ISFSI Site Restoration																					
Period 3f Direct Decommissioning Activities																					
Period 3f Additional Costs																					
3f.2.1	Demolition and Site Restoration of ISFSI	-	1,486	-	-	-	-	233	258	1,977	-	-	1,977	-	-	-	-	-	-	6,957	160
3f.2	Subtotal Period 3f Additional Costs	-	1,486	-	-	-	-	233	258	1,977	-	-	1,977	-	-	-	-	-	-	6,957	160
Period 3f Collateral Costs																					
3f.3.1	Small tool allowance	-	10	-	-	-	-	-	2	12	-	-	12	-	-	-	-	-	-	-	-
3f.3	Subtotal Period 3f Collateral Costs	-	10	-	-	-	-	-	2	12	-	-	12	-	-	-	-	-	-	-	-
Period 3f Period-Dependent Costs																					
3f.4.2	Property taxes	-	-	-	-	-	-	126	13	138	-	-	138	-	-	-	-	-	-	-	-
3f.4.3	Heavy equipment rental	-	117	-	-	-	-	-	17	134	-	-	134	-	-	-	-	-	-	-	-
3f.4.4	Plant energy budget	-	-	-	-	-	-	6	1	7	-	-	7	-	-	-	-	-	-	-	-
3f.4.5	Fixed Overhead	-	-	-	-	-	-	36	5	41	-	-	41	-	-	-	-	-	-	-	-
3f.4.6	Railroad Track Maintenance	-	-	-	-	-	-	21	3	24	-	-	24	-	-	-	-	-	-	-	-
3f.4.7	Security Staff Cost	-	-	-	-	-	-	177	27	204	-	-	204	-	-	-	-	-	-	-	2,520
3f.4.8	Utility Staff Cost	-	-	-	-	-	-	109	16	126	-	-	126	-	-	-	-	-	-	-	1,564
3f.4	Subtotal Period 3f Period-Dependent Costs	-	117	-	-	-	-	475	82	674	-	-	674	-	-	-	-	-	-	-	4,084
3f.0	TOTAL PERIOD 3f COST	-	1,613	-	-	-	-	709	342	2,663	-	-	2,663	-	-	-	-	-	-	6,957	4,244
PERIOD 3 TOTALS		-	26,369	1,271	987	-	10,238	554,007	84,549	677,422	21,726	583,395	72,301	-	21,949	-	-	1,160	2,859,167	89,592	4,230,904
TOTAL COST TO DECOMMISSION		17,263	95,223	21,839	11,878	49,952	84,523	1,093,866	238,219	1,612,762	776,139	763,237	73,386	288,203	197,270	1,992	898	1,160	24,474,580	848,750	7,816,514

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 Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			

TOTAL COST TO DECOMMISSION WITH 17.33% CONTINGENCY:	$1,612,762	thousands of 2020 dollars
TOTAL NRC LICENSE TERMINATION COST IS 48.12% OR:	$776,139	thousands of 2020 dollars
SPENT FUEL MANAGEMENT COST IS 47.32% OR:	$763,237	thousands of 2020 dollars
NON-NUCLEAR DEMOLITION COST IS 4.55% OR:	$73,386	thousands of 2020 dollars
TOTAL LOW-LEVEL RADIOACTIVE WASTE VOLUME BURIED (EXCLUDING GTCC):	200,160	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:	848,750	Man-hours

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

APPENDIX E

DETAILED COST ANALYSIS

SCENARIO 3: DECON with 100 Year DFS

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 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 1a - Shutdown through Transition																					
Period 1a Direct Decommissioning Activities																					
1a.1.1	Prepare preliminary decommissioning cost	-	-	-	-	-	-	167	25	192	192	-	-	-	-	-	-	-	-	-	1,300
1a.1.2	Notification of Cessation of Operations									a											
1a.1.3	Remove fuel & source material									n/a											
1a.1.4	Notification of Permanent Defueling									a											
1a.1.5	Deactivate plant systems & process waste									a											
1a.1.6	Prepare and submit PSDAR	-	-	-	-	-	-	257	39	296	296	-	-	-	-	-	-	-	-	-	2,000
1a.1.7	Review plant dwgs & specs.	-	-	-	-	-	-	591	89	680	680	-	-	-	-	-	-	-	-	-	4,600
1a.1.8	Perform detailed rad survey									a											
1a.1.9	Estimate by-product inventory	-	-	-	-	-	-	129	19	148	148	-	-	-	-	-	-	-	-	-	1,000
1a.1.10	End product description	-	-	-	-	-	-	129	19	148	148	-	-	-	-	-	-	-	-	-	1,000
1a.1.11	Detailed by-product inventory	-	-	-	-	-	-	167	25	192	192	-	-	-	-	-	-	-	-	-	1,300
1a.1.12	Define major work sequence	-	-	-	-	-	-	964	145	1,108	1,108	-	-	-	-	-	-	-	-	-	7,500
1a.1.13	Perform SER and EA	-	-	-	-	-	-	398	60	458	458	-	-	-	-	-	-	-	-	-	3,100
1a.1.14	Prepare/submit Defueled Technical Specifications	-	-	-	-	-	-	964	145	1,108	1,108	-	-	-	-	-	-	-	-	-	7,500
1a.1.15	Perform Site-Specific Cost Study	-	-	-	-	-	-	643	96	739	739	-	-	-	-	-	-	-	-	-	5,000
1a.1.16	Prepare/submit Irradiated Fuel Management Plan	-	-	-	-	-	-	129	19	148	148	-	-	-	-	-	-	-	-	-	1,000
Activity Specifications																					
1a.1.17.1	Plant & temporary facilities	-	-	-	-	-	-	632	95	727	654	-	73	-	-	-	-	-	-	-	4,920
1a.1.17.2	Plant systems	-	-	-	-	-	-	536	80	616	554	-	62	-	-	-	-	-	-	-	4,167
1a.1.17.3	NSSS Decontamination Flush	-	-	-	-	-	-	64	10	74	74	-	-	-	-	-	-	-	-	-	500
1a.1.17.4	Reactor internals	-	-	-	-	-	-	912	137	1,049	1,049	-	-	-	-	-	-	-	-	-	7,100
1a.1.17.5	Reactor vessel	-	-	-	-	-	-	835	125	961	961	-	-	-	-	-	-	-	-	-	6,500
1a.1.17.6	Sacrificial shield	-	-	-	-	-	-	64	10	74	74	-	-	-	-	-	-	-	-	-	500
1a.1.17.7	Moisture separators/reheaters	-	-	-	-	-	-	129	19	148	148	-	-	-	-	-	-	-	-	-	1,000
1a.1.17.8	Reinforced concrete	-	-	-	-	-	-	206	31	236	118	-	118	-	-	-	-	-	-	-	1,600
1a.1.17.9	Main Turbine	-	-	-	-	-	-	268	40	309	309	-	-	-	-	-	-	-	-	-	2,088
1a.1.17.10	Main Condensers	-	-	-	-	-	-	268	40	309	309	-	-	-	-	-	-	-	-	-	2,088
1a.1.17.11	Pressure suppression structure	-	-	-	-	-	-	257	39	296	296	-	-	-	-	-	-	-	-	-	2,000
1a.1.17.12	Drywell	-	-	-	-	-	-	206	31	236	236	-	-	-	-	-	-	-	-	-	1,600
1a.1.17.13	Plant structures & buildings	-	-	-	-	-	-	401	60	461	231	-	231	-	-	-	-	-	-	-	3,120
1a.1.17.14	Waste management	-	-	-	-	-	-	591	89	680	680	-	-	-	-	-	-	-	-	-	4,600
1a.1.17.15	Facility & site closeout	-	-	-	-	-	-	116	17	133	67	-	67	-	-	-	-	-	-	-	900
1a.1.17	Total	-	-	-	-	-	-	5,486	823	6,308	5,759	-	550	-	-	-	-	-	-	-	42,683
Planning & Site Preparations																					
1a.1.18	Prepare dismantling sequence	-	-	-	-	-	-	308	46	355	355	-	-	-	-	-	-	-	-	-	2,400
1a.1.19	Plant prep. & temp. svces	-	-	-	-	-	-	3,500	525	4,025	4,025	-	-	-	-	-	-	-	-	-	-
1a.1.20	Design water clean-up system	-	-	-	-	-	-	180	27	207	207	-	-	-	-	-	-	-	-	-	1,400
1a.1.21	Rigging/Cont. Cntrl Envlps/tooling/etc.	-	-	-	-	-	-	2,400	360	2,760	2,760	-	-	-	-	-	-	-	-	-	-
1a.1.22	Procure casks/liners & containers	-	-	-	-	-	-	158	24	182	182	-	-	-	-	-	-	-	-	-	1,230
1a.1	Subtotal Period 1a Activity Costs	-	-	-	-	-	-	16,569	2,485	19,054	18,505	-	550	-	-	-	-	-	-	-	83,013
Period 1a Collateral Costs																					
1a.3.1	Spent Fuel Capital and Transfer	-	-	-	-	-	-	1,323	198	1,522	-	1,522	-	-	-	-	-	-	-	-	-
1a.3.2	Retention and Severance	-	-	-	-	-	-	9,892	1,484	11,376	11,376	-	-	-	-	-	-	-	-	-	-
1a.3	Subtotal Period 1a Collateral Costs	-	-	-	-	-	-	11,215	1,682	12,897	11,376	1,522	-	-	-	-	-	-	-	-	-
Period 1a Period-Dependent Costs																					
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 physics supplies	-	614	-	-	-	-	-	153	767	767	-	-	-	-	-	-	-	-	-	-
1a.4.4	Heavy equipment rental	-	753	-	-	-	-	-	113	866	866	-	-	-	-	-	-	-	-	-	-
1a.4.5	Disposal of DAW generated	-	-	12	6	-	50	-	15	83	83	-	-	-	610	-	-	-	12,190	20	-
1a.4.6	Plant energy budget	-	-	-	-	-	-	1,817	272	2,089	2,089	-	-	-	-	-	-	-	-	-	-
1a.4.7	NRC Fees	-	-	-	-	-	-	1,137	114	1,251	1,251	-	-	-	-	-	-	-	-	-	-
1a.4.8	Emergency Planning Fees	-	-	-	-	-	-	3,428	343	3,770	-	3,770	-	-	-	-	-	-	-	-	-
1a.4.9	Fixed Overhead	-	-	-	-	-	-	2,616	392	3,009	3,009	-	-	-	-	-	-	-	-	-	-
1a.4.10	Spent Fuel Pool O&M	-	-	-	-	-	-	845	127	971	-	971	-	-	-	-	-	-	-	-	-
1a.4.11	ISFSI Operating Costs	-	-	-	-	-	-	112	17	129	-	129	-	-	-	-	-	-	-	-	-
1a.4.12	Railroad Track Maintenance	-	-	-	-	-	-	125	19	144	144	-	-	-	-	-	-	-	-	-	-
1a.4.13	Security Staff Cost	-	-	-	-	-	-	16,372	2,456	18,827	18,827	-	-	-	-	-	-	-	-	-	245,440
1a.4.14	Utility Staff Cost	-	-	-	-	-	-	27,285	4,093	31,378	31,378	-	-	-	-	-	-	-	-	-	422,240
1a.4	Subtotal Period 1a Period-Dependent Costs	-	1,367	12	6	-	50	59,634	8,703	69,772	64,902	4,870	-	-	610	-	-	-	12,190	20	667,680

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 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
1a.0	TOTAL PERIOD 1a COST	-	1,367	12	6	-	50	87,418	12,871	101,724	94,783	6,392	550	-	610	-	-	-	12,190	20	750,693
PERIOD 1b - Decommissioning Preparations																					
Period 1b Direct Decommissioning Activities																					
Detailed Work Procedures																					
1b.1.1.1	Plant systems	-	-	-	-	-	-	608	91	700	630	-	70	-	-	-	-	-	-	-	4,733
1b.1.1.2	NSSS Decontamination Flush	-	-	-	-	-	-	129	19	148	148	-	-	-	-	-	-	-	-	-	1,000
1b.1.1.3	Reactor internals	-	-	-	-	-	-	514	77	591	591	-	-	-	-	-	-	-	-	-	4,000
1b.1.1.4	Remaining buildings	-	-	-	-	-	-	174	26	200	50	-	150	-	-	-	-	-	-	-	1,350
1b.1.1.5	CRD housings & NIs	-	-	-	-	-	-	129	19	148	148	-	-	-	-	-	-	-	-	-	1,000
1b.1.1.6	Incore instrumentation	-	-	-	-	-	-	129	19	148	148	-	-	-	-	-	-	-	-	-	1,000
1b.1.1.7	Removal primary containment	-	-	-	-	-	-	257	39	296	296	-	-	-	-	-	-	-	-	-	2,000
1b.1.1.8	Reactor vessel	-	-	-	-	-	-	467	70	537	537	-	-	-	-	-	-	-	-	-	3,630
1b.1.1.9	Facility closeout	-	-	-	-	-	-	154	23	177	89	-	89	-	-	-	-	-	-	-	1,200
1b.1.1.10	Sacrificial shield	-	-	-	-	-	-	154	23	177	177	-	-	-	-	-	-	-	-	-	1,200
1b.1.1.11	Reinforced concrete	-	-	-	-	-	-	129	19	148	74	-	74	-	-	-	-	-	-	-	1,000
1b.1.1.12	Main Turbine	-	-	-	-	-	-	267	40	307	307	-	-	-	-	-	-	-	-	-	2,080
1b.1.1.13	Main Condensers	-	-	-	-	-	-	268	40	309	309	-	-	-	-	-	-	-	-	-	2,088
1b.1.1.14	Moisture separators & reheaters	-	-	-	-	-	-	257	39	296	296	-	-	-	-	-	-	-	-	-	2,000
1b.1.1.15	Radwaste building	-	-	-	-	-	-	351	53	403	363	-	40	-	-	-	-	-	-	-	2,730
1b.1.1.16	Reactor building	-	-	-	-	-	-	351	53	403	363	-	40	-	-	-	-	-	-	-	2,730
1b.1.1	Total	-	-	-	-	-	-	4,336	650	4,987	4,524	-	463	-	-	-	-	-	-	-	33,741
1b.1.2	Decon NSSS	296	-	-	-	-	-	-	148	444	444	-	-	-	-	-	-	-	-	1,067	-
1b.1	Subtotal Period 1b Activity Costs	296	-	-	-	-	-	4,336	798	5,431	4,968	-	463	-	-	-	-	-	-	1,067	33,741
Period 1b Additional Costs																					
1b.2.1	Spent Fuel Pool Isolation	-	-	-	-	-	-	12,675	1,901	14,576	14,576	-	-	-	-	-	-	-	-	-	-
1b.2.2	Site Characterization	-	-	-	-	-	-	5,930	1,779	7,708	7,708	-	-	-	-	-	-	-	-	30,500	10,852
1b.2.3	Mixed & RCRA Waste	-	-	28	29	14	-	-	9	80	80	-	-	43	-	-	-	-	5,253	161	-
1b.2	Subtotal Period 1b Additional Costs	-	-	28	29	14	-	18,605	3,689	22,365	22,365	-	-	43	-	-	-	-	5,253	30,661	10,852
Period 1b Collateral Costs																					
1b.3.1	Decon equipment	1,055	-	-	-	-	-	-	158	1,213	1,213	-	-	-	-	-	-	-	-	-	-
1b.3.2	DOC staff relocation expenses	-	-	-	-	-	-	1,264	190	1,454	1,454	-	-	-	-	-	-	-	-	-	-
1b.3.3	Process decommissioning water waste	38	-	25	45	-	102	-	53	263	263	-	-	-	233	-	-	-	13,991	45	-
1b.3.4	Process decommissioning chemical flush waste	1	-	24	77	-	1,526	-	396	2,024	2,024	-	-	-	-	231	-	-	24,599	43	-
1b.3.5	Small tool allowance	-	2	-	-	-	-	-	0	2	2	-	-	-	-	-	-	-	-	-	-
1b.3.6	Pipe cutting equipment	-	1,200	-	-	-	-	-	180	1,380	1,380	-	-	-	-	-	-	-	-	-	-
1b.3.7	Decon rig	2,104	-	-	-	-	-	-	316	2,419	2,419	-	-	-	-	-	-	-	-	-	-
1b.3.8	Spent Fuel Capital and Transfer	-	-	-	-	-	-	2,735	410	3,145	-	3,145	-	-	-	-	-	-	-	-	-
1b.3.9	Retention and Severance	-	-	-	-	-	-	6,335	950	7,285	7,285	-	-	-	-	-	-	-	-	-	-
1b.3	Subtotal Period 1b Collateral Costs	3,197	1,202	49	122	-	1,628	10,334	2,653	19,185	16,040	3,145	-	-	233	231	-	-	38,589	89	-
Period 1b Period-Dependent Costs																					
1b.4.1	Decon supplies	39	-	-	-	-	-	-	10	48	48	-	-	-	-	-	-	-	-	-	-
1b.4.2	Insurance	-	-	-	-	-	-	1,161	116	1,277	1,277	-	-	-	-	-	-	-	-	-	-
1b.4.3	Property taxes	-	-	-	-	-	-	1,709	171	1,880	1,880	-	-	-	-	-	-	-	-	-	-
1b.4.4	Health physics supplies	-	344	-	-	-	-	-	86	430	430	-	-	-	-	-	-	-	-	-	-
1b.4.5	Heavy equipment rental	-	375	-	-	-	-	-	56	432	432	-	-	-	-	-	-	-	-	-	-
1b.4.6	Disposal of DAW generated	-	-	7	4	-	29	-	9	49	49	-	-	-	356	-	-	-	7,122	12	-
1b.4.7	Plant energy budget	-	-	-	-	-	-	1,812	272	2,083	2,083	-	-	-	-	-	-	-	-	-	-
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	Fixed Overhead	-	-	-	-	-	-	1,305	196	1,500	1,500	-	-	-	-	-	-	-	-	-	-
1b.4.11	Spent Fuel Pool O&M	-	-	-	-	-	-	421	63	484	-	484	-	-	-	-	-	-	-	-	-
1b.4.12	ISFSI Operating Costs	-	-	-	-	-	-	56	8	64	-	64	-	-	-	-	-	-	-	-	-
1b.4.13	Railroad Track Maintenance	-	-	-	-	-	-	62	9	72	72	-	-	-	-	-	-	-	-	-	-
1b.4.14	Security Staff Cost	-	-	-	-	-	-	8,163	1,225	9,388	9,388	-	-	-	-	-	-	-	-	-	122,384
1b.4.15	DOC Staff Cost	-	-	-	-	-	-	5,846	877	6,723	6,723	-	-	-	-	-	-	-	-	-	63,266
1b.4.16	Utility Staff Cost	-	-	-	-	-	-	13,682	2,052	15,734	15,734	-	-	-	-	-	-	-	-	-	211,579
1b.4	Subtotal Period 1b Period-Dependent Costs	39	719	7	4	-	29	35,955	5,323	42,076	39,970	2,106	-	-	356	-	-	-	7,122	12	397,229
1b.0	TOTAL PERIOD 1b COST	3,531	1,921	84	154	14	1,657	69,230	12,465	89,056	83,343	5,251	463	43	589	231	-	-	50,964	31,828	441,822
PERIOD 1 TOTALS		3,531	3,288	96	160	14	1,707	156,648	25,335	190,780	178,125	11,643	1,012	43	1,199	231	-	-	63,155	31,848	1,192,515

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 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 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	-	528	-	221	1,031	1,031	-	-	-	1,430	-	-	-	99,742	2,905	-
2a.1.1.2	Recirculation Pumps & Motors	40	63	16	51	42	539	-	186	938	938	-	-	96	945	-	-	-	112,200	1,563	-
2a.1.1.3	CRDMs & NIs Removal	194	1,020	415	135	-	1,130	-	696	3,591	3,591	-	-	-	3,741	-	-	-	213,700	17,768	-
2a.1.1.4	Reactor Vessel Internals	244	6,722	12,852	2,696	-	29,845	364	24,027	76,749	76,749	-	-	-	1,252	1,761	898	-	343,150	30,515	1,379
2a.1.1.5	Reactor Vessel	113	9,121	2,672	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	4,099	42	37,903	728	35,973	112,449	112,449	-	-	96	23,536	1,761	898	-	1,874,002	83,267	2,758
Removal of Major Equipment																					
2a.1.2	Main Turbine/Generator	-	385	1,356	521	6,139	439	-	1,341	10,182	10,182	-	-	24,835	1,383	-	-	-	1,577,959	5,438	-
2a.1.3	Main Condensers	-	1,347	360	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	Radwaste	-	25	-	-	-	-	-	4	28	28	-	-	-	-	-	-	-	-	127	-
2a.1.4.3	Turbine	-	127	-	-	-	-	-	19	146	146	-	-	-	-	-	-	-	-	1,254	-
2a.1.4	Totals	-	483	-	-	-	-	-	72	556	556	-	-	-	-	-	-	-	-	3,598	-
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	-	27	1	2	26	13	-	14	83	83	-	-	156	37	-	-	-	8,681	400	-
2a.1.5.3	Chemistry Sampling - Insulated	-	2	0	0	-	0	-	1	3	3	-	-	-	1	-	-	-	72	28	-
2a.1.5.4	Circulating Water - RCA	-	207	14	62	1,114	-	-	230	1,626	1,626	-	-	6,656	-	-	-	-	270,307	2,860	-
2a.1.5.5	Combustible Gas Control - Insul - RCA	-	29	0	2	36	-	-	13	80	80	-	-	212	-	-	-	-	8,617	378	-
2a.1.5.6	Combustible Gas Control - RCA	-	18	1	3	48	-	-	12	81	81	-	-	285	-	-	-	-	11,577	245	-
2a.1.5.7	Condensate & Feedwater	-	987	183	329	3,337	2,464	-	1,431	8,731	8,731	-	-	19,947	7,319	-	-	-	1,275,810	14,196	-
2a.1.5.8	Condensate & Feedwater - Insulated	-	492	34	63	699	408	-	343	2,038	2,038	-	-	4,176	1,207	-	-	-	246,693	6,964	-
2a.1.5.9	Condensate Demin	-	545	30	51	560	339	-	316	1,840	1,840	-	-	3,346	1,000	-	-	-	199,936	7,618	-
2a.1.5.10	Condensate Storage	-	726	33	82	1,193	270	-	444	2,748	2,748	-	-	7,131	795	-	-	-	340,568	10,345	-
2a.1.5.11	Control Rod Drive	-	3	0	0	3	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	-	79	20	51	734	176	-	184	1,244	1,244	-	-	4,384	521	-	-	-	211,329	1,163	-
2a.1.5.14	Core Spray - Insulated	-	145	8	13	137	90	-	82	474	474	-	-	818	264	-	-	-	50,149	2,033	-
2a.1.5.15	Demin Water - Insulated - RCA	-	15	0	1	14	-	-	6	36	36	-	-	85	-	-	-	-	3,445	181	-
2a.1.5.16	Demin Water - RCA	-	41	1	2	42	-	-	17	104	104	-	-	253	-	-	-	-	10,278	508	-
2a.1.5.17	Diesel Oil - RCA	-	2	0	0	4	-	-	1	7	7	-	-	23	-	-	-	-	931	25	-
2a.1.5.18	Drywell Atmosphere Cooling - RCA	-	38	1	5	92	-	-	24	159	159	-	-	548	-	-	-	-	22,244	550	-
2a.1.5.19	EDG Emerg Service Water - Insul - RCA	-	0	0	0	0	-	-	0	1	1	-	-	2	-	-	-	-	84	4	-
2a.1.5.20	Electrical - Clean	-	13	-	-	-	-	-	2	15	-	-	15	-	-	-	-	-	-	182	-
2a.1.5.21	Emergency Service Water - Insul - RCA	-	21	0	1	23	-	-	9	55	55	-	-	137	-	-	-	-	5,544	281	-
2a.1.5.22	Emergency Service Water - RCA	-	2	0	0	2	-	-	1	5	5	-	-	13	-	-	-	-	512	22	-
2a.1.5.23	GEZIP - RCA	-	3	0	1	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	-	6	0	0	1	5	-	3	15	15	-	-	6	13	-	-	-	1,080	81	-
2a.1.5.26	H2-O2 Control Analyzing - Insulated	-	6	0	0	1	5	-	3	15	15	-	-	6	13	-	-	-	1,080	81	-
2a.1.5.27	High Pressure Coolant Injection	-	67	6	13	163	70	-	61	381	381	-	-	972	209	-	-	-	52,792	966	-
2a.1.5.28	High Pressure Coolant Injection - Insula	-	219	14	24	267	163	-	141	830	830	-	-	1,598	481	-	-	-	95,733	3,079	-
2a.1.5.29	Hydrogen Cooling	-	8	-	-	-	-	-	1	10	-	-	10	-	-	-	-	-	-	118	-
2a.1.5.30	Hydrogen Cooling - RCA	-	7	0	0	7	-	-	3	17	17	-	-	39	-	-	-	-	1,600	79	-
2a.1.5.31	Hydrogen Seal Oil - RCA	-	17	0	2	32	-	-	9	60	60	-	-	189	-	-	-	-	7,669	212	-
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	296	-	-	103	644	644	-	-	1,768	-	-	-	-	71,810	2,733	-
2a.1.5.34	Main Condenser	-	196	12	20	223	139	-	122	712	712	-	-	1,333	411	-	-	-	80,439	2,746	-
2a.1.5.35	Main Steam	-	249	17	32	359	201	-	173	1,029	1,029	-	-	2,148	594	-	-	-	125,135	3,512	-
2a.1.5.36	Main Turbine	-	1,012	205	353	3,306	2,921	-	1,553	9,350	9,350	-	-	19,760	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	-	-	-	145,208	3,069	-
2a.1.5.38	Miscellaneous	-	43	1	3	51	-	-	19	115	115	-	-	302	-	-	-	-	12,283	622	-
2a.1.5.39	Off Gas Recombiner	-	189	19	32	300	257	-	163	960	960	-	-	1,795	764	-	-	-	121,554	2,708	-
2a.1.5.40	Off Gas Recombiner - Insulated	-	387	19	27	229	240	-	197	1,100	1,100	-	-	1,366	709	-	-	-	100,933	5,385	-
2a.1.5.41	Post Accident Sampling	-	25	1	1	9	11	-	11	58	58	-	-	53	33	-	-	-	4,318	345	-
2a.1.5.42	Post Accident Sampling - Insulated	-	17	1	1	3	13	-	8	43	43	-	-	17	37	-	-	-	3,116	212	-
2a.1.5.43	RHR Service Water - Insulated - RCA	-	83	3	14	248	-	-	60	409	409	-	-	1,485	-	-	-	-	60,293	1,125	-
2a.1.5.44	RHR Service Water - RCA	-	4	0	0	6	-	-	2	12	12	-	-	35	-	-	-	-	1,410	57	-
2a.1.5.45	Reactor Feedwater Pump Seal	-	56	2	4	32	33	-	28	155	155	-	-	193	96	-	-	-	14,009	773	-

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 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
Disposal of Plant Systems (continued)																					
2a.1.5.46	Residual Heat Removal	362	252	172	178	1,072	2,051	-	962	5,049	5,049	-	-	6,406	6,012	-	-	-	647,941	4,135	-
2a.1.5.47	Residual Heat Removal - Insulated	622	554	61	82	563	880	-	772	3,535	3,535	-	-	3,367	2,607	-	-	-	303,087	10,340	-
2a.1.5.48	Rx Core Isolation Cooling	-	49	2	4	43	26	-	26	150	150	-	-	259	76	-	-	-	15,396	691	-
2a.1.5.49	Rx Core Isolation Cooling - Insulated	-	107	5	7	48	67	-	52	287	287	-	-	288	198	-	-	-	24,419	1,479	-
2a.1.5.50	Rx Recirculation	56	58	6	4	7	65	-	61	258	258	-	-	43	190	-	-	-	14,095	1,580	-
2a.1.5.51	Snubbers	-	169	2	5	63	30	-	60	331	331	-	-	377	90	-	-	-	21,009	2,548	-
2a.1.5.52	Standby Liquid Control - Insul - RCA	-	4	0	0	4	-	-	2	9	9	-	-	22	-	-	-	-	904	48	-
2a.1.5.53	Standby Liquid Control - RCA	-	26	1	2	41	-	-	13	83	83	-	-	245	-	-	-	-	9,969	341	-
2a.1.5.54	Stator Cooling - RCA	-	7	0	1	21	-	-	5	35	35	-	-	126	-	-	-	-	5,135	98	-
2a.1.5.55	Traversing Incore Probe	0	4	0	0	0	2	-	1	7	7	-	-	1	5	-	-	-	386	51	-
2a.1.5	Totals	1,040	8,221	924	1,572	16,339	11,425	-	8,209	47,730	47,706	-	24	97,654	33,808	-	-	-	6,125,515	119,943	-
2a.1.6	Scaffolding in support of decommissioning	-	2,265	22	12	191	31	-	607	3,127	3,127	-	-	1,030	91	-	-	-	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	180,360	180,336	-	24	141,010	59,545	1,761	898	-	10,458,540	253,640	2,758
Period 2a Collateral Costs																					
2a.3.1	Process decommissioning water waste	85	-	57	102	-	232	-	122	598	598	-	-	-	532	-	-	-	31,942	104	-
2a.3.2	Process decommissioning chemical flush waste	5	-	216	702	-	1,619	-	534	3,077	3,077	-	-	-	2,093	-	-	-	223,008	392	-
2a.3.3	Small tool allowance	-	324	-	-	-	-	-	49	373	336	-	37	-	-	-	-	-	-	-	-
2a.3.4	Spent Fuel Capital and Transfer	-	-	-	-	-	-	24,119	3,618	27,737	-	27,737	-	-	-	-	-	-	-	-	-
2a.3.5	Retention and Severance	-	-	-	-	-	-	13,127	1,969	15,097	15,097	-	-	-	-	-	-	-	-	-	-
2a.3	Subtotal Period 2a Collateral Costs	91	324	274	804	-	1,851	37,247	6,292	46,882	19,107	27,737	37	-	2,625	-	-	-	254,950	495	-
Period 2a Period-Dependent Costs																					
2a.4.1	Decon supplies	112	-	-	-	-	-	-	28	140	140	-	-	-	-	-	-	-	-	-	-
2a.4.2	Insurance	-	-	-	-	-	-	1,019	102	1,121	1,121	-	-	-	-	-	-	-	-	-	-
2a.4.3	Property taxes	-	-	-	-	-	-	4,377	438	4,814	4,814	-	-	-	-	-	-	-	-	-	-
2a.4.4	Health physics supplies	-	2,356	-	-	-	-	-	589	2,945	2,945	-	-	-	-	-	-	-	-	-	-
2a.4.5	Heavy equipment rental	-	3,627	-	-	-	-	-	544	4,171	4,171	-	-	-	-	-	-	-	-	-	-
2a.4.6	Disposal of DAW generated	-	-	110	57	-	457	-	134	758	758	-	-	-	5,551	-	-	-	111,023	181	-
2a.4.7	Plant energy budget	-	-	-	-	-	-	2,501	375	2,876	2,876	-	-	-	-	-	-	-	-	-	-
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	Spent Fuel Pool O&M	-	-	-	-	-	-	1,224	184	1,408	-	1,408	-	-	-	-	-	-	-	-	-
2a.4.12	ISFSI Operating Costs	-	-	-	-	-	-	162	24	187	-	187	-	-	-	-	-	-	-	-	-
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	Security Staff Cost	-	-	-	-	-	-	21,881	3,282	25,164	25,164	-	-	-	-	-	-	-	-	-	325,574
2a.4.16	DOC Staff Cost	-	-	-	-	-	-	21,021	3,153	24,174	24,174	-	-	-	-	-	-	-	-	-	229,108
2a.4.17	Utility Staff Cost	-	-	-	-	-	-	27,906	4,186	32,092	32,092	-	-	-	-	-	-	-	-	-	426,562
2a.4	Subtotal Period 2a Period-Dependent Costs	112	5,982	110	57	-	457	89,938	14,267	110,924	104,803	6,121	-	-	5,551	-	-	-	111,023	181	981,244
2a.0	TOTAL PERIOD 2a COST	1,945	36,028	19,028	7,259	25,937	52,350	127,913	67,707	338,166	304,246	33,858	62	141,010	67,722	1,761	898	-	10,824,520	254,317	984,002
PERIOD 2b - Site Decontamination																					
Period 2b Direct Decommissioning Activities																					
Disposal of Plant Systems																					
2b.1.1.1	ALARA/Radiological	-	18	0	1	6	3	-	6	35	35	-	-	35	10	-	-	-	2,060	277	-
2b.1.1.2	Alternate N2 - RCA	-	16	0	1	16	-	-	7	40	40	-	-	93	-	-	-	-	3,765	185	-
2b.1.1.3	Decontamination Projects	-	1	0	0	0	0	-	0	2	2	-	-	2	0	-	-	-	129	17	-
2b.1.1.4	Electrical - Contaminated	-	445	6	24	400	30	-	183	1,089	1,089	-	-	2,389	90	-	-	-	102,726	6,325	-
2b.1.1.5	Electrical - Decontaminated	-	2,698	48	218	3,906	-	-	1,298	8,167	8,167	-	-	23,344	-	-	-	-	948,013	37,107	-
2b.1.1.6	Fire - RCA	-	101	1	6	103	-	-	42	253	253	-	-	614	-	-	-	-	24,917	1,324	-
2b.1.1.7	HVAC Ductwork	-	305	7	27	446	34	-	156	975	975	-	-	2,665	100	-	-	-	114,598	4,111	-
2b.1.1.8	HVAC/Chilled Water - RCA	-	324	6	26	461	-	-	155	971	971	-	-	2,752	-	-	-	-	111,779	3,985	-
2b.1.1.9	Heating & Ventilation	-	483	16	61	1,007	76	-	302	1,945	1,945	-	-	6,018	227	-	-	-	258,789	7,101	-
2b.1.1.10	Heating Boiler - Insulated - RCA	-	3	0	0	4	-	-	1	9	9	-	-	26	-	-	-	-	1,058	35	-
2b.1.1.11	Liquid Radwaste	588	687	48	63	514	586	-	703	3,188	3,188	-	-	3,073	1,728	-	-	-	235,484	17,194	-
2b.1.1.12	Makeup Demin - RCA	-	103	3	14	246	-	-	65	431	431	-	-	1,471	-	-	-	-	59,747	1,412	-
2b.1.1.13	Non-Essential Diesel Generator - RCA	-	27	3	13	238	-	-	45	327	327	-	-	1,424	-	-	-	-	57,832	395	-
2b.1.1.14	Off Gas Holdup	-	342	21	38	461	214	-	216	1,291	1,291	-	-	2,755	630	-	-	-	152,277	4,769	-
2b.1.1.15	Primary Containment	-	455	42	87	1,038	507	-	414	2,543	2,543	-	-	6,201	1,506	-	-	-	347,704	6,454	-
2b.1.1.16	Process Radiation Monitors	-	46	2	2	24	18	-	20	111	111	-	-	142	52	-	-	-	9,115	649	-

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 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
Disposal of Plant Systems (continued)																					
2b.1.1.17	Rx Bldg Closed Clng Water - Insul - RCA	-	114	2	9	163	-	-	54	343	343	-	-	977	-	-	-	-	39,675	1,484	-
2b.1.1.18	Rx Bldg Closed Clng Water - RCA	-	184	15	66	1,187	-	-	235	1,687	1,687	-	-	7,093	-	-	-	-	288,031	2,489	-
2b.1.1.19	Rx Component Handling Equip	27	142	18	27	194	279	-	154	840	840	-	-	1,158	829	-	-	-	99,730	2,462	-
2b.1.1.20	Rx Pressure Vessel	28	47	6	5	13	78	-	48	225	225	-	-	75	230	-	-	-	17,816	1,051	-
2b.1.1.21	Rx Water Cleanup	172	265	19	16	22	251	-	222	965	965	-	-	130	737	-	-	-	52,670	5,736	-
2b.1.1.22	Secondary Containment	-	124	7	14	170	86	-	81	483	483	-	-	1,017	255	-	-	-	57,567	1,763	-
2b.1.1.23	Service & Seal Water - Insulated - RCA	-	120	2	11	197	-	-	62	392	392	-	-	1,180	-	-	-	-	47,917	1,565	-
2b.1.1.24	Service & Seal Water - RCA	-	159	4	17	303	-	-	88	570	570	-	-	1,809	-	-	-	-	73,453	2,016	-
2b.1.1.25	Service Air Blower - RCA	-	15	0	2	34	-	-	9	62	62	-	-	206	-	-	-	-	8,364	206	-
2b.1.1.26	Solid Radwaste	338	494	36	49	399	467	-	480	2,264	2,264	-	-	2,387	1,380	-	-	-	185,221	10,820	-
2b.1.1.27	Structures & Buildings	-	78	2	5	60	29	-	37	210	210	-	-	357	85	-	-	-	19,933	1,128	-
2b.1.1.28	Wells & Domestic Water	-	10	-	-	-	-	-	1	11	-	-	11	-	-	-	-	-	-	144	-
2b.1.1.29	Wells & Domestic Water - RCA	-	52	1	3	57	-	-	22	136	136	-	-	342	-	-	-	-	13,874	633	-
2b.1.1	Totals	1,153	7,860	315	804	11,668	2,657	-	5,107	29,563	29,552	-	11	69,735	7,859	-	-	-	3,334,244	122,835	-
2b.1.2	Scaffolding in support of decommissioning	-	2,831	28	16	239	38	-	758	3,909	3,909	-	-	1,287	114	-	-	-	65,139	28,205	-
Decontamination of Site Buildings																					
2b.1.3.1	Reactor Building	5,202	2,903	178	516	8,044	1,181	-	4,924	22,948	22,948	-	-	48,077	7,014	-	-	-	2,317,670	112,518	-
2b.1.3.2	Admin	106	6	0	3	-	15	-	59	189	189	-	-	-	145	-	-	-	6,840	1,600	-
2b.1.3.3	HPCI Room	29	28	1	3	20	14	-	29	123	123	-	-	118	125	-	-	-	10,759	789	-
2b.1.3.4	Hot Shop	17	4	0	2	-	11	-	12	46	46	-	-	-	103	-	-	-	4,860	286	-
2b.1.3.5	LLRW Storage & Shipping	58	24	2	8	5	45	-	48	191	191	-	-	31	433	-	-	-	21,708	1,127	-
2b.1.3.6	Offgas Stack	372	269	7	23	225	82	-	312	1,289	1,289	-	-	1,343	669	-	-	-	87,045	8,860	-
2b.1.3.7	Offgas Storage & Compressor	41	17	1	6	4	33	-	34	136	136	-	-	25	316	-	-	-	15,948	785	-
2b.1.3.8	Radwaste	121	61	3	17	29	96	-	107	435	435	-	-	172	910	-	-	-	49,943	2,503	-
2b.1.3.9	Radwaste Material Storage Warehouse	64	24	2	9	-	52	-	52	202	202	-	-	-	495	-	-	-	23,400	1,197	-
2b.1.3.10	Recombiner	27	25	1	5	33	24	-	32	148	148	-	-	199	216	-	-	-	18,405	695	-
2b.1.3.11	Turbine	705	353	21	104	215	564	-	632	2,594	2,594	-	-	1,283	5,299	-	-	-	303,150	14,443	-
2b.1.3.12	Turbine Building Addition	58	21	1	8	-	45	-	47	181	181	-	-	-	434	-	-	-	20,478	1,087	-
2b.1.3	Totals	6,799	3,736	218	704	8,574	2,164	-	6,288	28,483	28,483	-	-	51,247	16,159	-	-	-	2,880,206	145,889	-
2b.1.4	Prepare&submit License Termination Plan	-	-	-	-	-	-	526	79	605	605	-	-	-	-	-	-	-	-	-	4,096
2b.1.5	Receive NRC approval of termination plan									a											
2b.1	Subtotal Period 2b Activity Costs	7,952	14,427	560	1,524	20,481	4,859	526	12,232	62,561	62,549	-	11	122,269	24,132	-	-	-	6,279,589	296,929	4,096
Period 2b Additional Costs																					
2b.2.1	Operational Equipment	-	-	23	92	1,211	-	-	198	1,524	1,524	-	-	11,760	-	-	-	-	294,000	32	-
2b.2.2	Excavation of Underground Services	-	1,972	-	-	-	-	376	550	2,898	2,898	-	-	-	-	-	-	-	-	12,493	-
2b.2.3	Security Modifications	-	-	-	-	-	-	8,696	1,304	10,000	10,000	-	-	-	-	-	-	-	-	-	-
2b.2	Subtotal Period 2b Additional Costs	-	1,972	23	92	1,211	-	9,072	2,052	14,422	14,422	-	-	11,760	-	-	-	-	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	-	-	-	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	-	364	-	-	-	-	-	55	418	418	-	-	-	-	-	-	-	-	-	-
2b.3.4	Spent Fuel Capital and Transfer	-	-	-	-	-	-	117,254	17,588	134,843	-	134,843	-	-	-	-	-	-	-	-	-
2b.3.5	Retention and Severance	-	-	-	-	-	-	6,299	945	7,244	7,244	-	-	-	-	-	-	-	-	-	-
2b.3	Subtotal Period 2b Collateral Costs	199	364	178	378	-	865	123,554	18,978	144,516	9,673	134,843	-	-	1,666	-	-	-	119,165	322	-
Period 2b Period-Dependent Costs																					
2b.4.1	Decon supplies	1,440	-	-	-	-	-	-	360	1,799	1,799	-	-	-	-	-	-	-	-	-	-
2b.4.2	Insurance	-	-	-	-	-	-	742	74	816	816	-	-	-	-	-	-	-	-	-	-
2b.4.3	Property taxes	-	-	-	-	-	-	2,703	270	2,974	2,974	-	-	-	-	-	-	-	-	-	-
2b.4.4	Health physics supplies	-	2,376	-	-	-	-	-	594	2,970	2,970	-	-	-	-	-	-	-	-	-	-
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	-	-	-	5,084	-	-	-	101,679	166	-
2b.4.7	Plant energy budget	-	-	-	-	-	-	1,437	216	1,653	1,653	-	-	-	-	-	-	-	-	-	-
2b.4.8	NRC Fees	-	-	-	-	-	-	623	62	685	685	-	-	-	-	-	-	-	-	-	-
2b.4.9	Emergency Planning Fees	-	-	-	-	-	-	2,995	299	3,294	-	3,294	-	-	-	-	-	-	-	-	-
2b.4.10	Fixed Overhead	-	-	-	-	-	-	2,235	335	2,570	2,570	-	-	-	-	-	-	-	-	-	-
2b.4.11	Spent Fuel Pool O&M	-	-	-	-	-	-	891	134	1,024	-	1,024	-	-	-	-	-	-	-	-	-
2b.4.12	Liquid Radwaste Processing Equipment/Services	-	-	-	-	-	-	224	34	258	258	-	-	-	-	-	-	-	-	-	-
2b.4.13	ISFSI Operating Costs	-	-	-	-	-	-	118	18	136	-	136	-	-	-	-	-	-	-	-	-
2b.4.14	Railroad Track Maintenance	-	-	-	-	-	-	458	69	527	527	-	-	-	-	-	-	-	-	-	-
2b.4.15	Remedial Actions Surveys	-	-	-	-	-	-	1,182	177	1,359	1,359	-	-	-	-	-	-	-	-	-	-

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 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 Period-Dependent Costs (continued)																					
2b.4.16	Security Staff Cost	-	-	-	-	-	-	15,925	2,389	18,314	18,314	-	-	-	-	-	-	-	-	-	236,949
2b.4.17	DOC Staff Cost	-	-	-	-	-	-	14,772	2,216	16,988	16,988	-	-	-	-	-	-	-	-	-	160,160
2b.4.18	Utility Staff Cost	-	-	-	-	-	-	19,442	2,916	22,358	22,358	-	-	-	-	-	-	-	-	-	297,283
2b.4	Subtotal Period 2b Period-Dependent Costs	1,440	5,087	101	52	-	419	63,747	10,692	81,536	77,082	4,455	-	-	5,084	-	-	-	101,679	166	694,392
2b.0	TOTAL PERIOD 2b COST	9,591	21,850	861	2,046	21,692	6,143	196,899	43,954	303,035	163,726	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	Cranes/Heavy Loads/Rigging - RCA	-	3	0	1	17	-	-	4	25	25	-	-	103	-	-	-	-	4,184	48	-
2d.1.2.2	Electrical - Contaminated Fuel Pool	-	47	1	2	40	3	-	19	112	112	-	-	240	9	-	-	-	10,334	665	-
2d.1.2.3	Electrical - Decontam. Fuel Pool Area	-	297	5	23	411	-	-	140	876	876	-	-	2,457	-	-	-	-	99,783	4,090	-
2d.1.2.4	Fire - RCA - Fuel Pool Area	-	11	0	1	10	-	-	4	26	26	-	-	62	-	-	-	-	2,499	143	-
2d.1.2.5	Fuel Pool Cooling & Cleanup	246	428	34	37	197	455	-	382	1,781	1,781	-	-	1,179	1,341	-	-	-	133,939	8,380	-
2d.1.2.6	Fuel Pool Cooling & Cleanup - Insulated	27	41	3	3	11	40	-	36	161	161	-	-	67	117	-	-	-	10,220	848	-
2d.1.2.7	HVAC Ductwork - Fuel Pool Area	-	34	1	3	50	4	-	17	108	108	-	-	296	11	-	-	-	12,733	457	-
2d.1.2.8	HVAC/Chilled Water - RCA Fuel Pool Area	-	33	0	2	37	-	-	14	87	87	-	-	223	-	-	-	-	9,072	397	-
2d.1.2.9	Instrument & Service Air-RCA-Fuel Pool	-	29	1	2	45	-	-	14	91	91	-	-	267	-	-	-	-	10,841	357	-
2d.1.2	Totals	273	924	45	75	819	502	-	631	3,268	3,268	-	-	4,894	1,479	-	-	-	293,606	15,385	-
Decontamination of Site Buildings																					
2d.1.3.1	Reactor (Post Fuel)	946	2,599	172	913	329	10,216	-	3,880	19,056	19,056	-	-	1,969	62,698	-	-	-	2,732,406	45,703	-
2d.1.3	Totals	946	2,599	172	913	329	10,216	-	3,880	19,056	19,056	-	-	1,969	62,698	-	-	-	2,732,406	45,703	-
2d.1.4	Scaffolding in support of decommissioning	-	566	6	3	48	8	-	152	782	782	-	-	257	23	-	-	-	13,028	5,641	-
2d.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	67,635	-
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	-	-	-	504	-	-	-	30,239	98	-
2d.3.2	Process decommissioning chemical flush waste	1	-	26	84	-	193	-	64	366	366	-	-	-	249	-	-	-	26,553	47	-
2d.3.3	Small tool allowance	-	91	-	-	-	-	-	14	105	105	-	-	-	-	-	-	-	-	-	-
2d.3.4	Decommissioning Equipment Disposition	-	-	130	82	1,112	178	-	237	1,739	1,739	-	-	6,000	529	-	-	-	303,608	147	-
2d.3.5	Spent Fuel Capital and Transfer	-	-	-	-	-	-	27	4	32	-	32	-	-	-	-	-	-	-	-	-
2d.3	Subtotal Period 2d Collateral Costs	80	91	210	262	1,112	590	27	432	2,805	2,773	32	-	6,000	1,282	-	-	-	360,400	292	-
Period 2d Period-Dependent Costs																					
2d.4.1	Decon supplies	244	-	-	-	-	-	-	61	305	305	-	-	-	-	-	-	-	-	-	-
2d.4.2	Insurance	-	-	-	-	-	-	530	53	583	583	-	-	-	-	-	-	-	-	-	-
2d.4.3	Property taxes	-	-	-	-	-	-	1,664	166	1,830	1,830	-	-	-	-	-	-	-	-	-	-
2d.4.4	Health physics supplies	-	806	-	-	-	-	-	202	1,008	1,008	-	-	-	-	-	-	-	-	-	-
2d.4.5	Heavy equipment rental	-	1,936	-	-	-	-	-	290	2,227	2,227	-	-	-	-	-	-	-	-	-	-
2d.4.6	Disposal of DAW generated	-	-	40	21	-	167	-	49	277	277	-	-	-	2,030	-	-	-	40,600	66	-
2d.4.7	Plant energy budget	-	-	-	-	-	-	547	82	630	630	-	-	-	-	-	-	-	-	-	-
2d.4.8	NRC Fees	-	-	-	-	-	-	424	42	466	466	-	-	-	-	-	-	-	-	-	-
2d.4.9	Emergency Planning Fees	-	-	-	-	-	-	112	11	123	-	123	-	-	-	-	-	-	-	-	-
2d.4.10	Fixed Overhead	-	-	-	-	-	-	1,597	239	1,836	1,836	-	-	-	-	-	-	-	-	-	-
2d.4.11	Liquid Radwaste Processing Equipment/Services	-	-	-	-	-	-	320	48	368	368	-	-	-	-	-	-	-	-	-	-
2d.4.12	ISFSI Operating Costs	-	-	-	-	-	-	84	13	97	-	97	-	-	-	-	-	-	-	-	-
2d.4.13	Railroad Track Maintenance	-	-	-	-	-	-	94	14	108	108	-	-	-	-	-	-	-	-	-	-
2d.4.14	Remedial Actions Surveys	-	-	-	-	-	-	844	127	971	971	-	-	-	-	-	-	-	-	-	-
2d.4.15	Security Staff Cost	-	-	-	-	-	-	10,999	1,650	12,649	8,918	3,732	-	-	-	-	-	-	-	-	162,981
2d.4.16	DOC Staff Cost	-	-	-	-	-	-	7,311	1,097	8,408	8,408	-	-	-	-	-	-	-	-	-	78,356
2d.4.17	Utility Staff Cost	-	-	-	-	-	-	10,052	1,508	11,560	10,670	890	-	-	-	-	-	-	-	-	149,660
2d.4	Subtotal Period 2d Period-Dependent Costs	244	2,743	40	21	-	167	34,579	5,652	43,446	38,604	4,842	-	-	2,030	-	-	-	40,600	66	390,997
2d.0	TOTAL PERIOD 2d COST	2,196	6,981	576	1,422	2,308	14,055	36,065	12,202	75,806	70,932	4,873	-	13,120	75,164	-	-	-	3,926,210	67,993	403,477

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 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 2f - License Termination																					
Period 2f Direct Decommissioning Activities																					
2f.1.1	ORISE confirmatory survey	-	-	-	-	-	-	166	50	216	216	-	-	-	-	-	-	-	-	-	-
2f.1.2	Terminate license									a											
2f.1	Subtotal Period 2f Activity Costs	-	-	-	-	-	-	166	50	216	216	-	-	-	-	-	-	-	-	-	-
Period 2f Additional Costs																					
2f.2.1	License Termination Survey	-	-	-	-	-	-	6,920	2,076	8,995	8,995	-	-	-	-	-	-	-	-	95,048	6,240
2f.2	Subtotal Period 2f Additional Costs	-	-	-	-	-	-	6,920	2,076	8,995	8,995	-	-	-	-	-	-	-	-	95,048	6,240
Period 2f Collateral Costs																					
2f.3.1	DOC staff relocation expenses	-	-	-	-	-	-	1,264	190	1,454	1,454	-	-	-	-	-	-	-	-	-	-
2f.3.2	Spent Fuel Capital and Transfer	-	-	-	-	-	-	47	7	54	-	54	-	-	-	-	-	-	-	-	-
2f.3	Subtotal Period 2f Collateral Costs	-	-	-	-	-	-	1,311	197	1,508	1,454	54	-	-	-	-	-	-	-	-	-
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	Disposal of DAW generated	-	-	7	4	-	29	-	9	48	48	-	-	-	355	-	-	-	7,097	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	11	123	-	123	-	-	-	-	-	-	-	-	-
2f.4.8	Fixed Overhead	-	-	-	-	-	-	1,597	239	1,836	1,836	-	-	-	-	-	-	-	-	-	-
2f.4.9	ISFSI Operating Costs	-	-	-	-	-	-	84	13	97	-	97	-	-	-	-	-	-	-	-	-
2f.4.10	Railroad Track Maintenance	-	-	-	-	-	-	94	14	108	108	-	-	-	-	-	-	-	-	-	-
2f.4.11	Security Staff Cost	-	-	-	-	-	-	10,999	1,650	12,649	8,918	3,732	-	-	-	-	-	-	-	-	162,981
2f.4.12	DOC Staff Cost	-	-	-	-	-	-	5,393	809	6,201	6,201	-	-	-	-	-	-	-	-	-	57,200
2f.4.13	Utility Staff Cost	-	-	-	-	-	-	5,762	864	6,626	5,738	888	-	-	-	-	-	-	-	-	80,707
2f.4	Subtotal Period 2f Period-Dependent Costs	-	708	7	4	-	29	26,740	4,070	31,557	26,718	4,839	-	-	355	-	-	-	7,097	12	300,888
2f.0	TOTAL PERIOD 2f COST	-	708	7	4	-	29	35,137	6,392	42,276	37,382	4,893	-	-	355	-	-	-	7,097	95,059	307,128
PERIOD 2 TOTALS		13,731	65,566	20,473	10,731	49,937	72,577	396,013	130,255	759,282	576,287	182,922	73	288,160	174,123	1,761	898	-	21,552,260	727,310	2,393,096
PERIOD 3b - Site Restoration																					
Period 3b Direct Decommissioning Activities																					
Demolition of Remaining Site Buildings																					
3b.1.1.1	Reactor Building	-	1,971	-	-	-	-	-	296	2,267	-	-	2,267	-	-	-	-	-	-	13,911	-
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	HPCI Room	-	19	-	-	-	-	-	3	22	-	-	22	-	-	-	-	-	-	97	-
3b.1.1.5	Hot Shop	-	16	-	-	-	-	-	2	19	-	-	19	-	-	-	-	-	-	177	-
3b.1.1.6	Hydrogen & Oxygen Storage	-	2	-	-	-	-	-	0	2	-	-	2	-	-	-	-	-	-	19	-
3b.1.1.7	LLRW Storage & Shipping	-	83	-	-	-	-	-	12	95	-	-	95	-	-	-	-	-	-	662	-
3b.1.1.8	MSIV	-	4	-	-	-	-	-	1	4	-	-	4	-	-	-	-	-	-	42	-
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	Radwaste	-	228	-	-	-	-	-	34	262	-	-	262	-	-	-	-	-	-	1,220	-
3b.1.1.13	Recombiner	-	128	-	-	-	-	-	19	147	-	-	147	-	-	-	-	-	-	713	-
3b.1.1.14	Security Barrier	-	186	-	-	-	-	-	28	214	-	-	214	-	-	-	-	-	-	933	-
3b.1.1.15	Structures Greater than 3' Below Grade	-	2,461	-	-	-	-	-	369	2,830	-	-	2,830	-	-	-	-	-	-	12,649	-
3b.1.1.16	Tank Farm	-	4	-	-	-	-	-	1	5	-	-	5	-	-	-	-	-	-	21	-
3b.1.1.17	Turbine	-	1,259	-	-	-	-	-	189	1,448	-	-	1,448	-	-	-	-	-	-	13,036	-
3b.1.1.18	Turbine Building Addition	-	55	-	-	-	-	-	8	63	-	-	63	-	-	-	-	-	-	618	-
3b.1.1.19	Turbine Pedestal	-	182	-	-	-	-	-	27	209	-	-	209	-	-	-	-	-	-	926	-
3b.1.1	Totals	-	8,169	-	-	-	-	-	1,225	9,394	-	-	9,394	-	-	-	-	-	-	58,885	-
Site Closeout Activities																					
3b.1.2	Grade & landscape site	-	896	-	-	-	-	-	134	1,031	-	-	1,031	-	-	-	-	-	-	1,841	-
3b.1.3	Final report to NRC	-	-	-	-	-	-	200	30	231	231	-	-	-	-	-	-	-	-	-	1,560
3b.1	Subtotal Period 3b Activity Costs	-	9,065	-	-	-	-	200	1,390	10,655	231	-	10,425	-	-	-	-	-	-	60,726	1,560

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 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 3b Additional Costs																					
3b.2.1	Clean Concrete Disposal	-	3,322	-	-	-	-	13	500	3,835	-	-	3,835	-	-	-	-	-	-	12	-
3b.2.2	Intake Structure Cofferdam	-	335	-	-	-	-	-	50	385	-	-	385	-	-	-	-	-	-	2,584	-
3b.2.3	Construction Debris	-	-	-	-	-	-	1,170	176	1,346	-	-	1,346	-	-	-	-	-	-	-	-
3b.2.4	Backfill	-	5,583	-	-	-	-	-	837	6,421	-	-	6,421	-	-	-	-	-	-	5,422	-
3b.2.5	Discharge Structure Cofferdam	-	442	-	-	-	-	-	66	508	-	-	508	-	-	-	-	-	-	3,552	-
3b.2.6	Disposition of Original MPC Canisters	-	55	185	954	-	5,641	-	1,709	8,544	8,544	-	-	-	21,097	-	-	-	2,505,700	337	-
3b.2	Subtotal Period 3b Additional Costs	-	9,737	185	954	-	5,641	1,183	3,339	21,039	8,544	-	12,495	-	21,097	-	-	-	2,505,700	11,907	-
Period 3b Collateral Costs																					
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	-	125	127	-	-	-	-	-	-	-	-
Period 3b Period-Dependent Costs																					
3b.4.1	Insurance	-	-	-	-	-	-	1,220	122	1,342	1,342	-	-	-	-	-	-	-	-	-	-
3b.4.2	Property taxes	-	-	-	-	-	-	2,540	254	2,794	-	2,794	-	-	-	-	-	-	-	-	-
3b.4.3	Heavy equipment rental	-	5,842	-	-	-	-	-	876	6,719	-	-	6,719	-	-	-	-	-	-	-	-
3b.4.4	Plant energy budget	-	-	-	-	-	-	315	47	362	-	362	-	-	-	-	-	-	-	-	-
3b.4.5	NRC ISFSI Fees	-	-	-	-	-	-	356	36	391	-	391	-	-	-	-	-	-	-	-	-
3b.4.6	Emergency Planning Fees	-	-	-	-	-	-	257	26	283	-	283	-	-	-	-	-	-	-	-	-
3b.4.7	Fixed Overhead	-	-	-	-	-	-	1,122	168	1,290	429	860	-	-	-	-	-	-	-	-	-
3b.4.8	ISFSI Operating Costs	-	-	-	-	-	-	194	29	223	-	223	-	-	-	-	-	-	-	-	-
3b.4.9	Railroad Track Maintenance	-	-	-	-	-	-	543	81	624	249	375	-	-	-	-	-	-	-	-	-
3b.4.10	Security Staff Cost	-	-	-	-	-	-	25,319	3,798	29,117	0	8,589	20,527	-	-	-	-	-	-	-	375,152
3b.4.11	DOC Staff Cost	-	-	-	-	-	-	11,729	1,759	13,489	-	-	13,489	-	-	-	-	-	-	-	122,646
3b.4.12	Utility Staff Cost	-	-	-	-	-	-	7,148	1,072	8,220	-	2,129	6,091	-	-	-	-	-	-	-	101,904
3b.4	Subtotal Period 3b Period-Dependent Costs	-	5,842	-	-	-	-	50,742	8,269	64,854	2,020	16,007	46,826	-	-	-	-	-	-	-	599,702
3b.0	TOTAL PERIOD 3b COST	-	24,755	185	954	-	5,641	52,234	13,030	96,800	10,795	16,132	69,873	-	21,097	-	-	-	2,505,700	72,633	601,262
PERIOD 3c - Fuel Storage Operations/Shipping																					
Period 3c Direct Decommissioning Activities																					
Period 3c Collateral Costs																					
3c.3.1	Spent Fuel Capital and Transfer	-	-	-	-	-	-	553,074	82,961	636,035	-	636,035	-	-	-	-	-	-	-	-	-
3c.3	Subtotal Period 3c Collateral Costs	-	-	-	-	-	-	553,074	82,961	636,035	-	636,035	-	-	-	-	-	-	-	-	-
Period 3c Period-Dependent Costs																					
3c.4.1	Insurance	-	-	-	-	-	-	65,480	6,548	72,028	-	72,028	-	-	-	-	-	-	-	-	-
3c.4.2	Property taxes	-	-	-	-	-	-	84,567	8,457	93,024	-	93,024	-	-	-	-	-	-	-	-	-
3c.4.4	NRC ISFSI Fees	-	-	-	-	-	-	20,571	2,057	22,628	-	22,628	-	-	-	-	-	-	-	-	-
3c.4.5	Emergency Planning Fees	-	-	-	-	-	-	13,803	1,380	15,183	-	15,183	-	-	-	-	-	-	-	-	-
3c.4.6	Fixed Overhead	-	-	-	-	-	-	20,053	3,008	23,061	-	23,061	-	-	-	-	-	-	-	-	-
3c.4.7	ISFSI Operating Costs	-	-	-	-	-	-	10,420	1,563	11,983	-	11,983	-	-	-	-	-	-	-	-	-
3c.4.8	Railroad Track Maintenance	-	-	-	-	-	-	11,641	1,746	13,387	-	13,387	-	-	-	-	-	-	-	-	-
3c.4.9	Security Staff Cost	-	-	-	-	-	-	400,396	60,059	460,455	-	460,455	-	-	-	-	-	-	-	-	5,034,774
3c.4.10	DOC Staff Cost	-	-	-	-	-	-	28,541	4,281	32,822	-	32,822	-	-	-	-	-	-	-	-	193,645
3c.4.11	Utility Staff Cost	-	-	-	-	-	-	177,875	26,681	204,556	-	204,556	-	-	-	-	-	-	-	-	2,565,798
3c.4	Subtotal Period 3c Period-Dependent Costs	-	-	-	-	-	-	833,346	115,781	949,127	-	949,127	-	-	-	-	-	-	-	-	7,794,217
3c.0	TOTAL PERIOD 3c COST	-	-	-	-	-	-	1,386,420	198,742	1,585,162	-	1,585,162	-	-	-	-	-	-	-	-	7,794,217
PERIOD 3d - GTCC shipping																					
Period 3d Direct Decommissioning Activities																					
Nuclear Steam Supply System Removal																					
3d.1.1.1	Vessel & Internals GTCC Disposal	-	-	1,083	-	-	4,313	-	918	6,314	6,314	-	-	-	-	-	-	1,160	225,765	-	-
3d.1.1	Totals	-	-	1,083	-	-	4,313	-	918	6,314	6,314	-	-	-	-	-	-	1,160	225,765	-	-
3d.1	Subtotal Period 3d Activity Costs	-	-	1,083	-	-	4,313	-	918	6,314	6,314	-	-	-	-	-	-	1,160	225,765	-	-
Period 3d Collateral Costs																					
3d.3.1	Spent Fuel Capital and Transfer	-	-	-	-	-	-	28	4	32	-	32	-	-	-	-	-	-	-	-	-
3d.3	Subtotal Period 3d Collateral Costs	-	-	-	-	-	-	28	4	32	-	32	-	-	-	-	-	-	-	-	-

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 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 3d Period-Dependent Costs																					
3d.4.1	Insurance	-	-	-	-	-	-	27	3	30	30	-	-	-	-	-	-	-	-	-	-
3d.4.2	Property taxes	-	-	-	-	-	-	35	3	38	38	-	-	-	-	-	-	-	-	-	-
3d.4.4	NRC ISFSI Fees	-	-	-	-	-	-	8	1	9	-	9	-	-	-	-	-	-	-	-	-
3d.4.5	Emergency Planning Fees	-	-	-	-	-	-	6	1	6	-	6	-	-	-	-	-	-	-	-	-
3d.4.6	Fixed Overhead	-	-	-	-	-	-	8	1	10	10	-	-	-	-	-	-	-	-	-	-
3d.4.7	Railroad Track Maintenance	-	-	-	-	-	-	5	1	6	6	-	-	-	-	-	-	-	-	-	-
3d.4.8	Security Staff Cost	-	-	-	-	-	-	165	25	190	190	-	-	-	-	-	-	-	-	-	2,074
3d.4.9	Utility Staff Cost	-	-	-	-	-	-	39	6	45	45	-	-	-	-	-	-	-	-	-	539
3d.4	Subtotal Period 3d Period-Dependent Costs	-	-	-	-	-	-	293	40	333	318	15	-	-	-	-	-	-	-	-	2,613
3d.0	TOTAL PERIOD 3d COST	-	-	1,083	-	-	4,313	321	962	6,678	6,632	47	-	-	-	-	-	1,160	225,765	-	2,613
PERIOD 3e - ISFSI Decontamination																					
Period 3e Direct Decommissioning Activities																					
Period 3e Additional Costs																					
3e.2.1	License Termination ISFSI	-	0	3	33	-	283	2,086	602	3,008	3,008	-	-	-	848	-	-	-	131,507	10,502	2,225
3e.2	Subtotal Period 3e Additional Costs	-	0	3	33	-	283	2,086	602	3,008	3,008	-	-	-	848	-	-	-	131,507	10,502	2,225
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	Plant energy budget	-	-	-	-	-	-	12	3	15	15	-	-	-	-	-	-	-	-	-	-
3e.4.4	Fixed Overhead	-	-	-	-	-	-	71	18	89	89	-	-	-	-	-	-	-	-	-	-
3e.4.5	Railroad Track Maintenance	-	-	-	-	-	-	41	10	52	52	-	-	-	-	-	-	-	-	-	-
3e.4.6	Security Staff Cost	-	-	-	-	-	-	352	88	440	440	-	-	-	-	-	-	-	-	-	4,999
3e.4.7	Utility Staff Cost	-	-	-	-	-	-	261	65	326	326	-	-	-	-	-	-	-	-	-	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	-	0	3	33	-	283	3,191	878	4,389	4,389	-	-	-	848	-	-	-	131,507	10,502	11,017
PERIOD 3f - ISFSI Site Restoration																					
Period 3f Direct Decommissioning Activities																					
Period 3f Additional Costs																					
3f.2.1	Demolition and Site Restoration of ISFSI	-	1,564	-	-	-	-	256	273	2,093	-	-	2,093	-	-	-	-	-	-	7,309	160
3f.2	Subtotal Period 3f Additional Costs	-	1,564	-	-	-	-	256	273	2,093	-	-	2,093	-	-	-	-	-	-	7,309	160
Period 3f Collateral Costs																					
3f.3.1	Small tool allowance	-	11	-	-	-	-	-	2	12	-	-	12	-	-	-	-	-	-	-	-
3f.3	Subtotal Period 3f Collateral Costs	-	11	-	-	-	-	-	2	12	-	-	12	-	-	-	-	-	-	-	-
Period 3f Period-Dependent Costs																					
3f.4.2	Property taxes	-	-	-	-	-	-	126	13	138	-	-	138	-	-	-	-	-	-	-	-
3f.4.3	Heavy equipment rental	-	117	-	-	-	-	-	17	134	-	-	134	-	-	-	-	-	-	-	-
3f.4.4	Plant energy budget	-	-	-	-	-	-	6	1	7	-	-	7	-	-	-	-	-	-	-	-
3f.4.5	Fixed Overhead	-	-	-	-	-	-	36	5	41	-	-	41	-	-	-	-	-	-	-	-
3f.4.6	Railroad Track Maintenance	-	-	-	-	-	-	21	3	24	-	-	24	-	-	-	-	-	-	-	-
3f.4.7	Security Staff Cost	-	-	-	-	-	-	177	27	204	-	-	204	-	-	-	-	-	-	-	2,520
3f.4.8	Utility Staff Cost	-	-	-	-	-	-	109	16	126	-	-	126	-	-	-	-	-	-	-	1,564
3f.4	Subtotal Period 3f Period-Dependent Costs	-	117	-	-	-	-	475	82	674	-	-	674	-	-	-	-	-	-	-	4,084
3f.0	TOTAL PERIOD 3f COST	-	1,691	-	-	-	-	731	357	2,779	-	-	2,779	-	-	-	-	-	-	7,309	4,244
PERIOD 3 TOTALS		-	26,446	1,271	987	-	10,238	1,442,897	213,969	1,695,809	21,816	1,601,341	72,652	-	21,944	-	-	1,160	2,862,972	90,443	8,413,353
TOTAL COST TO DECOMMISSION		17,263	95,300	21,839	11,878	49,952	84,522	1,995,558	369,559	2,645,871	776,228	1,795,906	73,737	288,203	197,266	1,992	898	1,160	24,478,380	849,601	11,998,960

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 Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
TOTAL COST TO DECOMMISSION WITH 16.23% CONTINGENCY:					$2,645,871	thousands of 2020 dollars															
TOTAL NRC LICENSE TERMINATION COST IS 29.34% OR:					$776,228	thousands of 2020 dollars															
SPENT FUEL MANAGEMENT COST IS 67.88% OR:					$1,795,906	thousands of 2020 dollars															
NON-NUCLEAR DEMOLITION COST IS 2.79% OR:					$73,737	thousands of 2020 dollars															
TOTAL LOW-LEVEL RADIOACTIVE WASTE VOLUME BURIED (EXCLUDING GTCC):					200,155	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:					849,601	Man-hours															

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

APPENDIX F

DETAILED COST ANALYSIS

SCENARIO 4: DECON with 200 Year DFS

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 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 1a - Shutdown through Transition																					
Period 1a Direct Decommissioning Activities																					
1a.1.1	Prepare preliminary decommissioning cost	-	-	-	-	-	-	167	25	192	192	-	-	-	-	-	-	-	-	-	1,300
1a.1.2	Notification of Cessation of Operations									a											
1a.1.3	Remove fuel & source material									n/a											
1a.1.4	Notification of Permanent Defueling									a											
1a.1.5	Deactivate plant systems & process waste									a											
1a.1.6	Prepare and submit PSDAR	-	-	-	-	-	-	257	39	296	296	-	-	-	-	-	-	-	-	-	2,000
1a.1.7	Review plant dwgs & specs.	-	-	-	-	-	-	591	89	680	680	-	-	-	-	-	-	-	-	-	4,600
1a.1.8	Perform detailed rad survey									a											
1a.1.9	Estimate by-product inventory	-	-	-	-	-	-	129	19	148	148	-	-	-	-	-	-	-	-	-	1,000
1a.1.10	End product description	-	-	-	-	-	-	129	19	148	148	-	-	-	-	-	-	-	-	-	1,000
1a.1.11	Detailed by-product inventory	-	-	-	-	-	-	167	25	192	192	-	-	-	-	-	-	-	-	-	1,300
1a.1.12	Define major work sequence	-	-	-	-	-	-	964	145	1,108	1,108	-	-	-	-	-	-	-	-	-	7,500
1a.1.13	Perform SER and EA	-	-	-	-	-	-	398	60	458	458	-	-	-	-	-	-	-	-	-	3,100
1a.1.14	Prepare/submit Defueled Technical Specifications	-	-	-	-	-	-	964	145	1,108	1,108	-	-	-	-	-	-	-	-	-	7,500
1a.1.15	Perform Site-Specific Cost Study	-	-	-	-	-	-	643	96	739	739	-	-	-	-	-	-	-	-	-	5,000
1a.1.16	Prepare/submit Irradiated Fuel Management Plan	-	-	-	-	-	-	129	19	148	148	-	-	-	-	-	-	-	-	-	1,000
Activity Specifications																					
1a.1.17.1	Plant & temporary facilities	-	-	-	-	-	-	632	95	727	654	-	73	-	-	-	-	-	-	-	4,920
1a.1.17.2	Plant systems	-	-	-	-	-	-	536	80	616	554	-	62	-	-	-	-	-	-	-	4,167
1a.1.17.3	NSSS Decontamination Flush	-	-	-	-	-	-	64	10	74	74	-	-	-	-	-	-	-	-	-	500
1a.1.17.4	Reactor internals	-	-	-	-	-	-	912	137	1,049	1,049	-	-	-	-	-	-	-	-	-	7,100
1a.1.17.5	Reactor vessel	-	-	-	-	-	-	835	125	961	961	-	-	-	-	-	-	-	-	-	6,500
1a.1.17.6	Sacrificial shield	-	-	-	-	-	-	64	10	74	74	-	-	-	-	-	-	-	-	-	500
1a.1.17.7	Moisture separators/reheaters	-	-	-	-	-	-	129	19	148	148	-	-	-	-	-	-	-	-	-	1,000
1a.1.17.8	Reinforced concrete	-	-	-	-	-	-	206	31	236	118	-	118	-	-	-	-	-	-	-	1,600
1a.1.17.9	Main Turbine	-	-	-	-	-	-	268	40	309	309	-	-	-	-	-	-	-	-	-	2,088
1a.1.17.10	Main Condensers	-	-	-	-	-	-	268	40	309	309	-	-	-	-	-	-	-	-	-	2,088
1a.1.17.11	Pressure suppression structure	-	-	-	-	-	-	257	39	296	296	-	-	-	-	-	-	-	-	-	2,000
1a.1.17.12	Drywell	-	-	-	-	-	-	206	31	236	236	-	-	-	-	-	-	-	-	-	1,600
1a.1.17.13	Plant structures & buildings	-	-	-	-	-	-	401	60	461	231	-	231	-	-	-	-	-	-	-	3,120
1a.1.17.14	Waste management	-	-	-	-	-	-	591	89	680	680	-	-	-	-	-	-	-	-	-	4,600
1a.1.17.15	Facility & site closeout	-	-	-	-	-	-	116	17	133	67	-	67	-	-	-	-	-	-	-	900
1a.1.17	Total	-	-	-	-	-	-	5,486	823	6,308	5,759	-	550	-	-	-	-	-	-	-	42,683
Planning & Site Preparations																					
1a.1.18	Prepare dismantling sequence	-	-	-	-	-	-	308	46	355	355	-	-	-	-	-	-	-	-	-	2,400
1a.1.19	Plant prep. & temp. svces	-	-	-	-	-	-	3,500	525	4,025	4,025	-	-	-	-	-	-	-	-	-	-
1a.1.20	Design water clean-up system	-	-	-	-	-	-	180	27	207	207	-	-	-	-	-	-	-	-	-	1,400
1a.1.21	Rigging/Cont. Cntrl Envlps/tooling/etc.	-	-	-	-	-	-	2,400	360	2,760	2,760	-	-	-	-	-	-	-	-	-	-
1a.1.22	Procure casks/liners & containers	-	-	-	-	-	-	158	24	182	182	-	-	-	-	-	-	-	-	-	1,230
1a.1	Subtotal Period 1a Activity Costs	-	-	-	-	-	-	16,569	2,485	19,054	18,505	-	550	-	-	-	-	-	-	-	83,013
Period 1a Collateral Costs																					
1a.3.1	Spent Fuel Capital and Transfer	-	-	-	-	-	-	1,323	198	1,522	-	1,522	-	-	-	-	-	-	-	-	-
1a.3.2	Retention and Severance	-	-	-	-	-	-	9,892	1,484	11,376	11,376	-	-	-	-	-	-	-	-	-	-
1a.3	Subtotal Period 1a Collateral Costs	-	-	-	-	-	-	11,215	1,682	12,897	11,376	1,522	-	-	-	-	-	-	-	-	-
Period 1a Period-Dependent Costs																					
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 physics supplies	-	614	-	-	-	-	-	153	767	767	-	-	-	-	-	-	-	-	-	-
1a.4.4	Heavy equipment rental	-	753	-	-	-	-	-	113	866	866	-	-	-	-	-	-	-	-	-	-
1a.4.5	Disposal of DAW generated	-	-	12	6	-	50	-	15	83	83	-	-	-	610	-	-	-	12,190	20	-
1a.4.6	Plant energy budget	-	-	-	-	-	-	1,817	272	2,089	2,089	-	-	-	-	-	-	-	-	-	-
1a.4.7	NRC Fees	-	-	-	-	-	-	1,137	114	1,251	1,251	-	-	-	-	-	-	-	-	-	-
1a.4.8	Emergency Planning Fees	-	-	-	-	-	-	3,428	343	3,770	-	3,770	-	-	-	-	-	-	-	-	-
1a.4.9	Fixed Overhead	-	-	-	-	-	-	2,616	392	3,009	3,009	-	-	-	-	-	-	-	-	-	-
1a.4.10	Spent Fuel Pool O&M	-	-	-	-	-	-	845	127	971	-	971	-	-	-	-	-	-	-	-	-
1a.4.11	ISFSI Operating Costs	-	-	-	-	-	-	112	17	129	-	129	-	-	-	-	-	-	-	-	-
1a.4.12	Railroad Track Maintenance	-	-	-	-	-	-	125	19	144	144	-	-	-	-	-	-	-	-	-	-
1a.4.13	Security Staff Cost	-	-	-	-	-	-	16,372	2,456	18,827	18,827	-	-	-	-	-	-	-	-	-	245,440
1a.4.14	Utility Staff Cost	-	-	-	-	-	-	27,285	4,093	31,378	31,378	-	-	-	-	-	-	-	-	-	422,240
1a.4	Subtotal Period 1a Period-Dependent Costs	-	1,367	12	6	-	50	59,634	8,703	69,772	64,902	4,870	-	-	610	-	-	-	12,190	20	667,680

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 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
1a.0	TOTAL PERIOD 1a COST	-	1,367	12	6	-	50	87,418	12,871	101,724	94,783	6,392	550	-	610	-	-	-	12,190	20	750,693
PERIOD 1b - Decommissioning Preparations																					
Period 1b Direct Decommissioning Activities																					
Detailed Work Procedures																					
1b.1.1.1	Plant systems	-	-	-	-	-	-	608	91	700	630	-	70	-	-	-	-	-	-	-	4,733
1b.1.1.2	NSSS Decontamination Flush	-	-	-	-	-	-	129	19	148	148	-	-	-	-	-	-	-	-	-	1,000
1b.1.1.3	Reactor internals	-	-	-	-	-	-	514	77	591	591	-	-	-	-	-	-	-	-	-	4,000
1b.1.1.4	Remaining buildings	-	-	-	-	-	-	174	26	200	50	-	150	-	-	-	-	-	-	-	1,350
1b.1.1.5	CRD housings & NIs	-	-	-	-	-	-	129	19	148	148	-	-	-	-	-	-	-	-	-	1,000
1b.1.1.6	Incore instrumentation	-	-	-	-	-	-	129	19	148	148	-	-	-	-	-	-	-	-	-	1,000
1b.1.1.7	Removal primary containment	-	-	-	-	-	-	257	39	296	296	-	-	-	-	-	-	-	-	-	2,000
1b.1.1.8	Reactor vessel	-	-	-	-	-	-	467	70	537	537	-	-	-	-	-	-	-	-	-	3,630
1b.1.1.9	Facility closeout	-	-	-	-	-	-	154	23	177	89	-	89	-	-	-	-	-	-	-	1,200
1b.1.1.10	Sacrificial shield	-	-	-	-	-	-	154	23	177	177	-	-	-	-	-	-	-	-	-	1,200
1b.1.1.11	Reinforced concrete	-	-	-	-	-	-	129	19	148	74	-	74	-	-	-	-	-	-	-	1,000
1b.1.1.12	Main Turbine	-	-	-	-	-	-	267	40	307	307	-	-	-	-	-	-	-	-	-	2,080
1b.1.1.13	Main Condensers	-	-	-	-	-	-	268	40	309	309	-	-	-	-	-	-	-	-	-	2,088
1b.1.1.14	Moisture separators & reheaters	-	-	-	-	-	-	257	39	296	296	-	-	-	-	-	-	-	-	-	2,000
1b.1.1.15	Radwaste building	-	-	-	-	-	-	351	53	403	363	-	40	-	-	-	-	-	-	-	2,730
1b.1.1.16	Reactor building	-	-	-	-	-	-	351	53	403	363	-	40	-	-	-	-	-	-	-	2,730
1b.1.1	Total	-	-	-	-	-	-	4,336	650	4,987	4,524	-	463	-	-	-	-	-	-	-	33,741
1b.1.2	Decon NSSS	296	-	-	-	-	-	-	148	444	444	-	-	-	-	-	-	-	-	1,067	-
1b.1	Subtotal Period 1b Activity Costs	296	-	-	-	-	-	4,336	798	5,431	4,968	-	463	-	-	-	-	-	-	1,067	33,741
Period 1b Additional Costs																					
1b.2.1	Spent Fuel Pool Isolation	-	-	-	-	-	-	12,675	1,901	14,576	14,576	-	-	-	-	-	-	-	-	-	-
1b.2.2	Site Characterization	-	-	-	-	-	-	5,930	1,779	7,708	7,708	-	-	-	-	-	-	-	-	30,500	10,852
1b.2.3	Mixed & RCRA Waste	-	-	28	29	14	-	-	9	80	80	-	-	43	-	-	-	-	5,253	161	-
1b.2	Subtotal Period 1b Additional Costs	-	-	28	29	14	-	18,605	3,689	22,365	22,365	-	-	43	-	-	-	-	5,253	30,661	10,852
Period 1b Collateral Costs																					
1b.3.1	Decon equipment	1,055	-	-	-	-	-	-	158	1,213	1,213	-	-	-	-	-	-	-	-	-	-
1b.3.2	DOC staff relocation expenses	-	-	-	-	-	-	1,264	190	1,454	1,454	-	-	-	-	-	-	-	-	-	-
1b.3.3	Process decommissioning water waste	38	-	25	45	-	102	-	53	263	263	-	-	-	233	-	-	-	13,991	45	-
1b.3.4	Process decommissioning chemical flush waste	1	-	24	77	-	1,526	-	396	2,024	2,024	-	-	-	-	231	-	-	24,599	43	-
1b.3.5	Small tool allowance	-	2	-	-	-	-	-	0	2	2	-	-	-	-	-	-	-	-	-	-
1b.3.6	Pipe cutting equipment	-	1,200	-	-	-	-	-	180	1,380	1,380	-	-	-	-	-	-	-	-	-	-
1b.3.7	Decon rig	2,104	-	-	-	-	-	-	316	2,419	2,419	-	-	-	-	-	-	-	-	-	-
1b.3.8	Spent Fuel Capital and Transfer	-	-	-	-	-	-	2,735	410	3,145	-	3,145	-	-	-	-	-	-	-	-	-
1b.3.9	Retention and Severance	-	-	-	-	-	-	6,335	950	7,285	7,285	-	-	-	-	-	-	-	-	-	-
1b.3	Subtotal Period 1b Collateral Costs	3,197	1,202	49	122	-	1,628	10,334	2,653	19,185	16,040	3,145	-	-	233	231	-	-	38,589	89	-
Period 1b Period-Dependent Costs																					
1b.4.1	Decon supplies	39	-	-	-	-	-	-	10	48	48	-	-	-	-	-	-	-	-	-	-
1b.4.2	Insurance	-	-	-	-	-	-	1,161	116	1,277	1,277	-	-	-	-	-	-	-	-	-	-
1b.4.3	Property taxes	-	-	-	-	-	-	1,709	171	1,880	1,880	-	-	-	-	-	-	-	-	-	-
1b.4.4	Health physics supplies	-	344	-	-	-	-	-	86	430	430	-	-	-	-	-	-	-	-	-	-
1b.4.5	Heavy equipment rental	-	375	-	-	-	-	-	56	432	432	-	-	-	-	-	-	-	-	-	-
1b.4.6	Disposal of DAW generated	-	-	7	4	-	29	-	9	49	49	-	-	-	356	-	-	-	7,122	12	-
1b.4.7	Plant energy budget	-	-	-	-	-	-	1,812	272	2,083	2,083	-	-	-	-	-	-	-	-	-	-
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	Fixed Overhead	-	-	-	-	-	-	1,305	196	1,500	1,500	-	-	-	-	-	-	-	-	-	-
1b.4.11	Spent Fuel Pool O&M	-	-	-	-	-	-	421	63	484	-	484	-	-	-	-	-	-	-	-	-
1b.4.12	ISFSI Operating Costs	-	-	-	-	-	-	56	8	64	-	64	-	-	-	-	-	-	-	-	-
1b.4.13	Railroad Track Maintenance	-	-	-	-	-	-	62	9	72	72	-	-	-	-	-	-	-	-	-	-
1b.4.14	Security Staff Cost	-	-	-	-	-	-	8,163	1,225	9,388	9,388	-	-	-	-	-	-	-	-	-	122,384
1b.4.15	DOC Staff Cost	-	-	-	-	-	-	5,846	877	6,723	6,723	-	-	-	-	-	-	-	-	-	63,266
1b.4.16	Utility Staff Cost	-	-	-	-	-	-	13,682	2,052	15,734	15,734	-	-	-	-	-	-	-	-	-	211,579
1b.4	Subtotal Period 1b Period-Dependent Costs	39	719	7	4	-	29	35,955	5,323	42,076	39,970	2,106	-	-	356	-	-	-	7,122	12	397,229
1b.0	TOTAL PERIOD 1b COST	3,531	1,921	84	154	14	1,657	69,230	12,465	89,056	83,343	5,251	463	43	589	231	-	-	50,964	31,828	441,822
PERIOD 1 TOTALS		3,531	3,288	96	160	14	1,707	156,648	25,335	190,780	178,125	11,643	1,012	43	1,199	231	-	-	63,155	31,848	1,192,515

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Monticello Nuclear Generating Plant
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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 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 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	-	528	-	221	1,031	1,031	-	-	-	1,430	-	-	-	99,742	2,905	-
2a.1.1.2	Recirculation Pumps & Motors	40	63	16	51	42	539	-	186	938	938	-	-	96	945	-	-	-	112,200	1,563	-
2a.1.1.3	CRDMs & NIs Removal	194	1,020	415	135	-	1,130	-	696	3,591	3,591	-	-	-	3,741	-	-	-	213,700	17,768	-
2a.1.1.4	Reactor Vessel Internals	244	6,722	12,852	2,696	-	29,845	364	24,027	76,749	76,749	-	-	-	1,252	1,761	898	-	343,150	30,515	1,379
2a.1.1.5	Reactor Vessel	113	9,121	2,672	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	4,099	42	37,903	728	35,973	112,449	112,449	-	-	96	23,536	1,761	898	-	1,874,002	83,267	2,758
Removal of Major Equipment																					
2a.1.2	Main Turbine/Generator	-	385	1,356	521	6,139	439	-	1,341	10,182	10,182	-	-	24,835	1,383	-	-	-	1,577,959	5,438	-
2a.1.3	Main Condensers	-	1,347	360	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	Radwaste	-	25	-	-	-	-	-	4	28	28	-	-	-	-	-	-	-	-	127	-
2a.1.4.3	Turbine	-	127	-	-	-	-	-	19	146	146	-	-	-	-	-	-	-	-	1,254	-
2a.1.4	Totals	-	483	-	-	-	-	-	72	556	556	-	-	-	-	-	-	-	-	3,598	-
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	-	27	1	2	26	13	-	14	83	83	-	-	156	37	-	-	-	8,681	400	-
2a.1.5.3	Chemistry Sampling - Insulated	-	2	0	0	-	0	-	1	3	3	-	-	-	1	-	-	-	72	28	-
2a.1.5.4	Circulating Water - RCA	-	207	14	62	1,114	-	-	230	1,626	1,626	-	-	6,656	-	-	-	-	270,307	2,860	-
2a.1.5.5	Combustible Gas Control - Insul - RCA	-	29	0	2	36	-	-	13	80	80	-	-	212	-	-	-	-	8,617	378	-
2a.1.5.6	Combustible Gas Control - RCA	-	18	1	3	48	-	-	12	81	81	-	-	285	-	-	-	-	11,577	245	-
2a.1.5.7	Condensate & Feedwater	-	987	183	329	3,337	2,464	-	1,431	8,731	8,731	-	-	19,947	7,319	-	-	-	1,275,810	14,196	-
2a.1.5.8	Condensate & Feedwater - Insulated	-	492	34	63	699	408	-	343	2,038	2,038	-	-	4,176	1,207	-	-	-	246,693	6,964	-
2a.1.5.9	Condensate Demin	-	545	30	51	560	339	-	316	1,840	1,840	-	-	3,346	1,000	-	-	-	199,936	7,618	-
2a.1.5.10	Condensate Storage	-	726	33	82	1,193	270	-	444	2,748	2,748	-	-	7,131	795	-	-	-	340,568	10,345	-
2a.1.5.11	Control Rod Drive	-	3	0	0	3	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	-	79	20	51	734	176	-	184	1,244	1,244	-	-	4,384	521	-	-	-	211,329	1,163	-
2a.1.5.14	Core Spray - Insulated	-	145	8	13	137	90	-	82	474	474	-	-	818	264	-	-	-	50,149	2,033	-
2a.1.5.15	Demin Water - Insulated - RCA	-	15	0	1	14	-	-	6	36	36	-	-	85	-	-	-	-	3,445	181	-
2a.1.5.16	Demin Water - RCA	-	41	1	2	42	-	-	17	104	104	-	-	253	-	-	-	-	10,278	508	-
2a.1.5.17	Diesel Oil - RCA	-	2	0	0	4	-	-	1	7	7	-	-	23	-	-	-	-	931	25	-
2a.1.5.18	Drywell Atmosphere Cooling - RCA	-	38	1	5	92	-	-	24	159	159	-	-	548	-	-	-	-	22,244	550	-
2a.1.5.19	EDG Emerg Service Water - Insul - RCA	-	0	0	0	0	-	-	0	1	1	-	-	2	-	-	-	-	84	4	-
2a.1.5.20	Electrical - Clean	-	13	-	-	-	-	-	2	15	-	-	15	-	-	-	-	-	-	182	-
2a.1.5.21	Emergency Service Water - Insul - RCA	-	21	0	1	23	-	-	9	55	55	-	-	137	-	-	-	-	5,544	281	-
2a.1.5.22	Emergency Service Water - RCA	-	2	0	0	2	-	-	1	5	5	-	-	13	-	-	-	-	512	22	-
2a.1.5.23	GEZIP - RCA	-	3	0	1	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	-	6	0	0	1	5	-	3	15	15	-	-	6	13	-	-	-	1,080	81	-
2a.1.5.26	H2-O2 Control Analyzing - Insulated	-	6	0	0	1	5	-	3	15	15	-	-	6	13	-	-	-	1,080	81	-
2a.1.5.27	High Pressure Coolant Injection	-	67	6	13	163	70	-	61	381	381	-	-	972	209	-	-	-	52,792	966	-
2a.1.5.28	High Pressure Coolant Injection - Insula	-	219	14	24	267	163	-	141	830	830	-	-	1,598	481	-	-	-	95,733	3,079	-
2a.1.5.29	Hydrogen Cooling	-	8	-	-	-	-	-	1	10	-	-	10	-	-	-	-	-	-	118	-
2a.1.5.30	Hydrogen Cooling - RCA	-	7	0	0	7	-	-	3	17	17	-	-	39	-	-	-	-	1,600	79	-
2a.1.5.31	Hydrogen Seal Oil - RCA	-	17	0	2	32	-	-	9	60	60	-	-	189	-	-	-	-	7,669	212	-
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	296	-	-	103	644	644	-	-	1,768	-	-	-	-	71,810	2,733	-
2a.1.5.34	Main Condenser	-	196	12	20	223	139	-	122	712	712	-	-	1,333	411	-	-	-	80,439	2,746	-
2a.1.5.35	Main Steam	-	249	17	32	359	201	-	173	1,029	1,029	-	-	2,148	594	-	-	-	125,135	3,512	-
2a.1.5.36	Main Turbine	-	1,012	205	353	3,306	2,921	-	1,553	9,350	9,350	-	-	19,760	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	-	-	-	145,208	3,069	-
2a.1.5.38	Miscellaneous	-	43	1	3	51	-	-	19	115	115	-	-	302	-	-	-	-	12,283	622	-
2a.1.5.39	Off Gas Recombiner	-	189	19	32	300	257	-	163	960	960	-	-	1,795	764	-	-	-	121,554	2,708	-
2a.1.5.40	Off Gas Recombiner - Insulated	-	387	19	27	229	240	-	197	1,100	1,100	-	-	1,366	709	-	-	-	100,933	5,385	-
2a.1.5.41	Post Accident Sampling	-	25	1	1	9	11	-	11	58	58	-	-	53	33	-	-	-	4,318	345	-
2a.1.5.42	Post Accident Sampling - Insulated	-	17	1	1	3	13	-	8	43	43	-	-	17	37	-	-	-	3,116	212	-
2a.1.5.43	RHR Service Water - Insulated - RCA	-	83	3	14	248	-	-	60	409	409	-	-	1,485	-	-	-	-	60,293	1,125	-
2a.1.5.44	RHR Service Water - RCA	-	4	0	0	6	-	-	2	12	12	-	-	35	-	-	-	-	1,410	57	-
2a.1.5.45	Reactor Feedwater Pump Seal	-	56	2	4	32	33	-	28	155	155	-	-	193	96	-	-	-	14,009	773	-

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Disposal of Plant Systems (continued)																					
2a.1.5.46	Residual Heat Removal	362	252	172	178	1,072	2,051	-	962	5,049	5,049	-	-	6,406	6,012	-	-	-	647,941	4,135	-
2a.1.5.47	Residual Heat Removal - Insulated	622	554	61	82	563	880	-	772	3,535	3,535	-	-	3,367	2,607	-	-	-	303,087	10,340	-
2a.1.5.48	Rx Core Isolation Cooling	-	49	2	4	43	26	-	26	150	150	-	-	259	76	-	-	-	15,396	691	-
2a.1.5.49	Rx Core Isolation Cooling - Insulated	-	107	5	7	48	67	-	52	287	287	-	-	288	198	-	-	-	24,419	1,479	-
2a.1.5.50	Rx Recirculation	56	58	6	4	7	65	-	61	258	258	-	-	43	190	-	-	-	14,095	1,580	-
2a.1.5.51	Snubbers	-	169	2	5	63	30	-	60	331	331	-	-	377	90	-	-	-	21,009	2,548	-
2a.1.5.52	Standby Liquid Control - Insul - RCA	-	4	0	0	4	-	-	2	9	9	-	-	22	-	-	-	-	904	48	-
2a.1.5.53	Standby Liquid Control - RCA	-	26	1	2	41	-	-	13	83	83	-	-	245	-	-	-	-	9,969	341	-
2a.1.5.54	Stator Cooling - RCA	-	7	0	1	21	-	-	5	35	35	-	-	126	-	-	-	-	5,135	98	-
2a.1.5.55	Traversing Incore Probe	0	4	0	0	0	2	-	1	7	7	-	-	1	5	-	-	-	386	51	-
2a.1.5	Totals	1,040	8,221	924	1,572	16,339	11,425	-	8,209	47,730	47,706	-	24	97,654	33,808	-	-	-	6,125,515	119,943	-
2a.1.6	Scaffolding in support of decommissioning	-	2,265	22	12	191	31	-	607	3,127	3,127	-	-	1,030	91	-	-	-	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	180,360	180,336	-	24	141,010	59,545	1,761	898	-	10,458,540	253,640	2,758
Period 2a Collateral Costs																					
2a.3.1	Process decommissioning water waste	85	-	57	102	-	232	-	122	598	598	-	-	-	532	-	-	-	31,942	104	-
2a.3.2	Process decommissioning chemical flush waste	5	-	216	702	-	1,619	-	534	3,077	3,077	-	-	-	2,093	-	-	-	223,008	392	-
2a.3.3	Small tool allowance	-	324	-	-	-	-	-	49	373	336	-	37	-	-	-	-	-	-	-	-
2a.3.4	Spent Fuel Capital and Transfer	-	-	-	-	-	-	24,119	3,618	27,737	-	27,737	-	-	-	-	-	-	-	-	-
2a.3.5	Retention and Severance	-	-	-	-	-	-	13,127	1,969	15,097	15,097	-	-	-	-	-	-	-	-	-	-
2a.3.6	On-site survey and release of 0.0 tons clean metallic waste	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2a.3	Subtotal Period 2a Collateral Costs	91	324	274	804	-	1,851	37,247	6,292	46,882	19,107	27,737	37	-	2,625	-	-	-	254,950	495	-
Period 2a Period-Dependent Costs																					
2a.4.1	Decon supplies	112	-	-	-	-	-	-	28	140	140	-	-	-	-	-	-	-	-	-	-
2a.4.2	Insurance	-	-	-	-	-	-	1,019	102	1,121	1,121	-	-	-	-	-	-	-	-	-	-
2a.4.3	Property taxes	-	-	-	-	-	-	4,377	438	4,814	4,814	-	-	-	-	-	-	-	-	-	-
2a.4.4	Health physics supplies	-	2,356	-	-	-	-	-	589	2,945	2,945	-	-	-	-	-	-	-	-	-	-
2a.4.5	Heavy equipment rental	-	3,627	-	-	-	-	-	544	4,171	4,171	-	-	-	-	-	-	-	-	-	-
2a.4.6	Disposal of DAW generated	-	-	110	57	-	457	-	134	758	758	-	-	-	5,551	-	-	-	111,023	181	-
2a.4.7	Plant energy budget	-	-	-	-	-	-	2,501	375	2,876	2,876	-	-	-	-	-	-	-	-	-	-
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	Spent Fuel Pool O&M	-	-	-	-	-	-	1,224	184	1,408	-	1,408	-	-	-	-	-	-	-	-	-
2a.4.12	ISFSI Operating Costs	-	-	-	-	-	-	162	24	187	-	187	-	-	-	-	-	-	-	-	-
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	Security Staff Cost	-	-	-	-	-	-	22,088	3,313	25,401	25,401	-	-	-	-	-	-	-	-	-	325,574
2a.4.16	DOC Staff Cost	-	-	-	-	-	-	21,021	3,153	24,174	24,174	-	-	-	-	-	-	-	-	-	229,108
2a.4.17	Utility Staff Cost	-	-	-	-	-	-	27,906	4,186	32,092	32,092	-	-	-	-	-	-	-	-	-	426,562
2a.4	Subtotal Period 2a Period-Dependent Costs	112	5,982	110	57	-	457	90,145	14,298	111,162	105,041	6,121	-	-	5,551	-	-	-	111,023	181	981,244
2a.0	TOTAL PERIOD 2a COST	1,945	36,028	19,028	7,259	25,937	52,350	128,120	67,738	338,404	304,484	33,858	62	141,010	67,722	1,761	898	-	10,824,520	254,317	984,002
PERIOD 2b - Site Decontamination																					
Period 2b Direct Decommissioning Activities																					
Disposal of Plant Systems																					
2b.1.1.1	ALARA/Radiological	-	18	0	1	6	3	-	6	35	35	-	-	35	10	-	-	-	2,060	277	-
2b.1.1.2	Alternate N2 - RCA	-	16	0	1	16	-	-	7	40	40	-	-	93	-	-	-	-	3,765	185	-
2b.1.1.3	Decontamination Projects	-	1	0	0	0	0	-	0	2	2	-	-	2	0	-	-	-	129	17	-
2b.1.1.4	Electrical - Contaminated	-	445	6	24	400	30	-	183	1,089	1,089	-	-	2,389	90	-	-	-	102,726	6,325	-
2b.1.1.5	Electrical - Decontaminated	-	2,698	48	218	3,906	-	-	1,298	8,167	8,167	-	-	23,344	-	-	-	-	948,013	37,107	-
2b.1.1.6	Fire - RCA	-	101	1	6	103	-	-	42	253	253	-	-	614	-	-	-	-	24,917	1,324	-
2b.1.1.7	HVAC Ductwork	-	305	7	27	446	34	-	156	975	975	-	-	2,665	100	-	-	-	114,598	4,111	-
2b.1.1.8	HVAC/Chilled Water - RCA	-	324	6	26	461	-	-	155	971	971	-	-	2,752	-	-	-	-	111,779	3,985	-
2b.1.1.9	Heating & Ventilation	-	483	16	61	1,007	76	-	302	1,945	1,945	-	-	6,018	227	-	-	-	258,789	7,101	-
2b.1.1.10	Heating Boiler - Insulated - RCA	-	3	0	0	4	-	-	1	9	9	-	-	26	-	-	-	-	1,058	35	-
2b.1.1.11	Liquid Radwaste	588	687	48	63	514	586	-	703	3,188	3,188	-	-	3,073	1,728	-	-	-	235,484	17,194	-
2b.1.1.12	Makeup Demin - RCA	-	103	3	14	246	-	-	65	431	431	-	-	1,471	-	-	-	-	59,747	1,412	-
2b.1.1.13	Non-Essential Diesel Generator - RCA	-	27	3	13	238	-	-	45	327	327	-	-	1,424	-	-	-	-	57,832	395	-
2b.1.1.14	Off Gas Holdup	-	342	21	38	461	214	-	216	1,291	1,291	-	-	2,755	630	-	-	-	152,277	4,769	-
2b.1.1.15	Primary Containment	-	455	42	87	1,038	507	-	414	2,543	2,543	-	-	6,201	1,506	-	-	-	347,704	6,454	-

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 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
Disposal 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 Clng Water - Insul - RCA	-	114	2	9	163	-	-	54	343	343	-	-	977	-	-	-	-	39,675	1,484	-
2b.1.1.18	Rx Bldg Closed Clng Water - RCA	-	184	15	66	1,187	-	-	235	1,687	1,687	-	-	7,093	-	-	-	-	288,031	2,489	-
2b.1.1.19	Rx Component Handling Equip	27	142	18	27	194	279	-	154	840	840	-	-	1,158	829	-	-	-	99,730	2,462	-
2b.1.1.20	Rx Pressure Vessel	28	47	6	5	13	78	-	48	225	225	-	-	75	230	-	-	-	17,816	1,051	-
2b.1.1.21	Rx Water Cleanup	172	265	19	16	22	251	-	222	965	965	-	-	130	737	-	-	-	52,670	5,736	-
2b.1.1.22	Secondary Containment	-	124	7	14	170	86	-	81	483	483	-	-	1,017	255	-	-	-	57,567	1,763	-
2b.1.1.23	Service & Seal Water - Insulated - RCA	-	120	2	11	197	-	-	62	392	392	-	-	1,180	-	-	-	-	47,917	1,565	-
2b.1.1.24	Service & Seal Water - RCA	-	159	4	17	303	-	-	88	570	570	-	-	1,809	-	-	-	-	73,453	2,016	-
2b.1.1.25	Service Air Blower - RCA	-	15	0	2	34	-	-	9	62	62	-	-	206	-	-	-	-	8,364	206	-
2b.1.1.26	Solid Radwaste	338	494	36	49	399	467	-	480	2,264	2,264	-	-	2,387	1,380	-	-	-	185,221	10,820	-
2b.1.1.27	Structures & Buildings	-	78	2	5	60	29	-	37	210	210	-	-	357	85	-	-	-	19,933	1,128	-
2b.1.1.28	Wells & Domestic Water	-	10	-	-	-	-	-	1	11	-	-	11	-	-	-	-	-	-	144	-
2b.1.1.29	Wells & Domestic Water - RCA	-	52	1	3	57	-	-	22	136	136	-	-	342	-	-	-	-	13,874	633	-
2b.1.1	Totals	1,153	7,860	315	804	11,668	2,657	-	5,107	29,563	29,552	-	11	69,735	7,859	-	-	-	3,334,244	122,835	-
2b.1.2	Scaffolding in support of decommissioning	-	2,831	28	16	239	38	-	758	3,909	3,909	-	-	1,287	114	-	-	-	65,139	28,205	-
Decontamination of Site Buildings																					
2b.1.3.1	Reactor Building	5,202	2,903	178	516	8,044	1,181	-	4,924	22,948	22,948	-	-	48,077	7,014	-	-	-	2,317,670	112,518	-
2b.1.3.2	Admin	106	6	0	3	-	15	-	59	189	189	-	-	-	145	-	-	-	6,840	1,600	-
2b.1.3.3	HPCI Room	29	28	1	3	20	14	-	29	123	123	-	-	118	125	-	-	-	10,759	789	-
2b.1.3.4	Hot Shop	17	4	0	2	-	11	-	12	46	46	-	-	-	103	-	-	-	4,860	286	-
2b.1.3.5	LLRW Storage & Shipping	58	24	2	8	5	45	-	48	191	191	-	-	31	433	-	-	-	21,708	1,127	-
2b.1.3.6	Offgas Stack	372	269	7	23	225	82	-	312	1,289	1,289	-	-	1,343	669	-	-	-	87,045	8,860	-
2b.1.3.7	Offgas Storage & Compressor	41	17	1	6	4	33	-	34	136	136	-	-	25	316	-	-	-	15,948	785	-
2b.1.3.8	Radwaste	121	61	3	17	29	96	-	107	435	435	-	-	172	910	-	-	-	49,943	2,503	-
2b.1.3.9	Radwaste Material Storage Warehouse	64	24	2	9	-	52	-	52	202	202	-	-	-	495	-	-	-	23,400	1,197	-
2b.1.3.10	Recombiner	27	25	1	5	33	24	-	32	148	148	-	-	199	216	-	-	-	18,405	695	-
2b.1.3.11	Turbine	705	353	21	104	215	564	-	632	2,594	2,594	-	-	1,283	5,299	-	-	-	303,150	14,443	-
2b.1.3.12	Turbine Building Addition	58	21	1	8	-	45	-	47	181	181	-	-	-	434	-	-	-	20,478	1,087	-
2b.1.3	Totals	6,799	3,736	218	704	8,574	2,164	-	6,288	28,483	28,483	-	-	51,247	16,159	-	-	-	2,880,206	145,889	-
2b.1.4	Prepare/submit License Termination Plan	-	-	-	-	-	-	526	79	605	605	-	-	-	-	-	-	-	-	-	4,096
2b.1.5	Receive NRC approval of termination plan									a											
2b.1	Subtotal Period 2b Activity Costs	7,952	14,427	560	1,524	20,481	4,859	526	12,232	62,561	62,549	-	11	122,269	24,132	-	-	-	6,279,589	296,929	4,096
Period 2b Additional Costs																					
2b.2.1	Operational Equipment	-	-	23	92	1,211	-	-	198	1,524	1,524	-	-	11,760	-	-	-	-	294,000	32	-
2b.2.2	Excavation of Underground Services	-	1,972	-	-	-	-	376	550	2,898	2,898	-	-	-	-	-	-	-	-	12,493	-
2b.2.3	Security Modifications	-	-	-	-	-	-	8,696	1,304	10,000	10,000	-	-	-	-	-	-	-	-	-	-
2b.2	Subtotal Period 2b Additional Costs	-	1,972	23	92	1,211	-	9,072	2,052	14,422	14,422	-	-	11,760	-	-	-	-	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	-	-	-	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	-	364	-	-	-	-	-	55	418	418	-	-	-	-	-	-	-	-	-	-
2b.3.4	Spent Fuel Capital and Transfer	-	-	-	-	-	-	117,254	17,588	134,843	-	134,843	-	-	-	-	-	-	-	-	-
2b.3.5	Retention and Severance	-	-	-	-	-	-	6,299	945	7,244	7,244	-	-	-	-	-	-	-	-	-	-
2b.3	Subtotal Period 2b Collateral Costs	199	364	178	378	-	865	123,554	18,978	144,516	9,673	134,843	-	-	1,666	-	-	-	119,165	322	-
Period 2b Period-Dependent Costs																					
2b.4.1	Decon supplies	1,440	-	-	-	-	-	-	360	1,799	1,799	-	-	-	-	-	-	-	-	-	-
2b.4.2	Insurance	-	-	-	-	-	-	742	74	816	816	-	-	-	-	-	-	-	-	-	-
2b.4.3	Property taxes	-	-	-	-	-	-	2,703	270	2,974	2,974	-	-	-	-	-	-	-	-	-	-
2b.4.4	Health physics supplies	-	2,376	-	-	-	-	-	594	2,970	2,970	-	-	-	-	-	-	-	-	-	-
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	-	-	-	5,084	-	-	-	101,679	166	-
2b.4.7	Plant energy budget	-	-	-	-	-	-	1,437	216	1,653	1,653	-	-	-	-	-	-	-	-	-	-
2b.4.8	NRC Fees	-	-	-	-	-	-	623	62	685	685	-	-	-	-	-	-	-	-	-	-
2b.4.9	Emergency Planning Fees	-	-	-	-	-	-	2,995	299	3,294	-	3,294	-	-	-	-	-	-	-	-	-
2b.4.10	Fixed Overhead	-	-	-	-	-	-	2,235	335	2,570	2,570	-	-	-	-	-	-	-	-	-	-
2b.4.11	Spent Fuel Pool O&M	-	-	-	-	-	-	891	134	1,024	-	1,024	-	-	-	-	-	-	-	-	-
2b.4.12	Liquid Radwaste Processing Equipment/Services	-	-	-	-	-	-	224	34	258	258	-	-	-	-	-	-	-	-	-	-
2b.4.13	ISFSI Operating Costs	-	-	-	-	-	-	118	18	136	-	136	-	-	-	-	-	-	-	-	-
2b.4.14	Railroad Track Maintenance	-	-	-	-	-	-	458	69	527	527	-	-	-	-	-	-	-	-	-	-

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 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 Period-Dependent Costs (continued)																					
2b.4.15	Remedial Actions Surveys	-	-	-	-	-	-	1,182	177	1,359	1,359	-	-	-	-	-	-	-	-	-	-
2b.4.16	Security Staff Cost	-	-	-	-	-	-	15,718	2,358	18,076	18,076	-	-	-	-	-	-	-	-	-	236,949
2b.4.17	DOC Staff Cost	-	-	-	-	-	-	14,772	2,216	16,988	16,988	-	-	-	-	-	-	-	-	-	160,160
2b.4.18	Utility Staff Cost	-	-	-	-	-	-	19,442	2,916	22,358	22,358	-	-	-	-	-	-	-	-	-	297,283
2b.4	Subtotal Period 2b Period-Dependent Costs	1,440	5,087	101	52	-	419	63,540	10,661	81,298	76,844	4,455	-	-	5,084	-	-	-	101,679	166	694,392
2b.0	TOTAL PERIOD 2b COST	9,591	21,850	861	2,046	21,692	6,143	196,692	43,923	302,797	163,488	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	Cranes/Heavy Loads/Rigging - RCA	-	3	0	1	17	-	-	4	25	25	-	-	103	-	-	-	-	4,184	48	-
2d.1.2.2	Electrical - Contaminated Fuel Pool	-	47	1	2	40	3	-	19	112	112	-	-	240	9	-	-	-	10,334	665	-
2d.1.2.3	Electrical - Decontam. Fuel Pool Area	-	297	5	23	411	-	-	140	876	876	-	-	2,457	-	-	-	-	99,783	4,090	-
2d.1.2.4	Fire - RCA - Fuel Pool Area	-	11	0	1	10	-	-	4	26	26	-	-	62	-	-	-	-	2,499	143	-
2d.1.2.5	Fuel Pool Cooling & Cleanup	246	428	34	37	197	455	-	382	1,781	1,781	-	-	1,179	1,341	-	-	-	133,939	8,380	-
2d.1.2.6	Fuel Pool Cooling & Cleanup - Insulated	27	41	3	3	11	40	-	36	161	161	-	-	67	117	-	-	-	10,220	848	-
2d.1.2.7	HVAC Ductwork - Fuel Pool Area	-	34	1	3	50	4	-	17	108	108	-	-	296	11	-	-	-	12,733	457	-
2d.1.2.8	HVAC/Chilled Water - RCA Fuel Pool Area	-	33	0	2	37	-	-	14	87	87	-	-	223	-	-	-	-	9,072	397	-
2d.1.2.9	Instrument & Service Air-RCA-Fuel Pool	-	29	1	2	45	-	-	14	91	91	-	-	267	-	-	-	-	10,841	357	-
2d.1.2	Totals	273	924	45	75	819	502	-	631	3,268	3,268	-	-	4,894	1,479	-	-	-	293,606	15,385	-
Decontamination of Site Buildings																					
2d.1.3.1	Reactor (Post Fuel)	946	2,599	172	913	329	10,216	-	3,880	19,056	19,056	-	-	1,969	62,698	-	-	-	2,732,406	45,703	-
2d.1.3	Totals	946	2,599	172	913	329	10,216	-	3,880	19,056	19,056	-	-	1,969	62,698	-	-	-	2,732,406	45,703	-
2d.1.4	Scaffolding in support of decommissioning	-	566	6	3	48	8	-	152	782	782	-	-	257	23	-	-	-	13,028	5,641	-
2d.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	67,635	-
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	-	-	-	504	-	-	-	30,239	98	-
2d.3.2	Process decommissioning chemical flush waste	1	-	26	84	-	193	-	64	366	366	-	-	-	249	-	-	-	26,553	47	-
2d.3.3	Small tool allowance	-	91	-	-	-	-	-	14	105	105	-	-	-	-	-	-	-	-	-	-
2d.3.4	Decommissioning Equipment Disposition	-	-	130	82	1,112	178	-	237	1,739	1,739	-	-	6,000	529	-	-	-	303,608	147	-
2d.3.5	Spent Fuel Capital and Transfer	-	-	-	-	-	-	27	4	32	-	32	-	-	-	-	-	-	-	-	-
2d.3	Subtotal Period 2d Collateral Costs	80	91	210	262	1,112	590	27	432	2,805	2,773	32	-	6,000	1,282	-	-	-	360,400	292	-
Period 2d Period-Dependent Costs																					
2d.4.1	Decon supplies	244	-	-	-	-	-	-	61	305	305	-	-	-	-	-	-	-	-	-	-
2d.4.2	Insurance	-	-	-	-	-	-	530	53	583	583	-	-	-	-	-	-	-	-	-	-
2d.4.3	Property taxes	-	-	-	-	-	-	1,664	166	1,830	1,830	-	-	-	-	-	-	-	-	-	-
2d.4.4	Health physics supplies	-	806	-	-	-	-	-	202	1,008	1,008	-	-	-	-	-	-	-	-	-	-
2d.4.5	Heavy equipment rental	-	1,936	-	-	-	-	-	290	2,227	2,227	-	-	-	-	-	-	-	-	-	-
2d.4.6	Disposal of DAW generated	-	-	40	21	-	167	-	49	277	277	-	-	-	2,030	-	-	-	40,600	66	-
2d.4.7	Plant energy budget	-	-	-	-	-	-	547	82	630	630	-	-	-	-	-	-	-	-	-	-
2d.4.8	NRC Fees	-	-	-	-	-	-	424	42	466	466	-	-	-	-	-	-	-	-	-	-
2d.4.9	Emergency Planning Fees	-	-	-	-	-	-	112	11	123	-	123	-	-	-	-	-	-	-	-	-
2d.4.10	Fixed Overhead	-	-	-	-	-	-	1,597	239	1,836	1,836	-	-	-	-	-	-	-	-	-	-
2d.4.11	Liquid Radwaste Processing Equipment/Services	-	-	-	-	-	-	320	48	368	368	-	-	-	-	-	-	-	-	-	-
2d.4.12	ISFSI Operating Costs	-	-	-	-	-	-	84	13	97	-	97	-	-	-	-	-	-	-	-	-
2d.4.13	Railroad Track Maintenance	-	-	-	-	-	-	94	14	108	108	-	-	-	-	-	-	-	-	-	-
2d.4.14	Remedial Actions Surveys	-	-	-	-	-	-	844	127	971	971	-	-	-	-	-	-	-	-	-	-
2d.4.15	Security Staff Cost	-	-	-	-	-	-	10,999	1,650	12,649	8,918	3,732	-	-	-	-	-	-	-	-	162,981
2d.4.16	DOC Staff Cost	-	-	-	-	-	-	7,311	1,097	8,408	8,408	-	-	-	-	-	-	-	-	-	78,356
2d.4.17	Utility Staff Cost	-	-	-	-	-	-	10,052	1,508	11,560	10,670	890	-	-	-	-	-	-	-	-	149,660
2d.4	Subtotal Period 2d Period-Dependent Costs	244	2,743	40	21	-	167	34,579	5,652	43,446	38,604	4,842	-	-	2,030	-	-	-	40,600	66	390,997
2d.0	TOTAL PERIOD 2d COST	2,196	6,981	576	1,422	2,308	14,055	36,065	12,202	75,806	70,932	4,873	-	13,120	75,164	-	-	-	3,926,210	67,993	403,477

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 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 2f - License Termination																					
Period 2f Direct Decommissioning Activities																					
2f.1.1	ORISE confirmatory survey	-	-	-	-	-	-	166	50	216	216	-	-	-	-	-	-	-	-	-	-
2f.1.2	Terminate license									a											
2f.1	Subtotal Period 2f Activity Costs	-	-	-	-	-	-	166	50	216	216	-	-	-	-	-	-	-	-	-	-
Period 2f Additional Costs																					
2f.2.1	License Termination Survey	-	-	-	-	-	-	6,920	2,076	8,995	8,995	-	-	-	-	-	-	-	-	95,048	6,240
2f.2	Subtotal Period 2f Additional Costs	-	-	-	-	-	-	6,920	2,076	8,995	8,995	-	-	-	-	-	-	-	-	95,048	6,240
Period 2f Collateral Costs																					
2f.3.1	DOC staff relocation expenses	-	-	-	-	-	-	1,264	190	1,454	1,454	-	-	-	-	-	-	-	-	-	-
2f.3.2	Spent Fuel Capital and Transfer	-	-	-	-	-	-	47	7	54	-	54	-	-	-	-	-	-	-	-	-
2f.3	Subtotal Period 2f Collateral Costs	-	-	-	-	-	-	1,311	197	1,508	1,454	54	-	-	-	-	-	-	-	-	-
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	Disposal of DAW generated	-	-	7	4	-	29	-	9	48	48	-	-	-	355	-	-	-	7,097	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	11	123	-	123	-	-	-	-	-	-	-	-	-
2f.4.8	Fixed Overhead	-	-	-	-	-	-	1,597	239	1,836	1,836	-	-	-	-	-	-	-	-	-	-
2f.4.9	ISFSI Operating Costs	-	-	-	-	-	-	84	13	97	-	97	-	-	-	-	-	-	-	-	-
2f.4.10	Railroad Track Maintenance	-	-	-	-	-	-	94	14	108	108	-	-	-	-	-	-	-	-	-	-
2f.4.11	Security Staff Cost	-	-	-	-	-	-	10,999	1,650	12,649	8,918	3,732	-	-	-	-	-	-	-	-	162,981
2f.4.12	DOC Staff Cost	-	-	-	-	-	-	5,393	809	6,201	6,201	-	-	-	-	-	-	-	-	-	57,200
2f.4.13	Utility Staff Cost	-	-	-	-	-	-	5,762	864	6,626	5,738	888	-	-	-	-	-	-	-	-	80,707
2f.4	Subtotal Period 2f Period-Dependent Costs	-	708	7	4	-	29	26,740	4,070	31,557	26,718	4,839	-	-	355	-	-	-	7,097	12	300,888
2f.0	TOTAL PERIOD 2f COST	-	708	7	4	-	29	35,137	6,392	42,276	37,382	4,893	-	-	355	-	-	-	7,097	95,059	307,128
PERIOD 2 TOTALS		13,731	65,566	20,473	10,731	49,937	72,577	396,013	130,255	759,282	576,287	182,922	73	288,160	174,123	1,761	898	-	21,552,260	727,310	2,393,096
PERIOD 3b - Site Restoration																					
Period 3b Direct Decommissioning Activities																					
Demolition of Remaining Site Buildings																					
3b.1.1.1	Reactor Building	-	1,971	-	-	-	-	-	296	2,267	-	-	2,267	-	-	-	-	-	-	13,911	-
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	HPCI Room	-	19	-	-	-	-	-	3	22	-	-	22	-	-	-	-	-	-	97	-
3b.1.1.5	Hot Shop	-	16	-	-	-	-	-	2	19	-	-	19	-	-	-	-	-	-	177	-
3b.1.1.6	Hydrogen & Oxygen Storage	-	2	-	-	-	-	-	0	2	-	-	2	-	-	-	-	-	-	19	-
3b.1.1.7	LLRW Storage & Shipping	-	83	-	-	-	-	-	12	95	-	-	95	-	-	-	-	-	-	662	-
3b.1.1.8	MSIV	-	4	-	-	-	-	-	1	4	-	-	4	-	-	-	-	-	-	42	-
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	Radwaste	-	228	-	-	-	-	-	34	262	-	-	262	-	-	-	-	-	-	1,220	-
3b.1.1.13	Recombiner	-	128	-	-	-	-	-	19	147	-	-	147	-	-	-	-	-	-	713	-
3b.1.1.14	Security Barrier	-	186	-	-	-	-	-	28	214	-	-	214	-	-	-	-	-	-	933	-
3b.1.1.15	Structures Greater than 3' Below Grade	-	2,461	-	-	-	-	-	369	2,830	-	-	2,830	-	-	-	-	-	-	12,649	-
3b.1.1.16	Tank Farm	-	4	-	-	-	-	-	1	5	-	-	5	-	-	-	-	-	-	21	-
3b.1.1.17	Turbine	-	1,259	-	-	-	-	-	189	1,448	-	-	1,448	-	-	-	-	-	-	13,036	-
3b.1.1.18	Turbine Building Addition	-	55	-	-	-	-	-	8	63	-	-	63	-	-	-	-	-	-	618	-
3b.1.1.19	Turbine Pedestal	-	182	-	-	-	-	-	27	209	-	-	209	-	-	-	-	-	-	926	-
3b.1.1	Totals	-	8,169	-	-	-	-	-	1,225	9,394	-	-	9,394	-	-	-	-	-	-	58,885	-
Site Closeout Activities																					
3b.1.2	Grade & landscape site	-	896	-	-	-	-	-	134	1,031	-	-	1,031	-	-	-	-	-	-	1,841	-
3b.1.3	Final report to NRC	-	-	-	-	-	-	200	30	231	231	-	-	-	-	-	-	-	-	-	1,560
3b.1	Subtotal Period 3b Activity Costs	-	9,065	-	-	-	-	200	1,390	10,655	231	-	10,425	-	-	-	-	-	-	60,726	1,560

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 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 3b Additional Costs																					
3b.2.1	Clean Concrete Disposal	-	3,322	-	-	-	-	13	500	3,835	-	-	3,835	-	-	-	-	-	-	12	-
3b.2.2	Intake Structure Cofferdam	-	335	-	-	-	-	-	50	385	-	-	385	-	-	-	-	-	-	2,584	-
3b.2.3	Construction Debris	-	-	-	-	-	-	1,170	176	1,346	-	-	1,346	-	-	-	-	-	-	-	-
3b.2.4	Backfill	-	5,583	-	-	-	-	-	837	6,421	-	-	6,421	-	-	-	-	-	-	5,422	-
3b.2.5	Discharge Structure Cofferdam	-	442	-	-	-	-	-	66	508	-	-	508	-	-	-	-	-	-	3,552	-
3b.2.6	Disposition of Original MPC Canisters	-	55	185	954	-	5,641	-	1,709	8,544	8,544	-	-	-	21,097	-	-	-	2,505,700	337	-
3b.2	Subtotal Period 3b Additional Costs	-	9,737	185	954	-	5,641	1,183	3,339	21,039	8,544	-	12,495	-	21,097	-	-	-	2,505,700	11,907	-
Period 3b Collateral Costs																					
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	-	125	127	-	-	-	-	-	-	-	-
Period 3b Period-Dependent Costs																					
3b.4.1	Insurance	-	-	-	-	-	-	1,220	122	1,342	1,342	-	-	-	-	-	-	-	-	-	-
3b.4.2	Property taxes	-	-	-	-	-	-	2,540	254	2,794	-	2,794	-	-	-	-	-	-	-	-	-
3b.4.3	Heavy equipment rental	-	5,842	-	-	-	-	-	876	6,719	-	-	6,719	-	-	-	-	-	-	-	-
3b.4.4	Plant energy budget	-	-	-	-	-	-	315	47	362	-	362	-	-	-	-	-	-	-	-	-
3b.4.5	NRC ISFSI Fees	-	-	-	-	-	-	356	36	391	-	391	-	-	-	-	-	-	-	-	-
3b.4.6	Emergency Planning Fees	-	-	-	-	-	-	257	26	283	-	283	-	-	-	-	-	-	-	-	-
3b.4.7	Fixed Overhead	-	-	-	-	-	-	1,122	168	1,290	429	860	-	-	-	-	-	-	-	-	-
3b.4.8	ISFSI Operating Costs	-	-	-	-	-	-	194	29	223	-	223	-	-	-	-	-	-	-	-	-
3b.4.9	Railroad Track Maintenance	-	-	-	-	-	-	543	81	624	249	375	-	-	-	-	-	-	-	-	-
3b.4.10	Security Staff Cost	-	-	-	-	-	-	25,319	3,798	29,117	0	8,589	20,527	-	-	-	-	-	-	-	375,152
3b.4.11	DOC Staff Cost	-	-	-	-	-	-	11,729	1,759	13,489	-	-	13,489	-	-	-	-	-	-	-	122,646
3b.4.12	Utility Staff Cost	-	-	-	-	-	-	7,148	1,072	8,220	-	2,129	6,091	-	-	-	-	-	-	-	101,904
3b.4	Subtotal Period 3b Period-Dependent Costs	-	5,842	-	-	-	-	50,742	8,269	64,854	2,020	16,007	46,826	-	-	-	-	-	-	-	599,702
3b.0	TOTAL PERIOD 3b COST	-	24,755	185	954	-	5,641	52,234	13,030	96,800	10,795	16,132	69,873	-	21,097	-	-	-	2,505,700	72,633	601,262
PERIOD 3c - Fuel Storage Operations/Shipping																					
Period 3c Direct Decommissioning Activities																					
Period 3c Collateral Costs																					
3c.3.1	Spent Fuel Capital and Transfer	-	-	-	-	-	-	1,452,427	217,864	1,670,291	-	1,670,291	-	-	-	-	-	-	-	-	-
3c.3	Subtotal Period 3c Collateral Costs	-	-	-	-	-	-	1,452,427	217,864	1,670,291	-	1,670,291	-	-	-	-	-	-	-	-	-
Period 3c Period-Dependent Costs																					
3c.4.1	Insurance	-	-	-	-	-	-	135,860	13,586	149,445	-	149,445	-	-	-	-	-	-	-	-	-
3c.4.2	Property taxes	-	-	-	-	-	-	175,431	17,543	192,974	-	192,974	-	-	-	-	-	-	-	-	-
3c.4.4	NRC ISFSI Fees	-	-	-	-	-	-	41,099	4,110	45,209	-	45,209	-	-	-	-	-	-	-	-	-
3c.4.5	Emergency Planning Fees	-	-	-	-	-	-	28,639	2,864	31,503	-	31,503	-	-	-	-	-	-	-	-	-
3c.4.6	Fixed Overhead	-	-	-	-	-	-	41,607	6,241	47,848	-	47,848	-	-	-	-	-	-	-	-	-
3c.4.7	ISFSI Operating Costs	-	-	-	-	-	-	21,621	3,243	24,864	-	24,864	-	-	-	-	-	-	-	-	-
3c.4.8	Railroad Track Maintenance	-	-	-	-	-	-	24,154	3,623	27,777	-	27,777	-	-	-	-	-	-	-	-	-
3c.4.9	Security Staff Cost	-	-	-	-	-	-	830,756	124,613	955,369	-	955,369	-	-	-	-	-	-	-	-	10,446,330
3c.4.10	DOC Staff Cost	-	-	-	-	-	-	59,217	8,883	68,100	-	68,100	-	-	-	-	-	-	-	-	401,782
3c.4.11	Utility Staff Cost	-	-	-	-	-	-	369,061	55,359	424,420	-	424,420	-	-	-	-	-	-	-	-	5,323,611
3c.4	Subtotal Period 3c Period-Dependent Costs	-	-	-	-	-	-	1,727,443	240,065	1,967,509	-	1,967,509	-	-	-	-	-	-	-	-	16,171,720
3c.0	TOTAL PERIOD 3c COST	-	-	-	-	-	-	3,179,870	457,929	3,637,800	-	3,637,800	-	-	-	-	-	-	-	-	16,171,720
PERIOD 3d - GTCC shipping																					
Period 3d Direct Decommissioning Activities																					
Nuclear Steam Supply System Removal																					
3d.1.1.1	Vessel & Internals GTCC Disposal	-	-	1,083	-	-	4,313	-	918	6,314	6,314	-	-	-	-	-	-	1,160	225,765	-	-
3d.1.1	Totals	-	-	1,083	-	-	4,313	-	918	6,314	6,314	-	-	-	-	-	-	1,160	225,765	-	-
3d.1	Subtotal Period 3d Activity Costs	-	-	1,083	-	-	4,313	-	918	6,314	6,314	-	-	-	-	-	-	1,160	225,765	-	-
Period 3d Collateral Costs																					
3d.3.1	Spent Fuel Capital and Transfer	-	-	-	-	-	-	28	4	32	-	32	-	-	-	-	-	-	-	-	-
3d.3	Subtotal Period 3d Collateral Costs	-	-	-	-	-	-	28	4	32	-	32	-	-	-	-	-	-	-	-	-

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 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 3d Period-Dependent Costs																					
3d.4.1	Insurance	-	-	-	-	-	-	27	3	30	30	-	-	-	-	-	-	-	-	-	-
3d.4.2	Property taxes	-	-	-	-	-	-	35	3	38	38	-	-	-	-	-	-	-	-	-	-
3d.4.3	Plant energy budget	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3d.4.4	NRC ISFSI Fees	-	-	-	-	-	-	8	1	9	-	9	-	-	-	-	-	-	-	-	-
3d.4.5	Emergency Planning Fees	-	-	-	-	-	-	6	1	6	-	6	-	-	-	-	-	-	-	-	-
3d.4.6	Fixed Overhead	-	-	-	-	-	-	8	1	10	10	-	-	-	-	-	-	-	-	-	-
3d.4.7	Railroad Track Maintenance	-	-	-	-	-	-	5	1	6	6	-	-	-	-	-	-	-	-	-	-
3d.4.8	Security Staff Cost	-	-	-	-	-	-	165	25	190	190	-	-	-	-	-	-	-	-	-	2,074
3d.4.9	Utility Staff Cost	-	-	-	-	-	-	39	6	45	45	-	-	-	-	-	-	-	-	-	539
3d.4	Subtotal Period 3d Period-Dependent Costs	-	-	-	-	-	-	293	40	333	318	15	-	-	-	-	-	-	-	-	2,613
3d.0	TOTAL PERIOD 3d COST	-	-	1,083	-	-	4,313	321	962	6,678	6,632	47	-	-	-	-	-	1,160	225,765	-	2,613
PERIOD 3e - ISFSI Decontamination																					
Period 3e Direct Decommissioning Activities																					
Period 3e Additional Costs																					
3e.2.1	License Termination ISFSI	-	0	3	33	-	283	2,086	602	3,008	3,008	-	-	-	848	-	-	-	131,507	10,502	2,225
3e.2	Subtotal Period 3e Additional Costs	-	0	3	33	-	283	2,086	602	3,008	3,008	-	-	-	848	-	-	-	131,507	10,502	2,225
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	Plant energy budget	-	-	-	-	-	-	12	3	15	15	-	-	-	-	-	-	-	-	-	-
3e.4.4	Fixed Overhead	-	-	-	-	-	-	71	18	89	89	-	-	-	-	-	-	-	-	-	-
3e.4.5	Railroad Track Maintenance	-	-	-	-	-	-	41	10	52	52	-	-	-	-	-	-	-	-	-	-
3e.4.6	Security Staff Cost	-	-	-	-	-	-	352	88	440	440	-	-	-	-	-	-	-	-	-	4,999
3e.4.7	Utility Staff Cost	-	-	-	-	-	-	261	65	326	326	-	-	-	-	-	-	-	-	-	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	-	0	3	33	-	283	3,191	878	4,389	4,389	-	-	-	848	-	-	-	131,507	10,502	11,017
PERIOD 3f - ISFSI Site Restoration																					
Period 3f Direct Decommissioning Activities																					
Period 3f Additional Costs																					
3f.2.1	Demolition and Site Restoration of ISFSI	-	1,564	-	-	-	-	256	273	2,093	-	-	2,093	-	-	-	-	-	-	7,309	160
3f.2	Subtotal Period 3f Additional Costs	-	1,564	-	-	-	-	256	273	2,093	-	-	2,093	-	-	-	-	-	-	7,309	160
Period 3f Collateral Costs																					
3f.3.1	Small tool allowance	-	11	-	-	-	-	-	2	12	-	-	12	-	-	-	-	-	-	-	-
3f.3	Subtotal Period 3f Collateral Costs	-	11	-	-	-	-	-	2	12	-	-	12	-	-	-	-	-	-	-	-
Period 3f Period-Dependent Costs																					
3f.4.2	Property taxes	-	-	-	-	-	-	126	13	138	-	-	138	-	-	-	-	-	-	-	-
3f.4.3	Heavy equipment rental	-	117	-	-	-	-	-	17	134	-	-	134	-	-	-	-	-	-	-	-
3f.4.4	Plant energy budget	-	-	-	-	-	-	6	1	7	-	-	7	-	-	-	-	-	-	-	-
3f.4.5	Fixed Overhead	-	-	-	-	-	-	36	5	41	-	-	41	-	-	-	-	-	-	-	-
3f.4.6	Railroad Track Maintenance	-	-	-	-	-	-	21	3	24	-	-	24	-	-	-	-	-	-	-	-
3f.4.7	Security Staff Cost	-	-	-	-	-	-	177	27	204	-	-	204	-	-	-	-	-	-	-	2,520
3f.4.8	Utility Staff Cost	-	-	-	-	-	-	109	16	126	-	-	126	-	-	-	-	-	-	-	1,564
3f.4	Subtotal Period 3f Period-Dependent Costs	-	117	-	-	-	-	475	82	674	-	-	674	-	-	-	-	-	-	-	4,084
3f.0	TOTAL PERIOD 3f COST	-	1,691	-	-	-	-	731	357	2,779	-	-	2,779	-	-	-	-	-	-	7,309	4,244
PERIOD 3 TOTALS		-	26,446	1,271	987	-	10,238	3,236,348	473,156	3,748,446	21,816	3,653,978	72,652	-	21,944	-	-	1,160	2,862,972	90,443	16,790,860
TOTAL COST TO DECOMMISSION		17,263	95,300	21,839	11,878	49,952	84,522	3,789,008	628,746	4,698,509	776,228	3,848,543	73,737	288,203	197,266	1,992	898	1,160	24,478,380	849,601	20,376,470

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				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			

TOTAL COST TO DECOMMISSION WITH 15.45% CONTINGENCY:	$4,698,509	thousands of 2020 dollars
TOTAL NRC LICENSE TERMINATION COST IS 16.52% OR:	$776,228	thousands of 2020 dollars
SPENT FUEL MANAGEMENT COST IS 81.91% OR:	$3,848,543	thousands of 2020 dollars
NON-NUCLEAR DEMOLITION COST IS 1.57% OR:	$73,737	thousands of 2020 dollars
TOTAL LOW-LEVEL RADIOACTIVE WASTE VOLUME BURIED (EXCLUDING GTCC):	200,155	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:	849,601	Man-hours

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

APPENDIX G

DETAILED COST ANALYSIS

SCENARIO 5: SAFSTOR with 42 Year DFS

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	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 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 1a - Shutdown through Transition																					
Period 1a Direct Decommissioning Activities																					
1a.1.1	SAFSTOR site characterization survey	-	-	-	-	-	-	415	124	539	539	-	-	-	-	-	-	-	-	-	-
1a.1.2	Prepare preliminary decommissioning cost	-	-	-	-	-	-	167	25	192	192	-	-	-	-	-	-	-	-	-	1,300
1a.1.3	Notification of Cessation of Operations									a											
1a.1.4	Remove fuel & source material									n/a											
1a.1.5	Notification of Permanent Defueling									a											
1a.1.6	Deactivate plant systems & process waste									a											
1a.1.7	Prepare and submit PSDAR	-	-	-	-	-	-	257	39	296	296	-	-	-	-	-	-	-	-	-	2,000
1a.1.8	Review plant dwgs & specs.	-	-	-	-	-	-	167	25	192	192	-	-	-	-	-	-	-	-	-	1,300
1a.1.9	Perform detailed rad survey									a											
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	Define major work sequence	-	-	-	-	-	-	129	19	148	148	-	-	-	-	-	-	-	-	-	1,000
1a.1.14	Perform SER and EA	-	-	-	-	-	-	398	60	458	458	-	-	-	-	-	-	-	-	-	3,100
1a.1.15	Perform Site-Specific Cost Study	-	-	-	-	-	-	643	96	739	739	-	-	-	-	-	-	-	-	-	5,000
Activity Specifications																					
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	-	-	-	-	-	-	-	-	-	3,120
1a.1.16.4	Waste management	-	-	-	-	-	-	257	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
Detailed Work Procedures																					
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	Procure vacuum drying system	-	-	-	-	-	-	13	2	15	15	-	-	-	-	-	-	-	-	-	100
1a.1.19	Drain/de-energize non-cont. systems									a											
1a.1.20	Drain & dry NSSS									a											
1a.1.21	Drain/de-energize contaminated systems									a											
1a.1.22	Decon/secure contaminated systems									a											
1a.1	Subtotal Period 1a Activity Costs	-	-	-	-	-	-	5,027	816	5,844	5,844	-	-	-	-	-	-	-	-	-	35,890
Period 1a Collateral Costs																					
1a.3.1	Spent Fuel Capital and Transfer	-	-	-	-	-	-	1,323	198	1,522	-	1,522	-	-	-	-	-	-	-	-	-
1a.3.2	Retention and Severance	-	-	-	-	-	-	9,892	1,484	11,376	11,376	-	-	-	-	-	-	-	-	-	-
1a.3	Subtotal Period 1a Collateral Costs	-	-	-	-	-	-	11,215	1,682	12,897	11,376	1,522	-	-	-	-	-	-	-	-	-
Period 1a Period-Dependent Costs																					
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 physics supplies	-	614	-	-	-	-	-	153	767	767	-	-	-	-	-	-	-	-	-	-
1a.4.4	Heavy equipment rental	-	753	-	-	-	-	-	113	866	866	-	-	-	-	-	-	-	-	-	-
1a.4.5	Disposal of DAW generated	-	-	12	6	-	50	-	15	83	83	-	-	-	610	-	-	-	12,190	20	-
1a.4.6	Plant energy budget	-	-	-	-	-	-	1,817	272	2,089	2,089	-	-	-	-	-	-	-	-	-	-
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	Fixed Overhead	-	-	-	-	-	-	2,616	392	3,009	3,009	-	-	-	-	-	-	-	-	-	-
1a.4.10	Spent Fuel Pool O&M	-	-	-	-	-	-	845	127	971	-	971	-	-	-	-	-	-	-	-	-
1a.4.11	ISFSI Operating Costs	-	-	-	-	-	-	112	17	129	-	129	-	-	-	-	-	-	-	-	-
1a.4.12	Railroad Track Maintenance	-	-	-	-	-	-	125	19	144	144	-	-	-	-	-	-	-	-	-	-
1a.4.13	Security Staff Cost	-	-	-	-	-	-	16,372	2,456	18,827	18,827	-	-	-	-	-	-	-	-	-	245,440
1a.4.14	Utility Staff Cost	-	-	-	-	-	-	27,285	4,093	31,378	31,378	-	-	-	-	-	-	-	-	-	422,240
1a.4	Subtotal Period 1a Period-Dependent Costs	-	1,367	12	6	-	50	59,389	8,679	69,502	64,632	4,870	-	-	610	-	-	-	12,190	20	667,680
1a.0	TOTAL PERIOD 1a COST	-	1,367	12	6	-	50	75,631	11,177	88,244	81,852	6,392	-	-	610	-	-	-	12,190	20	703,570

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	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 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 1b - SAFSTOR Limited DECON Activities																					
Period 1b Direct Decommissioning Activities																					
Decontamination of Site Buildings																					
1b.1.1.1	Reactor Building	5,155	-	-	-	-	-	-	2,577	7,732	7,732	-	-	-	-	-	-	-	-	70,157	-
1b.1.1.2	Admin	106	-	-	-	-	-	-	53	159	159	-	-	-	-	-	-	-	-	1,526	-
1b.1.1.3	HPCI Room	28	-	-	-	-	-	-	14	42	42	-	-	-	-	-	-	-	-	391	-
1b.1.1.4	Hot Shop	16	-	-	-	-	-	-	8	24	24	-	-	-	-	-	-	-	-	234	-
1b.1.1.5	LLRW Storage & Shipping	54	-	-	-	-	-	-	27	82	82	-	-	-	-	-	-	-	-	788	-
1b.1.1.6	Offgas Stack	362	-	-	-	-	-	-	181	542	542	-	-	-	-	-	-	-	-	5,112	-
1b.1.1.7	Offgas Storage & Compressor	38	-	-	-	-	-	-	19	57	57	-	-	-	-	-	-	-	-	550	-
1b.1.1.8	Radwaste	114	-	-	-	-	-	-	57	171	171	-	-	-	-	-	-	-	-	1,647	-
1b.1.1.9	Radwaste Material Storage Warehouse	60	-	-	-	-	-	-	30	90	90	-	-	-	-	-	-	-	-	864	-
1b.1.1.10	Recombiner	25	-	-	-	-	-	-	13	38	38	-	-	-	-	-	-	-	-	363	-
1b.1.1.11	Turbine	664	-	-	-	-	-	-	332	996	996	-	-	-	-	-	-	-	-	9,600	-
1b.1.1.12	Turbine Building Addition	55	-	-	-	-	-	-	27	82	82	-	-	-	-	-	-	-	-	793	-
1b.1.1.13	Reactor (Post Fuel)	924	-	-	-	-	-	-	462	1,386	1,386	-	-	-	-	-	-	-	-	12,653	-
1b.1.1	Totals	7,601	-	-	-	-	-	-	3,800	11,401	11,401	-	-	-	-	-	-	-	-	104,679	-
1b.1	Subtotal Period 1b Activity Costs	7,601	-	-	-	-	-	-	3,800	11,401	11,401	-	-	-	-	-	-	-	-	104,679	-
Period 1b Additional Costs																					
1b.2.1	Spent Fuel Pool Isolation	-	-	-	-	-	-	12,675	1,901	14,576	14,576	-	-	-	-	-	-	-	-	-	-
1b.2	Subtotal Period 1b Additional Costs	-	-	-	-	-	-	12,675	1,901	14,576	14,576	-	-	-	-	-	-	-	-	-	-
Period 1b Collateral Costs																					
1b.3.1	Decon equipment	1,055	-	-	-	-	-	-	158	1,213	1,213	-	-	-	-	-	-	-	-	-	-
1b.3.2	Process decommissioning water waste	220	-	146	259	-	589	-	310	1,523	1,523	-	-	-	1,352	-	-	-	81,127	264	-
1b.3.4	Small tool allowance	-	130	-	-	-	-	-	20	150	150	-	-	-	-	-	-	-	-	-	-
1b.3.5	Spent Fuel Capital and Transfer	-	-	-	-	-	-	196	29	225	-	225	-	-	-	-	-	-	-	-	-
1b.3.6	Retention and Severance	-	-	-	-	-	-	3,601	540	4,141	4,141	-	-	-	-	-	-	-	-	-	-
1b.3	Subtotal Period 1b Collateral Costs	1,275	130	146	259	-	589	3,796	1,058	7,252	7,027	225	-	-	1,352	-	-	-	81,127	264	-
Period 1b Period-Dependent Costs																					
1b.4.1	Decon supplies	1,562	-	-	-	-	-	-	391	1,953	1,953	-	-	-	-	-	-	-	-	-	-
1b.4.2	Insurance	-	-	-	-	-	-	580	58	638	638	-	-	-	-	-	-	-	-	-	-
1b.4.3	Property taxes	-	-	-	-	-	-	890	89	979	979	-	-	-	-	-	-	-	-	-	-
1b.4.4	Health physics supplies	-	750	-	-	-	-	-	187	937	937	-	-	-	-	-	-	-	-	-	-
1b.4.5	Heavy equipment rental	-	188	-	-	-	-	-	28	216	216	-	-	-	-	-	-	-	-	-	-
1b.4.6	Disposal of DAW generated	-	-	12	6	-	48	-	14	80	80	-	-	-	588	-	-	-	11,769	19	-
1b.4.7	Plant energy budget	-	-	-	-	-	-	453	68	521	521	-	-	-	-	-	-	-	-	-	-
1b.4.8	NRC Fees	-	-	-	-	-	-	161	16	177	177	-	-	-	-	-	-	-	-	-	-
1b.4.9	Emergency Planning Fees	-	-	-	-	-	-	708	71	779	-	779	-	-	-	-	-	-	-	-	-
1b.4.10	Fixed Overhead	-	-	-	-	-	-	652	98	750	750	-	-	-	-	-	-	-	-	-	-
1b.4.11	Spent Fuel Pool O&M	-	-	-	-	-	-	211	32	242	-	242	-	-	-	-	-	-	-	-	-
1b.4.12	ISFSI Operating Costs	-	-	-	-	-	-	28	4	32	-	32	-	-	-	-	-	-	-	-	-
1b.4.13	Railroad Track Maintenance	-	-	-	-	-	-	31	5	36	36	-	-	-	-	-	-	-	-	-	-
1b.4.14	Security Staff Cost	-	-	-	-	-	-	4,082	612	4,694	4,694	-	-	-	-	-	-	-	-	-	61,192
1b.4.15	Utility Staff Cost	-	-	-	-	-	-	6,803	1,020	7,823	7,823	-	-	-	-	-	-	-	-	-	105,271
1b.4	Subtotal Period 1b Period-Dependent Costs	1,562	938	12	6	-	48	14,599	2,693	19,858	18,805	1,053	-	-	588	-	-	-	11,769	19	166,463
1b.0	TOTAL PERIOD 1b COST	10,438	1,068	157	265	-	637	31,070	9,453	53,088	51,810	1,278	-	-	1,941	-	-	-	92,896	104,962	166,463
PERIOD 1c - Preparations for SAFSTOR Dormancy																					
Period 1c Direct Decommissioning Activities																					
1c.1.1	Prepare support equipment for storage	-	527	-	-	-	-	-	79	606	606	-	-	-	-	-	-	-	-	3,000	-
1c.1.2	Install containment pressure equal. lines	-	54	-	-	-	-	-	8	62	62	-	-	-	-	-	-	-	-	700	-
1c.1.3	Interim survey prior to dormancy	-	-	-	-	-	-	733	220	953	953	-	-	-	-	-	-	-	-	12,801	-
1c.1.4	Secure building accesses									a											
1c.1.5	Prepare & submit interim report	-	-	-	-	-	-	75	11	86	86	-	-	-	-	-	-	-	-	-	583
1c.1	Subtotal Period 1c Activity Costs	-	581	-	-	-	-	808	318	1,707	1,707	-	-	-	-	-	-	-	-	16,501	583
Period 1c Collateral Costs																					
1c.3.1	Process decommissioning water waste	161	-	107	190	-	433	-	228	1,120	1,120	-	-	-	994	-	-	-	59,653	194	-

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	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 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 1c Collateral Costs (continued)																					
1c.3.3	Small tool allowance	-	5	-	-	-	-	-	1	6	6	-	-	-	-	-	-	-	-	-	-
1c.3.4	Spent Fuel Capital and Transfer	-	-	-	-	-	-	195	29	225	-	225	-	-	-	-	-	-	-	-	-
1c.3.5	Retention and Severance	-	-	-	-	-	-	2,734	410	3,145	3,145	-	-	-	-	-	-	-	-	-	-
1c.3	Subtotal Period 1c Collateral Costs	161	5	107	190	-	433	2,930	668	4,495	4,270	225	-	-	994	-	-	-	59,653	194	-
Period 1c Period-Dependent Costs																					
1c.4.1	Insurance	-	-	-	-	-	-	580	58	638	638	-	-	-	-	-	-	-	-	-	-
1c.4.2	Property taxes	-	-	-	-	-	-	888	89	977	977	-	-	-	-	-	-	-	-	-	-
1c.4.3	Health physics supplies	-	248	-	-	-	-	-	62	310	310	-	-	-	-	-	-	-	-	-	-
1c.4.4	Heavy equipment rental	-	188	-	-	-	-	-	28	216	216	-	-	-	-	-	-	-	-	-	-
1c.4.5	Disposal of DAW generated	-	-	3	2	-	13	-	4	21	21	-	-	-	152	-	-	-	3,039	5	-
1c.4.6	Plant energy budget	-	-	-	-	-	-	453	68	521	521	-	-	-	-	-	-	-	-	-	-
1c.4.7	NRC Fees	-	-	-	-	-	-	161	16	177	177	-	-	-	-	-	-	-	-	-	-
1c.4.8	Emergency Planning Fees	-	-	-	-	-	-	708	71	779	-	779	-	-	-	-	-	-	-	-	-
1c.4.9	Fixed Overhead	-	-	-	-	-	-	652	98	750	750	-	-	-	-	-	-	-	-	-	-
1c.4.10	Spent Fuel Pool O&M	-	-	-	-	-	-	211	32	242	-	242	-	-	-	-	-	-	-	-	-
1c.4.11	ISFSI Operating Costs	-	-	-	-	-	-	28	4	32	-	32	-	-	-	-	-	-	-	-	-
1c.4.12	Railroad Track Maintenance	-	-	-	-	-	-	31	5	36	36	-	-	-	-	-	-	-	-	-	-
1c.4.13	Security Staff Cost	-	-	-	-	-	-	4,082	612	4,694	4,694	-	-	-	-	-	-	-	-	-	61,192
1c.4.14	Utility Staff Cost	-	-	-	-	-	-	6,803	1,020	7,823	7,823	-	-	-	-	-	-	-	-	-	105,271
1c.4	Subtotal Period 1c Period-Dependent Costs	-	436	3	2	-	13	14,597	2,166	17,216	16,163	1,053	-	-	152	-	-	-	3,039	5	166,463
1c.0	TOTAL PERIOD 1c COST	161	1,021	110	192	-	446	18,335	3,153	23,418	22,140	1,278	-	-	1,146	-	-	-	62,692	16,700	167,046
PERIOD 1 TOTALS		10,599	3,456	279	463	-	1,133	125,036	23,783	164,750	155,802	8,948	-	-	3,696	-	-	-	167,779	121,681	1,037,079
PERIOD 2a - SAFSTOR Dormancy with Wet Spent Fuel Storage																					
Period 2a Direct Decommissioning Activities																					
2a.1.1	Quarterly Inspection									a											
2a.1.2	Semi-annual environmental survey									a											
2a.1.3	Prepare reports									a											
2a.1.4	Bituminous roof replacement	-	-	-	-	-	-	155	23	178	178	-	-	-	-	-	-	-	-	-	-
2a.1.5	Maintenance supplies	-	-	-	-	-	-	349	87	437	437	-	-	-	-	-	-	-	-	-	-
2a.1	Subtotal Period 2a Activity Costs	-	-	-	-	-	-	504	111	615	615	-	-	-	-	-	-	-	-	-	-
Period 2a Additional Costs																					
2a.2.1	Security Modifications	-	-	-	-	-	-	8,696	1,304	10,000	10,000	-	-	-	-	-	-	-	-	-	-
2a.2	Subtotal Period 2a Additional Costs	-	-	-	-	-	-	8,696	1,304	10,000	10,000	-	-	-	-	-	-	-	-	-	-
Period 2a Collateral Costs																					
2a.3.1	Spent Fuel Capital and Transfer	-	-	-	-	-	-	130,915	19,637	150,553	-	150,553	-	-	-	-	-	-	-	-	-
2a.3.2	Retention and Severance	-	-	-	-	-	-	19,427	2,914	22,341	22,341	-	-	-	-	-	-	-	-	-	-
2a.3	Subtotal Period 2a Collateral Costs	-	-	-	-	-	-	150,342	22,551	172,893	22,341	150,553	-	-	-	-	-	-	-	-	-
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	Health physics supplies	-	617	-	-	-	-	-	154	771	771	-	-	-	-	-	-	-	-	-	-
2a.4.4	Disposal of DAW generated	-	-	11	6	-	47	-	14	79	79	-	-	-	576	-	-	-	11,523	19	-
2a.4.5	Plant energy budget	-	-	-	-	-	-	910	136	1,046	1,046	-	-	-	-	-	-	-	-	-	-
2a.4.6	NRC Fees	-	-	-	-	-	-	610	61	671	671	-	-	-	-	-	-	-	-	-	-
2a.4.7	Emergency Planning Fees	-	-	-	-	-	-	7,110	711	7,821	-	7,821	-	-	-	-	-	-	-	-	-
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	-	2,432	-	-	-	-	-	-	-	-	-
2a.4.10	ISFSI Operating Costs	-	-	-	-	-	-	280	42	322	-	322	-	-	-	-	-	-	-	-	-
2a.4.11	Railroad Track Maintenance	-	-	-	-	-	-	639	96	735	735	-	-	-	-	-	-	-	-	-	-
2a.4.12	Security Staff Cost	-	-	-	-	-	-	37,806	5,671	43,477	31,086	12,391	-	-	-	-	-	-	-	-	562,523
2a.4.13	Utility Staff Cost	-	-	-	-	-	-	13,543	2,031	15,574	12,615	2,959	-	-	-	-	-	-	-	-	205,738
2a.4	Subtotal Period 2a Period-Dependent Costs	-	617	11	6	-	47	79,012	11,099	90,793	64,868	25,925	-	-	576	-	-	-	11,523	19	768,261
2a.0	TOTAL PERIOD 2a COST	-	617	11	6	-	47	238,554	35,065	274,301	97,823	176,478	-	-	576	-	-	-	11,523	19	768,261

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	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 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 - SAFSTOR Dormancy with Dry Spent Fuel Storage																					
Period 2b Direct Decommissioning Activities																					
2b.1.1	Quarterly Inspection									a											
2b.1.2	Semi-annual environmental survey									a											
2b.1.3	Prepare reports									a											
2b.1.4	Bituminous roof replacement	-	-	-	-	-	-	2,368	355	2,723	2,723	-	-	-	-	-	-	-	-	-	-
2b.1.5	Maintenance supplies	-	-	-	-	-	-	5,351	1,338	6,689	6,689	-	-	-	-	-	-	-	-	-	-
2b.1	Subtotal Period 2b Activity Costs	-	-	-	-	-	-	7,719	1,693	9,412	9,412	-	-	-	-	-	-	-	-	-	-
Period 2b Collateral Costs																					
2b.3.1	Spent Fuel Capital and Transfer	-	-	-	-	-	-	41,993	6,299	48,292	-	48,292	-	-	-	-	-	-	-	-	-
2b.3	Subtotal Period 2b Collateral Costs	-	-	-	-	-	-	41,993	6,299	48,292	-	48,292	-	-	-	-	-	-	-	-	-
Period 2b Period-Dependent Costs																					
2b.4.1	Insurance	-	-	-	-	-	-	26,968	2,697	29,664	29,664	-	-	-	-	-	-	-	-	-	-
2b.4.2	Property taxes	-	-	-	-	-	-	136,792	13,679	150,471	150,471	-	-	-	-	-	-	-	-	-	-
2b.4.3	Health physics supplies	-	4,580	-	-	-	-	-	1,145	5,725	5,725	-	-	-	-	-	-	-	-	-	-
2b.4.4	Disposal of DAW generated	-	-	84	43	-	349	-	102	579	579	-	-	-	4,238	-	-	-	84,754	138	-
2b.4.5	Plant energy budget	-	-	-	-	-	-	6,965	1,045	8,010	8,010	-	-	-	-	-	-	-	-	-	-
2b.4.6	NRC Fees	-	-	-	-	-	-	8,721	872	9,594	9,594	-	-	-	-	-	-	-	-	-	-
2b.4.7	Emergency Planning Fees	-	-	-	-	-	-	5,685	568	6,253	-	6,253	-	-	-	-	-	-	-	-	-
2b.4.8	Fixed Overhead	-	-	-	-	-	-	8,259	1,239	9,498	9,498	-	-	-	-	-	-	-	-	-	-
2b.4.9	ISFSI Operating Costs	-	-	-	-	-	-	4,292	644	4,935	-	4,935	-	-	-	-	-	-	-	-	-
2b.4.10	Railroad Track Maintenance	-	-	-	-	-	-	4,794	719	5,514	5,514	-	-	-	-	-	-	-	-	-	-
2b.4.11	Security Staff Cost	-	-	-	-	-	-	212,676	31,901	244,577	55,030	189,547	-	-	-	-	-	-	-	-	2,871,084
2b.4.12	Utility Staff Cost	-	-	-	-	-	-	86,757	13,014	99,770	54,475	45,296	-	-	-	-	-	-	-	-	1,276,037
2b.4	Subtotal Period 2b Period-Dependent Costs	-	4,580	84	43	-	349	501,908	67,625	574,590	328,559	246,032	-	-	4,238	-	-	-	84,754	138	4,147,121
2b.0	TOTAL PERIOD 2b COST	-	4,580	84	43	-	349	551,620	75,617	632,294	337,971	294,324	-	-	4,238	-	-	-	84,754	138	4,147,121
PERIOD 2c - SAFSTOR Dormancy without Spent Fuel Storage																					
Period 2c Direct Decommissioning Activities																					
2c.1.1	Quarterly Inspection									a											
2c.1.2	Semi-annual environmental survey									a											
2c.1.3	Prepare reports									a											
2c.1.4	Bituminous roof replacement	-	-	-	-	-	-	759	114	872	872	-	-	-	-	-	-	-	-	-	-
2c.1.5	Maintenance supplies	-	-	-	-	-	-	1,714	429	2,143	2,143	-	-	-	-	-	-	-	-	-	-
2c.1	Subtotal Period 2c Activity Costs	-	-	-	-	-	-	2,473	542	3,015	3,015	-	-	-	-	-	-	-	-	-	-
Period 2c Period-Dependent Costs																					
2c.4.1	Insurance	-	-	-	-	-	-	4,931	493	5,424	5,424	-	-	-	-	-	-	-	-	-	-
2c.4.2	Property taxes	-	-	-	-	-	-	37,270	3,727	40,997	40,997	-	-	-	-	-	-	-	-	-	-
2c.4.3	Health physics supplies	-	1,380	-	-	-	-	-	345	1,725	1,725	-	-	-	-	-	-	-	-	-	-
2c.4.4	Disposal of DAW generated	-	-	25	13	-	103	-	30	171	171	-	-	-	1,250	-	-	-	25,004	41	-
2c.4.5	Plant energy budget	-	-	-	-	-	-	2,231	335	2,566	2,566	-	-	-	-	-	-	-	-	-	-
2c.4.6	NRC Fees	-	-	-	-	-	-	2,520	252	2,772	2,772	-	-	-	-	-	-	-	-	-	-
2c.4.7	Fixed Overhead	-	-	-	-	-	-	2,646	397	3,042	3,042	-	-	-	-	-	-	-	-	-	-
2c.4.8	Railroad Track Maintenance	-	-	-	-	-	-	1,536	230	1,766	1,766	-	-	-	-	-	-	-	-	-	-
2c.4.9	Security Staff Cost	-	-	-	-	-	-	29,690	4,453	34,143	34,143	-	-	-	-	-	-	-	-	-	383,204
2c.4.10	Utility Staff Cost	-	-	-	-	-	-	14,429	2,164	16,593	16,593	-	-	-	-	-	-	-	-	-	223,536
2c.4	Subtotal Period 2c Period-Dependent Costs	-	1,380	25	13	-	103	95,252	12,427	109,199	109,199	-	-	-	1,250	-	-	-	25,004	41	606,740
2c.0	TOTAL PERIOD 2c COST	-	1,380	25	13	-	103	97,724	12,969	112,214	112,214	-	-	-	1,250	-	-	-	25,004	41	606,740
PERIOD 2 TOTALS		-	6,577	120	62	-	500	887,899	123,652	1,018,809	548,008	470,802	-	-	6,064	-	-	-	121,281	198	5,522,123
PERIOD 3a - Reactivate Site Following SAFSTOR Dormancy																					
Period 3a Direct Decommissioning Activities																					
3a.1.1	Prepare preliminary decommissioning cost	-	-	-	-	-	-	167	25	192	192	-	-	-	-	-	-	-	-	-	1,300
3a.1.2	Review plant dwgs & specs.	-	-	-	-	-	-	591	89	680	680	-	-	-	-	-	-	-	-	-	4,600
3a.1.3	Perform detailed rad survey									a											
3a.1.4	End product description	-	-	-	-	-	-	129	19	148	148	-	-	-	-	-	-	-	-	-	1,000
3a.1.5	Detailed by-product inventory	-	-	-	-	-	-	167	25	192	192	-	-	-	-	-	-	-	-	-	1,300
3a.1.6	Define major work sequence	-	-	-	-	-	-	964	145	1,108	1,108	-	-	-	-	-	-	-	-	-	7,500
3a.1.7	Perform SER and EA	-	-	-	-	-	-	398	60	458	458	-	-	-	-	-	-	-	-	-	3,100

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	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 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 3a Direct Decommissioning Activities (continued)																					
3a.1.8	Prepare/submit Defueled Technical Specifications	-	-	-	-	-	-	964	145	1,108	1,108	-	-	-	-	-	-	-	-	-	7,500
3a.1.9	Perform Site-Specific Cost Study	-	-	-	-	-	-	643	96	739	739	-	-	-	-	-	-	-	-	-	5,000
3a.1.10	Prepare/submit Irradiated Fuel Management Plan	-	-	-	-	-	-	129	19	148	148	-	-	-	-	-	-	-	-	-	1,000
Activity Specifications																					
3a.1.11.1	Re-activate plant & temporary facilities	-	-	-	-	-	-	947	142	1,089	980	-	109	-	-	-	-	-	-	-	7,370
3a.1.11.2	Plant systems	-	-	-	-	-	-	536	80	616	554	-	62	-	-	-	-	-	-	-	4,167
3a.1.11.3	Reactor internals	-	-	-	-	-	-	912	137	1,049	1,049	-	-	-	-	-	-	-	-	-	7,100
3a.1.11.4	Reactor vessel	-	-	-	-	-	-	835	125	961	961	-	-	-	-	-	-	-	-	-	6,500
3a.1.11.5	Sacrificial shield	-	-	-	-	-	-	64	10	74	74	-	-	-	-	-	-	-	-	-	500
3a.1.11.6	Moisture separators/reheaters	-	-	-	-	-	-	129	19	148	148	-	-	-	-	-	-	-	-	-	1,000
3a.1.11.7	Reinforced concrete	-	-	-	-	-	-	206	31	236	118	-	118	-	-	-	-	-	-	-	1,600
3a.1.11.8	Main Turbine	-	-	-	-	-	-	268	40	309	309	-	-	-	-	-	-	-	-	-	2,088
3a.1.11.9	Main Condensers	-	-	-	-	-	-	268	40	309	309	-	-	-	-	-	-	-	-	-	2,088
3a.1.11.10	Pressure suppression structure	-	-	-	-	-	-	257	39	296	296	-	-	-	-	-	-	-	-	-	2,000
3a.1.11.11	Drywell	-	-	-	-	-	-	206	31	236	236	-	-	-	-	-	-	-	-	-	1,600
3a.1.11.12	Plant structures & buildings	-	-	-	-	-	-	401	60	461	231	-	231	-	-	-	-	-	-	-	3,120
3a.1.11.13	Waste management	-	-	-	-	-	-	591	89	680	680	-	-	-	-	-	-	-	-	-	4,600
3a.1.11.14	Facility & site closeout	-	-	-	-	-	-	116	17	133	67	-	67	-	-	-	-	-	-	-	900
3a.1.11	Total	-	-	-	-	-	-	5,736	860	6,597	6,011	-	586	-	-	-	-	-	-	-	44,633
Planning & Site Preparations																					
3a.1.12	Prepare dismantling sequence	-	-	-	-	-	-	308	46	355	355	-	-	-	-	-	-	-	-	-	2,400
3a.1.13	Plant prep. & temp. svces	-	-	-	-	-	-	3,500	525	4,025	4,025	-	-	-	-	-	-	-	-	-	-
3a.1.14	Design water clean-up system	-	-	-	-	-	-	180	27	207	207	-	-	-	-	-	-	-	-	-	1,400
3a.1.15	Rigging/Cont. Cntrl Envlps/tooling/etc.	-	-	-	-	-	-	2,400	360	2,760	2,760	-	-	-	-	-	-	-	-	-	-
3a.1.16	Procure casks/liners & containers	-	-	-	-	-	-	158	24	182	182	-	-	-	-	-	-	-	-	-	1,230
3a.1	Subtotal Period 3a Activity Costs	-	-	-	-	-	-	16,434	2,465	18,899	18,313	-	586	-	-	-	-	-	-	-	81,963
Period 3a Additional Costs																					
3a.2.1	Site Characterization	-	-	-	-	-	-	5,930	1,779	7,708	7,708	-	-	-	-	-	-	-	-	30,500	10,852
3a.2.2	Mixed & RCRA Waste	-	-	28	29	14	-	-	9	80	80	-	-	43	-	-	-	-	5,253	161	-
3a.2	Subtotal Period 3a Additional Costs	-	-	28	29	14	-	5,930	1,788	7,788	7,788	-	-	43	-	-	-	-	5,253	30,661	10,852
Period 3a Period-Dependent Costs																					
3a.4.1	Insurance	-	-	-	-	-	-	401	40	442	442	-	-	-	-	-	-	-	-	-	-
3a.4.2	Property taxes	-	-	-	-	-	-	2,945	295	3,240	3,240	-	-	-	-	-	-	-	-	-	-
3a.4.3	Health physics supplies	-	537	-	-	-	-	-	134	672	672	-	-	-	-	-	-	-	-	-	-
3a.4.4	Heavy equipment rental	-	753	-	-	-	-	-	113	866	866	-	-	-	-	-	-	-	-	-	-
3a.4.5	Disposal of DAW generated	-	-	10	5	-	42	-	12	70	70	-	-	-	514	-	-	-	10,287	17	-
3a.4.6	Plant energy budget	-	-	-	-	-	-	1,817	272	2,089	2,089	-	-	-	-	-	-	-	-	-	-
3a.4.7	NRC Fees	-	-	-	-	-	-	335	33	368	368	-	-	-	-	-	-	-	-	-	-
3a.4.8	Fixed Overhead	-	-	-	-	-	-	2,616	392	3,009	3,009	-	-	-	-	-	-	-	-	-	-
3a.4.9	Railroad Track Maintenance	-	-	-	-	-	-	125	19	144	144	-	-	-	-	-	-	-	-	-	-
3a.4.10	Security Staff Cost	-	-	-	-	-	-	4,441	666	5,107	5,107	-	-	-	-	-	-	-	-	-	65,000
3a.4.11	Utility Staff Cost	-	-	-	-	-	-	16,594	2,489	19,084	19,084	-	-	-	-	-	-	-	-	-	257,920
3a.4	Subtotal Period 3a Period-Dependent Costs	-	1,290	10	5	-	42	29,274	4,467	35,089	35,089	-	-	-	514	-	-	-	10,287	17	322,920
3a.0	TOTAL PERIOD 3a COST	-	1,290	38	34	14	42	51,638	8,720	61,777	61,191	-	586	43	514	-	-	-	15,540	30,678	415,735
PERIOD 3b - Decommissioning Preparations																					
Period 3b Direct Decommissioning Activities																					
Detailed Work Procedures																					
3b.1.1.1	Plant systems	-	-	-	-	-	-	608	91	700	630	-	70	-	-	-	-	-	-	-	4,733
3b.1.1.2	Reactor internals	-	-	-	-	-	-	514	77	591	591	-	-	-	-	-	-	-	-	-	4,000
3b.1.1.3	Remaining buildings	-	-	-	-	-	-	174	26	200	50	-	150	-	-	-	-	-	-	-	1,350
3b.1.1.4	CRD housings & NIs	-	-	-	-	-	-	129	19	148	148	-	-	-	-	-	-	-	-	-	1,000
3b.1.1.5	Incore instrumentation	-	-	-	-	-	-	129	19	148	148	-	-	-	-	-	-	-	-	-	1,000
3b.1.1.6	Removal primary containment	-	-	-	-	-	-	257	39	296	296	-	-	-	-	-	-	-	-	-	2,000
3b.1.1.7	Reactor vessel	-	-	-	-	-	-	467	70	537	537	-	-	-	-	-	-	-	-	-	3,630
3b.1.1.8	Facility closeout	-	-	-	-	-	-	154	23	177	89	-	89	-	-	-	-	-	-	-	1,200
3b.1.1.9	Sacrificial shield	-	-	-	-	-	-	154	23	177	177	-	-	-	-	-	-	-	-	-	1,200
3b.1.1.10	Reinforced concrete	-	-	-	-	-	-	129	19	148	74	-	74	-	-	-	-	-	-	-	1,000
3b.1.1.11	Main Turbine	-	-	-	-	-	-	267	40	307	307	-	-	-	-	-	-	-	-	-	2,080
3b.1.1.12	Main Condensers	-	-	-	-	-	-	268	40	309	309	-	-	-	-	-	-	-	-	-	2,088

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	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 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
Detailed Work Procedures (continued)																					
3b.1.1.13	Moisture separators & reheaters	-	-	-	-	-	-	257	39	296	296	-	-	-	-	-	-	-	-	-	2,000
3b.1.1.14	Radwaste building	-	-	-	-	-	-	351	53	403	363	-	40	-	-	-	-	-	-	-	2,730
3b.1.1.15	Reactor building	-	-	-	-	-	-	351	53	403	363	-	40	-	-	-	-	-	-	-	2,730
3b.1.1	Total	-	-	-	-	-	-	4,208	631	4,839	4,376	-	463	-	-	-	-	-	-	-	32,741
3b.1	Subtotal Period 3b Activity Costs	-	-	-	-	-	-	4,208	631	4,839	4,376	-	463	-	-	-	-	-	-	-	32,741
Period 3b Collateral Costs																					
3b.3.1	Decon equipment	1,055	-	-	-	-	-	-	158	1,213	1,213	-	-	-	-	-	-	-	-	-	-
3b.3.2	DOC staff relocation expenses	-	-	-	-	-	-	1,264	190	1,454	1,454	-	-	-	-	-	-	-	-	-	-
3b.3.3	Pipe cutting equipment	-	1,200	-	-	-	-	-	180	1,380	1,380	-	-	-	-	-	-	-	-	-	-
3b.3	Subtotal Period 3b Collateral Costs	1,055	1,200	-	-	-	-	1,264	528	4,047	4,047	-	-	-	-	-	-	-	-	-	-
Period 3b Period-Dependent Costs																					
3b.4.1	Decon supplies	39	-	-	-	-	-	-	10	48	48	-	-	-	-	-	-	-	-	-	-
3b.4.2	Insurance	-	-	-	-	-	-	351	35	386	386	-	-	-	-	-	-	-	-	-	-
3b.4.3	Property taxes	-	-	-	-	-	-	1,348	135	1,483	1,483	-	-	-	-	-	-	-	-	-	-
3b.4.4	Health physics supplies	-	295	-	-	-	-	-	74	369	369	-	-	-	-	-	-	-	-	-	-
3b.4.5	Heavy equipment rental	-	375	-	-	-	-	-	56	432	432	-	-	-	-	-	-	-	-	-	-
3b.4.6	Disposal of DAW generated	-	-	6	3	-	24	-	7	40	40	-	-	-	290	-	-	-	5,802	9	-
3b.4.7	Plant energy budget	-	-	-	-	-	-	906	136	1,042	1,042	-	-	-	-	-	-	-	-	-	-
3b.4.8	NRC Fees	-	-	-	-	-	-	167	17	183	183	-	-	-	-	-	-	-	-	-	-
3b.4.9	Fixed Overhead	-	-	-	-	-	-	1,305	196	1,500	1,500	-	-	-	-	-	-	-	-	-	-
3b.4.10	Railroad Track Maintenance	-	-	-	-	-	-	62	9	72	72	-	-	-	-	-	-	-	-	-	-
3b.4.11	Security Staff Cost	-	-	-	-	-	-	2,214	332	2,546	2,546	-	-	-	-	-	-	-	-	-	32,411
3b.4.12	DOC Staff Cost	-	-	-	-	-	-	5,344	802	6,146	6,146	-	-	-	-	-	-	-	-	-	58,080
3b.4.13	Utility Staff Cost	-	-	-	-	-	-	8,274	1,241	9,516	9,516	-	-	-	-	-	-	-	-	-	128,607
3b.4	Subtotal Period 3b Period-Dependent Costs	39	670	6	3	-	24	19,971	3,049	23,762	23,762	-	-	-	290	-	-	-	5,802	9	219,098
3b.0	TOTAL PERIOD 3b COST	1,093	1,870	6	3	-	24	25,443	4,208	32,647	32,185	-	463	-	290	-	-	-	5,802	9	251,839
PERIOD 3 TOTALS		1,093	3,161	44	37	14	66	77,081	12,928	94,424	93,375	-	1,049	43	804	-	-	-	21,343	30,688	667,574
PERIOD 4a - Large Component Removal																					
Period 4a Direct Decommissioning Activities																					
Nuclear Steam Supply System Removal																					
4a.1.1.1	Recirculation System Piping & Valves	23	85	27	32	185	264	-	134	750	750	-	-	676	715	-	-	-	94,867	1,594	-
4a.1.1.2	Recirculation Pumps & Motors	8	56	16	37	252	270	-	131	771	771	-	-	568	473	-	-	-	112,200	1,049	-
4a.1.1.3	CRDMs & NIs Removal	41	801	415	98	-	1,130	-	560	3,045	3,045	-	-	-	3,741	-	-	-	213,700	12,506	-
4a.1.1.4	Reactor Vessel Internals	139	6,098	8,236	1,029	-	25,657	278	19,830	61,268	61,268	-	-	-	2,943	1,628	600	-	337,343	22,415	1,055
4a.1.1.5	Vessel & Internals GTCC Disposal	-	-	-	-	-	4,313	-	647	4,960	4,960	-	-	-	-	-	-	1,160	225,765	-	-
4a.1.1.6	Reactor Vessel	-	8,498	1,818	837	-	6,301	278	10,229	27,961	27,961	-	-	-	17,823	-	-	-	1,110,360	22,415	1,055
4a.1.1	Totals	211	15,538	10,512	2,034	438	37,935	557	31,530	98,755	98,755	-	-	1,244	25,695	1,628	600	1,160	2,094,136	59,979	2,110
Removal of Major Equipment																					
4a.1.2	Main Turbine/Generator	-	340	1,356	521	6,139	439	-	1,330	10,126	10,126	-	-	24,835	1,383	-	-	-	1,577,959	4,796	-
4a.1.3	Main Condensers	-	1,207	360	194	3,225	244	-	912	6,142	6,142	-	-	17,396	727	-	-	-	828,955	16,823	-
Cascading Costs from Clean Building Demolition																					
4a.1.4.1	Reactor Building	-	332	-	-	-	-	-	50	381	381	-	-	-	-	-	-	-	-	2,217	-
4a.1.4.2	Radwaste	-	25	-	-	-	-	-	4	28	28	-	-	-	-	-	-	-	-	127	-
4a.1.4.3	Turbine	-	127	-	-	-	-	-	19	146	146	-	-	-	-	-	-	-	-	1,254	-
4a.1.4	Totals	-	483	-	-	-	-	-	72	556	556	-	-	-	-	-	-	-	-	3,598	-
Disposal of Plant Systems																					
4a.1.5.1	Automatic Press Relief	-	106	2	10	182	-	-	56	356	356	-	-	1,088	-	-	-	-	44,184	1,468	-
4a.1.5.2	Chemistry Sampling	-	24	0	2	35	-	-	12	73	73	-	-	207	-	-	-	-	8,422	356	-
4a.1.5.3	Chemistry Sampling - Insulated	-	2	0	0	0	-	-	0	2	2	-	-	1	-	-	-	-	61	25	-
4a.1.5.4	Circulating Water - RCA	-	207	14	62	1,114	-	-	230	1,626	1,626	-	-	6,656	-	-	-	-	270,307	2,860	-
4a.1.5.5	Combustible Gas Control - Insul - RCA	-	29	0	2	36	-	-	13	80	80	-	-	212	-	-	-	-	8,617	378	-
4a.1.5.6	Combustible Gas Control - RCA	-	18	1	3	48	-	-	12	81	81	-	-	285	-	-	-	-	11,577	245	-
4a.1.5.7	Condensate & Feedwater	-	888	60	281	5,046	-	-	1,027	7,303	7,303	-	-	30,157	-	-	-	-	1,224,704	12,501	-
4a.1.5.8	Condensate & Feedwater - Insulated	-	444	12	55	980	-	-	267	1,757	1,757	-	-	5,855	-	-	-	-	237,764	6,185	-
4a.1.5.9	Condensate Demin	-	494	9	44	792	-	-	250	1,590	1,590	-	-	4,735	-	-	-	-	192,293	6,784	-
4a.1.5.10	Condensate Storage	-	657	16	77	1,378	-	-	384	2,512	2,512	-	-	8,237	-	-	-	-	334,489	9,265	-
4a.1.5.11	Control Rod Drive	-	3	0	0	4	-	-	1	8	8	-	-	24	-	-	-	-	976	36	-

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	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 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
Disposal of Plant Systems (continued)																					
4a.1.5.12	Control Rod Drive Hydraulic	-	374	5	23	408	-	-	159	968	968	-	-	2,440	-	-	-	-	99,094	5,255	-
4a.1.5.13	Core Spray	-	71	10	48	855	-	-	154	1,138	1,138	-	-	5,109	-	-	-	-	207,487	1,026	-
4a.1.5.14	Core Spray - Insulated	-	131	2	11	198	-	-	64	407	407	-	-	1,184	-	-	-	-	48,081	1,806	-
4a.1.5.15	Demin Water - Insulated - RCA	-	15	0	1	14	-	-	6	36	36	-	-	85	-	-	-	-	3,445	181	-
4a.1.5.16	Demin Water - RCA	-	41	1	2	42	-	-	17	104	104	-	-	253	-	-	-	-	10,278	508	-
4a.1.5.17	Diesel Oil - RCA	-	2	0	0	4	-	-	1	7	7	-	-	23	-	-	-	-	931	25	-
4a.1.5.18	Drywell Atmosphere Cooling - RCA	-	38	1	5	92	-	-	24	159	159	-	-	548	-	-	-	-	22,244	550	-
4a.1.5.19	EDG Emerg Service Water - Insul - RCA	-	0	0	0	0	-	-	0	1	1	-	-	2	-	-	-	-	84	4	-
4a.1.5.20	Electrical - Clean	-	13	-	-	-	-	-	2	15	-	-	15	-	-	-	-	-	-	182	-
4a.1.5.21	Emergency Service Water - Insul - RCA	-	21	0	1	23	-	-	9	55	55	-	-	137	-	-	-	-	5,544	281	-
4a.1.5.22	Emergency Service Water - RCA	-	2	0	0	2	-	-	1	5	5	-	-	13	-	-	-	-	512	22	-
4a.1.5.23	GEZIP - RCA	-	3	0	1	17	-	-	4	25	25	-	-	103	-	-	-	-	4,184	48	-
4a.1.5.24	Generator Physical Design - RCA	-	5	0	0	5	-	-	2	12	12	-	-	31	-	-	-	-	1,250	67	-
4a.1.5.25	H2-O2 Control Analyzing	-	6	0	0	4	-	-	2	12	12	-	-	23	-	-	-	-	948	72	-
4a.1.5.26	H2-O2 Control Analyzing - Insulated	-	6	0	0	4	-	-	2	12	12	-	-	23	-	-	-	-	948	72	-
4a.1.5.27	High Pressure Coolant Injection	-	60	3	12	211	-	-	49	334	334	-	-	1,262	-	-	-	-	51,257	850	-
4a.1.5.28	High Pressure Coolant Injection - Insula	-	198	4	21	379	-	-	110	713	713	-	-	2,266	-	-	-	-	92,018	2,734	-
4a.1.5.29	Hydrogen Cooling	-	8	-	-	-	-	-	1	10	-	-	10	-	-	-	-	-	-	118	-
4a.1.5.30	Hydrogen Cooling - RCA	-	7	0	0	7	-	-	3	17	17	-	-	39	-	-	-	-	1,600	79	-
4a.1.5.31	Hydrogen Seal Oil - RCA	-	17	0	2	32	-	-	9	60	60	-	-	189	-	-	-	-	7,669	212	-
4a.1.5.32	Hydrogen Water Chemistry - RCA	-	24	0	1	23	-	-	10	59	59	-	-	140	-	-	-	-	5,672	304	-
4a.1.5.33	Instrument & Service Air - RCA	-	225	4	17	296	-	-	103	644	644	-	-	1,768	-	-	-	-	71,810	2,733	-
4a.1.5.34	Main Condenser	-	177	4	18	318	-	-	95	613	613	-	-	1,903	-	-	-	-	77,301	2,443	-
4a.1.5.35	Main Steam	-	225	6	28	498	-	-	136	892	892	-	-	2,975	-	-	-	-	120,806	3,122	-
4a.1.5.36	Main Turbine	-	909	63	298	5,335	-	-	1,079	7,684	7,684	-	-	31,885	-	-	-	-	1,294,866	12,952	-
4a.1.5.37	Main Turbine - Insulated	-	193	7	32	579	-	-	141	952	952	-	-	3,460	-	-	-	-	140,506	2,725	-
4a.1.5.38	Miscellaneous	-	38	1	3	51	-	-	18	110	110	-	-	302	-	-	-	-	12,283	556	-
4a.1.5.39	Off Gas Recombiner	-	169	6	27	479	-	-	119	799	799	-	-	2,861	-	-	-	-	116,194	2,387	-
4a.1.5.40	Off Gas Recombiner - Insulated	-	351	5	22	393	-	-	150	921	921	-	-	2,350	-	-	-	-	95,441	4,785	-
4a.1.5.41	Post Accident Sampling	-	23	0	1	16	-	-	8	48	48	-	-	99	-	-	-	-	4,004	306	-
4a.1.5.42	Post Accident Sampling - Insulated	-	15	0	1	11	-	-	6	33	33	-	-	67	-	-	-	-	2,737	190	-
4a.1.5.43	RHR Service Water - Insulated - RCA	-	83	3	14	248	-	-	60	409	409	-	-	1,485	-	-	-	-	60,293	1,125	-
4a.1.5.44	RHR Service Water - RCA	-	4	0	0	6	-	-	2	12	12	-	-	35	-	-	-	-	1,410	57	-
4a.1.5.45	Reactor Feedwater Pump Seal	-	50	1	3	55	-	-	21	130	130	-	-	327	-	-	-	-	13,295	687	-
4a.1.5.46	Residual Heat Removal	-	226	58	147	2,110	514	-	529	3,584	3,584	-	-	12,609	1,519	-	-	-	609,174	3,282	-
4a.1.5.47	Residual Heat Removal - Insulated	-	500	39	74	851	464	-	384	2,312	2,312	-	-	5,084	1,374	-	-	-	294,396	7,027	-
4a.1.5.48	Rx Core Isolation Cooling	-	43	1	3	61	-	-	21	129	129	-	-	364	-	-	-	-	14,781	609	-
4a.1.5.49	Rx Core Isolation Cooling - Insulated	-	97	1	5	94	-	-	39	237	237	-	-	563	-	-	-	-	22,843	1,315	-
4a.1.5.50	Rx Recirculation	-	53	5	4	16	52	-	30	161	161	-	-	96	152	-	-	-	13,794	691	-
4a.1.5.51	Snubbers	-	151	1	5	84	-	-	51	292	292	-	-	502	-	-	-	-	20,395	2,272	-
4a.1.5.52	Standby Liquid Control - Insul - RCA	-	4	0	0	4	-	-	2	9	9	-	-	22	-	-	-	-	904	48	-
4a.1.5.53	Standby Liquid Control - RCA	-	26	1	2	41	-	-	13	83	83	-	-	245	-	-	-	-	9,969	341	-
4a.1.5.54	Stator Cooling - RCA	-	7	0	1	21	-	-	5	35	35	-	-	126	-	-	-	-	5,135	98	-
4a.1.5.55	Traversing Incore Probe	-	3	0	0	0	2	-	1	7	7	-	-	2	5	-	-	-	379	46	-
4a.1.5	Totals	-	7,490	347	1,370	23,501	1,032	-	5,894	39,634	39,610	-	24	140,459	3,050	-	-	-	5,899,167	104,297	-
4a.1.6	Scaffolding in support of decommissioning	-	2,106	22	12	191	31	-	567	2,929	2,929	-	-	1,030	91	-	-	-	52,111	19,968	-
4a.1	Subtotal Period 4a Activity Costs	211	27,165	12,598	4,132	33,494	39,680	557	40,305	158,142	158,117	-	24	184,963	30,945	1,628	600	1,160	10,452,330	209,462	2,110
Period 4a Collateral Costs																					
4a.3.1	Process decommissioning water waste	4	-	7	12	-	28	-	12	63	63	-	-	-	64	-	-	-	3,856	13	-
4a.3.3	Small tool allowance	-	267	-	-	-	-	-	40	307	276	-	31	-	-	-	-	-	-	-	-
4a.3	Subtotal Period 4a Collateral Costs	4	267	7	12	-	28	-	52	370	339	-	31	-	64	-	-	-	3,856	13	-
Period 4a Period-Dependent Costs																					
4a.4.1	Decon supplies	87	-	-	-	-	-	-	22	109	109	-	-	-	-	-	-	-	-	-	-
4a.4.2	Insurance	-	-	-	-	-	-	790	79	869	869	-	-	-	-	-	-	-	-	-	-
4a.4.3	Property taxes	-	-	-	-	-	-	2,995	299	3,294	3,294	-	-	-	-	-	-	-	-	-	-
4a.4.4	Health physics supplies	-	1,871	-	-	-	-	-	468	2,339	2,339	-	-	-	-	-	-	-	-	-	-
4a.4.5	Heavy equipment rental	-	2,811	-	-	-	-	-	422	3,232	3,232	-	-	-	-	-	-	-	-	-	-
4a.4.6	Disposal of DAW generated	-	-	89	46	-	369	-	108	612	612	-	-	-	4,484	-	-	-	89,676	146	-
4a.4.7	Plant energy budget	-	-	-	-	-	-	1,938	291	2,229	2,229	-	-	-	-	-	-	-	-	-	-
4a.4.8	NRC Fees	-	-	-	-	-	-	544	54	598	598	-	-	-	-	-	-	-	-	-	-
4a.4.9	Fixed Overhead	-	-	-	-	-	-	2,380	357	2,737	2,737	-	-	-	-	-	-	-	-	-	-
4a.4.10	Liquid Radwaste Processing Equipment/Services	-	-	-	-	-	-	477	72	549	549	-	-	-	-	-	-	-	-	-	-
4a.4.11	Railroad Track Maintenance	-	-	-	-	-	-	140	21	162	162	-	-	-	-	-	-	-	-	-	-

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	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 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 4a Period-Dependent Costs (continued)																					
4a.4.12	Remedial Actions Surveys	-	-	-	-	-	-	1,258	189	1,447	1,447	-	-	-	-	-	-	-	-	-	-
4a.4.13	Security Staff Cost	-	-	-	-	-	-	4,988	748	5,736	5,736	-	-	-	-	-	-	-	-	-	73,014
4a.4.14	DOC Staff Cost	-	-	-	-	-	-	14,604	2,191	16,795	16,795	-	-	-	-	-	-	-	-	-	161,214
4a.4.15	Utility Staff Cost	-	-	-	-	-	-	18,891	2,834	21,725	21,725	-	-	-	-	-	-	-	-	-	292,055
4a.4	Subtotal Period 4a Period-Dependent Costs	87	4,682	89	46	-	369	49,006	8,154	62,433	62,433	-	-	-	4,484	-	-	-	89,676	146	526,283
4a.0	TOTAL PERIOD 4a COST	302	32,113	12,694	4,190	33,494	40,078	49,563	48,510	220,944	220,889	-	55	184,963	35,493	1,628	600	1,160	10,545,860	209,621	528,393
PERIOD 4b - Site Decontamination																					
Period 4b Direct Decommissioning Activities																					
4b.1.1	Remove spent fuel racks	591	58	103	149	-	2,572	-	986	4,459	4,459	-	-	-	7,653	-	-	-	486,170	906	-
Disposal of Plant Systems																					
4b.1.2.1	ALARA/Radiological	-	16	0	0	8	-	-	5	30	30	-	-	49	-	-	-	-	1,987	247	-
4b.1.2.2	Alternate N2 - RCA	-	16	0	1	16	-	-	7	40	40	-	-	93	-	-	-	-	3,765	185	-
4b.1.2.3	Cranes/Heavy Loads/Rigging - RCA	-	3	0	1	17	-	-	4	25	25	-	-	103	-	-	-	-	4,184	48	-
4b.1.2.4	Decontamination Projects	-	1	0	0	1	-	-	0	2	2	-	-	3	-	-	-	-	125	15	-
4b.1.2.5	Electrical - Contaminated	-	400	5	23	421	-	-	167	1,016	1,016	-	-	2,514	-	-	-	-	102,112	5,633	-
4b.1.2.6	Electrical - Contaminated Fuel Pool	-	42	1	2	42	-	-	17	105	105	-	-	253	-	-	-	-	10,272	592	-
4b.1.2.7	Electrical - Decontam. Fuel Pool Area	-	297	5	23	411	-	-	140	876	876	-	-	2,457	-	-	-	-	99,783	4,090	-
4b.1.2.8	Electrical - Decontaminated	-	2,698	48	218	3,906	-	-	1,298	8,167	8,167	-	-	23,344	-	-	-	-	948,013	37,107	-
4b.1.2.9	Fire - RCA	-	101	1	6	103	-	-	42	253	253	-	-	614	-	-	-	-	24,917	1,324	-
4b.1.2.10	Fire - RCA - Fuel Pool Area	-	11	0	1	10	-	-	4	26	26	-	-	62	-	-	-	-	2,499	143	-
4b.1.2.11	Fuel Pool Cooling & Cleanup	-	387	20	33	343	241	-	216	1,241	1,241	-	-	2,051	712	-	-	-	128,918	5,363	-
4b.1.2.12	Fuel Pool Cooling & Cleanup - Insulated	-	37	2	3	22	24	-	19	107	107	-	-	130	71	-	-	-	9,830	514	-
4b.1.2.13	HVAC Ductwork	-	276	6	26	469	-	-	144	921	921	-	-	2,805	-	-	-	-	113,913	3,539	-
4b.1.2.14	HVAC Ductwork - Fuel Pool Area	-	31	1	3	52	-	-	16	102	102	-	-	312	-	-	-	-	12,657	393	-
4b.1.2.15	HVAC/Chilled Water - RCA	-	324	6	26	461	-	-	155	971	971	-	-	2,752	-	-	-	-	111,779	3,985	-
4b.1.2.16	HVAC/Chilled Water - RCA Fuel Pool Area	-	33	0	2	37	-	-	14	87	87	-	-	223	-	-	-	-	9,072	397	-
4b.1.2.17	Heating & Ventilation	-	433	13	59	1,060	-	-	277	1,842	1,842	-	-	6,334	-	-	-	-	257,243	6,340	-
4b.1.2.18	Heating Boiler - Insulated - RCA	-	3	0	0	4	-	-	1	9	9	-	-	26	-	-	-	-	1,058	35	-
4b.1.2.19	Instrument & Service Air-RCA-Fuel Pool	-	29	1	2	45	-	-	14	91	91	-	-	267	-	-	-	-	10,841	357	-
4b.1.2.20	Liquid Radwaste	-	621	31	57	703	311	-	350	2,072	2,072	-	-	4,203	915	-	-	-	229,422	8,550	-
4b.1.2.21	Makeup Demin - RCA	-	103	3	14	246	-	-	65	431	431	-	-	1,471	-	-	-	-	59,747	1,412	-
4b.1.2.22	Non-Essential Diesel Generator - RCA	-	27	3	13	238	-	-	45	327	327	-	-	1,424	-	-	-	-	57,832	395	-
4b.1.2.23	Off Gas Holdup	-	310	7	34	607	-	-	174	1,133	1,133	-	-	3,629	-	-	-	-	147,355	4,256	-
4b.1.2.24	Primary Containment	-	411	16	77	1,389	-	-	324	2,218	2,218	-	-	8,302	-	-	-	-	337,148	5,729	-
4b.1.2.25	Process Radiation Monitors	-	41	0	2	36	-	-	16	95	95	-	-	213	-	-	-	-	8,667	577	-
4b.1.2.26	Rx Bldg Closed Clng Water - Insul - RCA	-	114	2	9	163	-	-	54	343	343	-	-	977	-	-	-	-	39,675	1,484	-
4b.1.2.27	Rx Bldg Closed Clng Water - RCA	-	184	15	66	1,187	-	-	235	1,687	1,687	-	-	7,093	-	-	-	-	288,031	2,489	-
4b.1.2.28	Rx Component Handling Equip	-	127	11	24	291	139	-	115	708	708	-	-	1,737	415	-	-	-	96,901	1,839	-
4b.1.2.29	Rx Pressure Vessel	-	43	5	5	27	57	-	30	167	167	-	-	161	169	-	-	-	17,375	578	-
4b.1.2.30	Rx Water Cleanup	-	239	16	15	47	214	-	124	655	655	-	-	278	630	-	-	-	51,819	3,264	-
4b.1.2.31	Secondary Containment	-	112	3	13	229	-	-	65	421	421	-	-	1,372	-	-	-	-	55,702	1,569	-
4b.1.2.32	Service & Seal Water - Insulated - RCA	-	120	2	11	197	-	-	62	392	392	-	-	1,180	-	-	-	-	47,917	1,565	-
4b.1.2.33	Service & Seal Water - RCA	-	159	4	17	303	-	-	88	570	570	-	-	1,809	-	-	-	-	73,453	2,016	-
4b.1.2.34	Service Air Blower - RCA	-	15	0	2	34	-	-	9	62	62	-	-	206	-	-	-	-	8,364	206	-
4b.1.2.35	Solid Radwaste	-	446	21	45	567	223	-	261	1,563	1,563	-	-	3,390	659	-	-	-	179,772	6,270	-
4b.1.2.36	Structures & Buildings	-	70	1	4	80	-	-	30	185	185	-	-	477	-	-	-	-	19,351	1,005	-
4b.1.2.37	Wells & Domestic Water	-	10	-	-	-	-	-	1	11	-	-	11	-	-	-	-	-	-	144	-
4b.1.2.38	Wells & Domestic Water - RCA	-	52	1	3	57	-	-	22	136	136	-	-	342	-	-	-	-	13,874	633	-
4b.1.2	Totals	-	8,342	249	841	13,829	1,210	-	4,613	29,085	29,073	-	11	82,654	3,571	-	-	-	3,585,374	114,290	-
4b.1.3	Scaffolding in support of decommissioning	-	3,159	33	19	286	46	-	850	4,394	4,394	-	-	1,545	136	-	-	-	78,166	29,953	-
Decontamination of Site Buildings																					
4b.1.4.1	Reactor Building	4,668	2,596	178	516	8,044	1,181	-	4,580	21,764	21,764	-	-	48,077	7,014	-	-	-	2,317,670	100,718	-
4b.1.4.2	Admin	96	5	0	3	-	15	-	53	172	172	-	-	-	145	-	-	-	6,840	1,421	-
4b.1.4.3	HPCI Room	26	25	1	3	20	14	-	26	115	115	-	-	118	125	-	-	-	10,759	703	-
4b.1.4.4	Hot Shop	15	4	0	2	-	11	-	11	43	43	-	-	-	103	-	-	-	4,860	254	-
4b.1.4.5	LLRW Storage & Shipping	52	22	2	8	5	45	-	45	179	179	-	-	31	433	-	-	-	21,708	1,003	-
4b.1.4.6	Offgas Stack	336	241	7	23	225	82	-	286	1,199	1,199	-	-	1,343	669	-	-	-	87,045	7,924	-
4b.1.4.7	Offgas Storage & Compressor	36	15	1	6	4	33	-	32	128	128	-	-	25	316	-	-	-	15,948	696	-
4b.1.4.8	Radwaste	109	54	3	17	29	96	-	100	410	410	-	-	172	910	-	-	-	49,943	2,229	-
4b.1.4.9	Radwaste Material Storage Warehouse	57	21	2	9	-	52	-	48	189	189	-	-	-	495	-	-	-	23,400	1,062	-
4b.1.4.10	Recombiner	24	22	1	5	33	24	-	30	140	140	-	-	199	216	-	-	-	18,405	616	-

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	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 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
Decontamination of Site Buildings (continued)																					
4b.1.4.11	Turbine	638	314	21	104	215	564	-	588	2,444	2,444	-	-	1,283	5,299	-	-	-	303,150	12,856	-
4b.1.4.12	Turbine Building Addition	53	19	1	8	-	45	-	44	169	169	-	-	-	434	-	-	-	20,478	968	-
4b.1.4.13	Reactor (Post Fuel)	849	2,325	172	913	329	5,301	-	2,535	12,425	12,425	-	-	1,969	50,605	-	-	-	2,471,778	40,860	-
4b.1.4	Totals	6,960	5,663	390	1,617	8,904	7,465	-	8,379	39,378	39,378	-	-	53,216	66,764	-	-	-	5,351,984	171,309	-
4b.1.5	Prepare/submit License Termination Plan	-	-	-	-	-	-	526	79	605	605	-	-	-	-	-	-	-	-	-	4,096
4b.1.6	Receive NRC approval of termination plan									a											
4b.1	Subtotal Period 4b Activity Costs	7,551	17,223	776	2,626	23,019	11,293	526	14,907	77,921	77,910	-	11	137,414	78,124	-	-	-	9,501,694	316,457	4,096
Period 4b Additional Costs																					
4b.2.1	License Termination Survey Planning	-	-	-	-	-	-	1,458	437	1,896	1,896	-	-	-	-	-	-	-	-	-	12,480
4b.2.2	Excavation of Underground Services	-	1,972	-	-	-	-	376	550	2,898	2,898	-	-	-	-	-	-	-	-	12,493	-
4b.2.3	Operational Equipment	-	-	23	92	1,211	-	-	198	1,524	1,524	-	-	11,760	-	-	-	-	294,000	32	-
4b.2.4	License Termination ISFSI	-	57	188	987	-	5,925	3,118	2,569	12,844	12,844	-	-	-	21,949	-	-	-	2,633,402	10,339	14,785
4b.2	Subtotal Period 4b Additional Costs	-	2,029	211	1,079	1,211	5,925	4,952	3,753	19,161	19,161	-	-	11,760	21,949	-	-	-	2,927,402	22,864	27,265
Period 4b Collateral Costs																					
4b.3.1	Process decommissioning water waste	12	-	22	39	-	88	-	36	196	196	-	-	-	202	-	-	-	12,097	39	-
4b.3.3	Small tool allowance	-	397	-	-	-	-	-	60	457	457	-	-	-	-	-	-	-	-	-	-
4b.3.4	Decommissioning Equipment Disposition	-	-	130	82	1,112	178	-	237	1,739	1,739	-	-	6,000	529	-	-	-	303,608	147	-
4b.3	Subtotal Period 4b Collateral Costs	12	397	152	121	1,112	266	-	332	2,392	2,392	-	-	6,000	731	-	-	-	315,705	186	-
Period 4b Period-Dependent Costs																					
4b.4.1	Decon supplies	1,701	-	-	-	-	-	-	425	2,126	2,126	-	-	-	-	-	-	-	-	-	-
4b.4.2	Insurance	-	-	-	-	-	-	1,434	143	1,577	1,577	-	-	-	-	-	-	-	-	-	-
4b.4.3	Property taxes	-	-	-	-	-	-	5,202	520	5,722	5,722	-	-	-	-	-	-	-	-	-	-
4b.4.4	Health physics supplies	-	3,107	-	-	-	-	-	777	3,884	3,884	-	-	-	-	-	-	-	-	-	-
4b.4.5	Heavy equipment rental	-	5,239	-	-	-	-	-	786	6,024	6,024	-	-	-	-	-	-	-	-	-	-
4b.4.6	Disposal of DAW generated	-	-	117	60	-	486	-	142	805	805	-	-	-	5,892	-	-	-	117,848	192	-
4b.4.7	Plant energy budget	-	-	-	-	-	-	2,777	417	3,194	3,194	-	-	-	-	-	-	-	-	-	-
4b.4.8	NRC Fees	-	-	-	-	-	-	986	99	1,085	1,085	-	-	-	-	-	-	-	-	-	-
4b.4.9	Fixed Overhead	-	-	-	-	-	-	4,319	648	4,967	4,967	-	-	-	-	-	-	-	-	-	-
4b.4.10	Liquid Radwaste Processing Equipment/Services	-	-	-	-	-	-	866	130	996	996	-	-	-	-	-	-	-	-	-	-
4b.4.11	Railroad Track Maintenance	-	-	-	-	-	-	255	38	293	293	-	-	-	-	-	-	-	-	-	-
4b.4.12	Remedial Actions Surveys	-	-	-	-	-	-	2,283	343	2,626	2,626	-	-	-	-	-	-	-	-	-	-
4b.4.13	Security Staff Cost	-	-	-	-	-	-	9,052	1,358	10,409	10,409	-	-	-	-	-	-	-	-	-	132,493
4b.4.14	DOC Staff Cost	-	-	-	-	-	-	25,916	3,887	29,803	29,803	-	-	-	-	-	-	-	-	-	284,065
4b.4.15	Utility Staff Cost	-	-	-	-	-	-	32,416	4,862	37,278	37,278	-	-	-	-	-	-	-	-	-	500,294
4b.4	Subtotal Period 4b Period-Dependent Costs	1,701	8,346	117	60	-	486	85,506	14,575	110,790	110,790	-	-	-	5,892	-	-	-	117,848	192	916,853
4b.0	TOTAL PERIOD 4b COST	9,264	27,996	1,255	3,886	25,343	17,969	90,984	33,567	210,264	210,253	-	11	155,174	106,697	-	-	-	12,862,650	339,700	948,214
PERIOD 4f - License Termination																					
Period 4f Direct Decommissioning Activities																					
4f.1.1	ORISE confirmatory survey	-	-	-	-	-	-	166	50	216	216	-	-	-	-	-	-	-	-	-	-
4f.1.2	Terminate license									a											
4f.1	Subtotal Period 4f Activity Costs	-	-	-	-	-	-	166	50	216	216	-	-	-	-	-	-	-	-	-	-
Period 4f Additional Costs																					
4f.2.1	License Termination Survey	-	-	-	-	-	-	6,920	2,076	8,995	8,995	-	-	-	-	-	-	-	-	95,048	6,240
4f.2	Subtotal Period 4f Additional Costs	-	-	-	-	-	-	6,920	2,076	8,995	8,995	-	-	-	-	-	-	-	-	95,048	6,240
Period 4f Collateral Costs																					
4f.3.1	DOC staff relocation expenses	-	-	-	-	-	-	1,264	190	1,454	1,454	-	-	-	-	-	-	-	-	-	-
4f.3	Subtotal Period 4f Collateral Costs	-	-	-	-	-	-	1,264	190	1,454	1,454	-	-	-	-	-	-	-	-	-	-
Period 4f Period-Dependent Costs																					
4f.4.2	Property taxes	-	-	-	-	-	-	1,796	180	1,975	1,975	-	-	-	-	-	-	-	-	-	-
4f.4.3	Health physics supplies	-	705	-	-	-	-	-	176	881	881	-	-	-	-	-	-	-	-	-	-
4f.4.4	Disposal of DAW generated	-	-	7	4	-	29	-	8	48	48	-	-	-	351	-	-	-	7,025	11	-
4f.4.5	Plant energy budget	-	-	-	-	-	-	274	41	315	315	-	-	-	-	-	-	-	-	-	-
4f.4.6	NRC Fees	-	-	-	-	-	-	426	43	468	468	-	-	-	-	-	-	-	-	-	-
4f.4.7	Fixed Overhead	-	-	-	-	-	-	1,597	239	1,836	1,836	-	-	-	-	-	-	-	-	-	-
4f.4.8	Railroad Track Maintenance	-	-	-	-	-	-	94	14	108	108	-	-	-	-	-	-	-	-	-	-
4f.4.9	Security Staff Cost	-	-	-	-	-	-	1,360	204	1,564	1,564	-	-	-	-	-	-	-	-	-	18,805

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	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 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 4f Period-Dependent Costs (continued)																					
4f.4.10	DOC Staff Cost	-	-	-	-	-	-	5,393	809	6,201	6,201	-	-	-	-	-	-	-	-	-	57,200
4f.4.11	Utility Staff Cost	-	-	-	-	-	-	5,275	791	6,066	6,066	-	-	-	-	-	-	-	-	-	74,438
4f.4	Subtotal Period 4f Period-Dependent Costs	-	705	7	4	-	29	16,214	2,506	19,463	19,463	-	-	-	351	-	-	-	7,025	11	150,444
4f.0	TOTAL PERIOD 4f COST	-	705	7	4	-	29	24,563	4,821	30,128	30,128	-	-	-	351	-	-	-	7,025	95,059	156,684
PERIOD 4 TOTALS		9,566	60,813	13,956	8,079	58,837	58,076	165,111	86,898	461,337	461,270	-	66	340,138	142,540	1,628	600	1,160	23,415,530	644,379	1,633,290
PERIOD 5b - Site Restoration																					
Period 5b Direct Decommissioning Activities																					
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	Discharge Retention Basin	-	4	-	-	-	-	-	1	5	-	-	5	-	-	-	-	-	-	25	-
5b.1.1.4	HPCI Room	-	19	-	-	-	-	-	3	22	-	-	22	-	-	-	-	-	-	97	-
5b.1.1.5	Hot Shop	-	16	-	-	-	-	-	2	19	-	-	19	-	-	-	-	-	-	177	-
5b.1.1.6	Hydrogen & Oxygen Storage	-	2	-	-	-	-	-	0	2	-	-	2	-	-	-	-	-	-	19	-
5b.1.1.7	LLRW Storage & Shipping	-	83	-	-	-	-	-	12	95	-	-	95	-	-	-	-	-	-	662	-
5b.1.1.8	MSIV	-	4	-	-	-	-	-	1	4	-	-	4	-	-	-	-	-	-	42	-
5b.1.1.9	Misc Structures 2017	-	1,410	-	-	-	-	-	212	1,622	-	-	1,622	-	-	-	-	-	-	13,042	-
5b.1.1.10	Offgas Stack	-	108	-	-	-	-	-	16	124	-	-	124	-	-	-	-	-	-	544	-
5b.1.1.11	Offgas Storage & Compressor	-	39	-	-	-	-	-	6	45	-	-	45	-	-	-	-	-	-	199	-
5b.1.1.12	Radwaste	-	228	-	-	-	-	-	34	262	-	-	262	-	-	-	-	-	-	1,220	-
5b.1.1.13	Recombiner	-	128	-	-	-	-	-	19	147	-	-	147	-	-	-	-	-	-	713	-
5b.1.1.14	Security Barrier	-	186	-	-	-	-	-	28	214	-	-	214	-	-	-	-	-	-	933	-
5b.1.1.15	Structures Greater than 3' Below Grade	-	2,461	-	-	-	-	-	369	2,830	-	-	2,830	-	-	-	-	-	-	12,649	-
5b.1.1.16	Tank Farm	-	4	-	-	-	-	-	1	5	-	-	5	-	-	-	-	-	-	21	-
5b.1.1.17	Turbine	-	1,259	-	-	-	-	-	189	1,448	-	-	1,448	-	-	-	-	-	-	13,036	-
5b.1.1.18	Turbine Building Addition	-	55	-	-	-	-	-	8	63	-	-	63	-	-	-	-	-	-	618	-
5b.1.1.19	Turbine Pedestal	-	182	-	-	-	-	-	27	209	-	-	209	-	-	-	-	-	-	926	-
5b.1.1	Totals	-	8,169	-	-	-	-	-	1,225	9,394	-	-	9,394	-	-	-	-	-	-	58,885	-
Site Closeout Activities																					
5b.1.2	Grade & landscape site	-	896	-	-	-	-	-	134	1,031	-	-	1,031	-	-	-	-	-	-	1,841	-
5b.1.3	Final report to NRC	-	-	-	-	-	-	200	30	231	231	-	-	-	-	-	-	-	-	-	1,560
5b.1	Subtotal Period 5b Activity Costs	-	9,065	-	-	-	-	200	1,390	10,655	231	-	10,425	-	-	-	-	-	-	60,726	1,560
Period 5b Additional Costs																					
5b.2.1	Clean 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 Debris	-	-	-	-	-	-	1,170	176	1,346	-	-	1,346	-	-	-	-	-	-	-	-
5b.2.4	Backfill	-	5,583	-	-	-	-	-	837	6,421	-	-	6,421	-	-	-	-	-	-	5,422	-
5b.2.5	Discharge Structure Cofferdam	-	442	-	-	-	-	-	66	508	-	-	508	-	-	-	-	-	-	3,552	-
5b.2.6	Demolition and Site Restoration of ISFSI	-	1,486	-	-	-	-	233	258	1,977	-	-	1,977	-	-	-	-	-	-	6,957	160
5b.2	Subtotal Period 5b Additional Costs	-	11,168	-	-	-	-	1,416	1,888	14,472	-	-	14,472	-	-	-	-	-	-	18,527	160
Period 5b Collateral Costs																					
5b.3.1	Small tool allowance	-	121	-	-	-	-	-	18	139	-	-	139	-	-	-	-	-	-	-	-
5b.3	Subtotal Period 5b Collateral Costs	-	121	-	-	-	-	-	18	139	-	-	139	-	-	-	-	-	-	-	-
Period 5b Period-Dependent Costs																					
5b.4.2	Property taxes	-	-	-	-	-	-	4,602	460	5,062	-	-	5,062	-	-	-	-	-	-	-	-
5b.4.3	Heavy equipment rental	-	5,842	-	-	-	-	-	876	6,719	-	-	6,719	-	-	-	-	-	-	-	-
5b.4.4	Plant energy budget	-	-	-	-	-	-	315	47	362	-	-	362	-	-	-	-	-	-	-	-
5b.4.5	Fixed Overhead	-	-	-	-	-	-	1,122	168	1,290	-	-	1,290	-	-	-	-	-	-	-	-
5b.4.6	Railroad Track Maintenance	-	-	-	-	-	-	217	33	249	-	-	249	-	-	-	-	-	-	-	-
5b.4.7	Security Staff Cost	-	-	-	-	-	-	3,131	470	3,601	-	-	3,601	-	-	-	-	-	-	-	43,287
5b.4.8	DOC Staff Cost	-	-	-	-	-	-	11,729	1,759	13,489	-	-	13,489	-	-	-	-	-	-	-	122,646
5b.4.9	Utility Staff Cost	-	-	-	-	-	-	4,931	740	5,671	-	-	5,671	-	-	-	-	-	-	-	70,341
5b.4	Subtotal Period 5b Period-Dependent Costs	-	5,842	-	-	-	-	26,047	4,553	36,443	-	-	36,443	-	-	-	-	-	-	-	236,274
5b.0	TOTAL PERIOD 5b COST	-	26,196	-	-	-	-	27,664	7,849	61,709	231	-	61,478	-	-	-	-	-	-	79,253	237,994

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	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 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 5 TOTALS		-	26,196	-	-	-	-	27,664	7,849	61,709	231	-	61,478	-	-	-	-	-	-	79,253	237,994
TOTAL COST TO DECOMMISSION		21,259	100,203	14,399	8,640	58,852	59,775	1,282,791	255,109	1,801,028	1,258,686	479,749	62,593	340,180	153,105	1,628	600	1,160	23,725,930	876,199	9,098,058

TOTAL COST TO DECOMMISSION WITH 16.5% CONTINGENCY:	**$1,801,028**	**thousands of 2020 dollars**
TOTAL NRC LICENSE TERMINATION COST IS 69.89% OR:	**$1,258,686**	**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:	**$62,593**	**thousands of 2020 dollars**
TOTAL LOW-LEVEL RADIOACTIVE WASTE VOLUME BURIED (EXCLUDING GTCC):	**155,332**	**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:	**876,199**	**Man-hours**

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

APPENDIX H

DETAILED COST ANALYSIS

SCENARIO 6: SAFSTOR with 60 Year DFS

Table H
Monticello Nuclear Generating Plant
SAFSTOR 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 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 1a - Shutdown through Transition																					
Period 1a Direct Decommissioning Activities																					
1a.1.1	SAFSTOR site characterization survey	-	-	-	-	-	-	415	124	539	539	-	-	-	-	-	-	-	-	-	-
1a.1.2	Prepare preliminary decommissioning cost	-	-	-	-	-	-	167	25	192	192	-	-	-	-	-	-	-	-	-	1,300
1a.1.3	Notification of Cessation of Operations									a											
1a.1.4	Remove fuel & source material									n/a											
1a.1.5	Notification of Permanent Defueling									a											
1a.1.6	Deactivate plant systems & process waste									a											
1a.1.7	Prepare and submit PSDAR	-	-	-	-	-	-	257	39	296	296	-	-	-	-	-	-	-	-	-	2,000
1a.1.8	Review plant dwgs & specs.	-	-	-	-	-	-	167	25	192	192	-	-	-	-	-	-	-	-	-	1,300
1a.1.9	Perform detailed rad survey									a											
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	Define major work sequence	-	-	-	-	-	-	129	19	148	148	-	-	-	-	-	-	-	-	-	1,000
1a.1.14	Perform SER and EA	-	-	-	-	-	-	398	60	458	458	-	-	-	-	-	-	-	-	-	3,100
1a.1.15	Perform Site-Specific Cost Study	-	-	-	-	-	-	643	96	739	739	-	-	-	-	-	-	-	-	-	5,000
Activity Specifications																					
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	-	-	-	-	-	-	-	-	-	3,120
1a.1.16.4	Waste management	-	-	-	-	-	-	257	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
Detailed Work Procedures																					
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	Procure vacuum drying system	-	-	-	-	-	-	13	2	15	15	-	-	-	-	-	-	-	-	-	100
1a.1.19	Drain/de-energize non-cont. systems									a											
1a.1.20	Drain & dry NSSS									a											
1a.1.21	Drain/de-energize contaminated systems									a											
1a.1.22	Decon/secure contaminated systems									a											
1a.1	Subtotal Period 1a Activity Costs	-	-	-	-	-	-	5,027	816	5,844	5,844	-	-	-	-	-	-	-	-	-	35,890
Period 1a Collateral Costs																					
1a.3.1	Spent Fuel Capital and Transfer	-	-	-	-	-	-	1,323	198	1,522	-	1,522	-	-	-	-	-	-	-	-	-
1a.3.2	Retention and Severance	-	-	-	-	-	-	9,892	1,484	11,376	11,376	-	-	-	-	-	-	-	-	-	-
1a.3	Subtotal Period 1a Collateral Costs	-	-	-	-	-	-	11,215	1,682	12,897	11,376	1,522	-	-	-	-	-	-	-	-	-
Period 1a Period-Dependent Costs																					
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 physics supplies	-	614	-	-	-	-	-	153	767	767	-	-	-	-	-	-	-	-	-	-
1a.4.4	Heavy equipment rental	-	753	-	-	-	-	-	113	866	866	-	-	-	-	-	-	-	-	-	-
1a.4.5	Disposal of DAW generated	-	-	12	6	-	50	-	15	83	83	-	-	-	610	-	-	-	12,190	20	-
1a.4.6	Plant energy budget	-	-	-	-	-	-	1,817	272	2,089	2,089	-	-	-	-	-	-	-	-	-	-
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	Fixed Overhead	-	-	-	-	-	-	2,616	392	3,009	3,009	-	-	-	-	-	-	-	-	-	-
1a.4.10	Spent Fuel Pool O&M	-	-	-	-	-	-	845	127	971	-	971	-	-	-	-	-	-	-	-	-
1a.4.11	ISFSI Operating Costs	-	-	-	-	-	-	112	17	129	-	129	-	-	-	-	-	-	-	-	-
1a.4.12	Railroad Track Maintenance	-	-	-	-	-	-	125	19	144	144	-	-	-	-	-	-	-	-	-	-
1a.4.13	Security Staff Cost	-	-	-	-	-	-	16,372	2,456	18,827	18,827	-	-	-	-	-	-	-	-	-	245,440
1a.4.14	Utility Staff Cost	-	-	-	-	-	-	27,285	4,093	31,378	31,378	-	-	-	-	-	-	-	-	-	422,240
1a.4	Subtotal Period 1a Period-Dependent Costs	-	1,367	12	6	-	50	59,389	8,679	69,502	64,632	4,870	-	-	610	-	-	-	12,190	20	667,680
1a.0	TOTAL PERIOD 1a COST	-	1,367	12	6	-	50	75,631	11,177	88,244	81,852	6,392	-	-	610	-	-	-	12,190	20	703,570

Table H
Monticello Nuclear Generating Plant
SAFSTOR 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 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 1b - SAFSTOR Limited DECON Activities																					
Period 1b Direct Decommissioning Activities																					
Decontamination of Site Buildings																					
1b.1.1.1	Reactor Building	5,155	-	-	-	-	-	-	2,577	7,732	7,732	-	-	-	-	-	-	-	-	70,157	-
1b.1.1.2	Admin	106	-	-	-	-	-	-	53	159	159	-	-	-	-	-	-	-	-	1,526	-
1b.1.1.3	HPCI Room	28	-	-	-	-	-	-	14	42	42	-	-	-	-	-	-	-	-	391	-
1b.1.1.4	Hot Shop	16	-	-	-	-	-	-	8	24	24	-	-	-	-	-	-	-	-	234	-
1b.1.1.5	LLRW Storage & Shipping	54	-	-	-	-	-	-	27	82	82	-	-	-	-	-	-	-	-	788	-
1b.1.1.6	Offgas Stack	362	-	-	-	-	-	-	181	542	542	-	-	-	-	-	-	-	-	5,112	-
1b.1.1.7	Offgas Storage & Compressor	38	-	-	-	-	-	-	19	57	57	-	-	-	-	-	-	-	-	550	-
1b.1.1.8	Radwaste	114	-	-	-	-	-	-	57	171	171	-	-	-	-	-	-	-	-	1,647	-
1b.1.1.9	Radwaste Material Storage Warehouse	60	-	-	-	-	-	-	30	90	90	-	-	-	-	-	-	-	-	864	-
1b.1.1.10	Recombiner	25	-	-	-	-	-	-	13	38	38	-	-	-	-	-	-	-	-	363	-
1b.1.1.11	Turbine	664	-	-	-	-	-	-	332	996	996	-	-	-	-	-	-	-	-	9,600	-
1b.1.1.12	Turbine Building Addition	55	-	-	-	-	-	-	27	82	82	-	-	-	-	-	-	-	-	793	-
1b.1.1.13	Reactor (Post Fuel)	924	-	-	-	-	-	-	462	1,386	1,386	-	-	-	-	-	-	-	-	12,653	-
1b.1.1	Totals	7,601	-	-	-	-	-	-	3,800	11,401	11,401	-	-	-	-	-	-	-	-	104,679	-
1b.1	Subtotal Period 1b Activity Costs	7,601	-	-	-	-	-	-	3,800	11,401	11,401	-	-	-	-	-	-	-	-	104,679	-
Period 1b Additional Costs																					
1b.2.1	Spent Fuel Pool Isolation	-	-	-	-	-	-	12,675	1,901	14,576	14,576	-	-	-	-	-	-	-	-	-	-
1b.2	Subtotal Period 1b Additional Costs	-	-	-	-	-	-	12,675	1,901	14,576	14,576	-	-	-	-	-	-	-	-	-	-
Period 1b Collateral Costs																					
1b.3.1	Decon equipment	1,055	-	-	-	-	-	-	158	1,213	1,213	-	-	-	-	-	-	-	-	-	-
1b.3.2	Process decommissioning water waste	220	-	146	259	-	589	-	310	1,523	1,523	-	-	-	1,352	-	-	-	81,127	264	-
1b.3.4	Small tool allowance	-	130	-	-	-	-	-	20	150	150	-	-	-	-	-	-	-	-	-	-
1b.3.5	Spent Fuel Capital and Transfer	-	-	-	-	-	-	196	29	225	-	225	-	-	-	-	-	-	-	-	-
1b.3.6	Retention and Severance	-	-	-	-	-	-	3,601	540	4,141	4,141	-	-	-	-	-	-	-	-	-	-
1b.3	Subtotal Period 1b Collateral Costs	1,275	130	146	259	-	589	3,796	1,058	7,252	7,027	225	-	-	1,352	-	-	-	81,127	264	-
Period 1b Period-Dependent Costs																					
1b.4.1	Decon supplies	1,562	-	-	-	-	-	-	391	1,953	1,953	-	-	-	-	-	-	-	-	-	-
1b.4.2	Insurance	-	-	-	-	-	-	580	58	638	638	-	-	-	-	-	-	-	-	-	-
1b.4.3	Property taxes	-	-	-	-	-	-	890	89	979	979	-	-	-	-	-	-	-	-	-	-
1b.4.4	Health physics supplies	-	750	-	-	-	-	-	187	937	937	-	-	-	-	-	-	-	-	-	-
1b.4.5	Heavy equipment rental	-	188	-	-	-	-	-	28	216	216	-	-	-	-	-	-	-	-	-	-
1b.4.6	Disposal of DAW generated	-	-	12	6	-	48	-	14	80	80	-	-	-	588	-	-	-	11,769	19	-
1b.4.7	Plant energy budget	-	-	-	-	-	-	453	68	521	521	-	-	-	-	-	-	-	-	-	-
1b.4.8	NRC Fees	-	-	-	-	-	-	161	16	177	177	-	-	-	-	-	-	-	-	-	-
1b.4.9	Emergency Planning Fees	-	-	-	-	-	-	708	71	779	-	779	-	-	-	-	-	-	-	-	-
1b.4.10	Fixed Overhead	-	-	-	-	-	-	652	98	750	750	-	-	-	-	-	-	-	-	-	-
1b.4.11	Spent Fuel Pool O&M	-	-	-	-	-	-	211	32	242	-	242	-	-	-	-	-	-	-	-	-
1b.4.12	ISFSI Operating Costs	-	-	-	-	-	-	28	4	32	-	32	-	-	-	-	-	-	-	-	-
1b.4.13	Railroad Track Maintenance	-	-	-	-	-	-	31	5	36	36	-	-	-	-	-	-	-	-	-	-
1b.4.14	Security Staff Cost	-	-	-	-	-	-	4,082	612	4,694	4,694	-	-	-	-	-	-	-	-	-	61,192
1b.4.15	Utility Staff Cost	-	-	-	-	-	-	6,803	1,020	7,823	7,823	-	-	-	-	-	-	-	-	-	105,271
1b.4	Subtotal Period 1b Period-Dependent Costs	1,562	938	12	6	-	48	14,599	2,693	19,858	18,805	1,053	-	-	588	-	-	-	11,769	19	166,463
1b.0	TOTAL PERIOD 1b COST	10,438	1,068	157	265	-	637	31,070	9,453	53,088	51,810	1,278	-	-	1,941	-	-	-	92,896	104,962	166,463
PERIOD 1c - Preparations for SAFSTOR Dormancy																					
Period 1c Direct Decommissioning Activities																					
1c.1.1	Prepare support equipment for storage	-	527	-	-	-	-	-	79	606	606	-	-	-	-	-	-	-	-	3,000	-
1c.1.2	Install containment pressure equal. lines	-	54	-	-	-	-	-	8	62	62	-	-	-	-	-	-	-	-	700	-
1c.1.3	Interim survey prior to dormancy	-	-	-	-	-	-	733	220	953	953	-	-	-	-	-	-	-	-	12,801	-
1c.1.4	Secure building accesses									a											
1c.1.5	Prepare & submit interim report	-	-	-	-	-	-	75	11	86	86	-	-	-	-	-	-	-	-	-	583
1c.1	Subtotal Period 1c Activity Costs	-	581	-	-	-	-	808	318	1,707	1,707	-	-	-	-	-	-	-	-	16,501	583

Table H
Monticello Nuclear Generating Plant
SAFSTOR 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 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 1c Collateral Costs																					
1c.3.1	Process decommissioning water waste	161	-	107	190	-	433	-	228	1,120	1,120	-	-	-	994	-	-	-	59,653	194	-
1c.3.3	Small tool allowance	-	5	-	-	-	-	-	1	6	6	-	-	-	-	-	-	-	-	-	-
1c.3.4	Spent Fuel Capital and Transfer	-	-	-	-	-	-	195	29	225	-	225	-	-	-	-	-	-	-	-	-
1c.3.5	Retention and Severance	-	-	-	-	-	-	2,734	410	3,145	3,145	-	-	-	-	-	-	-	-	-	-
1c.3	Subtotal Period 1c Collateral Costs	161	5	107	190	-	433	2,930	668	4,495	4,270	225	-	-	994	-	-	-	59,653	194	-
Period 1c Period-Dependent Costs																					
1c.4.1	Insurance	-	-	-	-	-	-	580	58	638	638	-	-	-	-	-	-	-	-	-	-
1c.4.2	Property taxes	-	-	-	-	-	-	888	89	977	977	-	-	-	-	-	-	-	-	-	-
1c.4.3	Health physics supplies	-	248	-	-	-	-	-	62	310	310	-	-	-	-	-	-	-	-	-	-
1c.4.4	Heavy equipment rental	-	188	-	-	-	-	-	28	216	216	-	-	-	-	-	-	-	-	-	-
1c.4.5	Disposal of DAW generated	-	-	3	2	-	13	-	4	21	21	-	-	-	152	-	-	-	3,039	5	-
1c.4.6	Plant energy budget	-	-	-	-	-	-	453	68	521	521	-	-	-	-	-	-	-	-	-	-
1c.4.7	NRC Fees	-	-	-	-	-	-	161	16	177	177	-	-	-	-	-	-	-	-	-	-
1c.4.8	Emergency Planning Fees	-	-	-	-	-	-	708	71	779	-	779	-	-	-	-	-	-	-	-	-
1c.4.9	Fixed Overhead	-	-	-	-	-	-	652	98	750	750	-	-	-	-	-	-	-	-	-	-
1c.4.10	Spent Fuel Pool O&M	-	-	-	-	-	-	211	32	242	-	242	-	-	-	-	-	-	-	-	-
1c.4.11	ISFSI Operating Costs	-	-	-	-	-	-	28	4	32	-	32	-	-	-	-	-	-	-	-	-
1c.4.12	Railroad Track Maintenance	-	-	-	-	-	-	31	5	36	36	-	-	-	-	-	-	-	-	-	-
1c.4.13	Security Staff Cost	-	-	-	-	-	-	4,082	612	4,694	4,694	-	-	-	-	-	-	-	-	-	61,192
1c.4.14	Utility Staff Cost	-	-	-	-	-	-	6,803	1,020	7,823	7,823	-	-	-	-	-	-	-	-	-	105,271
1c.4	Subtotal Period 1c Period-Dependent Costs	-	436	3	2	-	13	14,597	2,166	17,216	16,163	1,053	-	-	152	-	-	-	3,039	5	166,463
1c.0	TOTAL PERIOD 1c COST	161	1,021	110	192	-	446	18,335	3,153	23,418	22,140	1,278	-	-	1,146	-	-	-	62,692	16,700	167,046
PERIOD 1 TOTALS		10,599	3,456	279	463	-	1,133	125,036	23,783	164,750	155,802	8,948	-	-	3,696	-	-	-	167,779	121,681	1,037,079
PERIOD 2a - SAFSTOR Dormancy with Wet Spent Fuel Storage																					
Period 2a Direct Decommissioning Activities																					
2a.1.1	Quarterly Inspection									a											
2a.1.2	Semi-annual environmental survey									a											
2a.1.3	Prepare reports									a											
2a.1.4	Bituminous roof replacement	-	-	-	-	-	-	155	23	178	178	-	-	-	-	-	-	-	-	-	-
2a.1.5	Maintenance supplies	-	-	-	-	-	-	349	87	437	437	-	-	-	-	-	-	-	-	-	-
2a.1	Subtotal Period 2a Activity Costs	-	-	-	-	-	-	504	111	615	615	-	-	-	-	-	-	-	-	-	-
Period 2a Additional Costs																					
2a.2.1	Security Modifications	-	-	-	-	-	-	8,696	1,304	10,000	10,000	-	-	-	-	-	-	-	-	-	-
2a.2	Subtotal Period 2a Additional Costs	-	-	-	-	-	-	8,696	1,304	10,000	10,000	-	-	-	-	-	-	-	-	-	-
Period 2a Collateral Costs																					
2a.3.1	Spent Fuel Capital and Transfer	-	-	-	-	-	-	130,915	19,637	150,553	-	150,553	-	-	-	-	-	-	-	-	-
2a.3.2	Retention and Severance	-	-	-	-	-	-	19,427	2,914	22,341	22,341	-	-	-	-	-	-	-	-	-	-
2a.3	Subtotal Period 2a Collateral Costs	-	-	-	-	-	-	150,342	22,551	172,893	22,341	150,553	-	-	-	-	-	-	-	-	-
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	Health physics supplies	-	617	-	-	-	-	-	154	771	771	-	-	-	-	-	-	-	-	-	-
2a.4.4	Disposal of DAW generated	-	-	11	6	-	47	-	14	79	79	-	-	-	576	-	-	-	11,523	19	-
2a.4.5	Plant energy budget	-	-	-	-	-	-	910	136	1,046	1,046	-	-	-	-	-	-	-	-	-	-
2a.4.6	NRC Fees	-	-	-	-	-	-	610	61	671	671	-	-	-	-	-	-	-	-	-	-
2a.4.7	Emergency Planning Fees	-	-	-	-	-	-	7,110	711	7,821	-	7,821	-	-	-	-	-	-	-	-	-
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	-	2,432	-	-	-	-	-	-	-	-	-
2a.4.10	ISFSI Operating Costs	-	-	-	-	-	-	280	42	322	-	322	-	-	-	-	-	-	-	-	-
2a.4.11	Railroad Track Maintenance	-	-	-	-	-	-	639	96	735	735	-	-	-	-	-	-	-	-	-	-
2a.4.12	Security Staff Cost	-	-	-	-	-	-	37,806	5,671	43,477	31,086	12,391	-	-	-	-	-	-	-	-	562,523
2a.4.13	Utility Staff Cost	-	-	-	-	-	-	13,543	2,031	15,574	12,615	2,959	-	-	-	-	-	-	-	-	205,738
2a.4	Subtotal Period 2a Period-Dependent Costs	-	617	11	6	-	47	79,012	11,099	90,793	64,868	25,925	-	-	576	-	-	-	11,523	19	768,261
2a.0	TOTAL PERIOD 2a COST	-	617	11	6	-	47	238,554	35,065	274,301	97,823	176,478	-	-	576	-	-	-	11,523	19	768,261

Table H
Monticello Nuclear Generating Plant
SAFSTOR 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 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 - SAFSTOR Dormancy with Dry Spent Fuel Storage																					
Period 2b Direct Decommissioning Activities																					
2b.1.1	Quarterly Inspection									a											
2b.1.2	Semi-annual environmental survey									a											
2b.1.3	Prepare reports									a											
2b.1.4	Bituminous roof replacement	-	-	-	-	-	-	3,127	469	3,596	3,596	-	-	-	-	-	-	-	-	-	-
2b.1.5	Maintenance supplies	-	-	-	-	-	-	7,065	1,766	8,831	8,831	-	-	-	-	-	-	-	-	-	-
2b.1	Subtotal Period 2b Activity Costs	-	-	-	-	-	-	10,192	2,235	12,427	12,427	-	-	-	-	-	-	-	-	-	-
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	-	-	-	-	-	-	35,606	3,561	39,167	39,167	-	-	-	-	-	-	-	-	-	-
2b.4.2	Property taxes	-	-	-	-	-	-	180,613	18,061	198,674	198,674	-	-	-	-	-	-	-	-	-	-
2b.4.3	Health physics supplies	-	6,047	-	-	-	-	-	1,512	7,559	7,559	-	-	-	-	-	-	-	-	-	-
2b.4.4	Disposal of DAW generated	-	-	111	57	-	461	-	135	764	764	-	-	-	5,595	-	-	-	111,903	182	-
2b.4.5	Plant energy budget	-	-	-	-	-	-	9,196	1,379	10,576	10,576	-	-	-	-	-	-	-	-	-	-
2b.4.6	NRC Fees	-	-	-	-	-	-	11,515	1,152	12,667	12,667	-	-	-	-	-	-	-	-	-	-
2b.4.7	Emergency Planning Fees	-	-	-	-	-	-	7,506	751	8,256	-	8,256	-	-	-	-	-	-	-	-	-
2b.4.8	Fixed Overhead	-	-	-	-	-	-	10,904	1,636	12,540	12,540	-	-	-	-	-	-	-	-	-	-
2b.4.9	ISFSI Operating Costs	-	-	-	-	-	-	5,666	850	6,516	-	6,516	-	-	-	-	-	-	-	-	-
2b.4.10	Railroad Track Maintenance	-	-	-	-	-	-	6,330	950	7,280	7,280	-	-	-	-	-	-	-	-	-	-
2b.4.11	Security Staff Cost	-	-	-	-	-	-	280,802	42,120	322,922	72,658	250,265	-	-	-	-	-	-	-	-	3,790,775
2b.4.12	Utility Staff Cost	-	-	-	-	-	-	114,547	17,182	131,729	71,924	59,805	-	-	-	-	-	-	-	-	1,684,789
2b.4	Subtotal Period 2b Period-Dependent Costs	-	6,047	111	57	-	461	662,686	89,288	758,650	433,808	324,843	-	-	5,595	-	-	-	111,903	182	5,475,563
2b.0	TOTAL PERIOD 2b COST	-	6,047	111	57	-	461	746,299	102,536	855,512	446,234	409,278	-	-	5,595	-	-	-	111,903	182	5,475,563
PERIOD 2 TOTALS		-	6,664	122	63	-	509	984,854	137,602	1,129,813	544,057	585,756	-	-	6,171	-	-	-	123,426	201	6,243,824
PERIOD 3a - Reactivate Site Following SAFSTOR Dormancy																					
Period 3a Direct Decommissioning Activities																					
3a.1.1	Prepare preliminary decommissioning cost	-	-	-	-	-	-	167	25	192	192	-	-	-	-	-	-	-	-	-	1,300
3a.1.2	Review plant dwgs & specs.	-	-	-	-	-	-	591	89	680	680	-	-	-	-	-	-	-	-	-	4,600
3a.1.3	Perform detailed rad survey									a											
3a.1.4	End product description	-	-	-	-	-	-	129	19	148	148	-	-	-	-	-	-	-	-	-	1,000
3a.1.5	Detailed by-product inventory	-	-	-	-	-	-	167	25	192	192	-	-	-	-	-	-	-	-	-	1,300
3a.1.6	Define major work sequence	-	-	-	-	-	-	964	145	1,108	1,108	-	-	-	-	-	-	-	-	-	7,500
3a.1.7	Perform SER and EA	-	-	-	-	-	-	398	60	458	458	-	-	-	-	-	-	-	-	-	3,100
3a.1.8	Prepare/submit Defueled Technical Specifications	-	-	-	-	-	-	964	145	1,108	1,108	-	-	-	-	-	-	-	-	-	7,500
3a.1.9	Perform Site-Specific Cost Study	-	-	-	-	-	-	643	96	739	739	-	-	-	-	-	-	-	-	-	5,000
3a.1.10	Prepare/submit Irradiated Fuel Management Plan	-	-	-	-	-	-	129	19	148	148	-	-	-	-	-	-	-	-	-	1,000
Activity Specifications																					
3a.1.11.1	Re-activate plant & temporary facilities	-	-	-	-	-	-	947	142	1,089	980	-	109	-	-	-	-	-	-	-	7,370
3a.1.11.2	Plant systems	-	-	-	-	-	-	536	80	616	554	-	62	-	-	-	-	-	-	-	4,167
3a.1.11.3	Reactor internals	-	-	-	-	-	-	912	137	1,049	1,049	-	-	-	-	-	-	-	-	-	7,100
3a.1.11.4	Reactor vessel	-	-	-	-	-	-	835	125	961	961	-	-	-	-	-	-	-	-	-	6,500
3a.1.11.5	Sacrificial shield	-	-	-	-	-	-	64	10	74	74	-	-	-	-	-	-	-	-	-	500
3a.1.11.6	Moisture separators/reheaters	-	-	-	-	-	-	129	19	148	148	-	-	-	-	-	-	-	-	-	1,000
3a.1.11.7	Reinforced concrete	-	-	-	-	-	-	206	31	236	118	-	118	-	-	-	-	-	-	-	1,600
3a.1.11.8	Main Turbine	-	-	-	-	-	-	268	40	309	309	-	-	-	-	-	-	-	-	-	2,088
3a.1.11.9	Main Condensers	-	-	-	-	-	-	268	40	309	309	-	-	-	-	-	-	-	-	-	2,088
3a.1.11.10	Pressure suppression structure	-	-	-	-	-	-	257	39	296	296	-	-	-	-	-	-	-	-	-	2,000
3a.1.11.11	Drywell	-	-	-	-	-	-	206	31	236	236	-	-	-	-	-	-	-	-	-	1,600
3a.1.11.12	Plant structures & buildings	-	-	-	-	-	-	401	60	461	231	-	231	-	-	-	-	-	-	-	3,120
3a.1.11.13	Waste management	-	-	-	-	-	-	591	89	680	680	-	-	-	-	-	-	-	-	-	4,600
3a.1.11.14	Facility & site closeout	-	-	-	-	-	-	116	17	133	67	-	67	-	-	-	-	-	-	-	900
3a.1.11	Total	-	-	-	-	-	-	5,736	860	6,597	6,011	-	586	-	-	-	-	-	-	-	44,633
Planning & Site Preparations																					
3a.1.12	Prepare dismantling sequence	-	-	-	-	-	-	308	46	355	355	-	-	-	-	-	-	-	-	-	2,400
3a.1.13	Plant prep. & temp. svces	-	-	-	-	-	-	3,500	525	4,025	4,025	-	-	-	-	-	-	-	-	-	-
3a.1.14	Design water clean-up system	-	-	-	-	-	-	180	27	207	207	-	-	-	-	-	-	-	-	-	1,400

Table H
Monticello Nuclear Generating Plant
SAFSTOR 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 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
Planning & Site Preparations (continued)																					
3a.1.15	Rigging/Cont. Cntrl Envlps/tooling/etc.	-	-	-	-	-	-	2,400	360	2,760	2,760	-	-	-	-	-	-	-	-	-	-
3a.1.16	Procure casks/liners & containers	-	-	-	-	-	-	158	24	182	182	-	-	-	-	-	-	-	-	-	1,230
3a.1	Subtotal Period 3a Activity Costs	-	-	-	-	-	-	16,434	2,465	18,899	18,313	-	586	-	-	-	-	-	-	-	81,963
Period 3a Additional Costs																					
3a.2.1	Site Characterization	-	-	-	-	-	-	5,930	1,779	7,708	7,708	-	-	-	-	-	-	-	-	30,500	10,852
3a.2.2	Mixed & RCRA Waste	-	-	28	29	14	-	-	9	80	80	-	-	43	-	-	-	-	5,253	161	-
3a.2	Subtotal Period 3a Additional Costs	-	-	28	29	14	-	5,930	1,788	7,788	7,788	-	-	43	-	-	-	-	5,253	30,661	10,852
Period 3a Collateral Costs																					
3a.3.1	Spent Fuel Capital and Transfer	-	-	-	-	-	-	1,805	271	2,076	-	2,076	-	-	-	-	-	-	-	-	-
3a.3	Subtotal Period 3a Collateral Costs	-	-	-	-	-	-	1,805	271	2,076	-	2,076	-	-	-	-	-	-	-	-	-
Period 3a Period-Dependent Costs																					
3a.4.1	Insurance	-	-	-	-	-	-	703	70	774	442	332	-	-	-	-	-	-	-	-	-
3a.4.2	Property taxes	-	-	-	-	-	-	3,479	348	3,827	3,241	586	-	-	-	-	-	-	-	-	-
3a.4.3	Health physics supplies	-	538	-	-	-	-	-	135	673	673	-	-	-	-	-	-	-	-	-	-
3a.4.4	Heavy equipment rental	-	753	-	-	-	-	-	113	866	866	-	-	-	-	-	-	-	-	-	-
3a.4.5	Disposal of DAW generated	-	-	10	5	-	42	-	12	70	70	-	-	-	516	-	-	-	10,311	17	-
3a.4.6	Plant energy budget	-	-	-	-	-	-	1,817	272	2,089	2,089	-	-	-	-	-	-	-	-	-	-
3a.4.7	NRC Fees	-	-	-	-	-	-	335	33	368	368	-	-	-	-	-	-	-	-	-	-
3a.4.8	Emergency Planning Fees	-	-	-	-	-	-	148	15	163	-	163	-	-	-	-	-	-	-	-	-
3a.4.9	Fixed Overhead	-	-	-	-	-	-	2,616	392	3,009	3,009	-	-	-	-	-	-	-	-	-	-
3a.4.10	ISFSI Operating Costs	-	-	-	-	-	-	112	17	129	-	129	-	-	-	-	-	-	-	-	-
3a.4.11	Railroad Track Maintenance	-	-	-	-	-	-	125	19	144	144	-	-	-	-	-	-	-	-	-	-
3a.4.12	Security Staff Cost	-	-	-	-	-	-	4,690	703	5,393	5,107	286	-	-	-	-	-	-	-	-	69,160
3a.4.13	Utility Staff Cost	-	-	-	-	-	-	16,817	2,523	19,339	18,160	1,180	-	-	-	-	-	-	-	-	260,000
3a.4	Subtotal Period 3a Period-Dependent Costs	-	1,291	10	5	-	42	30,842	4,653	36,844	34,169	2,675	-	-	516	-	-	-	10,311	17	329,160
3a.0	TOTAL PERIOD 3a COST	-	1,291	38	34	14	42	55,010	9,177	65,607	60,271	4,751	586	43	516	-	-	-	15,565	30,678	421,975
PERIOD 3b - Decommissioning Preparations																					
Period 3b Direct Decommissioning Activities																					
Detailed Work Procedures																					
3b.1.1.1	Plant systems	-	-	-	-	-	-	608	91	700	630	-	70	-	-	-	-	-	-	-	4,733
3b.1.1.2	Reactor internals	-	-	-	-	-	-	514	77	591	591	-	-	-	-	-	-	-	-	-	4,000
3b.1.1.3	Remaining buildings	-	-	-	-	-	-	174	26	200	50	-	150	-	-	-	-	-	-	-	1,350
3b.1.1.4	CRD housings & NIs	-	-	-	-	-	-	129	19	148	148	-	-	-	-	-	-	-	-	-	1,000
3b.1.1.5	Incore instrumentation	-	-	-	-	-	-	129	19	148	148	-	-	-	-	-	-	-	-	-	1,000
3b.1.1.6	Removal primary containment	-	-	-	-	-	-	257	39	296	296	-	-	-	-	-	-	-	-	-	2,000
3b.1.1.7	Reactor vessel	-	-	-	-	-	-	467	70	537	537	-	-	-	-	-	-	-	-	-	3,630
3b.1.1.8	Facility closeout	-	-	-	-	-	-	154	23	177	89	-	89	-	-	-	-	-	-	-	1,200
3b.1.1.9	Sacrificial shield	-	-	-	-	-	-	154	23	177	177	-	-	-	-	-	-	-	-	-	1,200
3b.1.1.10	Reinforced concrete	-	-	-	-	-	-	129	19	148	74	-	74	-	-	-	-	-	-	-	1,000
3b.1.1.11	Main Turbine	-	-	-	-	-	-	267	40	307	307	-	-	-	-	-	-	-	-	-	2,080
3b.1.1.12	Main Condensers	-	-	-	-	-	-	268	40	309	309	-	-	-	-	-	-	-	-	-	2,088
3b.1.1.13	Moisture separators & reheaters	-	-	-	-	-	-	257	39	296	296	-	-	-	-	-	-	-	-	-	2,000
3b.1.1.14	Radwaste building	-	-	-	-	-	-	351	53	403	363	-	40	-	-	-	-	-	-	-	2,730
3b.1.1.15	Reactor building	-	-	-	-	-	-	351	53	403	363	-	40	-	-	-	-	-	-	-	2,730
3b.1.1	Total	-	-	-	-	-	-	4,208	631	4,839	4,376	-	463	-	-	-	-	-	-	-	32,741
3b.1	Subtotal Period 3b Activity Costs	-	-	-	-	-	-	4,208	631	4,839	4,376	-	463	-	-	-	-	-	-	-	32,741
Period 3b Collateral Costs																					
3b.3.1	Decon equipment	1,055	-	-	-	-	-	-	158	1,213	1,213	-	-	-	-	-	-	-	-	-	-
3b.3.2	DOC staff relocation expenses	-	-	-	-	-	-	1,264	190	1,454	1,454	-	-	-	-	-	-	-	-	-	-
3b.3.3	Pipe cutting equipment	-	1,200	-	-	-	-	-	180	1,380	1,380	-	-	-	-	-	-	-	-	-	-
3b.3.4	Spent Fuel Capital and Transfer	-	-	-	-	-	-	900	135	1,035	-	1,035	-	-	-	-	-	-	-	-	-
3b.3	Subtotal Period 3b Collateral Costs	1,055	1,200	-	-	-	-	2,164	663	5,082	4,047	1,035	-	-	-	-	-	-	-	-	-
Period 3b Period-Dependent Costs																					
3b.4.1	Decon supplies	39	-	-	-	-	-	-	10	48	48	-	-	-	-	-	-	-	-	-	-
3b.4.2	Insurance	-	-	-	-	-	-	351	35	386	386	-	-	-	-	-	-	-	-	-	-
3b.4.3	Property taxes	-	-	-	-	-	-	1,614	161	1,776	1,483	293	-	-	-	-	-	-	-	-	-
3b.4.4	Health physics supplies	-	295	-	-	-	-	-	74	369	369	-	-	-	-	-	-	-	-	-	-
3b.4.5	Heavy equipment rental	-	375	-	-	-	-	-	56	432	432	-	-	-	-	-	-	-	-	-	-

Table H
Monticello Nuclear Generating Plant
SAFSTOR 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 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 3b Period-Dependent Costs (continued)																					
3b.4.6	Disposal of DAW generated	-	-	6	3	-	24	-	7	40	40	-	-	-	291	-	-	-	5,814	9	-
3b.4.7	Plant energy budget	-	-	-	-	-	-	906	136	1,042	1,042	-	-	-	-	-	-	-	-	-	-
3b.4.8	NRC Fees	-	-	-	-	-	-	167	17	183	183	-	-	-	-	-	-	-	-	-	-
3b.4.9	Emergency Planning Fees	-	-	-	-	-	-	74	7	81	-	81	-	-	-	-	-	-	-	-	-
3b.4.10	Fixed Overhead	-	-	-	-	-	-	1,305	196	1,500	1,500	-	-	-	-	-	-	-	-	-	-
3b.4.11	ISFSI Operating Costs	-	-	-	-	-	-	56	8	64	-	64	-	-	-	-	-	-	-	-	-
3b.4.12	Railroad Track Maintenance	-	-	-	-	-	-	62	9	72	72	-	-	-	-	-	-	-	-	-	-
3b.4.13	Security Staff Cost	-	-	-	-	-	-	2,338	351	2,689	2,547	143	-	-	-	-	-	-	-	-	34,485
3b.4.14	DOC Staff Cost	-	-	-	-	-	-	5,344	802	6,146	6,146	-	-	-	-	-	-	-	-	-	58,080
3b.4.15	Utility Staff Cost	-	-	-	-	-	-	8,385	1,258	9,643	9,055	588	-	-	-	-	-	-	-	-	129,644
3b.4	Subtotal Period 3b Period-Dependent Costs	39	671	6	3	-	24	20,602	3,127	24,471	23,302	1,169	-	-	291	-	-	-	5,814	9	222,210
3b.0	TOTAL PERIOD 3b COST	1,093	1,871	6	3	-	24	26,974	4,421	34,392	31,725	2,204	463	-	291	-	-	-	5,814	9	254,951
PERIOD 3 TOTALS		1,093	3,162	44	37	14	66	81,984	13,598	99,999	91,995	6,955	1,049	43	806	-	-	-	21,379	30,688	676,925
PERIOD 4a - Large Component Removal																					
Period 4a Direct Decommissioning Activities																					
Nuclear Steam Supply System Removal																					
4a.1.1.1	Recirculation System Piping & Valves	23	85	27	32	185	264	-	134	750	750	-	-	676	715	-	-	-	94,867	1,594	-
4a.1.1.2	Recirculation Pumps & Motors	8	56	16	37	252	270	-	131	771	771	-	-	568	473	-	-	-	112,200	1,049	-
4a.1.1.3	CRDMs & NIs Removal	41	801	415	98	-	1,130	-	560	3,045	3,045	-	-	-	3,741	-	-	-	213,700	12,506	-
4a.1.1.4	Reactor Vessel Internals	139	6,098	8,236	1,029	-	25,657	278	19,830	61,268	61,268	-	-	-	2,943	1,628	600	-	337,343	22,415	1,055
4a.1.1.5	Vessel & Internals GTCC Disposal	-	-	-	-	-	4,313	-	647	4,960	4,960	-	-	-	-	-	-	1,160	225,765	-	-
4a.1.1.6	Reactor Vessel	-	8,498	1,818	837	-	6,301	278	10,229	27,961	27,961	-	-	-	17,823	-	-	-	1,110,260	22,415	1,055
4a.1.1	Totals	211	15,538	10,512	2,034	438	37,935	557	31,530	98,755	98,755	-	-	1,244	25,695	1,628	600	1,160	2,094,136	59,979	2,110
Removal of Major Equipment																					
4a.1.2	Main Turbine/Generator	-	340	1,356	521	6,139	439	-	1,330	10,126	10,126	-	-	24,835	1,383	-	-	-	1,577,959	4,796	-
4a.1.3	Main Condensers	-	1,207	360	194	3,225	244	-	912	6,142	6,142	-	-	17,396	727	-	-	-	828,955	16,823	-
Cascading Costs from Clean Building Demolition																					
4a.1.4.1	Reactor Building	-	332	-	-	-	-	-	50	381	381	-	-	-	-	-	-	-	-	2,217	-
4a.1.4.2	Radwaste	-	25	-	-	-	-	-	4	28	28	-	-	-	-	-	-	-	-	127	-
4a.1.4.3	Turbine	-	127	-	-	-	-	-	19	146	146	-	-	-	-	-	-	-	-	1,254	-
4a.1.4	Totals	-	483	-	-	-	-	-	72	556	556	-	-	-	-	-	-	-	-	3,598	-
Disposal of Plant Systems																					
4a.1.5.1	Automatic Press Relief	-	106	2	10	182	-	-	56	356	356	-	-	1,088	-	-	-	-	44,184	1,468	-
4a.1.5.2	Chemistry Sampling	-	24	0	2	35	-	-	12	73	73	-	-	207	-	-	-	-	8,422	356	-
4a.1.5.3	Chemistry Sampling - Insulated	-	2	0	0	0	-	-	0	2	2	-	-	1	-	-	-	-	61	25	-
4a.1.5.4	Circulating Water - RCA	-	207	14	62	1,114	-	-	230	1,626	1,626	-	-	6,656	-	-	-	-	270,307	2,860	-
4a.1.5.5	Combustible Gas Control - Insul - RCA	-	29	0	2	36	-	-	13	80	80	-	-	212	-	-	-	-	8,617	378	-
4a.1.5.6	Combustible Gas Control - RCA	-	18	1	3	48	-	-	12	81	81	-	-	285	-	-	-	-	11,577	245	-
4a.1.5.7	Condensate & Feedwater	-	888	60	281	5,046	-	-	1,027	7,303	7,303	-	-	30,157	-	-	-	-	1,224,704	12,501	-
4a.1.5.8	Condensate & Feedwater - Insulated	-	444	12	55	980	-	-	267	1,757	1,757	-	-	5,855	-	-	-	-	237,764	6,185	-
4a.1.5.9	Condensate Demin	-	494	9	44	792	-	-	250	1,590	1,590	-	-	4,735	-	-	-	-	192,293	6,784	-
4a.1.5.10	Condensate Storage	-	657	16	77	1,378	-	-	384	2,512	2,512	-	-	8,237	-	-	-	-	334,489	9,265	-
4a.1.5.11	Control Rod Drive	-	3	0	0	4	-	-	1	8	8	-	-	24	-	-	-	-	976	36	-
4a.1.5.12	Control Rod Drive Hydraulic	-	374	5	23	408	-	-	159	968	968	-	-	2,440	-	-	-	-	99,094	5,255	-
4a.1.5.13	Core Spray	-	71	10	48	855	-	-	154	1,138	1,138	-	-	5,109	-	-	-	-	207,487	1,026	-
4a.1.5.14	Core Spray - Insulated	-	131	2	11	198	-	-	64	407	407	-	-	1,184	-	-	-	-	48,081	1,806	-
4a.1.5.15	Demin Water - Insulated - RCA	-	15	0	1	14	-	-	6	36	36	-	-	85	-	-	-	-	3,445	181	-
4a.1.5.16	Demin Water - RCA	-	41	1	2	42	-	-	17	104	104	-	-	253	-	-	-	-	10,278	508	-
4a.1.5.17	Diesel Oil - RCA	-	2	0	0	4	-	-	1	7	7	-	-	23	-	-	-	-	931	25	-
4a.1.5.18	Drywell Atmosphere Cooling - RCA	-	38	1	5	92	-	-	24	159	159	-	-	548	-	-	-	-	22,244	550	-
4a.1.5.19	EDG Emerg Service Water - Insul - RCA	-	0	0	0	0	-	-	0	1	1	-	-	2	-	-	-	-	84	4	-
4a.1.5.20	Electrical - Clean	-	13	-	-	-	-	-	2	15	-	-	15	-	-	-	-	-	-	182	-
4a.1.5.21	Emergency Service Water - Insul - RCA	-	21	0	1	23	-	-	9	55	55	-	-	137	-	-	-	-	5,544	281	-
4a.1.5.22	Emergency Service Water - RCA	-	2	0	0	2	-	-	1	5	5	-	-	13	-	-	-	-	512	22	-
4a.1.5.23	GEZIP - RCA	-	3	0	1	17	-	-	4	25	25	-	-	103	-	-	-	-	4,184	48	-
4a.1.5.24	Generator Physical Design - RCA	-	5	0	0	5	-	-	2	12	12	-	-	31	-	-	-	-	1,250	67	-
4a.1.5.25	H2-O2 Control Analyzing	-	6	0	0	4	-	-	2	12	12	-	-	23	-	-	-	-	948	72	-
4a.1.5.26	H2-O2 Control Analyzing - Insulated	-	6	0	0	4	-	-	2	12	12	-	-	23	-	-	-	-	948	72	-
4a.1.5.27	High Pressure Coolant Injection	-	60	3	12	211	-	-	49	334	334	-	-	1,262	-	-	-	-	51,257	850	-

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Disposal of Plant Systems (continued)																					
4a.1.5.28	High Pressure Coolant Injection - Insula	-	198	4	21	379	-	-	110	713	713	-	-	2,266	-	-	-	-	92,018	2,734	-
4a.1.5.29	Hydrogen Cooling	-	8	-	-	-	-	-	1	10	-	-	10	-	-	-	-	-	-	118	-
4a.1.5.30	Hydrogen Cooling - RCA	-	7	0	0	7	-	-	3	17	17	-	-	39	-	-	-	-	1,600	79	-
4a.1.5.31	Hydrogen Seal Oil - RCA	-	17	0	2	32	-	-	9	60	60	-	-	189	-	-	-	-	7,669	212	-
4a.1.5.32	Hydrogen Water Chemistry - RCA	-	24	0	1	23	-	-	10	59	59	-	-	140	-	-	-	-	5,672	304	-
4a.1.5.33	Instrument & Service Air - RCA	-	225	4	17	296	-	-	103	644	644	-	-	1,768	-	-	-	-	71,810	2,733	-
4a.1.5.34	Main Condenser	-	177	4	18	318	-	-	95	613	613	-	-	1,903	-	-	-	-	77,301	2,443	-
4a.1.5.35	Main Steam	-	225	6	28	498	-	-	136	892	892	-	-	2,975	-	-	-	-	120,806	3,122	-
4a.1.5.36	Main Turbine	-	909	63	298	5,335	-	-	1,079	7,684	7,684	-	-	31,885	-	-	-	-	1,294,866	12,952	-
4a.1.5.37	Main Turbine - Insulated	-	193	7	32	579	-	-	141	952	952	-	-	3,460	-	-	-	-	140,506	2,725	-
4a.1.5.38	Miscellaneous	-	38	1	3	51	-	-	18	110	110	-	-	302	-	-	-	-	12,283	556	-
4a.1.5.39	Off Gas Recombiner	-	169	6	27	479	-	-	119	799	799	-	-	2,861	-	-	-	-	116,194	2,387	-
4a.1.5.40	Off Gas Recombiner - Insulated	-	351	5	22	393	-	-	150	921	921	-	-	2,350	-	-	-	-	95,441	4,785	-
4a.1.5.41	Post Accident Sampling	-	23	0	1	16	-	-	8	48	48	-	-	99	-	-	-	-	4,004	306	-
4a.1.5.42	Post Accident Sampling - Insulated	-	15	0	1	11	-	-	6	33	33	-	-	67	-	-	-	-	2,737	190	-
4a.1.5.43	RHR Service Water - Insulated - RCA	-	83	3	14	248	-	-	60	409	409	-	-	1,485	-	-	-	-	60,293	1,125	-
4a.1.5.44	RHR Service Water - RCA	-	4	0	0	6	-	-	2	12	12	-	-	35	-	-	-	-	1,410	57	-
4a.1.5.45	Reactor Feedwater Pump Seal	-	50	1	3	55	-	-	21	130	130	-	-	327	-	-	-	-	13,295	687	-
4a.1.5.46	Residual Heat Removal	-	226	58	147	2,110	514	-	529	3,584	3,584	-	-	12,609	1,519	-	-	-	609,174	3,282	-
4a.1.5.47	Residual Heat Removal - Insulated	-	500	39	74	851	464	-	384	2,312	2,312	-	-	5,084	1,374	-	-	-	294,206	7,027	-
4a.1.5.48	Rx Core Isolation Cooling	-	43	1	3	61	-	-	21	129	129	-	-	364	-	-	-	-	14,781	609	-
4a.1.5.49	Rx Core Isolation Cooling - Insulated	-	97	1	5	94	-	-	39	237	237	-	-	563	-	-	-	-	22,843	1,315	-
4a.1.5.50	Rx Recirculation	-	53	5	4	16	52	-	30	161	161	-	-	96	152	-	-	-	13,794	691	-
4a.1.5.51	Snubbers	-	151	1	5	84	-	-	51	292	292	-	-	502	-	-	-	-	20,395	2,272	-
4a.1.5.52	Standby Liquid Control - Insul - RCA	-	4	0	0	4	-	-	2	9	9	-	-	22	-	-	-	-	904	48	-
4a.1.5.53	Standby Liquid Control - RCA	-	26	1	2	41	-	-	13	83	83	-	-	245	-	-	-	-	9,969	341	-
4a.1.5.54	Stator Cooling - RCA	-	7	0	1	21	-	-	5	35	35	-	-	126	-	-	-	-	5,135	98	-
4a.1.5.55	Traversing Incore Probe	-	3	0	0	0	2	-	1	7	7	-	-	2	5	-	-	-	379	46	-
4a.1.5	Totals	-	7,490	347	1,370	23,501	1,032	-	5,894	39,634	39,610	-	24	140,459	3,050	-	-	-	5,899,167	104,297	-
4a.1.6	Scaffolding in support of decommissioning	-	2,106	22	12	191	31	-	567	2,929	2,929	-	-	1,030	91	-	-	-	52,111	19,968	-
4a.1	Subtotal Period 4a Activity Costs	211	27,165	12,598	4,132	33,494	39,680	557	40,305	158,142	158,117	-	24	184,963	30,945	1,628	600	1,160	10,452,330	209,462	2,110
Period 4a Collateral Costs																					
4a.3.1	Process decommissioning water waste	4	-	7	12	-	28	-	12	63	63	-	-	64	-	-	-	-	3,856	13	-
4a.3.3	Small tool allowance	-	267	-	-	-	-	-	40	307	276	-	31	-	-	-	-	-	-	-	-
4a.3.4	Spent Fuel Capital and Transfer	-	-	-	-	-	-	2,351	353	2,704	-	2,704	-	-	-	-	-	-	-	-	-
4a.3	Subtotal Period 4a Collateral Costs	4	267	7	12	-	28	2,351	404	3,073	339	2,704	31	-	64	-	-	-	3,856	13	-
Period 4a Period-Dependent Costs																					
4a.4.1	Decon supplies	87	-	-	-	-	-	-	22	109	109	-	-	-	-	-	-	-	-	-	-
4a.4.2	Insurance	-	-	-	-	-	-	790	79	869	869	-	-	-	-	-	-	-	-	-	-
4a.4.3	Property taxes	-	-	-	-	-	-	3,594	359	3,953	3,293	660	-	-	-	-	-	-	-	-	-
4a.4.4	Health physics supplies	-	1,872	-	-	-	-	-	468	2,340	2,340	-	-	-	-	-	-	-	-	-	-
4a.4.5	Heavy equipment rental	-	2,811	-	-	-	-	-	422	3,232	3,232	-	-	-	-	-	-	-	-	-	-
4a.4.6	Disposal of DAW generated	-	-	89	46	-	370	-	108	612	612	-	-	-	4,485	-	-	-	89,703	146	-
4a.4.7	Plant energy budget	-	-	-	-	-	-	1,938	291	2,229	2,229	-	-	-	-	-	-	-	-	-	-
4a.4.8	NRC Fees	-	-	-	-	-	-	544	54	598	598	-	-	-	-	-	-	-	-	-	-
4a.4.9	Emergency Planning Fees	-	-	-	-	-	-	167	17	183	-	183	-	-	-	-	-	-	-	-	-
4a.4.10	Fixed Overhead	-	-	-	-	-	-	2,380	357	2,737	2,737	-	-	-	-	-	-	-	-	-	-
4a.4.11	Liquid Radwaste Processing Equipment/Services	-	-	-	-	-	-	477	72	549	549	-	-	-	-	-	-	-	-	-	-
4a.4.12	ISFSI Operating Costs	-	-	-	-	-	-	126	19	145	-	145	-	-	-	-	-	-	-	-	-
4a.4.13	Railroad Track Maintenance	-	-	-	-	-	-	140	21	162	162	-	-	-	-	-	-	-	-	-	-
4a.4.14	Remedial Actions Surveys	-	-	-	-	-	-	1,258	189	1,447	1,447	-	-	-	-	-	-	-	-	-	-
4a.4.15	Security Staff Cost	-	-	-	-	-	-	6,666	1,000	7,666	5,734	1,932	-	-	-	-	-	-	-	-	101,051
4a.4.16	DOC Staff Cost	-	-	-	-	-	-	14,604	2,191	16,795	16,795	-	-	-	-	-	-	-	-	-	161,214
4a.4.17	Utility Staff Cost	-	-	-	-	-	-	19,141	2,871	22,012	20,691	1,321	-	-	-	-	-	-	-	-	294,391
4a.4	Subtotal Period 4a Period-Dependent Costs	87	4,683	89	46	-	370	51,826	8,539	65,639	61,399	4,241	-	-	4,485	-	-	-	89,703	146	556,657
4a.0	TOTAL PERIOD 4a COST	302	32,114	12,694	4,190	33,494	40,078	54,734	49,247	226,854	219,855	6,944	55	184,963	35,494	1,628	600	1,160	10,545,890	209,621	558,767
PERIOD 4b - Site Decontamination																					
Period 4b Direct Decommissioning Activities																					
4b.1.1	Remove spent fuel racks	591	58	103	149	-	2,572	-	986	4,459	4,459	-	-	-	7,653	-	-	-	486,170	906	-

Table H
Monticello Nuclear Generating Plant
SAFSTOR 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 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
Disposal of Plant Systems																					
4b.1.2.1	ALARA/Radiological	-	16	0	0	8	-	-	5	30	30	-	-	49	-	-	-	-	1,987	247	-
4b.1.2.2	Alternate N2 - RCA	-	16	0	1	16	-	-	7	40	40	-	-	93	-	-	-	-	3,765	185	-
4b.1.2.3	Cranes/Heavy Loads/Rigging - RCA	-	3	0	1	17	-	-	4	25	25	-	-	103	-	-	-	-	4,184	48	-
4b.1.2.4	Decontamination Projects	-	1	0	0	1	-	-	0	2	2	-	-	3	-	-	-	-	125	15	-
4b.1.2.5	Electrical - Contaminated	-	400	5	23	421	-	-	167	1,016	1,016	-	-	2,514	-	-	-	-	102,112	5,633	-
4b.1.2.6	Electrical - Contaminated Fuel Pool	-	42	1	2	42	-	-	17	105	105	-	-	253	-	-	-	-	10,272	592	-
4b.1.2.7	Electrical - Decontam. Fuel Pool Area	-	297	5	23	411	-	-	140	876	876	-	-	2,457	-	-	-	-	99,783	4,090	-
4b.1.2.8	Electrical - Decontaminated	-	2,698	48	218	3,906	-	-	1,298	8,167	8,167	-	-	23,344	-	-	-	-	948,013	37,107	-
4b.1.2.9	Fire - RCA	-	101	1	6	103	-	-	42	253	253	-	-	614	-	-	-	-	24,917	1,324	-
4b.1.2.10	Fire - RCA - Fuel Pool Area	-	11	0	1	10	-	-	4	26	26	-	-	62	-	-	-	-	2,499	143	-
4b.1.2.11	Fuel Pool Cooling & Cleanup	-	387	20	33	343	241	-	216	1,241	1,241	-	-	2,051	712	-	-	-	128,918	5,363	-
4b.1.2.12	Fuel Pool Cooling & Cleanup - Insulated	-	37	2	3	22	24	-	19	107	107	-	-	130	71	-	-	-	9,830	514	-
4b.1.2.13	HVAC Ductwork	-	276	6	26	469	-	-	144	921	921	-	-	2,805	-	-	-	-	113,913	3,539	-
4b.1.2.14	HVAC Ductwork - Fuel Pool Area	-	31	1	3	52	-	-	16	102	102	-	-	312	-	-	-	-	12,657	393	-
4b.1.2.15	HVAC/Chilled Water - RCA	-	324	6	26	461	-	-	155	971	971	-	-	2,752	-	-	-	-	111,779	3,985	-
4b.1.2.16	HVAC/Chilled Water - RCA Fuel Pool Area	-	33	0	2	37	-	-	14	87	87	-	-	223	-	-	-	-	9,072	397	-
4b.1.2.17	Heating & Ventilation	-	433	13	59	1,060	-	-	277	1,842	1,842	-	-	6,334	-	-	-	-	257,243	6,340	-
4b.1.2.18	Heating Boiler - Insulated - RCA	-	3	0	0	4	-	-	1	9	9	-	-	26	-	-	-	-	1,058	35	-
4b.1.2.19	Instrument & Service Air-RCA-Fuel Pool	-	29	1	2	45	-	-	14	91	91	-	-	267	-	-	-	-	10,841	357	-
4b.1.2.20	Liquid Radwaste	-	621	31	57	703	311	-	350	2,072	2,072	-	-	4,203	915	-	-	-	229,422	8,550	-
4b.1.2.21	Makeup Demin - RCA	-	103	3	14	246	-	-	65	431	431	-	-	1,471	-	-	-	-	59,747	1,412	-
4b.1.2.22	Non-Essential Diesel Generator - RCA	-	27	3	13	238	-	-	45	327	327	-	-	1,424	-	-	-	-	57,832	395	-
4b.1.2.23	Off Gas Holdup	-	310	7	34	607	-	-	174	1,133	1,133	-	-	3,629	-	-	-	-	147,355	4,256	-
4b.1.2.24	Primary Containment	-	411	16	77	1,389	-	-	324	2,218	2,218	-	-	8,302	-	-	-	-	337,148	5,729	-
4b.1.2.25	Process Radiation Monitors	-	41	0	2	36	-	-	16	95	95	-	-	213	-	-	-	-	8,667	577	-
4b.1.2.26	Rx Bldg Closed Clng Water - Insul - RCA	-	114	2	9	163	-	-	54	343	343	-	-	977	-	-	-	-	39,675	1,484	-
4b.1.2.27	Rx Bldg Closed Clng Water - RCA	-	184	15	66	1,187	-	-	235	1,687	1,687	-	-	7,093	-	-	-	-	288,031	2,489	-
4b.1.2.28	Rx Component Handling Equip	-	127	11	24	291	139	-	115	708	708	-	-	1,737	415	-	-	-	96,901	1,839	-
4b.1.2.29	Rx Pressure Vessel	-	43	5	5	27	57	-	30	167	167	-	-	161	169	-	-	-	17,375	578	-
4b.1.2.30	Rx Water Cleanup	-	239	16	15	47	214	-	124	655	655	-	-	278	630	-	-	-	51,819	3,264	-
4b.1.2.31	Secondary Containment	-	112	3	13	229	-	-	65	421	421	-	-	1,372	-	-	-	-	55,702	1,569	-
4b.1.2.32	Service & Seal Water - Insulated - RCA	-	120	2	11	197	-	-	62	392	392	-	-	1,180	-	-	-	-	47,917	1,565	-
4b.1.2.33	Service & Seal Water - RCA	-	159	4	17	303	-	-	88	570	570	-	-	1,809	-	-	-	-	73,453	2,016	-
4b.1.2.34	Service Air Blower - RCA	-	15	0	2	34	-	-	9	62	62	-	-	206	-	-	-	-	8,364	206	-
4b.1.2.35	Solid Radwaste	-	446	21	45	567	223	-	261	1,563	1,563	-	-	3,390	659	-	-	-	179,772	6,270	-
4b.1.2.36	Structures & Buildings	-	70	1	4	80	-	-	30	185	185	-	-	477	-	-	-	-	19,351	1,005	-
4b.1.2.37	Wells & Domestic Water	-	10	-	-	-	-	-	1	11	-	-	11	-	-	-	-	-	-	144	-
4b.1.2.38	Wells & Domestic Water - RCA	-	52	1	3	57	-	-	22	136	136	-	-	342	-	-	-	-	13,874	633	-
4b.1.2	Totals	-	8,342	249	841	13,829	1,210	-	4,613	29,085	29,073	-	11	82,654	3,571	-	-	-	3,585,374	114,290	-
4b.1.3	Scaffolding in support of decommissioning	-	3,159	33	19	286	46	-	850	4,394	4,394	-	-	1,545	136	-	-	-	78,166	29,953	-
Decontamination of Site Buildings																					
4b.1.4.1	Reactor Building	4,668	2,596	178	516	8,044	1,181	-	4,580	21,764	21,764	-	-	48,077	7,014	-	-	-	2,317,670	100,718	-
4b.1.4.2	Admin	96	5	0	3	-	15	-	53	172	172	-	-	-	145	-	-	-	6,840	1,421	-
4b.1.4.3	HPCI Room	26	25	1	3	20	14	-	26	115	115	-	-	118	125	-	-	-	10,759	703	-
4b.1.4.4	Hot Shop	15	4	0	2	-	11	-	11	43	43	-	-	-	103	-	-	-	4,860	254	-
4b.1.4.5	LLRW Storage & Shipping	52	22	2	8	5	45	-	45	179	179	-	-	31	433	-	-	-	21,708	1,003	-
4b.1.4.6	Offgas Stack	336	241	7	23	225	82	-	286	1,199	1,199	-	-	1,343	669	-	-	-	87,045	7,924	-
4b.1.4.7	Offgas Storage & Compressor	36	15	1	6	4	33	-	32	128	128	-	-	25	316	-	-	-	15,948	696	-
4b.1.4.8	Radwaste	109	54	3	17	29	96	-	100	410	410	-	-	172	910	-	-	-	49,943	2,229	-
4b.1.4.9	Radwaste Material Storage Warehouse	57	21	2	9	-	52	-	48	189	189	-	-	-	495	-	-	-	23,400	1,062	-
4b.1.4.10	Recombiner	24	22	1	5	33	24	-	30	140	140	-	-	199	216	-	-	-	18,405	616	-
4b.1.4.11	Turbine	638	314	21	104	215	564	-	588	2,444	2,444	-	-	1,283	5,299	-	-	-	303,150	12,856	-
4b.1.4.12	Turbine Building Addition	53	19	1	8	-	45	-	44	169	169	-	-	-	434	-	-	-	20,478	968	-
4b.1.4.13	Reactor (Post Fuel)	849	2,325	172	913	329	5,301	-	2,535	12,425	12,425	-	-	1,969	50,605	-	-	-	2,471,778	40,860	-
4b.1.4	Totals	6,960	5,663	390	1,617	8,904	7,465	-	8,379	39,378	39,378	-	-	53,216	66,764	-	-	-	5,351,984	171,309	-
4b.1.5	Prepare/submit License Termination Plan	-	-	-	-	-	-	526	79	605	605	-	-	-	-	-	-	-	-	-	4,096
4b.1.6	Receive NRC approval of termination plan									a											
4b.1	Subtotal Period 4b Activity Costs	7,551	17,223	776	2,626	23,019	11,293	526	14,907	77,921	77,910	-	11	137,414	78,124	-	-	-	9,501,694	316,457	4,096
Period 4b Additional Costs																					
4b.2.1	License Termination Survey Planning	-	-	-	-	-	-	1,458	437	1,896	1,896	-	-	-	-	-	-	-	-	-	12,480
4b.2.2	Excavation of Underground Services	-	1,972	-	-	-	-	376	550	2,898	2,898	-	-	-	-	-	-	-	-	12,493	-
4b.2.3	Operational Equipment	-	-	23	92	1,211	-	-	198	1,524	1,524	-	-	11,760	-	-	-	-	294,000	32	-

Table H
Monticello Nuclear Generating Plant
SAFSTOR 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 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
4b.2	Subtotal Period 4b Additional Costs	-	1,972	23	92	1,211	-	1,835	1,185	6,317	6,317	-	-	11,760	-	-	-	-	294,000	12,525	12,480
Period 4b Collateral Costs																					
4b.3.1	Process decommissioning water waste	12	-	22	39	-	88	-	36	196	196	-	-	-	202	-	-	-	12,097	39	-
4b.3.3	Small tool allowance	-	397	-	-	-	-	-	60	456	456	-	-	-	-	-	-	-	-	-	-
4b.3.4	Decommissioning Equipment Disposition	-	-	130	82	1,112	178	-	237	1,739	1,739	-	-	6,000	529	-	-	-	303,608	147	-
4b.3.5	Spent Fuel Capital and Transfer	-	-	-	-	-	-	6,214	932	7,147	-	7,147	-	-	-	-	-	-	-	-	-
4b.3	Subtotal Period 4b Collateral Costs	12	397	152	121	1,112	266	6,214	1,264	9,538	2,392	7,147	-	6,000	731	-	-	-	315,705	186	-
Period 4b Period-Dependent Costs																					
4b.4.1	Decon supplies	1,701	-	-	-	-	-	-	425	2,126	2,126	-	-	-	-	-	-	-	-	-	-
4b.4.2	Insurance	-	-	-	-	-	-	1,434	143	1,577	1,577	-	-	-	-	-	-	-	-	-	-
4b.4.3	Property taxes	-	-	-	-	-	-	6,289	629	6,917	5,721	1,197	-	-	-	-	-	-	-	-	-
4b.4.4	Health physics supplies	-	3,050	-	-	-	-	-	763	3,813	3,813	-	-	-	-	-	-	-	-	-	-
4b.4.5	Heavy equipment rental	-	5,239	-	-	-	-	-	786	6,024	6,024	-	-	-	-	-	-	-	-	-	-
4b.4.6	Disposal of DAW generated	-	-	117	60	-	486	-	142	805	805	-	-	-	5,895	-	-	-	117,897	192	-
4b.4.7	Plant energy budget	-	-	-	-	-	-	2,777	417	3,194	3,194	-	-	-	-	-	-	-	-	-	-
4b.4.8	NRC Fees	-	-	-	-	-	-	986	99	1,085	1,085	-	-	-	-	-	-	-	-	-	-
4b.4.9	Emergency Planning Fees	-	-	-	-	-	-	302	30	332	-	332	-	-	-	-	-	-	-	-	-
4b.4.10	Fixed Overhead	-	-	-	-	-	-	4,319	648	4,967	4,967	-	-	-	-	-	-	-	-	-	-
4b.4.11	Liquid Radwaste Processing Equipment/Services	-	-	-	-	-	-	866	130	996	996	-	-	-	-	-	-	-	-	-	-
4b.4.12	ISFSI Operating Costs	-	-	-	-	-	-	228	34	262	-	262	-	-	-	-	-	-	-	-	-
4b.4.13	Railroad Track Maintenance	-	-	-	-	-	-	255	38	293	293	-	-	-	-	-	-	-	-	-	-
4b.4.14	Remedial Actions Surveys	-	-	-	-	-	-	2,283	343	2,626	2,626	-	-	-	-	-	-	-	-	-	-
4b.4.15	Security Staff Cost	-	-	-	-	-	-	12,097	1,815	13,912	10,406	3,506	-	-	-	-	-	-	-	-	183,371
4b.4.16	DOC Staff Cost	-	-	-	-	-	-	25,916	3,887	29,803	29,803	-	-	-	-	-	-	-	-	-	284,065
4b.4.17	Utility Staff Cost	-	-	-	-	-	-	32,869	4,930	37,799	35,380	2,419	-	-	-	-	-	-	-	-	504,534
4b.4	Subtotal Period 4b Period-Dependent Costs	1,701	8,289	117	60	-	486	90,622	15,259	116,533	108,817	7,716	-	-	5,895	-	-	-	117,897	192	971,970
4b.0	TOTAL PERIOD 4b COST	9,264	27,881	1,067	2,898	25,343	12,044	99,197	32,614	210,310	195,435	14,863	11	155,174	84,750	-	-	-	10,229,300	329,361	988,546
PERIOD 4f - License Termination																					
Period 4f Direct Decommissioning Activities																					
4f.1.1	ORISE confirmatory survey	-	-	-	-	-	-	166	50	216	216	-	-	-	-	-	-	-	-	-	-
4f.1.2	Terminate license									a											
4f.1	Subtotal Period 4f Activity Costs	-	-	-	-	-	-	166	50	216	216	-	-	-	-	-	-	-	-	-	-
Period 4f Additional Costs																					
4f.2.1	License Termination Survey	-	-	-	-	-	-	6,920	2,076	8,995	8,995	-	-	-	-	-	-	-	-	95,048	6,240
4f.2.2	License Termination ISFSI	-	57	188	987	-	5,925	3,118	2,569	12,844	12,844	-	-	-	21,949	-	-	-	2,633,402	10,339	14,785
4f.2	Subtotal Period 4f Additional Costs	-	57	188	987	-	5,925	10,037	4,645	21,839	21,839	-	-	-	21,949	-	-	-	2,633,402	105,387	21,025
Period 4f Collateral Costs																					
4f.3.1	DOC staff relocation expenses	-	-	-	-	-	-	1,264	190	1,454	1,454	-	-	-	-	-	-	-	-	-	-
4f.3.2	Small tool allowance	-	0	-	-	-	-	-	0	1	1	-	-	-	-	-	-	-	-	-	-
4f.3.3	Spent Fuel Capital and Transfer	-	-	-	-	-	-	846	127	972	-	972	-	-	-	-	-	-	-	-	-
4f.3	Subtotal Period 4f Collateral Costs	-	0	-	-	-	-	2,110	317	2,427	1,454	972	-	-	-	-	-	-	-	-	-
Period 4f Period-Dependent Costs																					
4f.4.1	Insurance	-	-	-	-	-	-	530	53	583	-	583	-	-	-	-	-	-	-	-	-
4f.4.2	Property taxes	-	-	-	-	-	-	2,198	220	2,417	1,975	442	-	-	-	-	-	-	-	-	-
4f.4.3	Health physics supplies	-	766	-	-	-	-	-	192	958	958	-	-	-	-	-	-	-	-	-	-
4f.4.4	Disposal of DAW generated	-	-	7	4	-	29	-	9	48	48	-	-	-	355	-	-	-	7,097	12	-
4f.4.5	Plant energy budget	-	-	-	-	-	-	274	41	315	315	-	-	-	-	-	-	-	-	-	-
4f.4.6	NRC Fees	-	-	-	-	-	-	426	43	468	468	-	-	-	-	-	-	-	-	-	-
4f.4.7	Emergency Planning Fees	-	-	-	-	-	-	112	11	123	-	123	-	-	-	-	-	-	-	-	-
4f.4.8	Fixed Overhead	-	-	-	-	-	-	1,597	239	1,836	1,836	-	-	-	-	-	-	-	-	-	-
4f.4.9	ISFSI Operating Costs	-	-	-	-	-	-	84	13	97	-	97	-	-	-	-	-	-	-	-	-
4f.4.10	Railroad Track Maintenance	-	-	-	-	-	-	94	14	108	108	-	-	-	-	-	-	-	-	-	-
4f.4.11	Security Staff Cost	-	-	-	-	-	-	3,463	519	3,982	1,565	2,417	-	-	-	-	-	-	-	-	50,932
4f.4.12	DOC Staff Cost	-	-	-	-	-	-	5,393	809	6,201	6,201	-	-	-	-	-	-	-	-	-	57,200
4f.4.13	Utility Staff Cost	-	-	-	-	-	-	5,762	864	6,626	5,738	888	-	-	-	-	-	-	-	-	80,707
4f.4	Subtotal Period 4f Period-Dependent Costs	-	766	7	4	-	29	19,931	3,027	23,764	19,213	4,550	-	-	355	-	-	-	7,097	12	188,838
4f.0	TOTAL PERIOD 4f COST	-	824	195	991	-	5,954	32,244	8,037	48,245	42,722	5,523	-	-	22,304	-	-	-	2,640,499	105,398	209,863
PERIOD 4 TOTALS		9,566	60,820	13,956	8,079	58,837	58,077	186,175	89,899	485,409	458,013	27,330	66	340,138	142,548	1,628	600	1,160	23,415,680	644,380	1,757,176

Table H
Monticello Nuclear Generating Plant
SAFSTOR 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 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 5b - Site Restoration																					
Period 5b Direct Decommissioning Activities																					
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	Discharge Retention Basin	-	4	-	-	-	-	-	1	5	-	-	5	-	-	-	-	-	-	25	-
5b.1.1.4	HPCI Room	-	19	-	-	-	-	-	3	22	-	-	22	-	-	-	-	-	-	97	-
5b.1.1.5	Hot Shop	-	16	-	-	-	-	-	2	19	-	-	19	-	-	-	-	-	-	177	-
5b.1.1.6	Hydrogen & Oxygen Storage	-	2	-	-	-	-	-	0	2	-	-	2	-	-	-	-	-	-	19	-
5b.1.1.7	LLRW Storage & Shipping	-	83	-	-	-	-	-	12	95	-	-	95	-	-	-	-	-	-	662	-
5b.1.1.8	MSIV	-	4	-	-	-	-	-	1	4	-	-	4	-	-	-	-	-	-	42	-
5b.1.1.9	Misc Structures 2017	-	1,410	-	-	-	-	-	212	1,622	-	-	1,622	-	-	-	-	-	-	13,042	-
5b.1.1.10	Offgas Stack	-	108	-	-	-	-	-	16	124	-	-	124	-	-	-	-	-	-	544	-
5b.1.1.11	Offgas Storage & Compressor	-	39	-	-	-	-	-	6	45	-	-	45	-	-	-	-	-	-	199	-
5b.1.1.12	Radwaste	-	228	-	-	-	-	-	34	262	-	-	262	-	-	-	-	-	-	1,220	-
5b.1.1.13	Recombiner	-	128	-	-	-	-	-	19	147	-	-	147	-	-	-	-	-	-	713	-
5b.1.1.14	Security Barrier	-	186	-	-	-	-	-	28	214	-	-	214	-	-	-	-	-	-	933	-
5b.1.1.15	Structures Greater than 3' Below Grade	-	2,461	-	-	-	-	-	369	2,830	-	-	2,830	-	-	-	-	-	-	12,649	-
5b.1.1.16	Tank Farm	-	4	-	-	-	-	-	1	5	-	-	5	-	-	-	-	-	-	21	-
5b.1.1.17	Turbine	-	1,259	-	-	-	-	-	189	1,448	-	-	1,448	-	-	-	-	-	-	13,036	-
5b.1.1.18	Turbine Building Addition	-	55	-	-	-	-	-	8	63	-	-	63	-	-	-	-	-	-	618	-
5b.1.1.19	Turbine Pedestal	-	182	-	-	-	-	-	27	209	-	-	209	-	-	-	-	-	-	926	-
5b.1.1	Totals	-	8,169	-	-	-	-	-	1,225	9,394	-	-	9,394	-	-	-	-	-	-	58,885	-
Site Closeout Activities																					
5b.1.2	Grade & landscape site	-	896	-	-	-	-	-	134	1,031	-	-	1,031	-	-	-	-	-	-	1,841	-
5b.1.3	Final report to NRC	-	-	-	-	-	-	200	30	231	231	-	-	-	-	-	-	-	-	-	1,560
5b.1	Subtotal Period 5b Activity Costs	-	9,065	-	-	-	-	200	1,390	10,655	231	-	10,425	-	-	-	-	-	-	60,726	1,560
Period 5b Additional Costs																					
5b.2.1	Clean 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 Debris	-	-	-	-	-	-	1,170	176	1,346	-	-	1,346	-	-	-	-	-	-	-	-
5b.2.4	Backfill	-	5,583	-	-	-	-	-	837	6,421	-	-	6,421	-	-	-	-	-	-	5,422	-
5b.2.5	Discharge Structure Cofferdam	-	442	-	-	-	-	-	66	508	-	-	508	-	-	-	-	-	-	3,552	-
5b.2.6	Demolition and Site Restoration of ISFSI	-	1,486	-	-	-	-	233	258	1,977	-	-	1,977	-	-	-	-	-	-	6,957	160
5b.2	Subtotal Period 5b Additional Costs	-	11,168	-	-	-	-	1,416	1,888	14,472	-	-	14,472	-	-	-	-	-	-	18,527	160
Period 5b Collateral Costs																					
5b.3.1	Small tool allowance	-	121	-	-	-	-	-	18	139	-	-	139	-	-	-	-	-	-	-	-
5b.3	Subtotal Period 5b Collateral Costs	-	121	-	-	-	-	-	18	139	-	-	139	-	-	-	-	-	-	-	-
Period 5b Period-Dependent Costs																					
5b.4.1	Insurance	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5b.4.2	Property taxes	-	-	-	-	-	-	4,770	477	5,247	-	-	5,247	-	-	-	-	-	-	-	-
5b.4.3	Heavy equipment rental	-	5,842	-	-	-	-	-	876	6,719	-	-	6,719	-	-	-	-	-	-	-	-
5b.4.4	Plant energy budget	-	-	-	-	-	-	315	47	362	-	-	362	-	-	-	-	-	-	-	-
5b.4.5	Emergency Planning Fees	-	-	-	-	-	-	47	5	51	-	51	-	-	-	-	-	-	-	-	-
5b.4.6	Fixed Overhead	-	-	-	-	-	-	1,122	168	1,290	-	-	1,290	-	-	-	-	-	-	-	-
5b.4.7	Railroad Track Maintenance	-	-	-	-	-	-	217	33	249	-	-	249	-	-	-	-	-	-	-	-
5b.4.8	Security Staff Cost	-	-	-	-	-	-	3,131	470	3,601	-	-	3,601	-	-	-	-	-	-	-	43,287
5b.4.9	DOC Staff Cost	-	-	-	-	-	-	11,729	1,759	13,489	-	-	13,489	-	-	-	-	-	-	-	122,646
5b.4.10	Utility Staff Cost	-	-	-	-	-	-	4,931	740	5,671	-	-	5,671	-	-	-	-	-	-	-	70,341
5b.4	Subtotal Period 5b Period-Dependent Costs	-	5,842	-	-	-	-	26,262	4,575	36,679	-	51	36,628	-	-	-	-	-	-	-	236,274
5b.0	TOTAL PERIOD 5b COST	-	26,196	-	-	-	-	27,879	7,870	61,945	231	51	61,663	-	-	-	-	-	-	79,253	237,994
PERIOD 5 TOTALS		-	26,196	-	-	-	-	27,879	7,870	61,945	231	51	61,663	-	-	-	-	-	-	79,253	237,994
TOTAL COST TO DECOMMISSION		21,259	100,298	14,401	8,642	58,852	59,785	1,405,928	272,752	1,941,915	1,250,098	629,040	62,778	340,180	153,222	1,628	600	1,160	23,728,260	876,203	9,952,997

Table H
Monticello Nuclear Generating Plant
SAFSTOR 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 Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
TOTAL COST TO DECOMMISSION WITH 16.34% CONTINGENCY:					$1,941,915	thousands of 2020 dollars															
TOTAL NRC LICENSE TERMINATION COST IS 64.37% OR:					$1,250,098	thousands of 2020 dollars															
SPENT FUEL MANAGEMENT COST IS 32.39% OR:					$629,040	thousands of 2020 dollars															
NON-NUCLEAR DEMOLITION COST IS 3.23% OR:					$62,778	thousands of 2020 dollars															
TOTAL LOW-LEVEL RADIOACTIVE WASTE VOLUME BURIED (EXCLUDING GTCC):					155,449	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:					876,203	Man-hours															

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

APPENDIX I

DETAILED COST ANALYSIS

SCENARIO 7: SAFSTOR with 100 Year DFS

Table I
Monticello Nuclear Generating Plant
SAFSTOR 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 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 1a - Shutdown through Transition																					
Period 1a Direct Decommissioning Activities																					
1a.1.1	SAFSTOR site characterization survey	-	-	-	-	-	-	415	124	539	539	-	-	-	-	-	-	-	-	-	-
1a.1.2	Prepare preliminary decommissioning cost	-	-	-	-	-	-	167	25	192	192	-	-	-	-	-	-	-	-	-	1,300
1a.1.3	Notification of Cessation of Operations									a											
1a.1.4	Remove fuel & source material									n/a											
1a.1.5	Notification of Permanent Defueling									a											
1a.1.6	Deactivate plant systems & process waste									a											
1a.1.7	Prepare and submit PSDAR	-	-	-	-	-	-	257	39	296	296	-	-	-	-	-	-	-	-	-	2,000
1a.1.8	Review plant dwgs & specs.	-	-	-	-	-	-	167	25	192	192	-	-	-	-	-	-	-	-	-	1,300
1a.1.9	Perform detailed rad survey									a											
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	Define major work sequence	-	-	-	-	-	-	129	19	148	148	-	-	-	-	-	-	-	-	-	1,000
1a.1.14	Perform SER and EA	-	-	-	-	-	-	398	60	458	458	-	-	-	-	-	-	-	-	-	3,100
1a.1.15	Prepare/submit Defueled 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 Irradiated Fuel Management Plan	-	-	-	-	-	-	129	19	148	148	-	-	-	-	-	-	-	-	-	1,000
Activity Specifications																					
1a.1.18.1	Prepare plant and facilities for SAFSTOR	-	-	-	-	-	-	632	95	727	727	-	-	-	-	-	-	-	-	-	4,920
1a.1.18.2	Plant systems	-	-	-	-	-	-	536	80	616	616	-	-	-	-	-	-	-	-	-	4,167
1a.1.18.3	Plant structures and buildings	-	-	-	-	-	-	401	60	461	461	-	-	-	-	-	-	-	-	-	3,120
1a.1.18.4	Waste management	-	-	-	-	-	-	257	39	296	296	-	-	-	-	-	-	-	-	-	2,000
1a.1.18.5	Facility and site dormancy	-	-	-	-	-	-	257	39	296	296	-	-	-	-	-	-	-	-	-	2,000
1a.1.18	Total	-	-	-	-	-	-	2,083	312	2,395	2,395	-	-	-	-	-	-	-	-	-	16,207
Detailed Work Procedures																					
1a.1.19.1	Plant systems	-	-	-	-	-	-	152	23	175	175	-	-	-	-	-	-	-	-	-	1,183
1a.1.19.2	Facility closeout & dormancy	-	-	-	-	-	-	154	23	177	177	-	-	-	-	-	-	-	-	-	1,200
1a.1.19	Total	-	-	-	-	-	-	306	46	352	352	-	-	-	-	-	-	-	-	-	2,383
1a.1.20	Procure vacuum drying system	-	-	-	-	-	-	13	2	15	15	-	-	-	-	-	-	-	-	-	100
1a.1.21	Drain/de-energize non-cont. systems									a											
1a.1.22	Drain & dry NSSS									a											
1a.1.23	Drain/de-energize contaminated systems									a											
1a.1.24	Decon/secure contaminated systems									a											
1a.1	Subtotal Period 1a Activity Costs	-	-	-	-	-	-	6,120	980	7,100	7,100	-	-	-	-	-	-	-	-	-	44,390
Period 1a Collateral Costs																					
1a.3.1	Spent Fuel Capital and Transfer	-	-	-	-	-	-	1,323	198	1,522	-	1,522	-	-	-	-	-	-	-	-	-
1a.3.2	Retention and Severance	-	-	-	-	-	-	9,892	1,484	11,376	11,376	-	-	-	-	-	-	-	-	-	-
1a.3	Subtotal Period 1a Collateral Costs	-	-	-	-	-	-	11,215	1,682	12,897	11,376	1,522	-	-	-	-	-	-	-	-	-
Period 1a Period-Dependent Costs																					
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 physics supplies	-	614	-	-	-	-	-	153	767	767	-	-	-	-	-	-	-	-	-	-
1a.4.4	Heavy equipment rental	-	753	-	-	-	-	-	113	866	866	-	-	-	-	-	-	-	-	-	-
1a.4.5	Disposal of DAW generated	-	-	12	6	-	50	-	15	83	83	-	-	-	610	-	-	-	12,190	20	-
1a.4.6	Plant energy budget	-	-	-	-	-	-	1,817	272	2,089	2,089	-	-	-	-	-	-	-	-	-	-
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	Fixed Overhead	-	-	-	-	-	-	2,616	392	3,009	3,009	-	-	-	-	-	-	-	-	-	-
1a.4.10	Spent Fuel Pool O&M	-	-	-	-	-	-	845	127	971	-	971	-	-	-	-	-	-	-	-	-
1a.4.11	ISFSI Operating Costs	-	-	-	-	-	-	112	17	129	-	129	-	-	-	-	-	-	-	-	-
1a.4.12	Railroad Track Maintenance	-	-	-	-	-	-	125	19	144	144	-	-	-	-	-	-	-	-	-	-
1a.4.13	Security Staff Cost	-	-	-	-	-	-	16,372	2,456	18,827	18,827	-	-	-	-	-	-	-	-	-	245,440
1a.4.14	Utility Staff Cost	-	-	-	-	-	-	27,285	4,093	31,378	31,378	-	-	-	-	-	-	-	-	-	422,240
1a.4	Subtotal Period 1a Period-Dependent Costs	-	1,367	12	6	-	50	59,389	8,679	69,502	64,632	4,870	-	-	610	-	-	-	12,190	20	667,680
1a.0	TOTAL PERIOD 1a COST	-	1,367	12	6	-	50	76,724	11,341	89,500	83,108	6,392	-	-	610	-	-	-	12,190	20	712,070

Table I
Monticello Nuclear Generating Plant
SAFSTOR 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 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 1b - SAFSTOR Limited DECON Activities																					
Period 1b Direct Decommissioning Activities																					
Decontamination of Site Buildings																					
1b.1.1.1	Reactor Building	5,155	-	-	-	-	-	-	2,577	7,732	7,732	-	-	-	-	-	-	-	-	70,157	-
1b.1.1.2	Admin	95	-	-	-	-	-	-	48	143	143	-	-	-	-	-	-	-	-	1,357	-
1b.1.1.3	HPCI Room	25	-	-	-	-	-	-	13	38	38	-	-	-	-	-	-	-	-	350	-
1b.1.1.4	Hot Shop	15	-	-	-	-	-	-	7	22	22	-	-	-	-	-	-	-	-	208	-
1b.1.1.5	LLRW Storage & Shipping	49	-	-	-	-	-	-	25	74	74	-	-	-	-	-	-	-	-	705	-
1b.1.1.6	Offgas Stack	326	-	-	-	-	-	-	163	489	489	-	-	-	-	-	-	-	-	4,575	-
1b.1.1.7	Offgas Storage & Compressor	34	-	-	-	-	-	-	17	51	51	-	-	-	-	-	-	-	-	488	-
1b.1.1.8	Radwaste	103	-	-	-	-	-	-	51	154	154	-	-	-	-	-	-	-	-	1,473	-
1b.1.1.9	Radwaste Material Storage Warehouse	54	-	-	-	-	-	-	27	81	81	-	-	-	-	-	-	-	-	768	-
1b.1.1.10	Recombiner	23	-	-	-	-	-	-	11	34	34	-	-	-	-	-	-	-	-	323	-
1b.1.1.11	Turbine	600	-	-	-	-	-	-	300	900	900	-	-	-	-	-	-	-	-	8,583	-
1b.1.1.12	Turbine Building Addition	50	-	-	-	-	-	-	25	74	74	-	-	-	-	-	-	-	-	709	-
1b.1.1.13	Reactor (Post Fuel)	830	-	-	-	-	-	-	415	1,245	1,245	-	-	-	-	-	-	-	-	11,337	-
1b.1.1	Totals	7,359	-	-	-	-	-	-	3,679	11,038	11,038	-	-	-	-	-	-	-	-	101,033	-
1b.1	Subtotal Period 1b Activity Costs	7,359	-	-	-	-	-	-	3,679	11,038	11,038	-	-	-	-	-	-	-	-	101,033	-
Period 1b Additional Costs																					
1b.2.1	Spent Fuel Pool Isolation	-	-	-	-	-	-	12,675	1,901	14,576	14,576	-	-	-	-	-	-	-	-	-	-
1b.2	Subtotal Period 1b Additional Costs	-	-	-	-	-	-	12,675	1,901	14,576	14,576	-	-	-	-	-	-	-	-	-	-
Period 1b Collateral Costs																					
1b.3.1	Decon equipment	1,055	-	-	-	-	-	-	158	1,213	1,213	-	-	-	-	-	-	-	-	-	-
1b.3.2	Process decommissioning water waste	220	-	145	258	-	588	-	310	1,522	1,522	-	-	-	1,351	-	-	-	81,042	263	-
1b.3.4	Small tool allowance	-	126	-	-	-	-	-	19	145	145	-	-	-	-	-	-	-	-	-	-
1b.3.5	Spent Fuel Capital and Transfer	-	-	-	-	-	-	196	29	225	-	225	-	-	-	-	-	-	-	-	-
1b.3.6	Retention and Severance	-	-	-	-	-	-	3,601	540	4,141	4,141	-	-	-	-	-	-	-	-	-	-
1b.3	Subtotal Period 1b Collateral Costs	1,274	126	145	258	-	588	3,796	1,057	7,246	7,021	225	-	-	1,351	-	-	-	81,042	263	-
Period 1b Period-Dependent Costs																					
1b.4.1	Decon supplies	1,562	-	-	-	-	-	-	391	1,953	1,953	-	-	-	-	-	-	-	-	-	-
1b.4.2	Insurance	-	-	-	-	-	-	580	58	638	638	-	-	-	-	-	-	-	-	-	-
1b.4.3	Property taxes	-	-	-	-	-	-	890	89	979	979	-	-	-	-	-	-	-	-	-	-
1b.4.4	Health physics supplies	-	729	-	-	-	-	-	182	911	911	-	-	-	-	-	-	-	-	-	-
1b.4.5	Heavy equipment rental	-	188	-	-	-	-	-	28	216	216	-	-	-	-	-	-	-	-	-	-
1b.4.6	Disposal of DAW generated	-	-	11	6	-	46	-	13	76	76	-	-	-	555	-	-	-	11,092	18	-
1b.4.7	Plant energy budget	-	-	-	-	-	-	453	68	521	521	-	-	-	-	-	-	-	-	-	-
1b.4.8	NRC Fees	-	-	-	-	-	-	161	16	177	177	-	-	-	-	-	-	-	-	-	-
1b.4.9	Emergency Planning Fees	-	-	-	-	-	-	708	71	779	-	779	-	-	-	-	-	-	-	-	-
1b.4.10	Fixed Overhead	-	-	-	-	-	-	652	98	750	750	-	-	-	-	-	-	-	-	-	-
1b.4.11	Spent Fuel Pool O&M	-	-	-	-	-	-	211	32	242	-	242	-	-	-	-	-	-	-	-	-
1b.4.12	ISFSI Operating Costs	-	-	-	-	-	-	28	4	32	-	32	-	-	-	-	-	-	-	-	-
1b.4.13	Railroad Track Maintenance	-	-	-	-	-	-	31	5	36	36	-	-	-	-	-	-	-	-	-	-
1b.4.14	Security Staff Cost	-	-	-	-	-	-	4,082	612	4,694	4,694	-	-	-	-	-	-	-	-	-	61,192
1b.4.15	Utility Staff Cost	-	-	-	-	-	-	6,803	1,020	7,823	7,823	-	-	-	-	-	-	-	-	-	105,271
1b.4	Subtotal Period 1b Period-Dependent Costs	1,562	917	11	6	-	46	14,599	2,687	19,828	18,775	1,053	-	-	555	-	-	-	11,092	18	166,463
1b.0	TOTAL PERIOD 1b COST	10,195	1,043	156	264	-	634	31,070	9,325	52,688	51,410	1,278	-	-	1,905	-	-	-	92,135	101,314	166,463
PERIOD 1c - Preparations for SAFSTOR Dormancy																					
Period 1c Direct Decommissioning Activities																					
1c.1.1	Prepare support equipment for storage	-	527	-	-	-	-	-	79	606	606	-	-	-	-	-	-	-	-	3,000	-
1c.1.2	Install containment pressure equal. lines	-	54	-	-	-	-	-	8	62	62	-	-	-	-	-	-	-	-	700	-
1c.1.3	Interim survey prior to dormancy	-	-	-	-	-	-	733	220	953	953	-	-	-	-	-	-	-	-	12,801	-
1c.1.4	Secure building accesses									a											
1c.1.5	Prepare & submit interim report	-	-	-	-	-	-	75	11	86	86	-	-	-	-	-	-	-	-	-	583
1c.1	Subtotal Period 1c Activity Costs	-	581	-	-	-	-	808	318	1,707	1,707	-	-	-	-	-	-	-	-	16,501	583
Period 1c Collateral Costs																					
1c.3.1	Process decommissioning water waste	161	-	107	190	-	433	-	228	1,120	1,120	-	-	-	994	-	-	-	59,653	194	-

Table I
Monticello Nuclear Generating Plant
SAFSTOR 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 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 1c Collateral Costs (continued)																					
1c.3.3	Small tool allowance	-	5	-	-	-	-	-	1	6	6	-	-	-	-	-	-	-	-	-	-
1c.3.4	Spent Fuel Capital and Transfer	-	-	-	-	-	-	2,539	381	2,920	-	2,920	-	-	-	-	-	-	-	-	-
1c.3.5	Retention and Severance	-	-	-	-	-	-	2,734	410	3,145	3,145	-	-	-	-	-	-	-	-	-	-
1c.3	Subtotal Period 1c Collateral Costs	161	5	107	190	-	433	5,273	1,020	7,190	4,270	2,920	-	-	994	-	-	-	59,653	194	-
Period 1c Period-Dependent Costs																					
1c.4.1	Insurance	-	-	-	-	-	-	580	58	638	638	-	-	-	-	-	-	-	-	-	-
1c.4.2	Property taxes	-	-	-	-	-	-	888	89	977	977	-	-	-	-	-	-	-	-	-	-
1c.4.3	Health physics supplies	-	248	-	-	-	-	-	62	310	310	-	-	-	-	-	-	-	-	-	-
1c.4.4	Heavy equipment rental	-	188	-	-	-	-	-	28	216	216	-	-	-	-	-	-	-	-	-	-
1c.4.5	Disposal of DAW generated	-	-	3	2	-	13	-	4	21	21	-	-	-	152	-	-	-	3,039	5	-
1c.4.6	Plant energy budget	-	-	-	-	-	-	453	68	521	521	-	-	-	-	-	-	-	-	-	-
1c.4.7	NRC Fees	-	-	-	-	-	-	161	16	177	177	-	-	-	-	-	-	-	-	-	-
1c.4.8	Emergency Planning Fees	-	-	-	-	-	-	708	71	779	-	779	-	-	-	-	-	-	-	-	-
1c.4.9	Fixed Overhead	-	-	-	-	-	-	652	98	750	750	-	-	-	-	-	-	-	-	-	-
1c.4.10	Spent Fuel Pool O&M	-	-	-	-	-	-	211	32	242	-	242	-	-	-	-	-	-	-	-	-
1c.4.11	ISFSI Operating Costs	-	-	-	-	-	-	28	4	32	-	32	-	-	-	-	-	-	-	-	-
1c.4.12	Railroad Track Maintenance	-	-	-	-	-	-	31	5	36	36	-	-	-	-	-	-	-	-	-	-
1c.4.13	Security Staff Cost	-	-	-	-	-	-	4,082	612	4,694	4,694	-	-	-	-	-	-	-	-	-	61,192
1c.4.14	Utility Staff Cost	-	-	-	-	-	-	6,803	1,020	7,823	7,823	-	-	-	-	-	-	-	-	-	105,271
1c.4	Subtotal Period 1c Period-Dependent Costs	-	436	3	2	-	13	14,597	2,166	17,216	16,163	1,053	-	-	152	-	-	-	3,039	5	166,463
1c.0	TOTAL PERIOD 1c COST	161	1,021	110	192	-	446	20,678	3,505	26,113	22,140	3,973	-	-	1,146	-	-	-	62,692	16,700	167,046
PERIOD 1 TOTALS		10,357	3,431	278	462	-	1,130	128,472	24,170	168,301	156,658	11,643	-	-	3,661	-	-	-	167,017	118,034	1,045,579
PERIOD 2a - SAFSTOR Dormancy with Wet Spent Fuel Storage																					
Period 2a Direct Decommissioning Activities																					
2a.1.1	Quarterly Inspection									a											
2a.1.2	Semi-annual environmental survey									a											
2a.1.3	Prepare reports									a											
2a.1.4	Bituminous roof replacement	-	-	-	-	-	-	155	23	178	178	-	-	-	-	-	-	-	-	-	-
2a.1.5	Maintenance supplies	-	-	-	-	-	-	349	87	437	437	-	-	-	-	-	-	-	-	-	-
2a.1	Subtotal Period 2a Activity Costs	-	-	-	-	-	-	504	111	615	615	-	-	-	-	-	-	-	-	-	-
Period 2a Additional Costs																					
2a.2.1	Security Modifications	-	-	-	-	-	-	8,696	1,304	10,000	10,000	-	-	-	-	-	-	-	-	-	-
2a.2	Subtotal Period 2a Additional Costs	-	-	-	-	-	-	8,696	1,304	10,000	10,000	-	-	-	-	-	-	-	-	-	-
Period 2a Collateral Costs																					
2a.3.1	Spent Fuel Capital and Transfer	-	-	-	-	-	-	141,374	21,206	162,580	-	162,580	-	-	-	-	-	-	-	-	-
2a.3.2	Retention and Severance	-	-	-	-	-	-	19,427	2,914	22,341	22,341	-	-	-	-	-	-	-	-	-	-
2a.3	Subtotal Period 2a Collateral Costs	-	-	-	-	-	-	160,801	24,120	184,921	22,341	162,580	-	-	-	-	-	-	-	-	-
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	Health physics supplies	-	617	-	-	-	-	-	154	771	771	-	-	-	-	-	-	-	-	-	-
2a.4.4	Disposal of DAW generated	-	-	11	6	-	47	-	14	79	79	-	-	-	576	-	-	-	11,523	19	-
2a.4.5	Plant energy budget	-	-	-	-	-	-	910	136	1,046	1,046	-	-	-	-	-	-	-	-	-	-
2a.4.6	NRC Fees	-	-	-	-	-	-	610	61	671	671	-	-	-	-	-	-	-	-	-	-
2a.4.7	Emergency Planning Fees	-	-	-	-	-	-	7,110	711	7,821	-	7,821	-	-	-	-	-	-	-	-	-
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	-	2,432	-	-	-	-	-	-	-	-	-
2a.4.10	ISFSI Operating Costs	-	-	-	-	-	-	280	42	322	-	322	-	-	-	-	-	-	-	-	-
2a.4.11	Railroad Track Maintenance	-	-	-	-	-	-	639	96	735	735	-	-	-	-	-	-	-	-	-	-
2a.4.12	Security Staff Cost	-	-	-	-	-	-	37,806	5,671	43,477	31,086	12,391	-	-	-	-	-	-	-	-	562,523
2a.4.13	Utility Staff Cost	-	-	-	-	-	-	13,543	2,031	15,574	12,615	2,959	-	-	-	-	-	-	-	-	205,738
2a.4	Subtotal Period 2a Period-Dependent Costs	-	617	11	6	-	47	79,012	11,099	90,793	64,868	25,925	-	-	576	-	-	-	11,523	19	768,261
2a.0	TOTAL PERIOD 2a COST	-	617	11	6	-	47	249,013	36,634	286,328	97,823	188,505	-	-	576	-	-	-	11,523	19	768,261

Table I
Monticello Nuclear Generating Plant
SAFSTOR 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 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 - SAFSTOR Dormancy with Dry Spent Fuel Storage																					
Period 2b Direct Decommissioning Activities																					
2b.1.1	Quarterly Inspection									a											
2b.1.2	Semi-annual environmental survey									a											
2b.1.3	Prepare reports									a											
2b.1.4	Bituminous roof replacement	-	-	-	-	-	-	3,127	469	3,596	3,596	-	-	-	-	-	-	-	-	-	-
2b.1.5	Maintenance supplies	-	-	-	-	-	-	7,065	1,766	8,831	8,831	-	-	-	-	-	-	-	-	-	-
2b.1	Subtotal Period 2b Activity Costs	-	-	-	-	-	-	10,192	2,235	12,427	12,427	-	-	-	-	-	-	-	-	-	-
Period 2b Collateral Costs																					
2b.3.1	Spent Fuel Capital and Transfer	-	-	-	-	-	-	366,775	55,016	421,791	-	421,791	-	-	-	-	-	-	-	-	-
2b.3	Subtotal Period 2b Collateral Costs	-	-	-	-	-	-	366,775	55,016	421,791	-	421,791	-	-	-	-	-	-	-	-	-
Period 2b Period-Dependent Costs																					
2b.4.1	Insurance	-	-	-	-	-	-	35,606	3,561	39,167	39,167	-	-	-	-	-	-	-	-	-	-
2b.4.2	Property taxes	-	-	-	-	-	-	180,613	18,061	198,674	198,674	-	-	-	-	-	-	-	-	-	-
2b.4.3	Health physics supplies	-	6,047	-	-	-	-	-	1,512	7,559	7,559	-	-	-	-	-	-	-	-	-	-
2b.4.4	Disposal of DAW generated	-	-	111	57	-	461	-	135	764	764	-	-	-	5,595	-	-	-	111,903	182	-
2b.4.5	Plant energy budget	-	-	-	-	-	-	9,196	1,379	10,576	10,576	-	-	-	-	-	-	-	-	-	-
2b.4.6	NRC Fees	-	-	-	-	-	-	11,515	1,152	12,667	12,667	-	-	-	-	-	-	-	-	-	-
2b.4.7	Emergency Planning Fees	-	-	-	-	-	-	7,506	751	8,256	-	8,256	-	-	-	-	-	-	-	-	-
2b.4.8	Fixed Overhead	-	-	-	-	-	-	10,904	1,636	12,540	12,540	-	-	-	-	-	-	-	-	-	-
2b.4.9	ISFSI Operating Costs	-	-	-	-	-	-	5,666	850	6,516	-	6,516	-	-	-	-	-	-	-	-	-
2b.4.10	Railroad Track Maintenance	-	-	-	-	-	-	6,330	950	7,280	7,280	-	-	-	-	-	-	-	-	-	-
2b.4.11	Security Staff Cost	-	-	-	-	-	-	280,802	42,120	322,922	72,658	250,265	-	-	-	-	-	-	-	-	3,790,775
2b.4.12	Utility Staff Cost	-	-	-	-	-	-	114,547	17,182	131,729	71,924	59,805	-	-	-	-	-	-	-	-	1,684,789
2b.4	Subtotal Period 2b Period-Dependent Costs	-	6,047	111	57	-	461	662,686	89,288	758,650	433,808	324,843	-	-	5,595	-	-	-	111,903	182	5,475,563
2b.0	TOTAL PERIOD 2b COST	-	6,047	111	57	-	461	1,039,652	146,539	1,192,868	446,234	746,634	-	-	5,595	-	-	-	111,903	182	5,475,563
PERIOD 2 TOTALS		-	6,664	122	63	-	509	1,288,665	183,173	1,479,196	544,057	935,139	-	-	6,171	-	-	-	123,426	201	6,243,824
PERIOD 3a - Reactivate Site Following SAFSTOR Dormancy																					
Period 3a Direct Decommissioning Activities																					
3a.1.1	Prepare preliminary decommissioning cost	-	-	-	-	-	-	167	25	192	192	-	-	-	-	-	-	-	-	-	1,300
3a.1.2	Review plant dwgs & specs.	-	-	-	-	-	-	591	89	680	680	-	-	-	-	-	-	-	-	-	4,600
3a.1.3	Perform detailed rad survey									a											
3a.1.4	End product description	-	-	-	-	-	-	129	19	148	148	-	-	-	-	-	-	-	-	-	1,000
3a.1.5	Detailed by-product inventory	-	-	-	-	-	-	167	25	192	192	-	-	-	-	-	-	-	-	-	1,300
3a.1.6	Define major work sequence	-	-	-	-	-	-	964	145	1,108	1,108	-	-	-	-	-	-	-	-	-	7,500
3a.1.7	Perform SER and EA	-	-	-	-	-	-	398	60	458	458	-	-	-	-	-	-	-	-	-	3,100
3a.1.8	Perform Site-Specific Cost Study	-	-	-	-	-	-	643	96	739	739	-	-	-	-	-	-	-	-	-	5,000
Activity Specifications																					
3a.1.9.1	Re-activate plant & temporary facilities	-	-	-	-	-	-	947	142	1,089	980	-	109	-	-	-	-	-	-	-	7,370
3a.1.9.2	Plant systems	-	-	-	-	-	-	536	80	616	554	-	62	-	-	-	-	-	-	-	4,167
3a.1.9.3	Reactor internals	-	-	-	-	-	-	912	137	1,049	1,049	-	-	-	-	-	-	-	-	-	7,100
3a.1.9.4	Reactor vessel	-	-	-	-	-	-	835	125	961	961	-	-	-	-	-	-	-	-	-	6,500
3a.1.9.5	Sacrificial shield	-	-	-	-	-	-	64	10	74	74	-	-	-	-	-	-	-	-	-	500
3a.1.9.6	Moisture separators/reheaters	-	-	-	-	-	-	129	19	148	148	-	-	-	-	-	-	-	-	-	1,000
3a.1.9.7	Reinforced concrete	-	-	-	-	-	-	206	31	236	118	-	118	-	-	-	-	-	-	-	1,600
3a.1.9.8	Main Turbine	-	-	-	-	-	-	268	40	309	309	-	-	-	-	-	-	-	-	-	2,088
3a.1.9.9	Main Condensers	-	-	-	-	-	-	268	40	309	309	-	-	-	-	-	-	-	-	-	2,088
3a.1.9.10	Pressure suppression structure	-	-	-	-	-	-	257	39	296	296	-	-	-	-	-	-	-	-	-	2,000
3a.1.9.11	Drywell	-	-	-	-	-	-	206	31	236	236	-	-	-	-	-	-	-	-	-	1,600
3a.1.9.12	Plant structures & buildings	-	-	-	-	-	-	401	60	461	231	-	231	-	-	-	-	-	-	-	3,120
3a.1.9.13	Waste management	-	-	-	-	-	-	591	89	680	680	-	-	-	-	-	-	-	-	-	4,600
3a.1.9.14	Facility & site closeout	-	-	-	-	-	-	116	17	133	67	-	67	-	-	-	-	-	-	-	900
3a.1.9	Total	-	-	-	-	-	-	5,736	860	6,597	6,011	-	586	-	-	-	-	-	-	-	44,633
Planning & Site Preparations																					
3a.1.10	Prepare dismantling sequence	-	-	-	-	-	-	308	46	355	355	-	-	-	-	-	-	-	-	-	2,400
3a.1.11	Plant prep. & temp. svces	-	-	-	-	-	-	3,500	525	4,025	4,025	-	-	-	-	-	-	-	-	-	-
3a.1.12	Design water clean-up system	-	-	-	-	-	-	180	27	207	207	-	-	-	-	-	-	-	-	-	1,400
3a.1.13	Rigging/Cont. Cntrl Envlps/tooling/etc.	-	-	-	-	-	-	2,400	360	2,760	2,760	-	-	-	-	-	-	-	-	-	-
3a.1.14	Procure casks/liners & containers	-	-	-	-	-	-	158	24	182	182	-	-	-	-	-	-	-	-	-	1,230

Table I
Monticello Nuclear Generating Plant
SAFSTOR 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 Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
3a.1	Subtotal Period 3a Activity Costs	-	-	-	-	-	-	15,341	2,301	17,643	17,057	-	586	-	-	-	-	-	-	-	73,463
Period 3a Additional Costs																					
3a.2.1	Site Characterization	-	-	-	-	-	-	5,930	1,779	7,708	7,708	-	-	-	-	-	-	-	-	30,500	10,852
3a.2.2	Mixed & RCRA Waste	-	-	28	29	14	-	-	9	80	80	-	-	43	-	-	-	-	5,253	161	-
3a.2	Subtotal Period 3a Additional Costs	-	-	28	29	14	-	5,930	1,788	7,788	7,788	-	-	43	-	-	-	-	5,253	30,661	10,852
Period 3a Collateral Costs																					
3a.3.1	Spent Fuel Capital and Transfer	-	-	-	-	-	-	5,693	854	6,547	-	6,547	-	-	-	-	-	-	-	-	-
3a.3	Subtotal Period 3a Collateral Costs	-	-	-	-	-	-	5,693	854	6,547	-	6,547	-	-	-	-	-	-	-	-	-
Period 3a Period-Dependent Costs																					
3a.4.1	Insurance	-	-	-	-	-	-	703	70	774	442	332	-	-	-	-	-	-	-	-	-
3a.4.2	Property taxes	-	-	-	-	-	-	3,479	348	3,827	3,241	586	-	-	-	-	-	-	-	-	-
3a.4.3	Health physics supplies	-	538	-	-	-	-	-	135	673	673	-	-	-	-	-	-	-	-	-	-
3a.4.4	Heavy equipment rental	-	753	-	-	-	-	-	113	866	866	-	-	-	-	-	-	-	-	-	-
3a.4.5	Disposal of DAW generated	-	-	10	5	-	42	-	12	70	70	-	-	-	516	-	-	-	10,311	17	-
3a.4.6	Plant energy budget	-	-	-	-	-	-	1,817	272	2,089	2,089	-	-	-	-	-	-	-	-	-	-
3a.4.7	NRC ISFSI Fees	-	-	-	-	-	-	51	5	56	-	56	-	-	-	-	-	-	-	-	-
3a.4.8	NRC Fees	-	-	-	-	-	-	335	33	368	368	-	-	-	-	-	-	-	-	-	-
3a.4.9	Emergency Planning Fees	-	-	-	-	-	-	148	15	163	-	163	-	-	-	-	-	-	-	-	-
3a.4.10	Fixed Overhead	-	-	-	-	-	-	2,616	392	3,009	3,009	-	-	-	-	-	-	-	-	-	-
3a.4.11	ISFSI Operating Costs	-	-	-	-	-	-	112	17	129	-	129	-	-	-	-	-	-	-	-	-
3a.4.12	Railroad Track Maintenance	-	-	-	-	-	-	125	19	144	144	-	-	-	-	-	-	-	-	-	-
3a.4.13	Security Staff Cost	-	-	-	-	-	-	4,690	703	5,393	5,107	286	-	-	-	-	-	-	-	-	69,160
3a.4.14	Utility Staff Cost	-	-	-	-	-	-	16,817	2,523	19,339	18,160	1,180	-	-	-	-	-	-	-	-	260,000
3a.4	Subtotal Period 3a Period-Dependent Costs	-	1,291	10	5	-	42	30,893	4,658	36,900	34,169	2,731	-	-	516	-	-	-	10,311	17	329,160
3a.0	TOTAL PERIOD 3a COST	-	1,291	38	34	14	42	57,857	9,601	68,878	59,014	9,278	586	43	516	-	-	-	15,565	30,678	413,475
PERIOD 3b - Decommissioning Preparations																					
Period 3b Direct Decommissioning Activities																					
Detailed Work Procedures																					
3b.1.1.1	Plant systems	-	-	-	-	-	-	608	91	700	630	-	70	-	-	-	-	-	-	-	4,733
3b.1.1.2	Reactor internals	-	-	-	-	-	-	514	77	591	591	-	-	-	-	-	-	-	-	-	4,000
3b.1.1.3	Remaining buildings	-	-	-	-	-	-	174	26	200	50	-	150	-	-	-	-	-	-	-	1,350
3b.1.1.4	CRD housings & NIs	-	-	-	-	-	-	129	19	148	148	-	-	-	-	-	-	-	-	-	1,000
3b.1.1.5	Incore instrumentation	-	-	-	-	-	-	129	19	148	148	-	-	-	-	-	-	-	-	-	1,000
3b.1.1.6	Removal primary containment	-	-	-	-	-	-	257	39	296	296	-	-	-	-	-	-	-	-	-	2,000
3b.1.1.7	Reactor vessel	-	-	-	-	-	-	467	70	537	537	-	-	-	-	-	-	-	-	-	3,630
3b.1.1.8	Facility closeout	-	-	-	-	-	-	154	23	177	89	-	89	-	-	-	-	-	-	-	1,200
3b.1.1.9	Sacrificial shield	-	-	-	-	-	-	154	23	177	177	-	-	-	-	-	-	-	-	-	1,200
3b.1.1.10	Reinforced concrete	-	-	-	-	-	-	129	19	148	74	-	74	-	-	-	-	-	-	-	1,000
3b.1.1.11	Main Turbine	-	-	-	-	-	-	267	40	307	307	-	-	-	-	-	-	-	-	-	2,080
3b.1.1.12	Main Condensers	-	-	-	-	-	-	268	40	309	309	-	-	-	-	-	-	-	-	-	2,088
3b.1.1.13	Moisture separators & reheaters	-	-	-	-	-	-	257	39	296	296	-	-	-	-	-	-	-	-	-	2,000
3b.1.1.14	Radwaste building	-	-	-	-	-	-	351	53	403	363	-	40	-	-	-	-	-	-	-	2,730
3b.1.1.15	Reactor building	-	-	-	-	-	-	351	53	403	363	-	40	-	-	-	-	-	-	-	2,730
3b.1.1	Total	-	-	-	-	-	-	4,208	631	4,839	4,376	-	463	-	-	-	-	-	-	-	32,741
3b.1	Subtotal Period 3b Activity Costs	-	-	-	-	-	-	4,208	631	4,839	4,376	-	463	-	-	-	-	-	-	-	32,741
Period 3b Collateral Costs																					
3b.3.1	Decon equipment	1,055	-	-	-	-	-	-	158	1,213	1,213	-	-	-	-	-	-	-	-	-	-
3b.3.2	DOC staff relocation expenses	-	-	-	-	-	-	1,264	190	1,454	1,454	-	-	-	-	-	-	-	-	-	-
3b.3.3	Pipe cutting equipment	-	1,200	-	-	-	-	-	180	1,380	1,380	-	-	-	-	-	-	-	-	-	-
3b.3.4	Spent Fuel Capital and Transfer	-	-	-	-	-	-	2,839	426	3,265	-	3,265	-	-	-	-	-	-	-	-	-
3b.3	Subtotal Period 3b Collateral Costs	1,055	1,200	-	-	-	-	4,103	954	7,311	4,047	3,265	-	-	-	-	-	-	-	-	-
Period 3b Period-Dependent Costs																					
3b.4.1	Decon supplies	39	-	-	-	-	-	-	10	48	48	-	-	-	-	-	-	-	-	-	-
3b.4.2	Insurance	-	-	-	-	-	-	351	35	386	386	-	-	-	-	-	-	-	-	-	-
3b.4.3	Property taxes	-	-	-	-	-	-	1,614	161	1,776	1,483	293	-	-	-	-	-	-	-	-	-
3b.4.4	Health physics supplies	-	295	-	-	-	-	-	74	369	369	-	-	-	-	-	-	-	-	-	-
3b.4.5	Heavy equipment rental	-	375	-	-	-	-	-	56	432	432	-	-	-	-	-	-	-	-	-	-
3b.4.6	Disposal of DAW generated	-	-	6	3	-	24	-	7	40	40	-	-	-	291	-	-	-	5,814	9	-
3b.4.7	Plant energy budget	-	-	-	-	-	-	906	136	1,042	1,042	-	-	-	-	-	-	-	-	-	-

Table I
Monticello Nuclear Generating Plant
SAFSTOR 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 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 3b Period-Dependent Costs (continued)																					
3b.4.8	NRC ISFSI Fees	-	-	-	-	-	-	25	3	28	-	28	-	-	-	-	-	-	-	-	-
3b.4.9	NRC Fees	-	-	-	-	-	-	167	17	183	183	-	-	-	-	-	-	-	-	-	-
3b.4.10	Emergency Planning Fees	-	-	-	-	-	-	74	7	81	-	81	-	-	-	-	-	-	-	-	-
3b.4.11	Fixed Overhead	-	-	-	-	-	-	1,305	196	1,500	1,500	-	-	-	-	-	-	-	-	-	-
3b.4.12	ISFSI Operating Costs	-	-	-	-	-	-	56	8	64	-	64	-	-	-	-	-	-	-	-	-
3b.4.13	Railroad Track Maintenance	-	-	-	-	-	-	62	9	72	72	-	-	-	-	-	-	-	-	-	-
3b.4.14	Security Staff Cost	-	-	-	-	-	-	2,338	351	2,689	2,547	143	-	-	-	-	-	-	-	-	34,485
3b.4.15	DOC Staff Cost	-	-	-	-	-	-	5,344	802	6,146	6,146	-	-	-	-	-	-	-	-	-	58,080
3b.4.16	Utility Staff Cost	-	-	-	-	-	-	8,385	1,258	9,643	9,055	588	-	-	-	-	-	-	-	-	129,644
3b.4	Subtotal Period 3b Period-Dependent Costs	39	671	6	3	-	24	20,628	3,129	24,499	23,302	1,197	-	-	291	-	-	-	5,814	9	222,210
3b.0	TOTAL PERIOD 3b COST	1,093	1,871	6	3	-	24	28,938	4,714	36,649	31,725	4,462	463	-	291	-	-	-	5,814	9	254,951
PERIOD 3 TOTALS		1,093	3,162	44	37	14	66	86,795	14,316	105,528	90,739	13,740	1,049	43	806	-	-	-	21,379	30,688	668,425
PERIOD 4a - Large Component Removal																					
Period 4a Direct Decommissioning Activities																					
Nuclear Steam Supply System Removal																					
4a.1.1.1	Recirculation System Piping & Valves	23	85	27	32	185	264	-	134	750	750	-	-	676	715	-	-	-	94,867	1,594	-
4a.1.1.2	Recirculation Pumps & Motors	8	56	16	37	252	270	-	131	771	771	-	-	568	473	-	-	-	112,200	1,049	-
4a.1.1.3	CRDMs & NIs Removal	41	801	415	98	-	1,130	-	560	3,045	3,045	-	-	-	3,741	-	-	-	213,700	12,506	-
4a.1.1.4	Reactor Vessel Internals	139	6,098	11,330	1,029	-	25,657	278	20,603	65,135	65,135	-	-	-	2,943	1,628	600	-	337,343	22,415	1,055
4a.1.1.5	Reactor Vessel	-	8,498	1,818	837	-	6,301	278	10,229	27,961	27,961	-	-	-	17,823	-	-	-	1,110,260	22,415	1,055
4a.1.1	Totals	211	15,538	13,605	2,034	438	33,622	557	31,657	97,662	97,662	-	-	1,244	25,695	1,628	600	-	1,868,371	59,979	2,110
Removal of Major Equipment																					
4a.1.2	Main Turbine/Generator	-	340	1,356	521	6,139	439	-	1,330	10,126	10,126	-	-	24,835	1,383	-	-	-	1,577,959	4,796	-
4a.1.3	Main Condensers	-	1,207	360	194	3,225	244	-	912	6,142	6,142	-	-	17,396	727	-	-	-	828,955	16,823	-
Cascading Costs from Clean Building Demolition																					
4a.1.4.1	Reactor Building	-	332	-	-	-	-	-	50	381	381	-	-	-	-	-	-	-	-	2,217	-
4a.1.4.2	Radwaste	-	25	-	-	-	-	-	4	28	28	-	-	-	-	-	-	-	-	127	-
4a.1.4.3	Turbine	-	127	-	-	-	-	-	19	146	146	-	-	-	-	-	-	-	-	1,254	-
4a.1.4	Totals	-	483	-	-	-	-	-	72	556	556	-	-	-	-	-	-	-	-	3,598	-
Disposal of Plant Systems																					
4a.1.5.1	Automatic Press Relief	-	106	2	10	182	-	-	56	356	356	-	-	1,088	-	-	-	-	44,184	1,468	-
4a.1.5.2	Chemistry Sampling	-	24	0	2	35	-	-	12	73	73	-	-	207	-	-	-	-	8,422	356	-
4a.1.5.3	Chemistry Sampling - Insulated	-	2	0	0	0	-	-	0	2	2	-	-	1	-	-	-	-	61	25	-
4a.1.5.4	Circulating Water - RCA	-	207	14	62	1,114	-	-	230	1,626	1,626	-	-	6,656	-	-	-	-	270,307	2,860	-
4a.1.5.5	Combustible Gas Control - Insul - RCA	-	29	0	2	36	-	-	13	80	80	-	-	212	-	-	-	-	8,617	378	-
4a.1.5.6	Combustible Gas Control - RCA	-	18	1	3	48	-	-	12	81	81	-	-	285	-	-	-	-	11,577	245	-
4a.1.5.7	Condensate & Feedwater	-	888	60	281	5,046	-	-	1,027	7,303	7,303	-	-	30,157	-	-	-	-	1,224,704	12,501	-
4a.1.5.8	Condensate & Feedwater - Insulated	-	444	12	55	980	-	-	267	1,757	1,757	-	-	5,855	-	-	-	-	237,764	6,185	-
4a.1.5.9	Condensate Demin	-	494	9	44	792	-	-	250	1,590	1,590	-	-	4,735	-	-	-	-	192,293	6,784	-
4a.1.5.10	Condensate Storage	-	657	16	77	1,378	-	-	384	2,512	2,512	-	-	8,237	-	-	-	-	334,489	9,265	-
4a.1.5.11	Control Rod Drive	-	3	0	0	4	-	-	1	8	8	-	-	24	-	-	-	-	976	36	-
4a.1.5.12	Control Rod Drive Hydraulic	-	374	5	23	408	-	-	159	968	968	-	-	2,440	-	-	-	-	99,094	5,255	-
4a.1.5.13	Core Spray	-	71	10	48	855	-	-	154	1,138	1,138	-	-	5,109	-	-	-	-	207,487	1,026	-
4a.1.5.14	Core Spray - Insulated	-	131	2	11	198	-	-	64	407	407	-	-	1,184	-	-	-	-	48,081	1,806	-
4a.1.5.15	Demin Water - Insulated - RCA	-	15	0	1	14	-	-	6	36	36	-	-	85	-	-	-	-	3,445	181	-
4a.1.5.16	Demin Water - RCA	-	41	1	2	42	-	-	17	104	104	-	-	253	-	-	-	-	10,278	508	-
4a.1.5.17	Diesel Oil - RCA	-	2	0	0	4	-	-	1	7	7	-	-	23	-	-	-	-	931	25	-
4a.1.5.18	Drywell Atmosphere Cooling - RCA	-	38	1	5	92	-	-	24	159	159	-	-	548	-	-	-	-	22,244	550	-
4a.1.5.19	EDG Emerg Service Water - Insul - RCA	-	0	0	0	0	-	-	0	1	1	-	-	2	-	-	-	-	84	4	-
4a.1.5.20	Electrical - Clean	-	13	-	-	-	-	-	2	15	-	-	15	-	-	-	-	-	-	182	-
4a.1.5.21	Emergency Service Water - Insul - RCA	-	21	0	1	23	-	-	9	55	55	-	-	137	-	-	-	-	5,544	281	-
4a.1.5.22	Emergency Service Water - RCA	-	2	0	0	2	-	-	1	5	5	-	-	13	-	-	-	-	512	22	-
4a.1.5.23	GEZIP - RCA	-	3	0	1	17	-	-	4	25	25	-	-	103	-	-	-	-	4,184	48	-
4a.1.5.24	Generator Physical Design - RCA	-	5	0	0	5	-	-	2	12	12	-	-	31	-	-	-	-	1,250	67	-
4a.1.5.25	H2-O2 Control Analyzing	-	6	0	0	4	-	-	2	12	12	-	-	23	-	-	-	-	948	72	-
4a.1.5.26	H2-O2 Control Analyzing - Insulated	-	6	0	0	4	-	-	2	12	12	-	-	23	-	-	-	-	948	72	-
4a.1.5.27	High Pressure Coolant Injection	-	60	3	12	211	-	-	49	334	334	-	-	1,262	-	-	-	-	51,257	850	-
4a.1.5.28	High Pressure Coolant Injection - Insula	-	198	4	21	379	-	-	110	713	713	-	-	2,266	-	-	-	-	92,018	2,734	-
4a.1.5.29	Hydrogen Cooling	-	8	-	-	-	-	-	1	10	-	-	10	-	-	-	-	-	-	118	-

Table I
Monticello Nuclear Generating Plant
SAFSTOR 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 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
Disposal of Plant Systems (continued)																					
4a.1.5.30	Hydrogen Cooling - RCA	-	7	0	0	7	-	-	3	17	17	-	-	39	-	-	-	-	1,600	79	-
4a.1.5.31	Hydrogen Seal Oil - RCA	-	17	0	2	32	-	-	9	60	60	-	-	189	-	-	-	-	7,669	212	-
4a.1.5.32	Hydrogen Water Chemistry - RCA	-	24	0	1	23	-	-	10	59	59	-	-	140	-	-	-	-	5,672	304	-
4a.1.5.33	Instrument & Service Air - RCA	-	225	4	17	296	-	-	103	644	644	-	-	1,768	-	-	-	-	71,810	2,733	-
4a.1.5.34	Main Condenser	-	177	4	18	318	-	-	95	613	613	-	-	1,903	-	-	-	-	77,301	2,443	-
4a.1.5.35	Main Steam	-	225	6	28	498	-	-	136	892	892	-	-	2,975	-	-	-	-	120,806	3,122	-
4a.1.5.36	Main Turbine	-	909	63	298	5,335	-	-	1,079	7,684	7,684	-	-	31,885	-	-	-	-	1,294,866	12,952	-
4a.1.5.37	Main Turbine - Insulated	-	193	7	32	579	-	-	141	952	952	-	-	3,460	-	-	-	-	140,506	2,725	-
4a.1.5.38	Miscellaneous	-	38	1	3	51	-	-	18	110	110	-	-	302	-	-	-	-	12,283	556	-
4a.1.5.39	Off Gas Recombiner	-	169	6	27	479	-	-	119	799	799	-	-	2,861	-	-	-	-	116,194	2,387	-
4a.1.5.40	Off Gas Recombiner - Insulated	-	351	5	22	393	-	-	150	921	921	-	-	2,350	-	-	-	-	95,441	4,785	-
4a.1.5.41	Post Accident Sampling	-	23	0	1	16	-	-	8	48	48	-	-	99	-	-	-	-	4,004	306	-
4a.1.5.42	Post Accident Sampling - Insulated	-	15	0	1	11	-	-	6	33	33	-	-	67	-	-	-	-	2,737	190	-
4a.1.5.43	RHR Service Water - Insulated - RCA	-	83	3	14	248	-	-	60	409	409	-	-	1,485	-	-	-	-	60,293	1,125	-
4a.1.5.44	RHR Service Water - RCA	-	4	0	0	6	-	-	2	12	12	-	-	35	-	-	-	-	1,410	57	-
4a.1.5.45	Reactor Feedwater Pump Seal	-	50	1	3	55	-	-	21	130	130	-	-	327	-	-	-	-	13,295	687	-
4a.1.5.46	Residual Heat Removal	-	226	58	147	2,110	514	-	529	3,584	3,584	-	-	12,609	1,519	-	-	-	609,174	3,282	-
4a.1.5.47	Residual Heat Removal - Insulated	-	500	39	74	851	464	-	384	2,312	2,312	-	-	5,084	1,374	-	-	-	294,206	7,027	-
4a.1.5.48	Rx Core Isolation Cooling	-	43	1	3	61	-	-	21	129	129	-	-	364	-	-	-	-	14,781	609	-
4a.1.5.49	Rx Core Isolation Cooling - Insulated	-	97	1	5	94	-	-	39	237	237	-	-	563	-	-	-	-	22,843	1,315	-
4a.1.5.50	Rx Recirculation	-	53	5	4	16	52	-	30	161	161	-	-	96	152	-	-	-	13,794	691	-
4a.1.5.51	Snubbers	-	151	1	5	84	-	-	51	292	292	-	-	502	-	-	-	-	20,395	2,272	-
4a.1.5.52	Standby Liquid Control - Insul - RCA	-	4	0	0	4	-	-	2	9	9	-	-	22	-	-	-	-	904	48	-
4a.1.5.53	Standby Liquid Control - RCA	-	26	1	2	41	-	-	13	83	83	-	-	245	-	-	-	-	9,969	341	-
4a.1.5.54	Stator Cooling - RCA	-	7	0	1	21	-	-	5	35	35	-	-	126	-	-	-	-	5,135	98	-
4a.1.5.55	Traversing Incore Probe	-	3	0	0	0	2	-	1	7	7	-	-	2	5	-	-	-	379	46	-
4a.1.5	Totals	-	7,490	347	1,370	23,501	1,032	-	5,894	39,634	39,610	-	24	140,459	3,050	-	-	-	5,899,167	104,297	-
4a.1.6	Scaffolding in support of decommissioning	-	2,106	22	12	191	31	-	567	2,929	2,929	-	-	1,030	91	-	-	-	52,111	19,968	-
4a.1	Subtotal Period 4a Activity Costs	211	27,165	15,691	4,132	33,494	35,367	557	40,431	157,048	157,024	-	24	184,963	30,945	1,628	600	-	10,226,560	209,462	2,110
Period 4a Collateral Costs																					
4a.3.1	Process decommissioning water waste	4	-	7	12	-	28	-	12	63	63	-	-	-	64	-	-	-	3,856	13	-
4a.3.3	Small tool allowance	-	267	-	-	-	-	-	40	307	276	-	31	-	-	-	-	-	-	-	-
4a.3.4	Spent Fuel Capital and Transfer	-	-	-	-	-	-	6,395	959	7,355	-	7,355	-	-	-	-	-	-	-	-	-
4a.3	Subtotal Period 4a Collateral Costs	4	267	7	12	-	28	6,395	1,011	7,724	339	7,355	31	-	64	-	-	-	3,856	13	-
Period 4a Period-Dependent Costs																					
4a.4.1	Decon supplies	87	-	-	-	-	-	-	22	109	109	-	-	-	-	-	-	-	-	-	-
4a.4.2	Insurance	-	-	-	-	-	-	790	79	869	869	-	-	-	-	-	-	-	-	-	-
4a.4.3	Property taxes	-	-	-	-	-	-	3,594	359	3,953	3,293	660	-	-	-	-	-	-	-	-	-
4a.4.4	Health physics supplies	-	1,872	-	-	-	-	-	468	2,340	2,340	-	-	-	-	-	-	-	-	-	-
4a.4.5	Heavy equipment rental	-	2,811	-	-	-	-	-	422	3,232	3,232	-	-	-	-	-	-	-	-	-	-
4a.4.6	Disposal of DAW generated	-	-	89	46	-	370	-	108	612	612	-	-	-	4,485	-	-	-	89,703	146	-
4a.4.7	Plant energy budget	-	-	-	-	-	-	1,938	291	2,229	2,229	-	-	-	-	-	-	-	-	-	-
4a.4.8	NRC ISFSI Fees	-	-	-	-	-	-	57	6	63	-	63	-	-	-	-	-	-	-	-	-
4a.4.9	NRC Fees	-	-	-	-	-	-	544	54	598	598	-	-	-	-	-	-	-	-	-	-
4a.4.10	Emergency Planning Fees	-	-	-	-	-	-	167	17	183	-	183	-	-	-	-	-	-	-	-	-
4a.4.11	Fixed Overhead	-	-	-	-	-	-	2,380	357	2,737	2,737	-	-	-	-	-	-	-	-	-	-
4a.4.12	Liquid Radwaste Processing Equipment/Services	-	-	-	-	-	-	477	72	549	549	-	-	-	-	-	-	-	-	-	-
4a.4.13	ISFSI Operating Costs	-	-	-	-	-	-	126	19	145	-	145	-	-	-	-	-	-	-	-	-
4a.4.14	Railroad Track Maintenance	-	-	-	-	-	-	140	21	162	162	-	-	-	-	-	-	-	-	-	-
4a.4.15	Remedial Actions Surveys	-	-	-	-	-	-	1,258	189	1,447	1,447	-	-	-	-	-	-	-	-	-	-
4a.4.16	Security Staff Cost	-	-	-	-	-	-	6,666	1,000	7,666	5,734	1,932	-	-	-	-	-	-	-	-	101,051
4a.4.17	DOC Staff Cost	-	-	-	-	-	-	14,604	2,191	16,795	16,795	-	-	-	-	-	-	-	-	-	161,214
4a.4.18	Utility Staff Cost	-	-	-	-	-	-	19,141	2,871	22,012	20,691	1,321	-	-	-	-	-	-	-	-	294,391
4a.4	Subtotal Period 4a Period-Dependent Costs	87	4,683	89	46	-	370	51,884	8,545	65,702	61,399	4,304	-	-	4,485	-	-	-	89,703	146	556,657
4a.0	TOTAL PERIOD 4a COST	302	32,114	15,787	4,190	33,494	35,765	58,836	49,986	230,475	218,761	11,658	55	184,963	35,494	1,628	600	-	10,320,120	209,621	558,767
PERIOD 4b - Site Decontamination																					
Period 4b Direct Decommissioning Activities																					
4b.1.1	Remove spent fuel racks	591	58	103	149	-	2,572	-	986	4,459	4,459	-	-	-	7,653	-	-	-	486,170	906	-

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Monticello Nuclear Generating Plant
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(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 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
Disposal of Plant Systems																					
4b.1.2.1	ALARA/Radiological	-	16	0	0	8	-	-	5	30	30	-	-	49	-	-	-	-	1,987	247	-
4b.1.2.2	Alternate N2 - RCA	-	16	0	1	16	-	-	7	40	40	-	-	93	-	-	-	-	3,765	185	-
4b.1.2.3	Cranes/Heavy Loads/Rigging - RCA	-	3	0	1	17	-	-	4	25	25	-	-	103	-	-	-	-	4,184	48	-
4b.1.2.4	Decontamination Projects	-	1	0	0	1	-	-	0	2	2	-	-	3	-	-	-	-	125	15	-
4b.1.2.5	Electrical - Contaminated	-	400	5	23	421	-	-	167	1,016	1,016	-	-	2,514	-	-	-	-	102,112	5,633	-
4b.1.2.6	Electrical - Contaminated Fuel Pool	-	42	1	2	42	-	-	17	105	105	-	-	253	-	-	-	-	10,272	592	-
4b.1.2.7	Electrical - Decontam. Fuel Pool Area	-	297	5	23	411	-	-	140	876	876	-	-	2,457	-	-	-	-	99,783	4,090	-
4b.1.2.8	Electrical - Decontaminated	-	2,698	48	218	3,906	-	-	1,298	8,167	8,167	-	-	23,344	-	-	-	-	948,013	37,107	-
4b.1.2.9	Fire - RCA	-	101	1	6	103	-	-	42	253	253	-	-	614	-	-	-	-	24,917	1,324	-
4b.1.2.10	Fire - RCA - Fuel Pool Area	-	11	0	1	10	-	-	4	26	26	-	-	62	-	-	-	-	2,499	143	-
4b.1.2.11	Fuel Pool Cooling & Cleanup	-	387	20	33	343	241	-	216	1,241	1,241	-	-	2,051	712	-	-	-	128,918	5,363	-
4b.1.2.12	Fuel Pool Cooling & Cleanup - Insulated	-	37	2	3	22	24	-	19	107	107	-	-	130	71	-	-	-	9,830	514	-
4b.1.2.13	HVAC Ductwork	-	276	6	26	469	-	-	144	921	921	-	-	2,805	-	-	-	-	113,913	3,539	-
4b.1.2.14	HVAC Ductwork - Fuel Pool Area	-	31	1	3	52	-	-	16	102	102	-	-	312	-	-	-	-	12,657	393	-
4b.1.2.15	HVAC/Chilled Water - RCA	-	324	6	26	461	-	-	155	971	971	-	-	2,752	-	-	-	-	111,779	3,985	-
4b.1.2.16	HVAC/Chilled Water - RCA Fuel Pool Area	-	33	0	2	37	-	-	14	87	87	-	-	223	-	-	-	-	9,072	397	-
4b.1.2.17	Heating & Ventilation	-	433	13	59	1,060	-	-	277	1,842	1,842	-	-	6,334	-	-	-	-	257,243	6,340	-
4b.1.2.18	Heating Boiler - Insulated - RCA	-	3	0	0	4	-	-	1	9	9	-	-	26	-	-	-	-	1,058	35	-
4b.1.2.19	Instrument & Service Air-RCA-Fuel Pool	-	29	1	2	45	-	-	14	91	91	-	-	267	-	-	-	-	10,841	357	-
4b.1.2.20	Liquid Radwaste	-	621	31	57	703	311	-	350	2,072	2,072	-	-	4,203	915	-	-	-	229,422	8,550	-
4b.1.2.21	Makeup Demin - RCA	-	103	3	14	246	-	-	65	431	431	-	-	1,471	-	-	-	-	59,747	1,412	-
4b.1.2.22	Non-Essential Diesel Generator - RCA	-	27	3	13	238	-	-	45	327	327	-	-	1,424	-	-	-	-	57,832	395	-
4b.1.2.23	Off Gas Holdup	-	310	7	34	607	-	-	174	1,133	1,133	-	-	3,629	-	-	-	-	147,355	4,256	-
4b.1.2.24	Primary Containment	-	411	16	77	1,389	-	-	324	2,218	2,218	-	-	8,302	-	-	-	-	337,148	5,729	-
4b.1.2.25	Process Radiation Monitors	-	41	0	2	36	-	-	16	95	95	-	-	213	-	-	-	-	8,667	577	-
4b.1.2.26	Rx Bldg Closed Clng Water - Insul - RCA	-	114	2	9	163	-	-	54	343	343	-	-	977	-	-	-	-	39,675	1,484	-
4b.1.2.27	Rx Bldg Closed Clng Water - RCA	-	184	15	66	1,187	-	-	235	1,687	1,687	-	-	7,093	-	-	-	-	288,031	2,489	-
4b.1.2.28	Rx Component Handling Equip	-	127	11	24	291	139	-	115	708	708	-	-	1,737	415	-	-	-	96,901	1,839	-
4b.1.2.29	Rx Pressure Vessel	-	43	5	5	27	57	-	30	167	167	-	-	161	169	-	-	-	17,375	578	-
4b.1.2.30	Rx Water Cleanup	-	239	16	15	47	214	-	124	655	655	-	-	278	630	-	-	-	51,819	3,264	-
4b.1.2.31	Secondary Containment	-	112	3	13	229	-	-	65	421	421	-	-	1,372	-	-	-	-	55,702	1,569	-
4b.1.2.32	Service & Seal Water - Insulated - RCA	-	120	2	11	197	-	-	62	392	392	-	-	1,180	-	-	-	-	47,917	1,565	-
4b.1.2.33	Service & Seal Water - RCA	-	159	4	17	303	-	-	88	570	570	-	-	1,809	-	-	-	-	73,453	2,016	-
4b.1.2.34	Service Air Blower - RCA	-	15	0	2	34	-	-	9	62	62	-	-	206	-	-	-	-	8,364	206	-
4b.1.2.35	Solid Radwaste	-	446	21	45	567	223	-	261	1,563	1,563	-	-	3,390	659	-	-	-	179,772	6,270	-
4b.1.2.36	Structures & Buildings	-	70	1	4	80	-	-	30	185	185	-	-	477	-	-	-	-	19,351	1,005	-
4b.1.2.37	Wells & Domestic Water	-	10	-	-	-	-	-	1	11	-	-	11	-	-	-	-	-	-	144	-
4b.1.2.38	Wells & Domestic Water - RCA	-	52	1	3	57	-	-	22	136	136	-	-	342	-	-	-	-	13,874	633	-
4b.1.2	Totals	-	8,342	249	841	13,829	1,210	-	4,613	29,085	29,073	-	11	82,654	3,571	-	-	-	3,585,374	114,290	-
4b.1.3	Scaffolding in support of decommissioning	-	3,159	33	19	286	46	-	850	4,394	4,394	-	-	1,545	136	-	-	-	78,166	29,953	-
Decontamination of Site Buildings																					
4b.1.4.1	Reactor Building	4,668	2,596	178	516	8,044	1,181	-	4,580	21,764	21,764	-	-	48,077	7,014	-	-	-	2,317,670	100,718	-
4b.1.4.2	Admin	96	5	0	3	-	15	-	53	172	172	-	-	-	145	-	-	-	6,840	1,421	-
4b.1.4.3	HPCI Room	26	25	1	3	20	14	-	26	115	115	-	-	118	125	-	-	-	10,759	703	-
4b.1.4.4	Hot Shop	15	4	0	2	-	11	-	11	43	43	-	-	-	103	-	-	-	4,860	254	-
4b.1.4.5	LLRW Storage & Shipping	52	22	2	8	5	45	-	45	179	179	-	-	31	433	-	-	-	21,708	1,003	-
4b.1.4.6	Offgas Stack	336	241	7	23	225	82	-	286	1,199	1,199	-	-	1,343	669	-	-	-	87,045	7,924	-
4b.1.4.7	Offgas Storage & Compressor	36	15	1	6	4	33	-	32	128	128	-	-	25	316	-	-	-	15,948	696	-
4b.1.4.8	Radwaste	109	54	3	17	29	96	-	100	410	410	-	-	172	910	-	-	-	49,943	2,229	-
4b.1.4.9	Radwaste Material Storage Warehouse	57	21	2	9	-	52	-	48	189	189	-	-	-	495	-	-	-	23,400	1,062	-
4b.1.4.10	Recombiner	24	22	1	5	33	24	-	30	140	140	-	-	199	216	-	-	-	18,405	616	-
4b.1.4.11	Turbine	638	314	21	104	215	564	-	588	2,444	2,444	-	-	1,283	5,299	-	-	-	303,150	12,856	-
4b.1.4.12	Turbine Building Addition	53	19	1	8	-	45	-	44	169	169	-	-	-	434	-	-	-	20,478	968	-
4b.1.4.13	Reactor (Post Fuel)	849	2,325	172	913	329	5,301	-	2,535	12,425	12,425	-	-	1,969	50,605	-	-	-	2,471,778	40,860	-
4b.1.4	Totals	6,960	5,663	390	1,617	8,904	7,465	-	8,379	39,378	39,378	-	-	53,216	66,764	-	-	-	5,351,984	171,309	-
4b.1.5	Prepare/submit License Termination Plan	-	-	-	-	-	-	526	79	605	605	-	-	-	-	-	-	-	-	-	4,096
4b.1.6	Receive NRC approval of termination plan									a											
4b.1	Subtotal Period 4b Activity Costs	7,551	17,223	776	2,626	23,019	11,293	526	14,907	77,921	77,910	-	11	137,414	78,124	-	-	-	9,501,694	316,457	4,096
Period 4b Additional Costs																					
4b.2.1	License Termination Survey Planning	-	-	-	-	-	-	1,458	437	1,896	1,896	-	-	-	-	-	-	-	-	-	12,480
4b.2.2	Excavation of Underground Services	-	1,972	-	-	-	-	376	550	2,898	2,898	-	-	-	-	-	-	-	-	12,493	-
4b.2.3	Operational Equipment	-	-	23	92	1,211	-	-	198	1,524	1,524	-	-	11,760	-	-	-	-	294,000	32	-

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4b.2	Subtotal Period 4b Additional Costs	-	1,972	23	92	1,211	-	1,835	1,185	6,317	6,317	-	-	11,760	-	-	-	-	294,000	12,525	12,480
Period 4b Collateral Costs																					
4b.3.1	Process decommissioning water waste	12	-	22	39	-	88	-	36	196	196	-	-	-	202	-	-	-	12,097	39	-
4b.3.3	Small tool allowance	-	397	-	-	-	-	-	60	456	456	-	-	-	-	-	-	-	-	-	-
4b.3.4	Decommissioning Equipment Disposition	-	-	130	82	1,112	178	-	237	1,739	1,739	-	-	6,000	529	-	-	-	303,608	147	-
4b.3.5	Spent Fuel Capital and Transfer	-	-	-	-	-	-	14,092	2,114	16,206	-	16,206	-	-	-	-	-	-	-	-	-
4b.3	Subtotal Period 4b Collateral Costs	12	397	152	121	1,112	266	14,092	2,446	18,597	2,392	16,206	-	6,000	731	-	-	-	315,705	186	-
Period 4b Period-Dependent Costs																					
4b.4.1	Decon supplies	1,701	-	-	-	-	-	-	425	2,126	2,126	-	-	-	-	-	-	-	-	-	-
4b.4.2	Insurance	-	-	-	-	-	-	1,434	143	1,577	1,577	-	-	-	-	-	-	-	-	-	-
4b.4.3	Property taxes	-	-	-	-	-	-	6,289	629	6,917	5,721	1,197	-	-	-	-	-	-	-	-	-
4b.4.4	Health physics supplies	-	3,050	-	-	-	-	-	763	3,813	3,813	-	-	-	-	-	-	-	-	-	-
4b.4.5	Heavy equipment rental	-	5,239	-	-	-	-	-	786	6,024	6,024	-	-	-	-	-	-	-	-	-	-
4b.4.6	Disposal of DAW generated	-	-	117	60	-	486	-	142	805	805	-	-	-	5,895	-	-	-	117,897	192	-
4b.4.7	Plant energy budget	-	-	-	-	-	-	2,777	417	3,194	3,194	-	-	-	-	-	-	-	-	-	-
4b.4.8	NRC ISFSI Fees	-	-	-	-	-	-	104	10	114	-	114	-	-	-	-	-	-	-	-	-
4b.4.9	NRC Fees	-	-	-	-	-	-	986	99	1,085	1,085	-	-	-	-	-	-	-	-	-	-
4b.4.10	Emergency Planning Fees	-	-	-	-	-	-	302	30	332	-	332	-	-	-	-	-	-	-	-	-
4b.4.11	Fixed Overhead	-	-	-	-	-	-	4,319	648	4,967	4,967	-	-	-	-	-	-	-	-	-	-
4b.4.12	Liquid Radwaste Processing Equipment/Services	-	-	-	-	-	-	896	130	996	996	-	-	-	-	-	-	-	-	-	-
4b.4.13	ISFSI Operating Costs	-	-	-	-	-	-	228	34	262	-	262	-	-	-	-	-	-	-	-	-
4b.4.14	Railroad Track Maintenance	-	-	-	-	-	-	255	38	293	293	-	-	-	-	-	-	-	-	-	-
4b.4.15	Remedial Actions Surveys	-	-	-	-	-	-	2,283	343	2,626	2,626	-	-	-	-	-	-	-	-	-	-
4b.4.16	Security Staff Cost	-	-	-	-	-	-	12,097	1,815	13,912	3,826	10,086	-	-	-	-	-	-	-	-	183,371
4b.4.17	DOC Staff Cost	-	-	-	-	-	-	25,916	3,887	29,803	29,803	-	-	-	-	-	-	-	-	-	284,065
4b.4.18	Utility Staff Cost	-	-	-	-	-	-	32,869	4,930	37,799	35,380	2,419	-	-	-	-	-	-	-	-	504,534
4b.4	Subtotal Period 4b Period-Dependent Costs	1,701	8,289	117	60	-	486	90,726	15,269	116,648	102,236	14,411	-	-	5,895	-	-	-	117,897	192	971,970
4b.0	TOTAL PERIOD 4b COST	9,264	27,881	1,067	2,898	25,343	12,044	107,179	33,806	219,483	188,855	30,617	11	155,174	84,750	-	-	-	10,229,300	329,361	988,546
PERIOD 4f - License Termination																					
Period 4f Direct Decommissioning Activities																					
4f.1.1	ORISE confirmatory survey	-	-	-	-	-	-	166	50	216	216	-	-	-	-	-	-	-	-	-	-
4f.1.2	Terminate license									a											
4f.1	Subtotal Period 4f Activity Costs	-	-	-	-	-	-	166	50	216	216	-	-	-	-	-	-	-	-	-	-
Period 4f Additional Costs																					
4f.2.1	License Termination Survey	-	-	-	-	-	-	6,920	2,076	8,995	8,995	-	-	-	-	-	-	-	-	95,048	6,240
4f.2	Subtotal Period 4f Additional Costs	-	-	-	-	-	-	6,920	2,076	8,995	8,995	-	-	-	-	-	-	-	-	95,048	6,240
Period 4f Collateral Costs																					
4f.3.1	DOC staff relocation expenses	-	-	-	-	-	-	1,264	190	1,454	1,454	-	-	-	-	-	-	-	-	-	-
4f.3.2	Spent Fuel Capital and Transfer	-	-	-	-	-	-	4,289	643	4,933	-	4,933	-	-	-	-	-	-	-	-	-
4f.3	Subtotal Period 4f Collateral Costs	-	-	-	-	-	-	5,553	833	6,386	1,454	4,933	-	-	-	-	-	-	-	-	-
Period 4f Period-Dependent Costs																					
4f.4.1	Insurance	-	-	-	-	-	-	530	53	583	-	583	-	-	-	-	-	-	-	-	-
4f.4.2	Property taxes	-	-	-	-	-	-	2,198	220	2,417	1,975	442	-	-	-	-	-	-	-	-	-
4f.4.3	Health physics supplies	-	708	-	-	-	-	-	177	884	884	-	-	-	-	-	-	-	-	-	-
4f.4.4	Disposal of DAW generated	-	-	7	4	-	29	-	9	48	48	-	-	-	355	-	-	-	7,097	12	-
4f.4.5	Plant energy budget	-	-	-	-	-	-	274	41	315	315	-	-	-	-	-	-	-	-	-	-
4f.4.6	NRC ISFSI Fees	-	-	-	-	-	-	38	4	42	-	42	-	-	-	-	-	-	-	-	-
4f.4.7	NRC Fees	-	-	-	-	-	-	426	43	468	468	-	-	-	-	-	-	-	-	-	-
4f.4.8	Emergency Planning Fees	-	-	-	-	-	-	112	11	123	-	123	-	-	-	-	-	-	-	-	-
4f.4.9	Fixed Overhead	-	-	-	-	-	-	1,597	239	1,836	1,836	-	-	-	-	-	-	-	-	-	-
4f.4.10	ISFSI Operating Costs	-	-	-	-	-	-	84	13	97	-	97	-	-	-	-	-	-	-	-	-
4f.4.11	Railroad Track Maintenance	-	-	-	-	-	-	94	14	108	108	-	-	-	-	-	-	-	-	-	-
4f.4.12	Security Staff Cost	-	-	-	-	-	-	3,463	519	3,982	1,565	2,417	-	-	-	-	-	-	-	-	50,932
4f.4.13	DOC Staff Cost	-	-	-	-	-	-	5,393	809	6,201	6,201	-	-	-	-	-	-	-	-	-	57,200
4f.4.14	Utility Staff Cost	-	-	-	-	-	-	5,762	864	6,626	5,738	888	-	-	-	-	-	-	-	-	80,707
4f.4	Subtotal Period 4f Period-Dependent Costs	-	708	7	4	-	29	19,969	3,016	23,732	19,140	4,593	-	-	355	-	-	-	7,097	12	188,838
4f.0	TOTAL PERIOD 4f COST	-	708	7	4	-	29	32,608	5,974	39,330	29,805	9,526	-	-	355	-	-	-	7,097	95,059	195,078
PERIOD 4 TOTALS		9,566	60,703	16,861	7,092	58,837	47,839	198,623	89,767	489,288	437,421	51,801	66	340,138	120,599	1,628	600	-	20,556,510	634,041	1,742,391

Table I
Monticello Nuclear Generating Plant
SAFSTOR 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 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 5b - Site Restoration																					
Period 5b Direct Decommissioning Activities																					
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	Discharge Retention Basin	-	4	-	-	-	-	-	1	5	-	-	5	-	-	-	-	-	-	25	-
5b.1.1.4	HPCI Room	-	19	-	-	-	-	-	3	22	-	-	22	-	-	-	-	-	-	97	-
5b.1.1.5	Hot Shop	-	16	-	-	-	-	-	2	19	-	-	19	-	-	-	-	-	-	177	-
5b.1.1.6	Hydrogen & Oxygen Storage	-	2	-	-	-	-	-	0	2	-	-	2	-	-	-	-	-	-	19	-
5b.1.1.7	LLRW Storage & Shipping	-	83	-	-	-	-	-	12	95	-	-	95	-	-	-	-	-	-	662	-
5b.1.1.8	MSIV	-	4	-	-	-	-	-	1	4	-	-	4	-	-	-	-	-	-	42	-
5b.1.1.9	Misc Structures 2017	-	1,410	-	-	-	-	-	212	1,622	-	-	1,622	-	-	-	-	-	-	13,042	-
5b.1.1.10	Offgas Stack	-	108	-	-	-	-	-	16	124	-	-	124	-	-	-	-	-	-	544	-
5b.1.1.11	Offgas Storage & Compressor	-	39	-	-	-	-	-	6	45	-	-	45	-	-	-	-	-	-	199	-
5b.1.1.12	Radwaste	-	228	-	-	-	-	-	34	262	-	-	262	-	-	-	-	-	-	1,220	-
5b.1.1.13	Recombiner	-	128	-	-	-	-	-	19	147	-	-	147	-	-	-	-	-	-	713	-
5b.1.1.14	Security Barrier	-	186	-	-	-	-	-	28	214	-	-	214	-	-	-	-	-	-	933	-
5b.1.1.15	Structures Greater than 3' Below Grade	-	2,461	-	-	-	-	-	369	2,830	-	-	2,830	-	-	-	-	-	-	12,649	-
5b.1.1.16	Tank Farm	-	4	-	-	-	-	-	1	5	-	-	5	-	-	-	-	-	-	21	-
5b.1.1.17	Turbine	-	1,259	-	-	-	-	-	189	1,448	-	-	1,448	-	-	-	-	-	-	13,036	-
5b.1.1.18	Turbine Building Addition	-	55	-	-	-	-	-	8	63	-	-	63	-	-	-	-	-	-	618	-
5b.1.1.19	Turbine Pedestal	-	182	-	-	-	-	-	27	209	-	-	209	-	-	-	-	-	-	926	-
5b.1.1	Totals	-	8,169	-	-	-	-	-	1,225	9,394	-	-	9,394	-	-	-	-	-	-	58,885	-
Site Closeout Activities																					
5b.1.2	Grade & landscape site	-	896	-	-	-	-	-	134	1,031	-	-	1,031	-	-	-	-	-	-	1,841	-
5b.1.3	Final report to NRC	-	-	-	-	-	-	200	30	231	231	-	-	-	-	-	-	-	-	-	1,560
5b.1	Subtotal Period 5b Activity Costs	-	9,065	-	-	-	-	200	1,390	10,655	231	-	10,425	-	-	-	-	-	-	60,726	1,560
Period 5b Additional Costs																					
5b.2.1	Clean 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 Debris	-	-	-	-	-	-	1,170	176	1,346	-	-	1,346	-	-	-	-	-	-	-	-
5b.2.4	Backfill	-	5,583	-	-	-	-	-	837	6,421	-	-	6,421	-	-	-	-	-	-	5,422	-
5b.2.5	Discharge Structure Cofferdam	-	442	-	-	-	-	-	66	508	-	-	508	-	-	-	-	-	-	3,552	-
5b.2.6	Disposition of Original MPC Canisters	-	55	185	954	-	5,641	-	1,709	8,544	8,544	-	-	-	21,097	-	-	-	2,505,700	337	-
5b.2	Subtotal Period 5b Additional Costs	-	9,737	185	954	-	5,641	1,183	3,339	21,039	8,544	-	12,495	-	21,097	-	-	-	2,505,700	11,907	-
Period 5b Collateral Costs																					
5b.3.1	Small tool allowance	-	111	-	-	-	-	-	17	127	-	-	127	-	-	-	-	-	-	-	-
5b.3.2	Spent Fuel Capital and Transfer	-	-	-	-	-	-	10,914	1,637	12,551	-	12,551	-	-	-	-	-	-	-	-	-
5b.3	Subtotal Period 5b Collateral Costs	-	111	-	-	-	-	10,914	1,654	12,678	-	12,551	127	-	-	-	-	-	-	-	-
Period 5b Period-Dependent Costs																					
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	Heavy equipment rental	-	5,842	-	-	-	-	-	876	6,719	-	-	6,719	-	-	-	-	-	-	-	-
5b.4.4	Plant energy budget	-	-	-	-	-	-	315	47	362	-	362	-	-	-	-	-	-	-	-	-
5b.4.5	NRC ISFSI Fees	-	-	-	-	-	-	414	41	456	-	456	-	-	-	-	-	-	-	-	-
5b.4.6	Emergency Planning Fees	-	-	-	-	-	-	257	26	283	-	283	-	-	-	-	-	-	-	-	-
5b.4.7	Fixed Overhead	-	-	-	-	-	-	1,122	168	1,290	0	860	429	-	-	-	-	-	-	-	-
5b.4.8	ISFSI Operating Costs	-	-	-	-	-	-	194	29	223	-	223	-	-	-	-	-	-	-	-	-
5b.4.9	Railroad Track Maintenance	-	-	-	-	-	-	217	33	249	0	150	100	-	-	-	-	-	-	-	-
5b.4.10	Security Staff Cost	-	-	-	-	-	-	7,971	1,196	9,167	0	8,580	587	-	-	-	-	-	-	-	117,235
5b.4.11	DOC Staff Cost	-	-	-	-	-	-	11,729	1,759	13,489	-	-	13,489	-	-	-	-	-	-	-	122,646
5b.4.12	Utility Staff Cost	-	-	-	-	-	-	7,148	1,072	8,220	-	2,129	6,091	-	-	-	-	-	-	-	101,904
5b.4	Subtotal Period 5b Period-Dependent Costs	-	5,842	-	-	-	-	35,122	5,823	46,787	0	14,385	32,402	-	-	-	-	-	-	-	341,785
5b.0	TOTAL PERIOD 5b COST	-	24,755	185	954	-	5,641	47,419	12,205	91,160	8,775	26,936	55,449	-	21,097	-	-	-	2,505,700	72,633	343,345
PERIOD 5c - Fuel Storage Operations/Shipping																					
Period 5c Direct Decommissioning Activities																					
Period 5c Collateral Costs																					
5c.3.1	Spent Fuel Capital and Transfer	-	-	-	-	-	-	142,259	21,339	163,598	-	163,598	-	-	-	-	-	-	-	-	-

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Monticello Nuclear Generating Plant
SAFSTOR 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 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
5c.3	Subtotal Period 5c Collateral Costs	-	-	-	-	-	-	142,259	21,339	163,598	-	163,598	-	-	-	-	-	-	-	-	-
Period 5c	Period-Dependent Costs																				
5c.4.1	Insurance	-	-	-	-	-	-	27,126	2,713	29,838	-	29,838	-	-	-	-	-	-	-	-	-
5c.4.2	Property taxes	-	-	-	-	-	-	35,797	3,580	39,376	-	39,376	-	-	-	-	-	-	-	-	-
5c.4.4	NRC ISFSI Fees	-	-	-	-	-	-	9,215	922	10,137	-	10,137	-	-	-	-	-	-	-	-	-
5c.4.5	Emergency Planning Fees	-	-	-	-	-	-	5,718	572	6,290	-	6,290	-	-	-	-	-	-	-	-	-
5c.4.6	Fixed Overhead	-	-	-	-	-	-	8,307	1,246	9,553	-	9,553	-	-	-	-	-	-	-	-	-
5c.4.7	ISFSI Operating Costs	-	-	-	-	-	-	4,317	648	4,964	-	4,964	-	-	-	-	-	-	-	-	-
5c.4.8	Railroad Track Maintenance	-	-	-	-	-	-	4,823	723	5,546	-	5,546	-	-	-	-	-	-	-	-	-
5c.4.9	Security Staff Cost	-	-	-	-	-	-	150,854	22,628	173,482	-	173,482	-	-	-	-	-	-	-	-	2,165,930
5c.4.10	DOC Staff Cost	-	-	-	-	-	-	11,823	1,773	13,597	-	13,597	-	-	-	-	-	-	-	-	80,220
5c.4.11	Utility Staff Cost	-	-	-	-	-	-	73,686	11,053	84,739	-	84,739	-	-	-	-	-	-	-	-	1,062,910
5c.4	Subtotal Period 5c Period-Dependent Costs	-	-	-	-	-	-	331,665	45,857	377,522	-	377,522	-	-	-	-	-	-	-	-	3,309,059
5c.0	TOTAL PERIOD 5c COST	-	-	-	-	-	-	473,925	67,196	541,121	-	541,121	-	-	-	-	-	-	-	-	3,309,059
PERIOD 5d - GTCC shipping																					
Period 5d	Direct Decommissioning Activities																				
Nuclear Steam Supply System Removal																					
5d.1.1.1	Vessel & Internals GTCC Disposal	-	-	1,083	-	-	4,313	-	918	6,314	6,314	-	-	-	-	-	-	1,160	225,765	-	-
5d.1.1	Totals	-	-	1,083	-	-	4,313	-	918	6,314	6,314	-	-	-	-	-	-	1,160	225,765	-	-
5d.1	Subtotal Period 5d Activity Costs	-	-	1,083	-	-	4,313	-	918	6,314	6,314	-	-	-	-	-	-	1,160	225,765	-	-
Period 5d	Collateral Costs																				
5d.3.1	Spent Fuel Capital and Transfer	-	-	-	-	-	-	28	4	32	-	32	-	-	-	-	-	-	-	-	-
5d.3	Subtotal Period 5d Collateral Costs	-	-	-	-	-	-	28	4	32	-	32	-	-	-	-	-	-	-	-	-
Period 5d	Period-Dependent Costs																				
5d.4.1	Insurance	-	-	-	-	-	-	27	3	30	30	-	-	-	-	-	-	-	-	-	-
5d.4.2	Property taxes	-	-	-	-	-	-	35	3	38	38	-	-	-	-	-	-	-	-	-	-
5d.4.4	NRC ISFSI Fees	-	-	-	-	-	-	8	1	9	-	9	-	-	-	-	-	-	-	-	-
5d.4.5	Emergency Planning Fees	-	-	-	-	-	-	6	1	6	-	6	-	-	-	-	-	-	-	-	-
5d.4.6	Fixed Overhead	-	-	-	-	-	-	8	1	10	10	-	-	-	-	-	-	-	-	-	-
5d.4.7	Railroad Track Maintenance	-	-	-	-	-	-	5	1	6	6	-	-	-	-	-	-	-	-	-	-
5d.4.8	Security Staff Cost	-	-	-	-	-	-	150	23	173	173	-	-	-	-	-	-	-	-	-	2,154
5d.4.9	Utility Staff Cost	-	-	-	-	-	-	39	6	45	45	-	-	-	-	-	-	-	-	-	539
5d.4	Subtotal Period 5d Period-Dependent Costs	-	-	-	-	-	-	278	38	316	301	15	-	-	-	-	-	-	-	-	2,693
5d.0	TOTAL PERIOD 5d COST	-	-	1,083	-	-	4,313	306	960	6,661	6,615	47	-	-	-	-	-	1,160	225,765	-	2,693
PERIOD 5e - ISFSI Decontamination																					
Period 5e	Direct Decommissioning Activities																				
Period 5e	Additional Costs																				
5e.2.1	License Termination ISFSI	-	0	3	33	-	283	2,086	602	3,008	3,008	-	-	-	848	-	-	-	131,507	10,502	2,225
5e.2	Subtotal Period 5e Additional Costs	-	0	3	33	-	283	2,086	602	3,008	3,008	-	-	-	848	-	-	-	131,507	10,502	2,225
Period 5e	Period-Dependent Costs																				
5e.4.1	Insurance	-	-	-	-	-	-	118	30	148	148	-	-	-	-	-	-	-	-	-	-
5e.4.2	Property taxes	-	-	-	-	-	-	248	62	310	310	-	-	-	-	-	-	-	-	-	-
5e.4.3	Plant energy budget	-	-	-	-	-	-	12	3	15	15	-	-	-	-	-	-	-	-	-	-
5e.4.4	Fixed Overhead	-	-	-	-	-	-	71	18	89	89	-	-	-	-	-	-	-	-	-	-
5e.4.5	Railroad Track Maintenance	-	-	-	-	-	-	41	10	52	52	-	-	-	-	-	-	-	-	-	-
5e.4.6	Security Staff Cost	-	-	-	-	-	-	352	88	440	440	-	-	-	-	-	-	-	-	-	4,999
5e.4.7	Utility Staff Cost	-	-	-	-	-	-	261	65	326	326	-	-	-	-	-	-	-	-	-	3,792
5e.4	Subtotal Period 5e Period-Dependent Costs	-	-	-	-	-	-	1,104	276	1,380	1,380	-	-	-	-	-	-	-	-	-	8,792
5e.0	TOTAL PERIOD 5e COST	-	0	3	33	-	283	3,190	877	4,387	4,387	-	-	-	848	-	-	-	131,507	10,502	11,017

Table I
Monticello Nuclear Generating Plant
SAFSTOR 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 Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
PERIOD 5f - ISFSI Site Restoration																					
Period 5f Direct Decommissioning Activities																					
Period 5f Additional Costs																					
5f.2.1	Demolition and Site Restoration of ISFSI	-	1,564	-	-	-	-	256	273	2,093	-	-	2,093	-	-	-	-	-	-	7,309	160
5f.2	Subtotal Period 5f Additional Costs	-	1,564	-	-	-	-	256	273	2,093	-	-	2,093	-	-	-	-	-	-	7,309	160
Period 5f Collateral Costs																					
5f.3.1	Small tool allowance	-	11	-	-	-	-	-	2	12	-	-	12	-	-	-	-	-	-	-	-
5f.3	Subtotal Period 5f Collateral Costs	-	11	-	-	-	-	-	2	12	-	-	12	-	-	-	-	-	-	-	-
Period 5f Period-Dependent Costs																					
5f.4.2	Property taxes	-	-	-	-	-	-	127	13	140	-	-	140	-	-	-	-	-	-	-	-
5f.4.3	Heavy equipment rental	-	118	-	-	-	-	-	18	136	-	-	136	-	-	-	-	-	-	-	-
5f.4.4	Plant energy budget	-	-	-	-	-	-	6	1	7	-	-	7	-	-	-	-	-	-	-	-
5f.4.5	Fixed Overhead	-	-	-	-	-	-	37	5	42	-	-	42	-	-	-	-	-	-	-	-
5f.4.6	Railroad Track Maintenance	-	-	-	-	-	-	21	3	24	-	-	24	-	-	-	-	-	-	-	-
5f.4.7	Security Staff Cost	-	-	-	-	-	-	180	27	207	-	-	207	-	-	-	-	-	-	-	2,562
5f.4.8	Utility Staff Cost	-	-	-	-	-	-	111	17	128	-	-	128	-	-	-	-	-	-	-	1,590
5f.4	Subtotal Period 5f Period-Dependent Costs	-	118	-	-	-	-	482	84	685	-	-	685	-	-	-	-	-	-	-	4,151
5f.0	TOTAL PERIOD 5f COST	-	1,693	-	-	-	-	738	358	2,790	-	-	2,790	-	-	-	-	-	-	7,309	4,311
PERIOD 5 TOTALS		-	26,448	1,271	987	-	10,238	525,577	81,597	646,118	19,776	568,103	58,239	-	21,944	-	-	1,160	2,862,972	90,444	3,670,425
TOTAL COST TO DECOMMISSION		21,016	100,409	18,576	8,641	58,852	59,781	2,228,133	393,023	2,888,431	1,248,652	1,580,426	59,354	340,180	153,182	1,628	600	1,160	23,731,310	873,407	13,370,640

TOTAL COST TO DECOMMISSION WITH 15.75% CONTINGENCY:	**$2,888,431**	**thousands of 2020 dollars**
TOTAL NRC LICENSE TERMINATION COST IS 43.23% OR:	**$1,248,652**	**thousands of 2020 dollars**
SPENT FUEL MANAGEMENT COST IS 54.72% OR:	**$1,580,426**	**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:
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

APPENDIX J

DETAILED COST ANALYSIS

SCENARIO 8: SAFSTOR with 200 Year DFS

Table J
Monticello Nuclear Generating Plant
SAFSTOR 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 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 1a - Shutdown through Transition																					
Period 1a Direct Decommissioning Activities																					
1a.1.1	SAFSTOR site characterization survey	-	-	-	-	-	-	415	124	539	539	-	-	-	-	-	-	-	-	-	-
1a.1.2	Prepare preliminary decommissioning cost	-	-	-	-	-	-	167	25	192	192	-	-	-	-	-	-	-	-	-	1,300
1a.1.3	Notification of Cessation of Operations									a											
1a.1.4	Remove fuel & source material									n/a											
1a.1.5	Notification of Permanent Defueling									a											
1a.1.6	Deactivate plant systems & process waste									a											
1a.1.7	Prepare and submit PSDAR	-	-	-	-	-	-	257	39	296	296	-	-	-	-	-	-	-	-	-	2,000
1a.1.8	Review plant dwgs & specs.	-	-	-	-	-	-	167	25	192	192	-	-	-	-	-	-	-	-	-	1,300
1a.1.9	Perform detailed rad survey									a											
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	Define major work sequence	-	-	-	-	-	-	129	19	148	148	-	-	-	-	-	-	-	-	-	1,000
1a.1.14	Perform SER and EA	-	-	-	-	-	-	398	60	458	458	-	-	-	-	-	-	-	-	-	3,100
1a.1.15	Prepare/submit Defueled 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 Irradiated Fuel Management Plan	-	-	-	-	-	-	129	19	148	148	-	-	-	-	-	-	-	-	-	1,000
Activity Specifications																					
1a.1.18.1	Prepare plant and facilities for SAFSTOR	-	-	-	-	-	-	632	95	727	727	-	-	-	-	-	-	-	-	-	4,920
1a.1.18.2	Plant systems	-	-	-	-	-	-	536	80	616	616	-	-	-	-	-	-	-	-	-	4,167
1a.1.18.3	Plant structures and buildings	-	-	-	-	-	-	401	60	461	461	-	-	-	-	-	-	-	-	-	3,120
1a.1.18.4	Waste management	-	-	-	-	-	-	257	39	296	296	-	-	-	-	-	-	-	-	-	2,000
1a.1.18.5	Facility and site dormancy	-	-	-	-	-	-	257	39	296	296	-	-	-	-	-	-	-	-	-	2,000
1a.1.18	Total	-	-	-	-	-	-	2,083	312	2,395	2,395	-	-	-	-	-	-	-	-	-	16,207
Detailed Work Procedures																					
1a.1.19.1	Plant systems	-	-	-	-	-	-	152	23	175	175	-	-	-	-	-	-	-	-	-	1,183
1a.1.19.2	Facility closeout & dormancy	-	-	-	-	-	-	154	23	177	177	-	-	-	-	-	-	-	-	-	1,200
1a.1.19	Total	-	-	-	-	-	-	306	46	352	352	-	-	-	-	-	-	-	-	-	2,383
1a.1.20	Procure vacuum drying system	-	-	-	-	-	-	13	2	15	15	-	-	-	-	-	-	-	-	-	100
1a.1.21	Drain/de-energize non-cont. systems									a											
1a.1.22	Drain & dry NSSS									a											
1a.1.23	Drain/de-energize contaminated systems									a											
1a.1.24	Decon/secure contaminated systems									a											
1a.1	Subtotal Period 1a Activity Costs	-	-	-	-	-	-	6,120	980	7,100	7,100	-	-	-	-	-	-	-	-	-	44,390
Period 1a Collateral Costs																					
1a.3.1	Spent Fuel Capital and Transfer	-	-	-	-	-	-	1,323	198	1,522	-	1,522	-	-	-	-	-	-	-	-	-
1a.3.2	Retention and Severance	-	-	-	-	-	-	9,892	1,484	11,376	11,376	-	-	-	-	-	-	-	-	-	-
1a.3	Subtotal Period 1a Collateral Costs	-	-	-	-	-	-	11,215	1,682	12,897	11,376	1,522	-	-	-	-	-	-	-	-	-
Period 1a Period-Dependent Costs																					
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 physics supplies	-	614	-	-	-	-	-	153	767	767	-	-	-	-	-	-	-	-	-	-
1a.4.4	Heavy equipment rental	-	753	-	-	-	-	-	113	866	866	-	-	-	-	-	-	-	-	-	-
1a.4.5	Disposal of DAW generated	-	-	12	6	-	50	-	15	83	83	-	-	-	610	-	-	-	12,190	20	-
1a.4.6	Plant energy budget	-	-	-	-	-	-	1,817	272	2,089	2,089	-	-	-	-	-	-	-	-	-	-
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	Fixed Overhead	-	-	-	-	-	-	2,616	392	3,009	3,009	-	-	-	-	-	-	-	-	-	-
1a.4.10	Spent Fuel Pool O&M	-	-	-	-	-	-	845	127	971	-	971	-	-	-	-	-	-	-	-	-
1a.4.11	ISFSI Operating Costs	-	-	-	-	-	-	112	17	129	-	129	-	-	-	-	-	-	-	-	-
1a.4.12	Railroad Track Maintenance	-	-	-	-	-	-	125	19	144	144	-	-	-	-	-	-	-	-	-	-
1a.4.13	Security Staff Cost	-	-	-	-	-	-	16,372	2,456	18,827	18,827	-	-	-	-	-	-	-	-	-	245,440
1a.4.14	Utility Staff Cost	-	-	-	-	-	-	27,285	4,093	31,378	31,378	-	-	-	-	-	-	-	-	-	422,240
1a.4	Subtotal Period 1a Period-Dependent Costs	-	1,367	12	6	-	50	59,389	8,679	69,502	64,632	4,870	-	-	610	-	-	-	12,190	20	667,680
1a.0	TOTAL PERIOD 1a COST	-	1,367	12	6	-	50	76,724	11,341	89,500	83,108	6,392	-	-	610	-	-	-	12,190	20	712,070

Table J
Monticello Nuclear Generating Plant
SAFSTOR 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 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 1b - SAFSTOR Limited DECON Activities																					
Period 1b Direct Decommissioning Activities																					
Decontamination of Site Buildings																					
1b.1.1.1	Reactor Building	5,155	-	-	-	-	-	-	2,577	7,732	7,732	-	-	-	-	-	-	-	-	70,157	-
1b.1.1.2	Admin	95	-	-	-	-	-	-	48	143	143	-	-	-	-	-	-	-	-	1,357	-
1b.1.1.3	HPCI Room	25	-	-	-	-	-	-	13	38	38	-	-	-	-	-	-	-	-	350	-
1b.1.1.4	Hot Shop	15	-	-	-	-	-	-	7	22	22	-	-	-	-	-	-	-	-	208	-
1b.1.1.5	LLRW Storage & Shipping	49	-	-	-	-	-	-	25	74	74	-	-	-	-	-	-	-	-	705	-
1b.1.1.6	Offgas Stack	326	-	-	-	-	-	-	163	489	489	-	-	-	-	-	-	-	-	4,575	-
1b.1.1.7	Offgas Storage & Compressor	34	-	-	-	-	-	-	17	51	51	-	-	-	-	-	-	-	-	488	-
1b.1.1.8	Radwaste	103	-	-	-	-	-	-	51	154	154	-	-	-	-	-	-	-	-	1,473	-
1b.1.1.9	Radwaste Material Storage Warehouse	54	-	-	-	-	-	-	27	81	81	-	-	-	-	-	-	-	-	768	-
1b.1.1.10	Recombiner	23	-	-	-	-	-	-	11	34	34	-	-	-	-	-	-	-	-	323	-
1b.1.1.11	Turbine	600	-	-	-	-	-	-	300	900	900	-	-	-	-	-	-	-	-	8,583	-
1b.1.1.12	Turbine Building Addition	50	-	-	-	-	-	-	25	74	74	-	-	-	-	-	-	-	-	709	-
1b.1.1.13	Reactor (Post Fuel)	830	-	-	-	-	-	-	415	1,245	1,245	-	-	-	-	-	-	-	-	11,337	-
1b.1.1	Totals	7,359	-	-	-	-	-	-	3,679	11,038	11,038	-	-	-	-	-	-	-	-	101,033	-
1b.1	Subtotal Period 1b Activity Costs	7,359	-	-	-	-	-	-	3,679	11,038	11,038	-	-	-	-	-	-	-	-	101,033	-
Period 1b Additional Costs																					
1b.2.1	Spent Fuel Pool Isolation	-	-	-	-	-	-	12,675	1,901	14,576	14,576	-	-	-	-	-	-	-	-	-	-
1b.2	Subtotal Period 1b Additional Costs	-	-	-	-	-	-	12,675	1,901	14,576	14,576	-	-	-	-	-	-	-	-	-	-
Period 1b Collateral Costs																					
1b.3.1	Decon equipment	1,055	-	-	-	-	-	-	158	1,213	1,213	-	-	-	-	-	-	-	-	-	-
1b.3.2	Process decommissioning water waste	220	-	145	258	-	588	-	310	1,522	1,522	-	-	-	1,351	-	-	-	81,042	263	-
1b.3.4	Small tool allowance	-	126	-	-	-	-	-	19	145	145	-	-	-	-	-	-	-	-	-	-
1b.3.5	Spent Fuel Capital and Transfer	-	-	-	-	-	-	196	29	225	-	225	-	-	-	-	-	-	-	-	-
1b.3.6	Retention and Severance	-	-	-	-	-	-	3,601	540	4,141	4,141	-	-	-	-	-	-	-	-	-	-
1b.3	Subtotal Period 1b Collateral Costs	1,274	126	145	258	-	588	3,796	1,057	7,246	7,021	225	-	-	1,351	-	-	-	81,042	263	-
Period 1b Period-Dependent Costs																					
1b.4.1	Decon supplies	1,562	-	-	-	-	-	-	391	1,953	1,953	-	-	-	-	-	-	-	-	-	-
1b.4.2	Insurance	-	-	-	-	-	-	580	58	638	638	-	-	-	-	-	-	-	-	-	-
1b.4.3	Property taxes	-	-	-	-	-	-	890	89	979	979	-	-	-	-	-	-	-	-	-	-
1b.4.4	Health physics supplies	-	729	-	-	-	-	-	182	911	911	-	-	-	-	-	-	-	-	-	-
1b.4.5	Heavy equipment rental	-	188	-	-	-	-	-	28	216	216	-	-	-	-	-	-	-	-	-	-
1b.4.6	Disposal of DAW generated	-	-	11	6	-	46	-	13	76	76	-	-	-	555	-	-	-	11,092	18	-
1b.4.7	Plant energy budget	-	-	-	-	-	-	453	68	521	521	-	-	-	-	-	-	-	-	-	-
1b.4.8	NRC Fees	-	-	-	-	-	-	161	16	177	177	-	-	-	-	-	-	-	-	-	-
1b.4.9	Emergency Planning Fees	-	-	-	-	-	-	708	71	779	-	779	-	-	-	-	-	-	-	-	-
1b.4.10	Fixed Overhead	-	-	-	-	-	-	652	98	750	750	-	-	-	-	-	-	-	-	-	-
1b.4.11	Spent Fuel Pool O&M	-	-	-	-	-	-	211	32	242	-	242	-	-	-	-	-	-	-	-	-
1b.4.12	ISFSI Operating Costs	-	-	-	-	-	-	28	4	32	-	32	-	-	-	-	-	-	-	-	-
1b.4.13	Railroad Track Maintenance	-	-	-	-	-	-	31	5	36	36	-	-	-	-	-	-	-	-	-	-
1b.4.14	Security Staff Cost	-	-	-	-	-	-	4,082	612	4,694	4,694	-	-	-	-	-	-	-	-	-	61,192
1b.4.15	Utility Staff Cost	-	-	-	-	-	-	6,803	1,020	7,823	7,823	-	-	-	-	-	-	-	-	-	105,271
1b.4	Subtotal Period 1b Period-Dependent Costs	1,562	917	11	6	-	46	14,599	2,687	19,828	18,775	1,053	-	-	555	-	-	-	11,092	18	166,463
1b.0	TOTAL PERIOD 1b COST	10,195	1,043	156	264	-	634	31,070	9,325	52,688	51,410	1,278	-	-	1,905	-	-	-	92,135	101,314	166,463
PERIOD 1c - Preparations for SAFSTOR Dormancy																					
Period 1c Direct Decommissioning Activities																					
1c.1.1	Prepare support equipment for storage	-	527	-	-	-	-	-	79	606	606	-	-	-	-	-	-	-	-	3,000	-
1c.1.2	Install containment pressure equal. lines	-	54	-	-	-	-	-	8	62	62	-	-	-	-	-	-	-	-	700	-
1c.1.3	Interim survey prior to dormancy	-	-	-	-	-	-	733	220	953	953	-	-	-	-	-	-	-	-	12,801	-
1c.1.4	Secure building accesses									a											
1c.1.5	Prepare & submit interim report	-	-	-	-	-	-	75	11	86	86	-	-	-	-	-	-	-	-	-	583
1c.1	Subtotal Period 1c Activity Costs	-	581	-	-	-	-	808	318	1,707	1,707	-	-	-	-	-	-	-	-	16,501	583
Period 1c Collateral Costs																					
1c.3.1	Process decommissioning water waste	161	-	107	190	-	433	-	228	1,120	1,120	-	-	-	994	-	-	-	59,653	194	-

Table J
Monticello Nuclear Generating Plant
SAFSTOR 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 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 tool allowance	-	5	-	-	-	-	-	1	6	6	-	-	-	-	-	-	-	-	-	-
1c.3.4	Spent Fuel Capital and Transfer	-	-	-	-	-	-	2,539	381	2,920	-	2,920	-	-	-	-	-	-	-	-	-
1c.3.5	Retention and Severance	-	-	-	-	-	-	2,734	410	3,145	3,145	-	-	-	-	-	-	-	-	-	-
1c.3	Subtotal Period 1c Collateral Costs	161	5	107	190	-	433	5,273	1,020	7,190	4,270	2,920	-	-	994	-	-	-	59,653	194	-
Period 1c	Period-Dependent Costs																				
1c.4.1	Insurance	-	-	-	-	-	-	580	58	638	638	-	-	-	-	-	-	-	-	-	-
1c.4.2	Property taxes	-	-	-	-	-	-	888	89	977	977	-	-	-	-	-	-	-	-	-	-
1c.4.3	Health physics supplies	-	248	-	-	-	-	-	62	310	310	-	-	-	-	-	-	-	-	-	-
1c.4.4	Heavy equipment rental	-	188	-	-	-	-	-	28	216	216	-	-	-	-	-	-	-	-	-	-
1c.4.5	Disposal of DAW generated	-	-	3	2	-	13	-	4	21	21	-	-	-	152	-	-	-	3,039	5	-
1c.4.6	Plant energy budget	-	-	-	-	-	-	453	68	521	521	-	-	-	-	-	-	-	-	-	-
1c.4.7	NRC Fees	-	-	-	-	-	-	161	16	177	177	-	-	-	-	-	-	-	-	-	-
1c.4.8	Emergency Planning Fees	-	-	-	-	-	-	708	71	779	-	779	-	-	-	-	-	-	-	-	-
1c.4.9	Fixed Overhead	-	-	-	-	-	-	652	98	750	750	-	-	-	-	-	-	-	-	-	-
1c.4.10	Spent Fuel Pool O&M	-	-	-	-	-	-	211	32	242	-	242	-	-	-	-	-	-	-	-	-
1c.4.11	ISFSI Operating Costs	-	-	-	-	-	-	28	4	32	-	32	-	-	-	-	-	-	-	-	-
1c.4.12	Railroad Track Maintenance	-	-	-	-	-	-	31	5	36	36	-	-	-	-	-	-	-	-	-	-
1c.4.13	Security Staff Cost	-	-	-	-	-	-	4,082	612	4,694	4,694	-	-	-	-	-	-	-	-	-	61,192
1c.4.14	Utility Staff Cost	-	-	-	-	-	-	6,803	1,020	7,823	7,823	-	-	-	-	-	-	-	-	-	105,271
1c.4	Subtotal Period 1c Period-Dependent Costs	-	436	3	2	-	13	14,597	2,166	17,216	16,163	1,053	-	-	152	-	-	-	3,039	5	166,463
1c.0	TOTAL PERIOD 1c COST	161	1,021	110	192	-	446	20,678	3,505	26,113	22,140	3,973	-	-	1,146	-	-	-	62,692	16,700	167,046
PERIOD 1 TOTALS		10,357	3,431	278	462	-	1,130	128,472	24,170	168,301	156,658	11,643	-	-	3,661	-	-	-	167,017	118,034	1,045,579
PERIOD 2a - SAFSTOR Dormancy with Wet Spent Fuel Storage																					
Period 2a	Direct Decommissioning Activities																				
2a.1.1	Quarterly Inspection									a											
2a.1.2	Semi-annual environmental survey									a											
2a.1.3	Prepare reports									a											
2a.1.4	Bituminous roof replacement	-	-	-	-	-	-	155	23	178	178	-	-	-	-	-	-	-	-	-	-
2a.1.5	Maintenance supplies	-	-	-	-	-	-	349	87	437	437	-	-	-	-	-	-	-	-	-	-
2a.1	Subtotal Period 2a Activity Costs	-	-	-	-	-	-	504	111	615	615	-	-	-	-	-	-	-	-	-	-
Period 2a	Additional Costs																				
2a.2.1	Security Modifications	-	-	-	-	-	-	8,696	1,304	10,000	10,000	-	-	-	-	-	-	-	-	-	-
2a.2	Subtotal Period 2a Additional Costs	-	-	-	-	-	-	8,696	1,304	10,000	10,000	-	-	-	-	-	-	-	-	-	-
Period 2a	Collateral Costs																				
2a.3.1	Spent Fuel Capital and Transfer	-	-	-	-	-	-	141,374	21,206	162,580	-	162,580	-	-	-	-	-	-	-	-	-
2a.3.2	Retention and Severance	-	-	-	-	-	-	19,427	2,914	22,341	22,341	-	-	-	-	-	-	-	-	-	-
2a.3	Subtotal Period 2a Collateral Costs	-	-	-	-	-	-	160,801	24,120	184,921	22,341	162,580	-	-	-	-	-	-	-	-	-
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	Health physics supplies	-	617	-	-	-	-	-	154	771	771	-	-	-	-	-	-	-	-	-	-
2a.4.4	Disposal of DAW generated	-	-	11	6	-	47	-	14	79	79	-	-	-	576	-	-	-	11,523	19	-
2a.4.5	Plant energy budget	-	-	-	-	-	-	910	136	1,046	1,046	-	-	-	-	-	-	-	-	-	-
2a.4.6	NRC Fees	-	-	-	-	-	-	610	61	671	671	-	-	-	-	-	-	-	-	-	-
2a.4.7	Emergency Planning Fees	-	-	-	-	-	-	7,110	711	7,821	-	7,821	-	-	-	-	-	-	-	-	-
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	-	2,432	-	-	-	-	-	-	-	-	-
2a.4.10	ISFSI Operating Costs	-	-	-	-	-	-	280	42	322	-	322	-	-	-	-	-	-	-	-	-
2a.4.11	Railroad Track Maintenance	-	-	-	-	-	-	639	96	735	735	-	-	-	-	-	-	-	-	-	-
2a.4.12	Security Staff Cost	-	-	-	-	-	-	37,806	5,671	43,477	31,086	12,391	-	-	-	-	-	-	-	-	562,523
2a.4.13	Utility Staff Cost	-	-	-	-	-	-	13,543	2,031	15,574	12,615	2,959	-	-	-	-	-	-	-	-	205,738
2a.4	Subtotal Period 2a Period-Dependent Costs	-	617	11	6	-	47	79,012	11,099	90,793	64,868	25,925	-	-	576	-	-	-	11,523	19	768,261
2a.0	TOTAL PERIOD 2a COST	-	617	11	6	-	47	249,013	36,634	286,328	97,823	188,505	-	-	576	-	-	-	11,523	19	768,261
PERIOD 2b - SAFSTOR Dormancy with Dry Spent Fuel Storage																					
Period 2b	Direct Decommissioning Activities																				
2b.1.1	Quarterly Inspection									a											
2b.1.2	Semi-annual environmental survey									a											

Table J
Monticello Nuclear Generating Plant
SAFSTOR 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 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									a											
2b.1.4	Bituminous roof replacement	-	-	-	-	-	-	3,127	469	3,596	3,596	-	-	-	-	-	-	-	-	-	-
2b.1.5	Maintenance supplies	-	-	-	-	-	-	7,065	1,766	8,831	8,831	-	-	-	-	-	-	-	-	-	-
2b.1	Subtotal Period 2b Activity Costs	-	-	-	-	-	-	10,192	2,235	12,427	12,427	-	-	-	-	-	-	-	-	-	-
Period 2b Collateral Costs																					
2b.3.1	Spent Fuel Capital and Transfer	-	-	-	-	-	-	366,775	55,016	421,791	-	421,791	-	-	-	-	-	-	-	-	-
2b.3	Subtotal Period 2b Collateral Costs	-	-	-	-	-	-	366,775	55,016	421,791	-	421,791	-	-	-	-	-	-	-	-	-
Period 2b Period-Dependent Costs																					
2b.4.1	Insurance	-	-	-	-	-	-	35,606	3,561	39,167	39,167	-	-	-	-	-	-	-	-	-	-
2b.4.2	Property taxes	-	-	-	-	-	-	180,613	18,061	198,674	198,674	-	-	-	-	-	-	-	-	-	-
2b.4.3	Health physics supplies	-	6,047	-	-	-	-	-	1,512	7,559	7,559	-	-	-	-	-	-	-	-	-	-
2b.4.4	Disposal of DAW generated	-	-	111	57	-	461	-	135	764	764	-	-	-	5,595	-	-	-	111,903	182	-
2b.4.5	Plant energy budget	-	-	-	-	-	-	9,196	1,379	10,576	10,576	-	-	-	-	-	-	-	-	-	-
2b.4.6	NRC Fees	-	-	-	-	-	-	11,515	1,152	12,667	12,667	-	-	-	-	-	-	-	-	-	-
2b.4.7	Emergency Planning Fees	-	-	-	-	-	-	7,506	751	8,256	-	8,256	-	-	-	-	-	-	-	-	-
2b.4.8	Fixed Overhead	-	-	-	-	-	-	10,904	1,636	12,540	12,540	-	-	-	-	-	-	-	-	-	-
2b.4.9	ISFSI Operating Costs	-	-	-	-	-	-	5,666	850	6,516	-	6,516	-	-	-	-	-	-	-	-	-
2b.4.10	Railroad Track Maintenance	-	-	-	-	-	-	6,330	950	7,280	7,280	-	-	-	-	-	-	-	-	-	-
2b.4.11	Security Staff Cost	-	-	-	-	-	-	280,802	42,120	322,922	72,658	250,265	-	-	-	-	-	-	-	-	3,790,775
2b.4.12	Utility Staff Cost	-	-	-	-	-	-	114,547	17,182	131,729	71,924	59,805	-	-	-	-	-	-	-	-	1,684,789
2b.4	Subtotal Period 2b Period-Dependent Costs	-	6,047	111	57	-	461	662,686	89,288	758,650	433,808	324,843	-	-	5,595	-	-	-	111,903	182	5,475,563
2b.0	TOTAL PERIOD 2b COST	-	6,047	111	57	-	461	1,039,652	146,539	1,192,868	446,234	746,634	-	-	5,595	-	-	-	111,903	182	5,475,563
PERIOD 2 TOTALS		-	6,664	122	63	-	509	1,288,665	183,173	1,479,196	544,057	935,139	-	-	6,171	-	-	-	123,426	201	6,243,824
PERIOD 3a - Reactivate Site Following SAFSTOR Dormancy																					
Period 3a Direct Decommissioning Activities																					
3a.1.1	Prepare preliminary decommissioning cost	-	-	-	-	-	-	167	25	192	192	-	-	-	-	-	-	-	-	-	1,300
3a.1.2	Review plant dwgs & specs.	-	-	-	-	-	-	591	89	680	680	-	-	-	-	-	-	-	-	-	4,600
3a.1.3	Perform detailed rad survey									a											
3a.1.4	End product description	-	-	-	-	-	-	129	19	148	148	-	-	-	-	-	-	-	-	-	1,000
3a.1.5	Detailed by-product inventory	-	-	-	-	-	-	167	25	192	192	-	-	-	-	-	-	-	-	-	1,300
3a.1.6	Define major work sequence	-	-	-	-	-	-	964	145	1,108	1,108	-	-	-	-	-	-	-	-	-	7,500
3a.1.7	Perform SER and EA	-	-	-	-	-	-	398	60	458	458	-	-	-	-	-	-	-	-	-	3,100
3a.1.8	Perform Site-Specific Cost Study	-	-	-	-	-	-	643	96	739	739	-	-	-	-	-	-	-	-	-	5,000
Activity Specifications																					
3a.1.9.1	Re-activate plant & temporary facilities	-	-	-	-	-	-	947	142	1,089	980	-	109	-	-	-	-	-	-	-	7,370
3a.1.9.2	Plant systems	-	-	-	-	-	-	536	80	616	554	-	62	-	-	-	-	-	-	-	4,167
3a.1.9.3	Reactor internals	-	-	-	-	-	-	912	137	1,049	1,049	-	-	-	-	-	-	-	-	-	7,100
3a.1.9.4	Reactor vessel	-	-	-	-	-	-	835	125	961	961	-	-	-	-	-	-	-	-	-	6,500
3a.1.9.5	Sacrificial shield	-	-	-	-	-	-	64	10	74	74	-	-	-	-	-	-	-	-	-	500
3a.1.9.6	Moisture separators/reheaters	-	-	-	-	-	-	129	19	148	148	-	-	-	-	-	-	-	-	-	1,000
3a.1.9.7	Reinforced concrete	-	-	-	-	-	-	206	31	236	118	-	118	-	-	-	-	-	-	-	1,600
3a.1.9.8	Main Turbine	-	-	-	-	-	-	268	40	309	309	-	-	-	-	-	-	-	-	-	2,088
3a.1.9.9	Main Condensers	-	-	-	-	-	-	268	40	309	309	-	-	-	-	-	-	-	-	-	2,088
3a.1.9.10	Pressure suppression structure	-	-	-	-	-	-	257	39	296	296	-	-	-	-	-	-	-	-	-	2,000
3a.1.9.11	Drywell	-	-	-	-	-	-	206	31	236	236	-	-	-	-	-	-	-	-	-	1,600
3a.1.9.12	Plant structures & buildings	-	-	-	-	-	-	401	60	461	231	-	231	-	-	-	-	-	-	-	3,120
3a.1.9.13	Waste management	-	-	-	-	-	-	591	89	680	680	-	-	-	-	-	-	-	-	-	4,600
3a.1.9.14	Facility & site closeout	-	-	-	-	-	-	116	17	133	67	-	67	-	-	-	-	-	-	-	900
3a.1.9	Total	-	-	-	-	-	-	5,736	860	6,597	6,011	-	586	-	-	-	-	-	-	-	44,633
Planning & Site Preparations																					
3a.1.10	Prepare dismantling sequence	-	-	-	-	-	-	308	46	355	355	-	-	-	-	-	-	-	-	-	2,400
3a.1.11	Plant prep. & temp. svces	-	-	-	-	-	-	3,500	525	4,025	4,025	-	-	-	-	-	-	-	-	-	-
3a.1.12	Design water clean-up system	-	-	-	-	-	-	180	27	207	207	-	-	-	-	-	-	-	-	-	1,400
3a.1.13	Rigging/Cont. Cntrl Envlps/tooling/etc.	-	-	-	-	-	-	2,400	360	2,760	2,760	-	-	-	-	-	-	-	-	-	-
3a.1.14	Procure casks/liners & containers	-	-	-	-	-	-	158	24	182	182	-	-	-	-	-	-	-	-	-	1,230
3a.1	Subtotal Period 3a Activity Costs	-	-	-	-	-	-	15,341	2,301	17,643	17,057	-	586	-	-	-	-	-	-	-	73,463
Period 3a Additional Costs																					
3a.2.1	Site Characterization	-	-	-	-	-	-	5,930	1,779	7,708	7,708	-	-	-	-	-	-	-	-	30,500	10,852

Table J
Monticello Nuclear Generating Plant
SAFSTOR 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 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 3a Additional Costs (continued)																					
3a.2.2	Mixed & RCRA Waste	-	-	28	29	14	-	-	9	80	80	-	-	43	-	-	-	-	5,253	161	-
3a.2	Subtotal Period 3a Additional Costs	-	-	28	29	14	-	5,930	1,788	7,788	7,788	-	-	43	-	-	-	-	5,253	30,661	10,852
Period 3a Collateral Costs																					
3a.3.1	Spent Fuel Capital and Transfer	-	-	-	-	-	-	5,693	854	6,547	-	6,547	-	-	-	-	-	-	-	-	-
3a.3	Subtotal Period 3a Collateral Costs	-	-	-	-	-	-	5,693	854	6,547	-	6,547	-	-	-	-	-	-	-	-	-
Period 3a Period-Dependent Costs																					
3a.4.1	Insurance	-	-	-	-	-	-	703	70	774	442	332	-	-	-	-	-	-	-	-	-
3a.4.2	Property taxes	-	-	-	-	-	-	3,479	348	3,827	3,241	586	-	-	-	-	-	-	-	-	-
3a.4.3	Health physics supplies	-	538	-	-	-	-	-	135	673	673	-	-	-	-	-	-	-	-	-	-
3a.4.4	Heavy equipment rental	-	753	-	-	-	-	-	113	866	866	-	-	-	-	-	-	-	-	-	-
3a.4.5	Disposal of DAW generated	-	-	10	5	-	42	-	12	70	70	-	-	-	516	-	-	-	10,311	17	-
3a.4.6	Plant energy budget	-	-	-	-	-	-	1,817	272	2,089	2,089	-	-	-	-	-	-	-	-	-	-
3a.4.7	NRC ISFSI Fees	-	-	-	-	-	-	28	3	31	-	31	-	-	-	-	-	-	-	-	-
3a.4.8	NRC Fees	-	-	-	-	-	-	335	33	368	368	-	-	-	-	-	-	-	-	-	-
3a.4.9	Emergency Planning Fees	-	-	-	-	-	-	148	15	163	-	163	-	-	-	-	-	-	-	-	-
3a.4.10	Fixed Overhead	-	-	-	-	-	-	2,616	392	3,009	3,009	-	-	-	-	-	-	-	-	-	-
3a.4.11	ISFSI Operating Costs	-	-	-	-	-	-	112	17	129	-	129	-	-	-	-	-	-	-	-	-
3a.4.12	Railroad Track Maintenance	-	-	-	-	-	-	125	19	144	144	-	-	-	-	-	-	-	-	-	-
3a.4.13	Security Staff Cost	-	-	-	-	-	-	4,690	703	5,393	5,107	286	-	-	-	-	-	-	-	-	69,160
3a.4.14	Utility Staff Cost	-	-	-	-	-	-	16,817	2,523	19,339	18,160	1,180	-	-	-	-	-	-	-	-	260,000
3a.4	Subtotal Period 3a Period-Dependent Costs	-	1,291	10	5	-	42	30,870	4,656	36,875	34,169	2,706	-	-	516	-	-	-	10,311	17	329,160
3a.0	TOTAL PERIOD 3a COST	-	1,291	38	34	14	42	57,834	9,599	68,853	59,014	9,253	586	43	516	-	-	-	15,565	30,678	413,475
PERIOD 3b - Decommissioning Preparations																					
Period 3b Direct Decommissioning Activities																					
Detailed Work Procedures																					
3b.1.1.1	Plant systems	-	-	-	-	-	-	608	91	700	630	-	70	-	-	-	-	-	-	-	4,733
3b.1.1.2	Reactor internals	-	-	-	-	-	-	514	77	591	591	-	-	-	-	-	-	-	-	-	4,000
3b.1.1.3	Remaining buildings	-	-	-	-	-	-	174	26	200	50	-	150	-	-	-	-	-	-	-	1,350
3b.1.1.4	CRD housings & NIs	-	-	-	-	-	-	129	19	148	148	-	-	-	-	-	-	-	-	-	1,000
3b.1.1.5	Incore instrumentation	-	-	-	-	-	-	129	19	148	148	-	-	-	-	-	-	-	-	-	1,000
3b.1.1.6	Removal primary containment	-	-	-	-	-	-	257	39	296	296	-	-	-	-	-	-	-	-	-	2,000
3b.1.1.7	Reactor vessel	-	-	-	-	-	-	467	70	537	537	-	-	-	-	-	-	-	-	-	3,630
3b.1.1.8	Facility closeout	-	-	-	-	-	-	154	23	177	89	-	89	-	-	-	-	-	-	-	1,200
3b.1.1.9	Sacrificial shield	-	-	-	-	-	-	154	23	177	177	-	-	-	-	-	-	-	-	-	1,200
3b.1.1.10	Reinforced concrete	-	-	-	-	-	-	129	19	148	74	-	74	-	-	-	-	-	-	-	1,000
3b.1.1.11	Main Turbine	-	-	-	-	-	-	267	40	307	307	-	-	-	-	-	-	-	-	-	2,080
3b.1.1.12	Main Condensers	-	-	-	-	-	-	268	40	309	309	-	-	-	-	-	-	-	-	-	2,088
3b.1.1.13	Moisture separators & reheaters	-	-	-	-	-	-	257	39	296	296	-	-	-	-	-	-	-	-	-	2,000
3b.1.1.14	Radwaste building	-	-	-	-	-	-	351	53	403	363	-	40	-	-	-	-	-	-	-	2,730
3b.1.1.15	Reactor building	-	-	-	-	-	-	351	53	403	363	-	40	-	-	-	-	-	-	-	2,730
3b.1.1	Total	-	-	-	-	-	-	4,208	631	4,839	4,376	-	463	-	-	-	-	-	-	-	32,741
3b.1	Subtotal Period 3b Activity Costs	-	-	-	-	-	-	4,208	631	4,839	4,376	-	463	-	-	-	-	-	-	-	32,741
Period 3b Collateral Costs																					
3b.3.1	Decon equipment	1,055	-	-	-	-	-	-	158	1,213	1,213	-	-	-	-	-	-	-	-	-	-
3b.3.2	DOC staff relocation expenses	-	-	-	-	-	-	1,264	190	1,454	1,454	-	-	-	-	-	-	-	-	-	-
3b.3.3	Pipe cutting equipment	-	1,200	-	-	-	-	-	180	1,380	1,380	-	-	-	-	-	-	-	-	-	-
3b.3.4	Spent Fuel Capital and Transfer	-	-	-	-	-	-	2,839	426	3,265	-	3,265	-	-	-	-	-	-	-	-	-
3b.3	Subtotal Period 3b Collateral Costs	1,055	1,200	-	-	-	-	4,103	954	7,311	4,047	3,265	-	-	-	-	-	-	-	-	-
Period 3b Period-Dependent Costs																					
3b.4.1	Decon supplies	39	-	-	-	-	-	-	10	48	48	-	-	-	-	-	-	-	-	-	-
3b.4.2	Insurance	-	-	-	-	-	-	351	35	386	386	-	-	-	-	-	-	-	-	-	-
3b.4.3	Property taxes	-	-	-	-	-	-	1,614	161	1,776	1,483	293	-	-	-	-	-	-	-	-	-
3b.4.4	Health physics supplies	-	295	-	-	-	-	-	74	369	369	-	-	-	-	-	-	-	-	-	-
3b.4.5	Heavy equipment rental	-	375	-	-	-	-	-	56	432	432	-	-	-	-	-	-	-	-	-	-
3b.4.6	Disposal of DAW generated	-	-	6	3	-	24	-	7	40	40	-	-	-	291	-	-	-	5,814	9	-
3b.4.7	Plant energy budget	-	-	-	-	-	-	906	136	1,042	1,042	-	-	-	-	-	-	-	-	-	-
3b.4.8	NRC ISFSI Fees	-	-	-	-	-	-	14	1	15	-	15	-	-	-	-	-	-	-	-	-
3b.4.9	NRC Fees	-	-	-	-	-	-	167	17	183	183	-	-	-	-	-	-	-	-	-	-
3b.4.10	Emergency Planning Fees	-	-	-	-	-	-	74	7	81	-	81	-	-	-	-	-	-	-	-	-

Table J
Monticello Nuclear Generating Plant
SAFSTOR 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 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 3b Period-Dependent Costs (continued)																					
3b.4.11	Fixed Overhead	-	-	-	-	-	-	1,305	196	1,500	1,500	-	-	-	-	-	-	-	-	-	-
3b.4.12	ISFSI Operating Costs	-	-	-	-	-	-	56	8	64	-	64	-	-	-	-	-	-	-	-	-
3b.4.13	Railroad Track Maintenance	-	-	-	-	-	-	62	9	72	72	-	-	-	-	-	-	-	-	-	-
3b.4.14	Security Staff Cost	-	-	-	-	-	-	2,338	351	2,689	2,547	143	-	-	-	-	-	-	-	-	34,485
3b.4.15	DOC Staff Cost	-	-	-	-	-	-	5,344	802	6,146	6,146	-	-	-	-	-	-	-	-	-	58,080
3b.4.16	Utility Staff Cost	-	-	-	-	-	-	8,385	1,258	9,643	9,055	588	-	-	-	-	-	-	-	-	129,644
3b.4	Subtotal Period 3b Period-Dependent Costs	39	671	6	3	-	24	20,616	3,128	24,487	23,302	1,185	-	-	291	-	-	-	5,814	9	222,210
3b.0	TOTAL PERIOD 3b COST	1,093	1,871	6	3	-	24	28,927	4,713	36,637	31,725	4,449	463	-	291	-	-	-	5,814	9	254,951
PERIOD 3 TOTALS		1,093	3,162	44	37	14	66	86,761	14,312	105,490	90,739	13,702	1,049	43	806	-	-	-	21,379	30,688	668,425
PERIOD 4a - Large Component Removal																					
Period 4a Direct Decommissioning Activities																					
Nuclear Steam Supply System Removal																					
4a.1.1.1	Recirculation System Piping & Valves	23	85	27	32	185	264	-	134	750	750	-	-	676	715	-	-	-	94,867	1,594	-
4a.1.1.2	Recirculation Pumps & Motors	8	56	16	37	252	270	-	131	771	771	-	-	568	473	-	-	-	112,200	1,049	-
4a.1.1.3	CRDMs & NIs Removal	41	801	415	98	-	1,130	-	560	3,045	3,045	-	-	-	3,741	-	-	-	213,700	12,506	-
4a.1.1.4	Reactor Vessel Internals	139	6,098	11,330	1,029	-	25,657	278	20,603	65,135	65,135	-	-	-	2,943	1,628	600	-	337,343	22,415	1,055
4a.1.1.5	Reactor Vessel	-	8,498	1,818	837	-	6,301	278	10,229	27,961	27,961	-	-	-	17,823	-	-	-	1,110,360	22,415	1,055
4a.1.1	Totals	211	15,538	13,605	2,034	438	33,622	557	31,657	97,662	97,662	-	-	1,244	25,695	1,628	600	-	1,868,371	59,979	2,110
Removal of Major Equipment																					
4a.1.2	Main Turbine/Generator	-	340	1,356	521	6,139	439	-	1,330	10,126	10,126	-	-	24,835	1,383	-	-	-	1,577,959	4,796	-
4a.1.3	Main Condensers	-	1,207	360	194	3,225	244	-	912	6,142	6,142	-	-	17,396	727	-	-	-	828,955	16,823	-
Cascading Costs from Clean Building Demolition																					
4a.1.4.1	Reactor Building	-	332	-	-	-	-	-	50	381	381	-	-	-	-	-	-	-	-	2,217	-
4a.1.4.2	Radwaste	-	25	-	-	-	-	-	4	28	28	-	-	-	-	-	-	-	-	127	-
4a.1.4.3	Turbine	-	127	-	-	-	-	-	19	146	146	-	-	-	-	-	-	-	-	1,254	-
4a.1.4	Totals	-	483	-	-	-	-	-	72	556	556	-	-	-	-	-	-	-	-	3,598	-
Disposal of Plant Systems																					
4a.1.5.1	Automatic Press Relief	-	106	2	10	182	-	-	56	356	356	-	-	1,088	-	-	-	-	44,184	1,468	-
4a.1.5.2	Chemistry Sampling	-	24	0	2	35	-	-	12	73	73	-	-	207	-	-	-	-	8,422	356	-
4a.1.5.3	Chemistry Sampling - Insulated	-	2	0	0	0	-	-	0	2	2	-	-	1	-	-	-	-	61	25	-
4a.1.5.4	Circulating Water - RCA	-	207	14	62	1,114	-	-	230	1,626	1,626	-	-	6,656	-	-	-	-	270,307	2,860	-
4a.1.5.5	Combustible Gas Control - Insul - RCA	-	29	0	2	36	-	-	13	80	80	-	-	212	-	-	-	-	8,617	378	-
4a.1.5.6	Combustible Gas Control - RCA	-	18	1	3	48	-	-	12	81	81	-	-	285	-	-	-	-	11,577	245	-
4a.1.5.7	Condensate & Feedwater	-	888	60	281	5,046	-	-	1,027	7,303	7,303	-	-	30,157	-	-	-	-	1,224,704	12,501	-
4a.1.5.8	Condensate & Feedwater - Insulated	-	444	12	55	980	-	-	267	1,757	1,757	-	-	5,855	-	-	-	-	237,764	6,185	-
4a.1.5.9	Condensate Demin	-	494	9	44	792	-	-	250	1,590	1,590	-	-	4,735	-	-	-	-	192,293	6,784	-
4a.1.5.10	Condensate Storage	-	657	16	77	1,378	-	-	384	2,512	2,512	-	-	8,237	-	-	-	-	334,489	9,265	-
4a.1.5.11	Control Rod Drive	-	3	0	0	4	-	-	1	8	8	-	-	24	-	-	-	-	976	36	-
4a.1.5.12	Control Rod Drive Hydraulic	-	374	5	23	408	-	-	159	968	968	-	-	2,440	-	-	-	-	99,094	5,255	-
4a.1.5.13	Core Spray	-	71	10	48	855	-	-	154	1,138	1,138	-	-	5,109	-	-	-	-	207,487	1,026	-
4a.1.5.14	Core Spray - Insulated	-	131	2	11	198	-	-	64	407	407	-	-	1,184	-	-	-	-	48,081	1,806	-
4a.1.5.15	Demin Water - Insulated - RCA	-	15	0	1	14	-	-	6	36	36	-	-	85	-	-	-	-	3,445	181	-
4a.1.5.16	Demin Water - RCA	-	41	1	2	42	-	-	17	104	104	-	-	253	-	-	-	-	10,278	508	-
4a.1.5.17	Diesel Oil - RCA	-	2	0	0	4	-	-	1	7	7	-	-	23	-	-	-	-	931	25	-
4a.1.5.18	Drywell Atmosphere Cooling - RCA	-	38	1	5	92	-	-	24	159	159	-	-	548	-	-	-	-	22,244	550	-
4a.1.5.19	EDG Emerg Service Water - Insul - RCA	-	0	0	0	0	-	-	0	1	1	-	-	2	-	-	-	-	84	4	-
4a.1.5.20	Electrical - Clean	-	13	-	-	-	-	-	2	15	-	-	15	-	-	-	-	-	-	182	-
4a.1.5.21	Emergency Service Water - Insul - RCA	-	21	0	1	23	-	-	9	55	55	-	-	137	-	-	-	-	5,544	281	-
4a.1.5.22	Emergency Service Water - RCA	-	2	0	0	2	-	-	1	5	5	-	-	13	-	-	-	-	512	22	-
4a.1.5.23	GEZIP - RCA	-	3	0	1	17	-	-	4	25	25	-	-	103	-	-	-	-	4,184	48	-
4a.1.5.24	Generator Physical Design - RCA	-	5	0	0	5	-	-	2	12	12	-	-	31	-	-	-	-	1,250	67	-
4a.1.5.25	H2-O2 Control Analyzing	-	6	0	0	4	-	-	2	12	12	-	-	23	-	-	-	-	948	72	-
4a.1.5.26	H2-O2 Control Analyzing - Insulated	-	6	0	0	4	-	-	2	12	12	-	-	23	-	-	-	-	948	72	-
4a.1.5.27	High Pressure Coolant Injection	-	60	3	12	211	-	-	49	334	334	-	-	1,262	-	-	-	-	51,257	850	-
4a.1.5.28	High Pressure Coolant Injection - Insula	-	198	4	21	379	-	-	110	713	713	-	-	2,266	-	-	-	-	92,018	2,734	-
4a.1.5.29	Hydrogen Cooling	-	8	-	-	-	-	-	1	10	-	-	10	-	-	-	-	-	-	118	-
4a.1.5.30	Hydrogen Cooling - RCA	-	7	0	0	7	-	-	3	17	17	-	-	39	-	-	-	-	1,600	79	-
4a.1.5.31	Hydrogen Seal Oil - RCA	-	17	0	2	32	-	-	9	60	60	-	-	189	-	-	-	-	7,669	212	-
4a.1.5.32	Hydrogen Water Chemistry - RCA	-	24	0	1	23	-	-	10	59	59	-	-	140	-	-	-	-	5,672	304	-

Table J
Monticello Nuclear Generating Plant
SAFSTOR 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 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
Disposal of Plant Systems (continued)																					
4a.1.5.33	Instrument & Service Air - RCA	-	225	4	17	296	-	-	103	644	644	-	-	1,768	-	-	-	-	71,810	2,733	-
4a.1.5.34	Main Condenser	-	177	4	18	318	-	-	95	613	613	-	-	1,903	-	-	-	-	77,301	2,443	-
4a.1.5.35	Main Steam	-	225	6	28	498	-	-	136	892	892	-	-	2,975	-	-	-	-	120,806	3,122	-
4a.1.5.36	Main Turbine	-	909	63	298	5,335	-	-	1,079	7,684	7,684	-	-	31,885	-	-	-	-	1,294,866	12,952	-
4a.1.5.37	Main Turbine - Insulated	-	193	7	32	579	-	-	141	952	952	-	-	3,460	-	-	-	-	140,506	2,725	-
4a.1.5.38	Miscellaneous	-	38	1	3	51	-	-	18	110	110	-	-	302	-	-	-	-	12,283	556	-
4a.1.5.39	Off Gas Recombiner	-	169	6	27	479	-	-	119	799	799	-	-	2,861	-	-	-	-	116,194	2,387	-
4a.1.5.40	Off Gas Recombiner - Insulated	-	351	5	22	393	-	-	150	921	921	-	-	2,350	-	-	-	-	95,441	4,785	-
4a.1.5.41	Post Accident Sampling	-	23	0	1	16	-	-	8	48	48	-	-	99	-	-	-	-	4,004	306	-
4a.1.5.42	Post Accident Sampling - Insulated	-	15	0	1	11	-	-	6	33	33	-	-	67	-	-	-	-	2,737	190	-
4a.1.5.43	RHR Service Water - Insulated - RCA	-	83	3	14	248	-	-	60	409	409	-	-	1,485	-	-	-	-	60,293	1,125	-
4a.1.5.44	RHR Service Water - RCA	-	4	0	0	6	-	-	2	12	12	-	-	35	-	-	-	-	1,410	57	-
4a.1.5.45	Reactor Feedwater Pump Seal	-	50	1	3	55	-	-	21	130	130	-	-	327	-	-	-	-	13,295	687	-
4a.1.5.46	Residual Heat Removal	-	226	58	147	2,110	514	-	529	3,584	3,584	-	-	12,609	1,519	-	-	-	609,174	3,282	-
4a.1.5.47	Residual Heat Removal - Insulated	-	500	39	74	851	464	-	384	2,312	2,312	-	-	5,084	1,374	-	-	-	294,206	7,027	-
4a.1.5.48	Rx Core Isolation Cooling	-	43	1	3	61	-	-	21	129	129	-	-	364	-	-	-	-	14,781	609	-
4a.1.5.49	Rx Core Isolation Cooling - Insulated	-	97	1	5	94	-	-	39	237	237	-	-	563	-	-	-	-	22,843	1,315	-
4a.1.5.50	Rx Recirculation	-	53	5	4	16	52	-	30	161	161	-	-	96	152	-	-	-	13,794	691	-
4a.1.5.51	Snubbers	-	151	1	5	84	-	-	51	292	292	-	-	502	-	-	-	-	20,395	2,272	-
4a.1.5.52	Standby Liquid Control - Insul - RCA	-	4	0	0	4	-	-	2	9	9	-	-	22	-	-	-	-	904	48	-
4a.1.5.53	Standby Liquid Control - RCA	-	26	1	2	41	-	-	13	83	83	-	-	245	-	-	-	-	9,969	341	-
4a.1.5.54	Stator Cooling - RCA	-	7	0	1	21	-	-	5	35	35	-	-	126	-	-	-	-	5,135	98	-
4a.1.5.55	Traversing Incore Probe	-	3	0	0	0	2	-	1	7	7	-	-	2	5	-	-	-	379	46	-
4a.1.5	Totals	-	7,490	347	1,370	23,501	1,032	-	5,894	39,634	39,610	-	24	140,459	3,050	-	-	-	5,899,167	104,297	-
4a.1.6	Scaffolding in support of decommissioning	-	2,106	22	12	191	31	-	567	2,929	2,929	-	-	1,030	91	-	-	-	52,111	19,968	-
4a.1	Subtotal Period 4a Activity Costs	211	27,165	15,691	4,132	33,494	35,367	557	40,431	157,048	157,024	-	24	184,963	30,945	1,628	600	-	10,226,560	209,462	2,110
Period 4a Collateral Costs																					
4a.3.1	Process decommissioning water waste	4	-	7	12	-	28	-	12	63	63	-	-	-	64	-	-	-	3,856	13	-
4a.3.3	Small tool allowance	-	267	-	-	-	-	-	40	307	276	-	31	-	-	-	-	-	-	-	-
4a.3.4	Spent Fuel Capital and Transfer	-	-	-	-	-	-	6,395	959	7,355	-	7,355	-	-	-	-	-	-	-	-	-
4a.3	Subtotal Period 4a Collateral Costs	4	267	7	12	-	28	6,395	1,011	7,724	339	7,355	31	-	64	-	-	-	3,856	13	-
Period 4a Period-Dependent Costs																					
4a.4.1	Decon supplies	87	-	-	-	-	-	-	22	109	109	-	-	-	-	-	-	-	-	-	-
4a.4.2	Insurance	-	-	-	-	-	-	790	79	869	869	-	-	-	-	-	-	-	-	-	-
4a.4.3	Property taxes	-	-	-	-	-	-	3,594	359	3,953	3,293	660	-	-	-	-	-	-	-	-	-
4a.4.4	Health physics supplies	-	1,872	-	-	-	-	-	468	2,340	2,340	-	-	-	-	-	-	-	-	-	-
4a.4.5	Heavy equipment rental	-	2,811	-	-	-	-	-	422	3,232	3,232	-	-	-	-	-	-	-	-	-	-
4a.4.6	Disposal of DAW generated	-	-	89	46	-	370	-	108	612	612	-	-	-	4,485	-	-	-	89,703	146	-
4a.4.7	Plant energy budget	-	-	-	-	-	-	1,938	291	2,229	2,229	-	-	-	-	-	-	-	-	-	-
4a.4.8	NRC ISFSI Fees	-	-	-	-	-	-	32	3	35	-	35	-	-	-	-	-	-	-	-	-
4a.4.9	NRC Fees	-	-	-	-	-	-	544	54	598	598	-	-	-	-	-	-	-	-	-	-
4a.4.10	Emergency Planning Fees	-	-	-	-	-	-	167	17	183	-	183	-	-	-	-	-	-	-	-	-
4a.4.11	Fixed Overhead	-	-	-	-	-	-	2,380	357	2,737	2,737	-	-	-	-	-	-	-	-	-	-
4a.4.12	Liquid Radwaste Processing Equipment/Services	-	-	-	-	-	-	477	72	549	549	-	-	-	-	-	-	-	-	-	-
4a.4.13	ISFSI Operating Costs	-	-	-	-	-	-	126	19	145	-	145	-	-	-	-	-	-	-	-	-
4a.4.14	Railroad Track Maintenance	-	-	-	-	-	-	140	21	162	162	-	-	-	-	-	-	-	-	-	-
4a.4.15	Remedial Actions Surveys	-	-	-	-	-	-	1,258	189	1,447	1,447	-	-	-	-	-	-	-	-	-	-
4a.4.16	Security Staff Cost	-	-	-	-	-	-	6,666	1,000	7,666	5,734	1,932	-	-	-	-	-	-	-	-	101,051
4a.4.17	DOC Staff Cost	-	-	-	-	-	-	14,604	2,191	16,795	16,795	-	-	-	-	-	-	-	-	-	161,214
4a.4.18	Utility Staff Cost	-	-	-	-	-	-	19,141	2,871	22,012	20,691	1,321	-	-	-	-	-	-	-	-	294,391
4a.4	Subtotal Period 4a Period-Dependent Costs	87	4,683	89	46	-	370	51,858	8,542	65,674	61,399	4,275	-	-	4,485	-	-	-	89,703	146	556,657
4a.0	TOTAL PERIOD 4a COST	302	32,114	15,787	4,190	33,494	35,765	58,810	49,984	230,446	218,761	11,630	55	184,963	35,494	1,628	600	-	10,320,120	209,621	558,767
PERIOD 4b - Site Decontamination																					
Period 4b Direct Decommissioning Activities																					
4b.1.1	Remove spent fuel racks	591	58	103	149	-	2,572	-	986	4,459	4,459	-	-	-	7,653	-	-	-	486,170	906	-
Disposal of Plant Systems																					
4b.1.2.1	ALARA/Radiological	-	16	0	0	8	-	-	5	30	30	-	-	49	-	-	-	-	1,987	247	-
4b.1.2.2	Alternate N2 - RCA	-	16	0	1	16	-	-	7	40	40	-	-	93	-	-	-	-	3,765	185	-
4b.1.2.3	Cranes/Heavy Loads/Rigging - RCA	-	3	0	1	17	-	-	4	25	25	-	-	103	-	-	-	-	4,184	48	-

Table J
Monticello Nuclear Generating Plant
SAFSTOR 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 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
Disposal of Plant Systems (continued)																					
4b.1.2.4	Decontamination Projects	-	1	0	0	1	-	-	0	2	2	-	-	3	-	-	-	-	125	15	-
4b.1.2.5	Electrical - Contaminated	-	400	5	23	421	-	-	167	1,016	1,016	-	-	2,514	-	-	-	-	102,112	5,633	-
4b.1.2.6	Electrical - Contaminated Fuel Pool	-	42	1	2	42	-	-	17	105	105	-	-	253	-	-	-	-	10,272	592	-
4b.1.2.7	Electrical - Decontam. Fuel Pool Area	-	297	5	23	411	-	-	140	876	876	-	-	2,457	-	-	-	-	99,783	4,090	-
4b.1.2.8	Electrical - Decontaminated	-	2,698	48	218	3,906	-	-	1,298	8,167	8,167	-	-	23,344	-	-	-	-	948,013	37,107	-
4b.1.2.9	Fire - RCA	-	101	1	6	103	-	-	42	253	253	-	-	614	-	-	-	-	24,917	1,324	-
4b.1.2.10	Fire - RCA - Fuel Pool Area	-	11	0	1	10	-	-	4	26	26	-	-	62	-	-	-	-	2,499	143	-
4b.1.2.11	Fuel Pool Cooling & Cleanup	-	387	20	33	343	241	-	216	1,241	1,241	-	-	2,051	712	-	-	-	128,918	5,363	-
4b.1.2.12	Fuel Pool Cooling & Cleanup - Insulated	-	37	2	3	22	24	-	19	107	107	-	-	130	71	-	-	-	9,830	514	-
4b.1.2.13	HVAC Ductwork	-	276	6	26	469	-	-	144	921	921	-	-	2,805	-	-	-	-	113,913	3,539	-
4b.1.2.14	HVAC Ductwork - Fuel Pool Area	-	31	1	3	52	-	-	16	102	102	-	-	312	-	-	-	-	12,657	393	-
4b.1.2.15	HVAC/Chilled Water - RCA	-	324	6	26	461	-	-	155	971	971	-	-	2,752	-	-	-	-	111,779	3,985	-
4b.1.2.16	HVAC/Chilled Water - RCA Fuel Pool Area	-	33	0	2	37	-	-	14	87	87	-	-	223	-	-	-	-	9,072	397	-
4b.1.2.17	Heating & Ventilation	-	433	13	59	1,060	-	-	277	1,842	1,842	-	-	6,334	-	-	-	-	257,243	6,340	-
4b.1.2.18	Heating Boiler - Insulated - RCA	-	3	0	0	4	-	-	1	9	9	-	-	26	-	-	-	-	1,058	35	-
4b.1.2.19	Instrument & Service Air-RCA-Fuel Pool	-	29	1	2	45	-	-	14	91	91	-	-	267	-	-	-	-	10,841	357	-
4b.1.2.20	Liquid Radwaste	-	621	31	57	703	311	-	350	2,072	2,072	-	-	4,203	915	-	-	-	229,422	8,550	-
4b.1.2.21	Makeup Demin - RCA	-	103	3	14	246	-	-	65	431	431	-	-	1,471	-	-	-	-	59,747	1,412	-
4b.1.2.22	Non-Essential Diesel Generator - RCA	-	27	3	13	238	-	-	45	327	327	-	-	1,424	-	-	-	-	57,832	395	-
4b.1.2.23	Off Gas Holdup	-	310	7	34	607	-	-	174	1,133	1,133	-	-	3,629	-	-	-	-	147,355	4,256	-
4b.1.2.24	Primary Containment	-	411	16	77	1,389	-	-	324	2,218	2,218	-	-	8,302	-	-	-	-	337,148	5,729	-
4b.1.2.25	Process Radiation Monitors	-	41	0	2	36	-	-	16	95	95	-	-	213	-	-	-	-	8,667	577	-
4b.1.2.26	Rx Bldg Closed Clng Water - Insul - RCA	-	114	2	9	163	-	-	54	343	343	-	-	977	-	-	-	-	39,675	1,484	-
4b.1.2.27	Rx Bldg Closed Clng Water - RCA	-	184	15	66	1,187	-	-	235	1,687	1,687	-	-	7,093	-	-	-	-	288,031	2,489	-
4b.1.2.28	Rx Component Handling Equip	-	127	11	24	291	139	-	115	708	708	-	-	1,737	415	-	-	-	96,901	1,839	-
4b.1.2.29	Rx Pressure Vessel	-	43	5	5	27	57	-	30	167	167	-	-	161	169	-	-	-	17,375	578	-
4b.1.2.30	Rx Water Cleanup	-	239	16	15	47	214	-	124	655	655	-	-	278	630	-	-	-	51,819	3,264	-
4b.1.2.31	Secondary Containment	-	112	3	13	229	-	-	65	421	421	-	-	1,372	-	-	-	-	55,702	1,569	-
4b.1.2.32	Service & Seal Water - Insulated - RCA	-	120	2	11	197	-	-	62	392	392	-	-	1,180	-	-	-	-	47,917	1,565	-
4b.1.2.33	Service & Seal Water - RCA	-	159	4	17	303	-	-	88	570	570	-	-	1,809	-	-	-	-	73,453	2,016	-
4b.1.2.34	Service Air Blower - RCA	-	15	0	2	34	-	-	9	62	62	-	-	206	-	-	-	-	8,364	206	-
4b.1.2.35	Solid Radwaste	-	446	21	45	567	223	-	261	1,563	1,563	-	-	3,390	659	-	-	-	179,772	6,270	-
4b.1.2.36	Structures & Buildings	-	70	1	4	80	-	-	30	185	185	-	-	477	-	-	-	-	19,351	1,005	-
4b.1.2.37	Wells & Domestic Water	-	10	-	-	-	-	-	1	11	-	-	11	-	-	-	-	-	-	144	-
4b.1.2.38	Wells & Domestic Water - RCA	-	52	1	3	57	-	-	22	136	136	-	-	342	-	-	-	-	13,874	633	-
4b.1.2	Totals	-	8,342	249	841	13,829	1,210	-	4,613	29,085	29,073	-	11	82,654	3,571	-	-	-	3,585,374	114,290	-
4b.1.3	Scaffolding in support of decommissioning	-	3,159	33	19	286	46	-	850	4,394	4,394	-	-	1,545	136	-	-	-	78,166	29,953	-
Decontamination of Site Buildings																					
4b.1.4.1	Reactor Building	4,668	2,596	178	516	8,044	1,181	-	4,580	21,764	21,764	-	-	48,077	7,014	-	-	-	2,317,670	100,718	-
4b.1.4.2	Admin	96	5	0	3	-	15	-	53	172	172	-	-	-	145	-	-	-	6,840	1,421	-
4b.1.4.3	HPCI Room	26	25	1	3	20	14	-	26	115	115	-	-	118	125	-	-	-	10,759	703	-
4b.1.4.4	Hot Shop	15	4	0	2	-	11	-	11	43	43	-	-	-	103	-	-	-	4,860	254	-
4b.1.4.5	LLRW Storage & Shipping	52	22	2	8	5	45	-	45	179	179	-	-	31	433	-	-	-	21,708	1,003	-
4b.1.4.6	Offgas Stack	336	241	7	23	225	82	-	286	1,199	1,199	-	-	1,343	669	-	-	-	87,045	7,924	-
4b.1.4.7	Offgas Storage & Compressor	36	15	1	6	4	33	-	32	128	128	-	-	25	316	-	-	-	15,948	696	-
4b.1.4.8	Radwaste	109	54	3	17	29	96	-	100	410	410	-	-	172	910	-	-	-	49,943	2,229	-
4b.1.4.9	Radwaste Material Storage Warehouse	57	21	2	9	-	52	-	48	189	189	-	-	-	495	-	-	-	23,400	1,062	-
4b.1.4.10	Recombiner	24	22	1	5	33	24	-	30	140	140	-	-	199	216	-	-	-	18,405	616	-
4b.1.4.11	Turbine	638	314	21	104	215	564	-	588	2,444	2,444	-	-	1,283	5,299	-	-	-	303,150	12,856	-
4b.1.4.12	Turbine Building Addition	53	19	1	8	-	45	-	44	169	169	-	-	-	434	-	-	-	20,478	968	-
4b.1.4.13	Reactor (Post Fuel)	849	2,325	172	913	329	5,301	-	2,535	12,425	12,425	-	-	1,969	50,605	-	-	-	2,471,778	40,860	-
4b.1.4	Totals	6,960	5,663	390	1,617	8,904	7,465	-	8,379	39,378	39,378	-	-	53,216	66,764	-	-	-	5,351,984	171,309	-
4b.1.5	Prepare/submit License Termination Plan	-	-	-	-	-	-	526	79	605	605	-	-	-	-	-	-	-	-	-	4,096
4b.1.6	Receive NRC approval of termination plan									a											
4b.1	Subtotal Period 4b Activity Costs	7,551	17,223	776	2,626	23,019	11,293	526	14,907	77,921	77,910	-	11	137,414	78,124	-	-	-	9,501,694	316,457	4,096
Period 4b Additional Costs																					
4b.2.1	License Termination Survey Planning	-	-	-	-	-	-	1,458	437	1,896	1,896	-	-	-	-	-	-	-	-	-	12,480
4b.2.2	Excavation of Underground Services	-	1,972	-	-	-	-	376	550	2,898	2,898	-	-	-	-	-	-	-	-	12,493	-
4b.2.3	Operational Equipment	-	-	23	92	1,211	-	-	198	1,524	1,524	-	-	11,760	-	-	-	-	294,000	32	-
4b.2	Subtotal Period 4b Additional Costs	-	1,972	23	92	1,211	-	1,835	1,185	6,317	6,317	-	-	11,760	-	-	-	-	294,000	12,525	12,480

Table J
Monticello Nuclear Generating Plant
SAFSTOR 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 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 4b Collateral Costs																					
4b.3.1	Process decommissioning water waste	12	-	22	39	-	88	-	36	196	196	-	-	-	202	-	-	-	12,097	39	-
4b.3.3	Small tool allowance	-	397	-	-	-	-	-	60	456	456	-	-	-	-	-	-	-	-	-	-
4b.3.4	Decommissioning Equipment Disposition	-	-	130	82	1,112	178	-	237	1,739	1,739	-	-	6,000	529	-	-	-	303,608	147	-
4b.3.5	Spent Fuel Capital and Transfer	-	-	-	-	-	-	14,092	2,114	16,206	-	16,206	-	-	-	-	-	-	-	-	-
4b.3	Subtotal Period 4b Collateral Costs	12	397	152	121	1,112	266	14,092	2,446	18,597	2,392	16,206	-	6,000	731	-	-	-	315,705	186	-
Period 4b Period-Dependent Costs																					
4b.4.1	Decon supplies	1,701	-	-	-	-	-	-	425	2,126	2,126	-	-	-	-	-	-	-	-	-	-
4b.4.2	Insurance	-	-	-	-	-	-	1,434	143	1,577	1,577	-	-	-	-	-	-	-	-	-	-
4b.4.3	Property taxes	-	-	-	-	-	-	6,289	629	6,917	5,721	1,197	-	-	-	-	-	-	-	-	-
4b.4.4	Health physics supplies	-	3,050	-	-	-	-	-	763	3,813	3,813	-	-	-	-	-	-	-	-	-	-
4b.4.5	Heavy equipment rental	-	5,239	-	-	-	-	-	786	6,024	6,024	-	-	-	-	-	-	-	-	-	-
4b.4.6	Disposal of DAW generated	-	-	117	60	-	486	-	142	805	805	-	-	-	5,895	-	-	-	117,897	192	-
4b.4.7	Plant energy budget	-	-	-	-	-	-	2,777	417	3,194	3,194	-	-	-	-	-	-	-	-	-	-
4b.4.8	NRC ISFSI Fees	-	-	-	-	-	-	57	6	63	-	63	-	-	-	-	-	-	-	-	-
4b.4.9	NRC Fees	-	-	-	-	-	-	986	99	1,085	1,085	-	-	-	-	-	-	-	-	-	-
4b.4.10	Emergency Planning Fees	-	-	-	-	-	-	302	30	332	-	332	-	-	-	-	-	-	-	-	-
4b.4.11	Fixed Overhead	-	-	-	-	-	-	4,319	648	4,967	4,967	-	-	-	-	-	-	-	-	-	-
4b.4.12	Liquid Radwaste Processing Equipment/Services	-	-	-	-	-	-	866	130	996	996	-	-	-	-	-	-	-	-	-	-
4b.4.13	ISFSI Operating Costs	-	-	-	-	-	-	228	34	262	-	262	-	-	-	-	-	-	-	-	-
4b.4.14	Railroad Track Maintenance	-	-	-	-	-	-	255	38	293	293	-	-	-	-	-	-	-	-	-	-
4b.4.15	Remedial Actions Surveys	-	-	-	-	-	-	2,283	343	2,626	2,626	-	-	-	-	-	-	-	-	-	-
4b.4.16	Security Staff Cost	-	-	-	-	-	-	12,097	1,815	13,912	3,826	10,086	-	-	-	-	-	-	-	-	183,371
4b.4.17	DOC Staff Cost	-	-	-	-	-	-	25,916	3,887	29,803	29,803	-	-	-	-	-	-	-	-	-	284,065
4b.4.18	Utility Staff Cost	-	-	-	-	-	-	32,869	4,930	37,799	35,380	2,419	-	-	-	-	-	-	-	-	504,534
4b.4	Subtotal Period 4b Period-Dependent Costs	1,701	8,289	117	60	-	486	90,679	15,264	116,596	102,236	14,360	-	-	5,895	-	-	-	117,897	192	971,970
4b.0	TOTAL PERIOD 4b COST	9,264	27,881	1,067	2,898	25,343	12,044	107,132	33,802	219,432	188,855	30,565	11	155,174	84,750	-	-	-	10,229,300	329,361	988,546
PERIOD 4f - License Termination																					
Period 4f Direct Decommissioning Activities																					
4f.1.1	ORISE confirmatory survey	-	-	-	-	-	-	166	50	216	216	-	-	-	-	-	-	-	-	-	-
4f.1.2	Terminate license									a											
4f.1	Subtotal Period 4f Activity Costs	-	-	-	-	-	-	166	50	216	216	-	-	-	-	-	-	-	-	-	-
Period 4f Additional Costs																					
4f.2.1	License Termination Survey	-	-	-	-	-	-	6,920	2,076	8,995	8,995	-	-	-	-	-	-	-	-	95,048	6,240
4f.2	Subtotal Period 4f Additional Costs	-	-	-	-	-	-	6,920	2,076	8,995	8,995	-	-	-	-	-	-	-	-	95,048	6,240
Period 4f Collateral Costs																					
4f.3.1	DOC staff relocation expenses	-	-	-	-	-	-	1,264	190	1,454	1,454	-	-	-	-	-	-	-	-	-	-
4f.3.2	Spent Fuel Capital and Transfer	-	-	-	-	-	-	4,289	643	4,933	-	4,933	-	-	-	-	-	-	-	-	-
4f.3	Subtotal Period 4f Collateral Costs	-	-	-	-	-	-	5,553	833	6,386	1,454	4,933	-	-	-	-	-	-	-	-	-
Period 4f Period-Dependent Costs																					
4f.4.1	Insurance	-	-	-	-	-	-	530	53	583	-	583	-	-	-	-	-	-	-	-	-
4f.4.2	Property taxes	-	-	-	-	-	-	2,198	220	2,417	1,975	442	-	-	-	-	-	-	-	-	-
4f.4.3	Health physics supplies	-	708	-	-	-	-	-	177	884	884	-	-	-	-	-	-	-	-	-	-
4f.4.4	Disposal of DAW generated	-	-	7	4	-	29	-	9	48	48	-	-	-	355	-	-	-	7,097	12	-
4f.4.5	Plant energy budget	-	-	-	-	-	-	274	41	315	315	-	-	-	-	-	-	-	-	-	-
4f.4.6	NRC ISFSI Fees	-	-	-	-	-	-	21	2	23	-	23	-	-	-	-	-	-	-	-	-
4f.4.7	NRC Fees	-	-	-	-	-	-	426	43	468	468	-	-	-	-	-	-	-	-	-	-
4f.4.8	Emergency Planning Fees	-	-	-	-	-	-	112	11	123	-	123	-	-	-	-	-	-	-	-	-
4f.4.9	Fixed Overhead	-	-	-	-	-	-	1,597	239	1,836	1,836	-	-	-	-	-	-	-	-	-	-
4f.4.10	ISFSI Operating Costs	-	-	-	-	-	-	84	13	97	-	97	-	-	-	-	-	-	-	-	-
4f.4.11	Railroad Track Maintenance	-	-	-	-	-	-	94	14	108	108	-	-	-	-	-	-	-	-	-	-
4f.4.12	Security Staff Cost	-	-	-	-	-	-	3,463	519	3,982	1,565	2,417	-	-	-	-	-	-	-	-	50,932
4f.4.13	DOC Staff Cost	-	-	-	-	-	-	5,393	809	6,201	6,201	-	-	-	-	-	-	-	-	-	57,200
4f.4.14	Utility Staff Cost	-	-	-	-	-	-	5,762	864	6,626	5,738	888	-	-	-	-	-	-	-	-	80,707
4f.4	Subtotal Period 4f Period-Dependent Costs	-	708	7	4	-	29	19,952	3,014	23,713	19,140	4,574	-	-	355	-	-	-	7,097	12	188,838
4f.0	TOTAL PERIOD 4f COST	-	708	7	4	-	29	32,591	5,973	39,311	29,805	9,507	-	-	355	-	-	-	7,097	95,059	195,078
PERIOD 4 TOTALS		9,566	60,703	16,861	7,092	58,837	47,839	198,533	89,758	489,189	437,421	51,702	66	340,138	120,599	1,628	600	-	20,556,510	634,041	1,742,391

Table J
Monticello Nuclear Generating Plant
SAFSTOR 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 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 5b - Site Restoration																					
Period 5b Direct Decommissioning Activities																					
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	Discharge Retention Basin	-	4	-	-	-	-	-	1	5	-	-	5	-	-	-	-	-	-	25	-
5b.1.1.4	HPCI Room	-	19	-	-	-	-	-	3	22	-	-	22	-	-	-	-	-	-	97	-
5b.1.1.5	Hot Shop	-	16	-	-	-	-	-	2	19	-	-	19	-	-	-	-	-	-	177	-
5b.1.1.6	Hydrogen & Oxygen Storage	-	2	-	-	-	-	-	0	2	-	-	2	-	-	-	-	-	-	19	-
5b.1.1.7	LLRW Storage & Shipping	-	83	-	-	-	-	-	12	95	-	-	95	-	-	-	-	-	-	662	-
5b.1.1.8	MSIV	-	4	-	-	-	-	-	1	4	-	-	4	-	-	-	-	-	-	42	-
5b.1.1.9	Misc Structures 2017	-	1,410	-	-	-	-	-	212	1,622	-	-	1,622	-	-	-	-	-	-	13,042	-
5b.1.1.10	Offgas Stack	-	108	-	-	-	-	-	16	124	-	-	124	-	-	-	-	-	-	544	-
5b.1.1.11	Offgas Storage & Compressor	-	39	-	-	-	-	-	6	45	-	-	45	-	-	-	-	-	-	199	-
5b.1.1.12	Radwaste	-	228	-	-	-	-	-	34	262	-	-	262	-	-	-	-	-	-	1,220	-
5b.1.1.13	Recombiner	-	128	-	-	-	-	-	19	147	-	-	147	-	-	-	-	-	-	713	-
5b.1.1.14	Security Barrier	-	186	-	-	-	-	-	28	214	-	-	214	-	-	-	-	-	-	933	-
5b.1.1.15	Structures Greater than 3' Below Grade	-	2,461	-	-	-	-	-	369	2,830	-	-	2,830	-	-	-	-	-	-	12,649	-
5b.1.1.16	Tank Farm	-	4	-	-	-	-	-	1	5	-	-	5	-	-	-	-	-	-	21	-
5b.1.1.17	Turbine	-	1,259	-	-	-	-	-	189	1,448	-	-	1,448	-	-	-	-	-	-	13,036	-
5b.1.1.18	Turbine Building Addition	-	55	-	-	-	-	-	8	63	-	-	63	-	-	-	-	-	-	618	-
5b.1.1.19	Turbine Pedestal	-	182	-	-	-	-	-	27	209	-	-	209	-	-	-	-	-	-	926	-
5b.1.1	Totals	-	8,169	-	-	-	-	-	1,225	9,394	-	-	9,394	-	-	-	-	-	-	58,885	-
Site Closeout Activities																					
5b.1.2	Grade & landscape site	-	896	-	-	-	-	-	134	1,031	-	-	1,031	-	-	-	-	-	-	1,841	-
5b.1.3	Final report to NRC	-	-	-	-	-	-	200	30	231	231	-	-	-	-	-	-	-	-	-	1,560
5b.1	Subtotal Period 5b Activity Costs	-	9,065	-	-	-	-	200	1,390	10,655	231	-	10,425	-	-	-	-	-	-	60,726	1,560
Period 5b Additional Costs																					
5b.2.1	Clean 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 Debris	-	-	-	-	-	-	1,170	176	1,346	-	-	1,346	-	-	-	-	-	-	-	-
5b.2.4	Backfill	-	5,583	-	-	-	-	-	837	6,421	-	-	6,421	-	-	-	-	-	-	5,422	-
5b.2.5	Discharge Structure Cofferdam	-	442	-	-	-	-	-	66	508	-	-	508	-	-	-	-	-	-	3,552	-
5b.2.6	Disposition of Original MPC Canisters	-	55	185	954	-	5,641	-	1,709	8,544	8,544	-	-	-	21,097	-	-	-	2,505,700	337	-
5b.2	Subtotal Period 5b Additional Costs	-	9,737	185	954	-	5,641	1,183	3,339	21,039	8,544	-	12,495	-	21,097	-	-	-	2,505,700	11,907	-
Period 5b Collateral Costs																					
5b.3.1	Small tool allowance	-	111	-	-	-	-	-	17	127	-	-	127	-	-	-	-	-	-	-	-
5b.3.2	Spent Fuel Capital and Transfer	-	-	-	-	-	-	9,867	1,480	11,347	-	11,347	-	-	-	-	-	-	-	-	-
5b.3	Subtotal Period 5b Collateral Costs	-	111	-	-	-	-	9,867	1,497	11,475	-	11,347	127	-	-	-	-	-	-	-	-
Period 5b Period-Dependent Costs																					
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	Heavy equipment rental	-	5,842	-	-	-	-	-	876	6,719	-	-	6,719	-	-	-	-	-	-	-	-
5b.4.4	Plant energy budget	-	-	-	-	-	-	315	47	362	-	362	-	-	-	-	-	-	-	-	-
5b.4.5	NRC ISFSI Fees	-	-	-	-	-	-	375	37	412	-	412	-	-	-	-	-	-	-	-	-
5b.4.6	Emergency Planning Fees	-	-	-	-	-	-	257	26	283	-	283	-	-	-	-	-	-	-	-	-
5b.4.7	Fixed Overhead	-	-	-	-	-	-	1,122	168	1,290	0	860	429	-	-	-	-	-	-	-	-
5b.4.8	ISFSI Operating Costs	-	-	-	-	-	-	194	29	223	-	223	-	-	-	-	-	-	-	-	-
5b.4.9	Railroad Track Maintenance	-	-	-	-	-	-	217	33	249	0	150	100	-	-	-	-	-	-	-	-
5b.4.10	Security Staff Cost	-	-	-	-	-	-	7,971	1,196	9,167	0	8,580	587	-	-	-	-	-	-	-	117,235
5b.4.11	DOC Staff Cost	-	-	-	-	-	-	11,729	1,759	13,489	-	-	13,489	-	-	-	-	-	-	-	122,646
5b.4.12	Utility Staff Cost	-	-	-	-	-	-	7,148	1,072	8,220	82	2,047	6,091	-	-	-	-	-	-	-	101,904
5b.4	Subtotal Period 5b Period-Dependent Costs	-	5,842	-	-	-	-	35,082	5,819	46,744	82	14,259	32,402	-	-	-	-	-	-	-	341,785
5b.0	TOTAL PERIOD 5b COST	-	24,755	185	954	-	5,641	46,332	12,044	89,912	8,857	25,606	55,449	-	21,097	-	-	-	2,505,700	72,633	343,345
PERIOD 5c - Fuel Storage Operations/Shipping																					
Period 5c Direct Decommissioning Activities																					
Period 5c Collateral Costs																					
5c.3.1	Spent Fuel Capital and Transfer	-	-	-	-	-	-	1,042,659	156,399	1,199,058	-	1,199,058	-	-	-	-	-	-	-	-	-

Table J
Monticello Nuclear Generating Plant
SAFSTOR 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 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
5c.3	Subtotal Period 5c Collateral Costs	-	-	-	-	-	-	1,042,659	156,399	1,199,058	-	1,199,058	-	-	-	-	-	-	-	-	-
Period 5c Period-Dependent Costs																					
5c.4.1	Insurance	-	-	-	-	-	-	97,505	9,751	107,256	-	107,256	-	-	-	-	-	-	-	-	-
5c.4.2	Property taxes	-	-	-	-	-	-	126,660	12,666	139,326	-	139,326	-	-	-	-	-	-	-	-	-
5c.4.3	Plant energy budget	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5c.4.4	NRC ISFSI Fees	-	-	-	-	-	-	29,939	2,994	32,933	-	32,933	-	-	-	-	-	-	-	-	-
5c.4.5	Emergency Planning Fees	-	-	-	-	-	-	20,554	2,055	22,610	-	22,610	-	-	-	-	-	-	-	-	-
5c.4.6	Fixed Overhead	-	-	-	-	-	-	29,861	4,479	34,340	-	34,340	-	-	-	-	-	-	-	-	-
5c.4.7	ISFSI Operating Costs	-	-	-	-	-	-	15,517	2,328	17,845	-	17,845	-	-	-	-	-	-	-	-	-
5c.4.8	Railroad Track Maintenance	-	-	-	-	-	-	17,335	2,600	19,935	-	19,935	-	-	-	-	-	-	-	-	-
5c.4.9	Security Staff Cost	-	-	-	-	-	-	542,257	81,339	623,596	-	623,596	-	-	-	-	-	-	-	-	7,785,623
5c.4.10	DOC Staff Cost	-	-	-	-	-	-	42,500	6,375	48,875	-	48,875	-	-	-	-	-	-	-	-	288,356
5c.4.11	Utility Staff Cost	-	-	-	-	-	-	264,872	39,731	304,603	-	304,603	-	-	-	-	-	-	-	-	3,820,722
5c.4	Subtotal Period 5c Period-Dependent Costs	-	-	-	-	-	-	1,187,001	164,317	1,351,318	-	1,351,318	-	-	-	-	-	-	-	-	11,894,700
5c.0	TOTAL PERIOD 5c COST	-	-	-	-	-	-	2,229,660	320,716	2,550,376	-	2,550,376	-	-	-	-	-	-	-	-	11,894,700
PERIOD 5d - GTCC shipping																					
Period 5d Direct Decommissioning Activities																					
Nuclear Steam Supply System Removal																					
5d.1.1.1	Vessel & Internals GTCC Disposal	-	-	1,083	-	-	4,313	-	918	6,314	6,314	-	-	-	-	-	-	1,160	225,765	-	-
5d.1.1	Totals	-	-	1,083	-	-	4,313	-	918	6,314	6,314	-	-	-	-	-	-	1,160	225,765	-	-
5d.1	Subtotal Period 5d Activity Costs	-	-	1,083	-	-	4,313	-	918	6,314	6,314	-	-	-	-	-	-	1,160	225,765	-	-
Period 5d Collateral Costs																					
5d.3.1	Spent Fuel Capital and Transfer	-	-	-	-	-	-	28	4	32	-	32	-	-	-	-	-	-	-	-	-
5d.3	Subtotal Period 5d Collateral Costs	-	-	-	-	-	-	28	4	32	-	32	-	-	-	-	-	-	-	-	-
Period 5d Period-Dependent Costs																					
5d.4.1	Insurance	-	-	-	-	-	-	27	3	30	30	-	-	-	-	-	-	-	-	-	-
5d.4.2	Property taxes	-	-	-	-	-	-	35	3	38	38	-	-	-	-	-	-	-	-	-	-
5d.4.4	NRC ISFSI Fees	-	-	-	-	-	-	8	1	9	-	9	-	-	-	-	-	-	-	-	-
5d.4.5	Emergency Planning Fees	-	-	-	-	-	-	6	1	6	-	6	-	-	-	-	-	-	-	-	-
5d.4.6	Fixed Overhead	-	-	-	-	-	-	8	1	10	10	-	-	-	-	-	-	-	-	-	-
5d.4.7	Railroad Track Maintenance	-	-	-	-	-	-	5	1	6	6	-	-	-	-	-	-	-	-	-	-
5d.4.8	Security Staff Cost	-	-	-	-	-	-	150	23	173	173	-	-	-	-	-	-	-	-	-	2,154
5d.4.9	Utility Staff Cost	-	-	-	-	-	-	39	6	45	45	-	-	-	-	-	-	-	-	-	539
5d.4	Subtotal Period 5d Period-Dependent Costs	-	-	-	-	-	-	278	38	316	301	15	-	-	-	-	-	-	-	-	2,693
5d.0	TOTAL PERIOD 5d COST	-	-	1,083	-	-	4,313	306	960	6,661	6,615	47	-	-	-	-	-	1,160	225,765	-	2,693
PERIOD 5e - ISFSI Decontamination																					
Period 5e Direct Decommissioning Activities																					
Period 5e Additional Costs																					
5e.2.1	License Termination ISFSI	-	0	3	33	-	283	2,086	602	3,008	3,008	-	-	-	848	-	-	-	131,507	10,502	2,225
5e.2	Subtotal Period 5e Additional Costs	-	0	3	33	-	283	2,086	602	3,008	3,008	-	-	-	848	-	-	-	131,507	10,502	2,225
Period 5e Period-Dependent Costs																					
5e.4.1	Insurance	-	-	-	-	-	-	118	30	148	148	-	-	-	-	-	-	-	-	-	-
5e.4.2	Property taxes	-	-	-	-	-	-	248	62	310	310	-	-	-	-	-	-	-	-	-	-
5e.4.3	Plant energy budget	-	-	-	-	-	-	12	3	15	15	-	-	-	-	-	-	-	-	-	-
5e.4.4	Fixed Overhead	-	-	-	-	-	-	71	18	89	89	-	-	-	-	-	-	-	-	-	-
5e.4.5	Railroad Track Maintenance	-	-	-	-	-	-	41	10	52	52	-	-	-	-	-	-	-	-	-	-
5e.4.6	Security Staff Cost	-	-	-	-	-	-	352	88	440	440	-	-	-	-	-	-	-	-	-	4,999
5e.4.7	Utility Staff Cost	-	-	-	-	-	-	261	65	326	326	-	-	-	-	-	-	-	-	-	3,792
5e.4	Subtotal Period 5e Period-Dependent Costs	-	-	-	-	-	-	1,104	276	1,380	1,380	-	-	-	-	-	-	-	-	-	8,792
5e.0	TOTAL PERIOD 5e COST	-	0	3	33	-	283	3,190	877	4,387	4,387	-	-	-	848	-	-	-	131,507	10,502	11,017

Table J
Monticello Nuclear Generating Plant
SAFSTOR 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 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 5f - ISFSI Site Restoration																					
Period 5f Direct Decommissioning Activities																					
Period 5f Additional Costs																					
5f.2.1	Demolition and Site Restoration of ISFSI	-	1,564	-	-	-	-	256	273	2,093	-	-	2,093	-	-	-	-	-	-	7,309	160
5f.2	Subtotal Period 5f Additional Costs	-	1,564	-	-	-	-	256	273	2,093	-	-	2,093	-	-	-	-	-	-	7,309	160
Period 5f Collateral Costs																					
5f.3.1	Small tool allowance	-	11	-	-	-	-	-	2	12	-	-	12	-	-	-	-	-	-	-	-
5f.3	Subtotal Period 5f Collateral Costs	-	11	-	-	-	-	-	2	12	-	-	12	-	-	-	-	-	-	-	-
Period 5f Period-Dependent Costs																					
5f.4.2	Property taxes	-	-	-	-	-	-	127	13	140	-	-	140	-	-	-	-	-	-	-	-
5f.4.3	Heavy equipment rental	-	118	-	-	-	-	-	18	136	-	-	136	-	-	-	-	-	-	-	-
5f.4.4	Plant energy budget	-	-	-	-	-	-	6	1	7	-	-	7	-	-	-	-	-	-	-	-
5f.4.5	Fixed Overhead	-	-	-	-	-	-	37	5	42	-	-	42	-	-	-	-	-	-	-	-
5f.4.6	Railroad Track Maintenance	-	-	-	-	-	-	21	3	24	-	-	24	-	-	-	-	-	-	-	-
5f.4.7	Security Staff Cost	-	-	-	-	-	-	180	27	207	-	-	207	-	-	-	-	-	-	-	2,562
5f.4.8	Utility Staff Cost	-	-	-	-	-	-	111	17	128	-	-	128	-	-	-	-	-	-	-	1,590
5f.4	Subtotal Period 5f Period-Dependent Costs	-	118	-	-	-	-	482	84	685	-	-	685	-	-	-	-	-	-	-	4,151
5f.0	TOTAL PERIOD 5f COST	-	1,693	-	-	-	-	738	358	2,790	-	-	2,790	-	-	-	-	-	-	7,309	4,311
PERIOD 5 TOTALS		-	26,448	1,271	987	-	10,238	2,280,226	334,956	2,654,126	19,859	2,576,029	58,239	-	21,944	-	-	1,160	2,862,972	90,444	12,256,070
TOTAL COST TO DECOMMISSION		21,016	100,409	18,576	8,641	58,852	59,781	3,982,657	646,370	4,896,303	1,248,734	3,588,215	59,354	340,180	153,182	1,628	600	1,160	23,731,310	873,407	21,956,280

TOTAL COST TO DECOMMISSION WITH 15.21% CONTINGENCY:	**$4,896,303**	**thousands of 2020 dollars**
TOTAL NRC LICENSE TERMINATION COST IS 25.5% OR:	**$1,248,734**	**thousands of 2020 dollars**
SPENT FUEL MANAGEMENT COST IS 73.28% OR:	**$3,588,215**	**thousands of 2020 dollars**
NON-NUCLEAR DEMOLITION COST IS 1.21% 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:
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

APPENDIX K

ISFSI DECOMMISSIONING

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
Decommissioning Contractor									
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	-	9,973	-
Subtotal	**57**	**188**	**987**	**5,925**	**1,544**	**8,701**	**21,949**	**10,339**	**1,048**
Supporting Costs									
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
Subtotal	-	-	-	-	**1,574**	**1,574**	-	-	**13,737**
Total (w/o contingency)	**57**	**188**	**987**	**5,925**	**3,118**	**10,275**	**21,949**	**10,339**	**14,785**
Total (w/25% contingency)	**71**	**235**	**1,234**	**7,406**	**3,897**	**12,844**			

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 Manhours	Oversight and Contractor Manhours
Decommissioning Contractor									
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	-
Subtotal	**0**	**3**	**33**	**283**	**1,616**	**1,936**	**848**	**10,502**	**1,072**
Supporting Costs									
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
Subtotal	-	-	-	-	**1,575**	**1,575**	-	-	**9,945**
Total (w/o contingency)	**0**	**3**	**33**	**283**	**3,191**	**3,511**	**848**	**10,502**	**11,017**
Total (w/25% contingency)	**0**	**4**	**41**	**354**	**3,989**	**4,389**			

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

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No.	Date	Item Revised	Reason for Revision
0	10-22-2020		Original Issue

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, [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.

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

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

complete the transfer of the fuel to a federal facility (e.g., a monitored retrievable storage facility). [2] 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.[3] 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

2 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.

3 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

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

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."[5] 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."[6] 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.

4 Ibid. Page FR24022, Column 3

5 Ibid.

6 Ibid. Page FR24023, Column 2

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.[7] 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. [8]

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.[9] 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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7 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

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

9 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

Scenario	1st Spent Fuel Canister Replacement	1st 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+
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 [10] developed by the Atomic Industrial Forum (now Nuclear Energy Institute). This reference describes a unit cost factor

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

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."[11] 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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11 Project and Cost Engineers' Handbook, Second Edition, American Association of Cost Engineers, Marcel Dekker, Inc., New York, New York, p. 239

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, [12] and its Amendments of 1985, [13] 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 [14]) can be sent to Energy*Solutions*' 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[15]).

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

12 "Low-Level Radioactive Waste Policy Act," Public Law 96-573, 1980

13 "Low-Level Radioactive Waste Policy Amendments Act of 1985," Public Law 99-240, 1986

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

15 U.S. Code of Federal Regulations, Title 10, Part 61, "Licensing Requirements for Land Disposal of Radioactive Waste"

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.[16] 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.

<u>High-Level Radioactive Waste Management</u>

Congress passed the "Nuclear Waste Policy Act" [17] (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

16 "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

17 "Nuclear Waste Policy Act of 1982 and Amendments," DOE's Office of Civilian Radioactive Management, 1982

of the nuclear fuel cycle … and make recommendations for a new plan."[18] 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."[19]

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"[20]
- "[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."[21]

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..."[22] 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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18 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

19 Ibid.

20 "Blue Ribbon Commission on America's Nuclear Future, Report to the Secretary of Energy,", p. 32, January 2012

21 Ibid., p.27

22 "Strategy for the Management and Disposal of Used Nuclear Fuel and High-Level Radioactive Waste," U.S. DOE, January 11, 2013

- 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."[23]

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) [24] 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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23 Ibid., p.2

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

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.[25] 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."[26]

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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25 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 …"

26 Minnesota Statute 216B.2445, "Nuclear Power Plant Decommissioning and Storage of Used Nuclear Fuel"

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." [27]

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. [28]
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). [29] 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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27 Ibid.

28 "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

29 U.S. Code of Federal Regulations, Title 10, Part 50, "Domestic Licensing of Production and Utilization Facilities," Subpart 54 (bb), "Conditions of Licenses"

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 [30]), 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

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

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 [31]. 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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31 Minnesota Administrative Rule part 7035.0400 "General Requirements"

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.

SCENARIO 1: DECON WITH 42 YEARS DFS
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 [1]	291,789
Site Security	300,346
Spent Fuel Pool Isolation	14,576
Spent Fuel Storage (Direct Costs) [2]	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 [3]	1,399,471

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

[1] Includes engineering costs

[2] 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

[3] Columns may not add due to rounding

SCENARIO 2: DECON WITH 60 YEAR DFS
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 [1]	317,530
Security	389,426
Spent Fuel Pool Isolation	14,576
Spent Fuel Storage (Direct Costs) [2]	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
Total [3]	1,618,023

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

[1] Includes engineering costs

[2] 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

[3] Columns may not add due to rounding

SCENARIO 3: DECON WITH 100 YEAR DFS
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 [1]	502,435
Security	587,397
Spent Fuel Pool Isolation	14,576
Spent Fuel Storage (Direct Costs) [2]	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
Total [3]	2,725,392

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

[1] Includes engineering costs

[2] 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

[3] Columns may not add due to rounding

SCENARIO 4: DECON WITH 200 YEAR DFS
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 [1]	782,364
Security	1,082,311
Spent Fuel Pool Isolation	14,576
Spent Fuel Storage (Direct Costs) [2]	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
Total [3]	4,852,175

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

[1] Includes engineering costs

[2] 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

[3] Columns may not add due to rounding

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 8th, 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

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

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 8th, 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

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.[2] 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,[3]" 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, [4] 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 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.[5] 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. [6] 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).

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.[7] 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" [8] (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."[9]

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"[10]
- "[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."

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..." [11] 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) [12] 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.

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.[13] 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."[14]

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.[15]
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). [16] 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 [17]), 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.

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, [18] and its Amendments of 1985, [19] 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 [20]) can be sent to Energy*Solutions*' 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.[21] 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," [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 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

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] An additional and separate limit of 4 millirem per year, as defined in 40 CFR §141.66, is applied to drinking water. [24]

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) [25] 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.

FIGURE 1.1
MONTICELLO NUCLEAR GENERATING PLANT
GENERAL PLAN

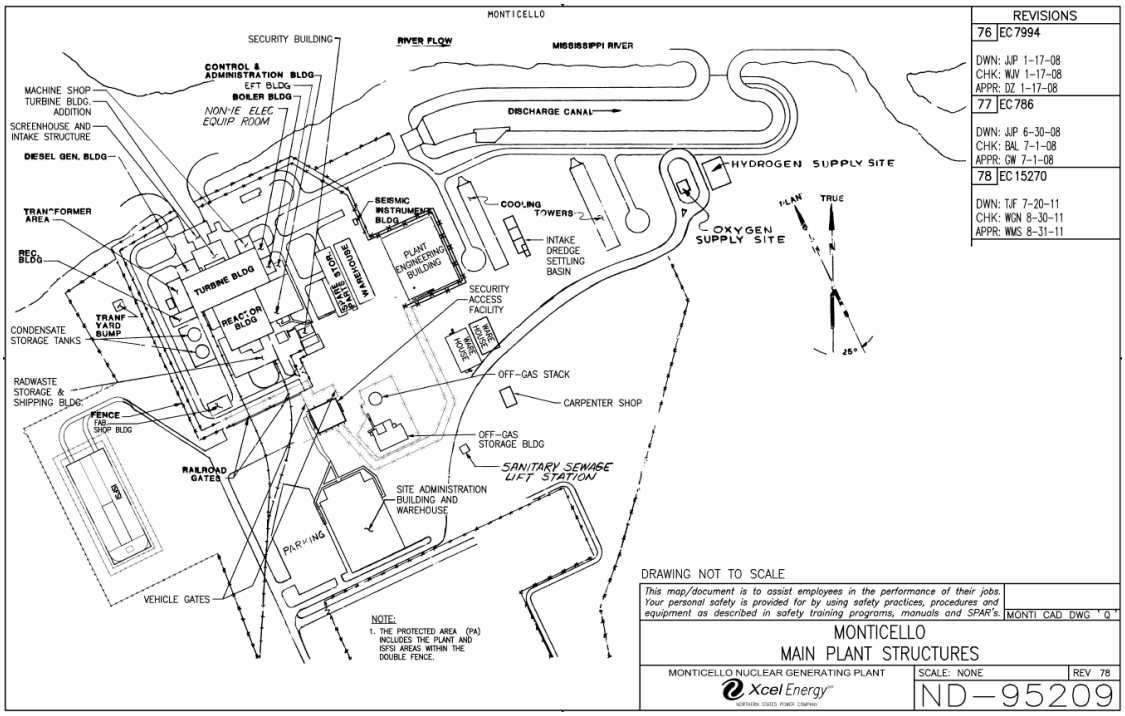
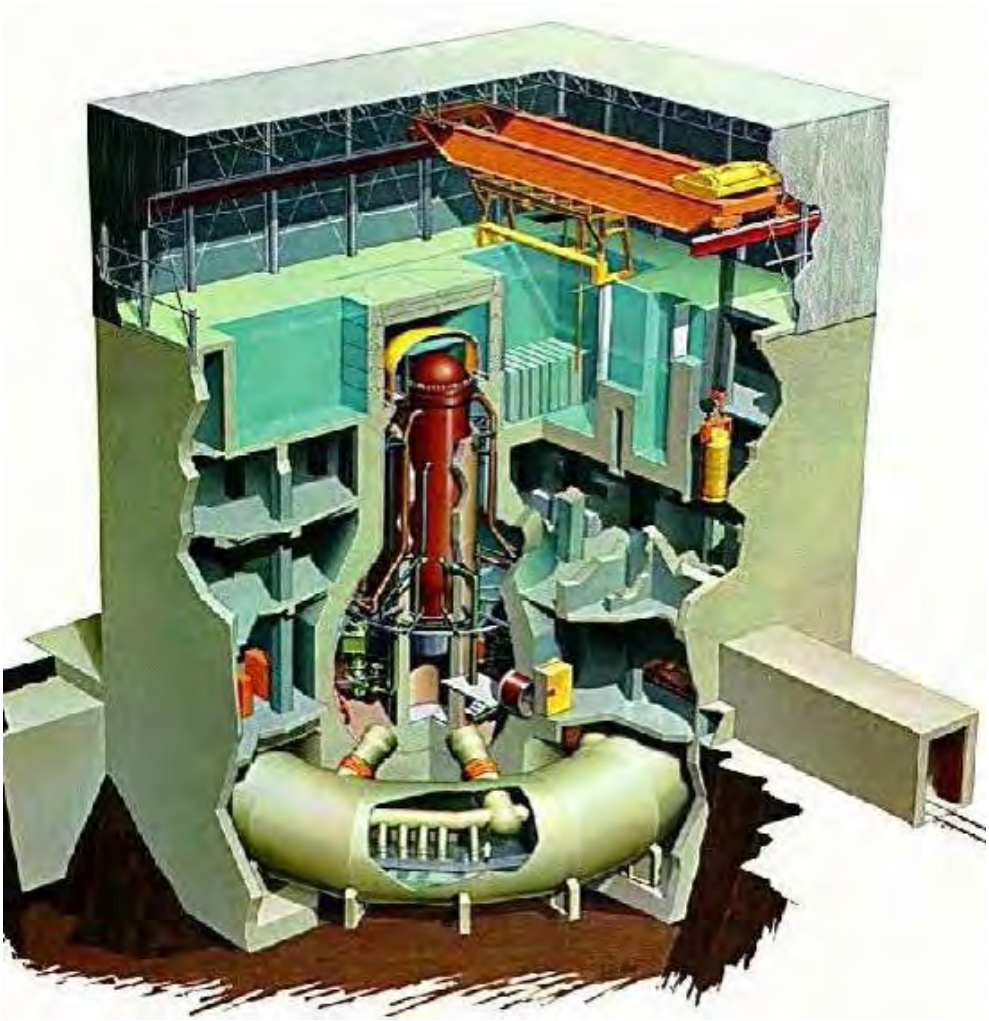


FIGURE 1.2
MONTICELLO NUCLEAR GENERATING PLANT
AERIAL VIEW

FIGURE 1.3
MONTICELLO NUCLEAR GENERATING PLANT
REACTOR BUILDING SECTION



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	1st Spent Fuel Canister Replacement	1st 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+
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.

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 de-activation 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.

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

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

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.

- 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

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)."[26] 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 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

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

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.

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,"[28] and the DOE "Decommissioning Handbook."[29] 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 RSMeans. [30]

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

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 [31] 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. [32]

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%

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 handing 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

AIF/NESP-036 study. "Contingencies" are defined in the American Association of Cost Engineers "Project and Cost Engineers' Handbook"[33] 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

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%

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

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:

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").[34] 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.[35] 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

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.

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

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. [36]

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

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.

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. [37] 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

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., ^{137}Cs, ^{90}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 Energy*Solutions* 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. [38]

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

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 Energy*Solutions* 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.

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.

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.

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., ^{137}Cs, ^{90}Sr, or transuranics) has been prevented from reaching levels exceeding those that permit the major NSSS components to be shipped under current transportation regulations and disposal requirements.

The curie contents of the vessel and internals at final shutdown are derived from those listed in NUREG/CR-3474.[39] 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[40] and NUREG/CR-0672, [41] 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.

- 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.

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."[42] 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

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.

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

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).

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

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
Total	736,471	248,869	10,030	166,633	237,468	1,399,471

Note: Columns may not add due to rounding

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

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

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

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

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

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

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

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

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

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

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

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

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

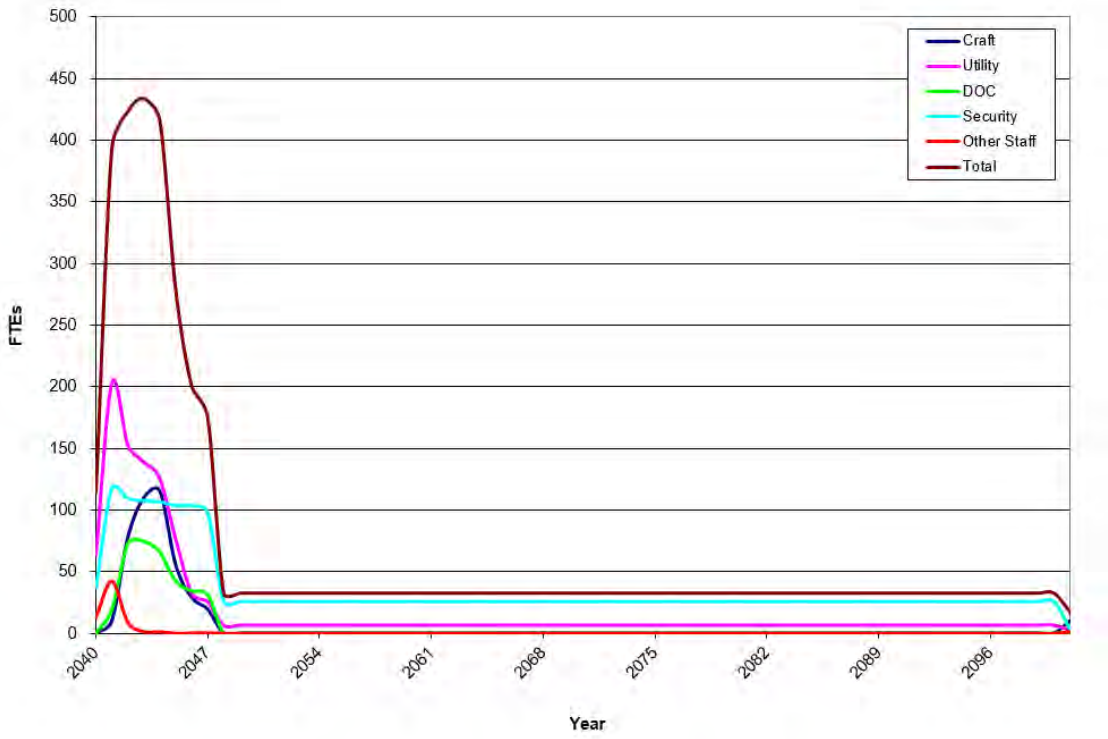
Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2190	9,380	4,911	0	0	2,442	16,733
2191	9,380	4,911	0	0	2,442	16,733
2192	10,121	7,070	0	0	2,449	19,641
2193	10,640	8,690	0	0	2,442	21,772
2194	34,684	80,821	0	0	2,442	117,946
2195	10,460	8,150	0	0	2,442	21,052
2196	10,841	9,230	0	0	2,449	22,520
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

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
Total	2,458,456	1,597,144	10,030	166,633	619,914	4,852,176

Note: Columns may not add due to rounding

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)

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. [43]

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.

- 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.

FIGURE 4.1
DECON ACTIVITY SCHEDULE

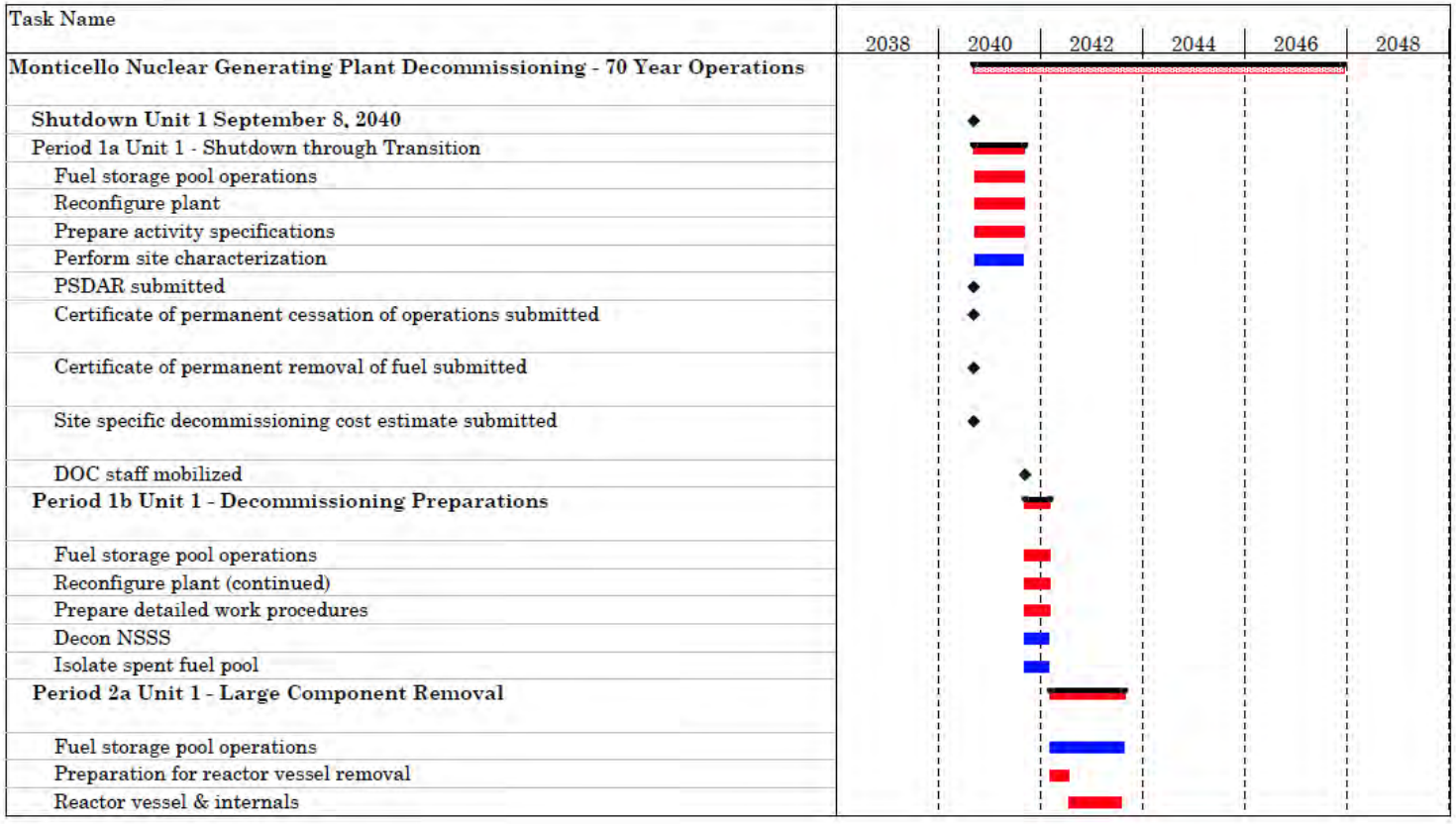
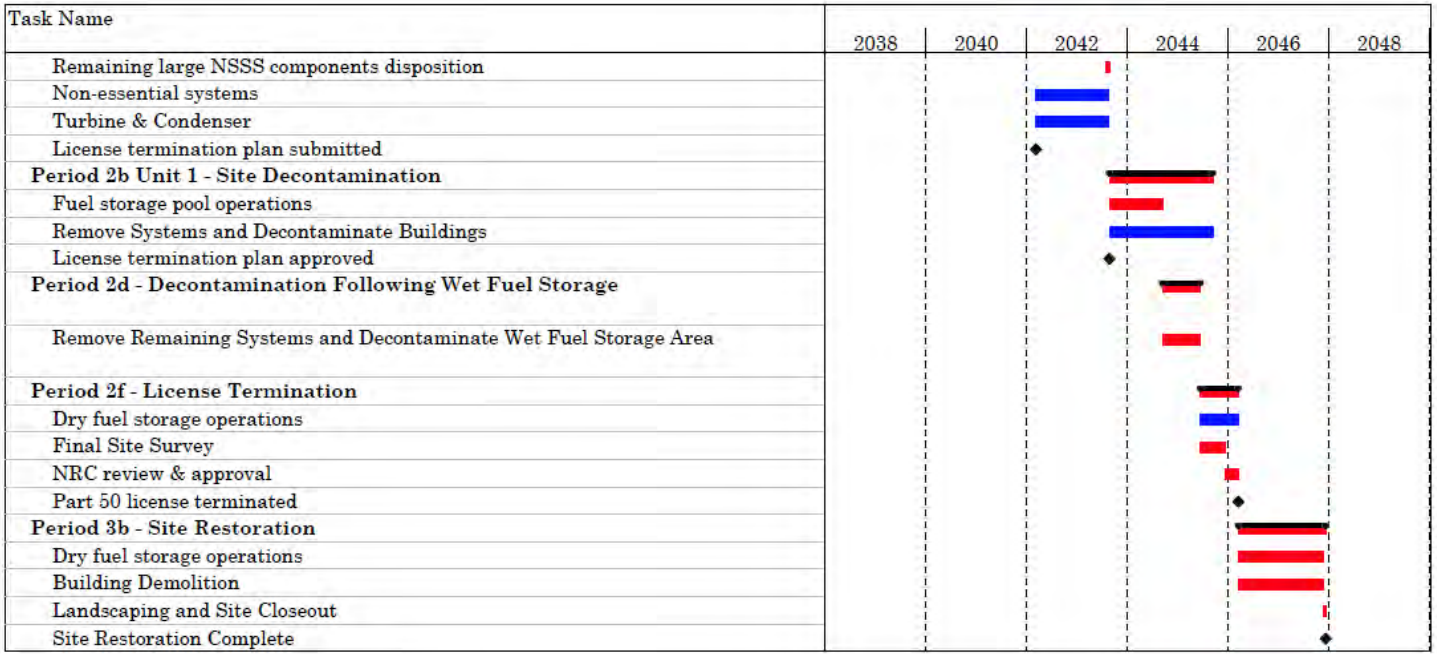


FIGURE 4.1 (continued)
DECON ACTIVITY SCHEDULE



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

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

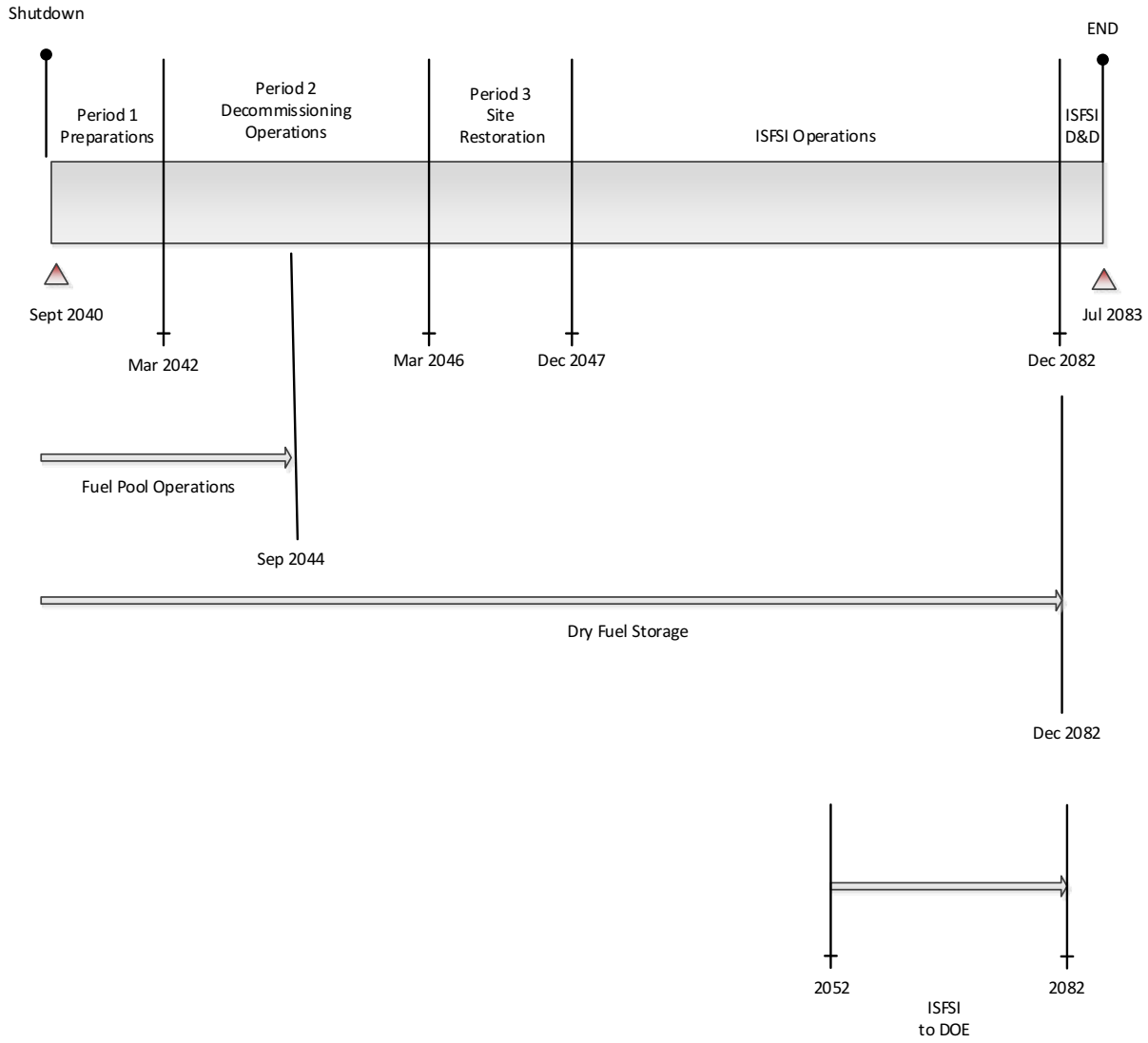


FIGURE 4.3
SCENARIO 2: DECON WITH 60 YEAR DFS
DECOMMISSIONING TIMELINE
(not to scale)

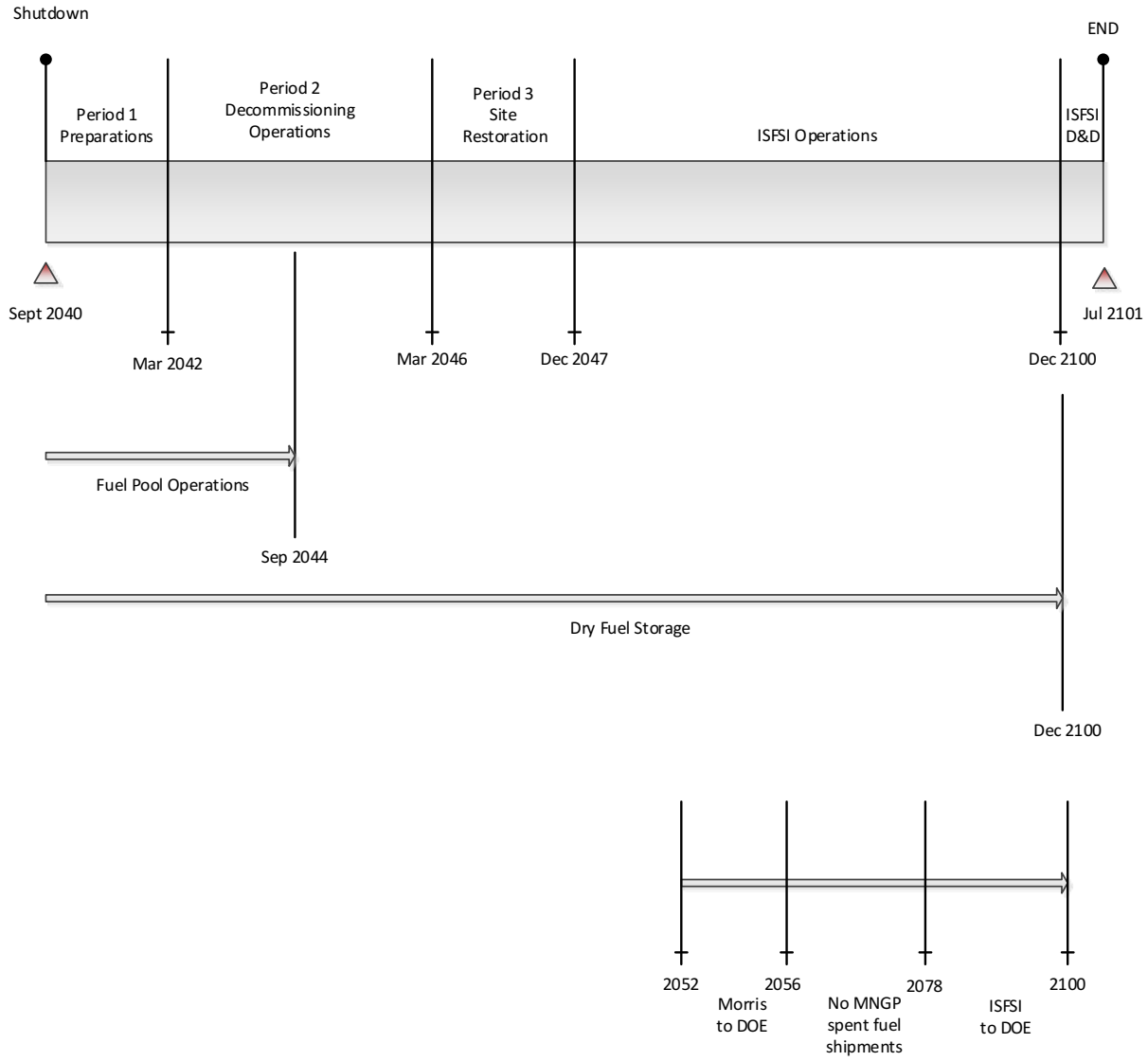


FIGURE 4.4
SCENARIO 3: DECON WITH 100 YEAR DFS
DECOMMISSIONING TIMELINE
(not to scale)

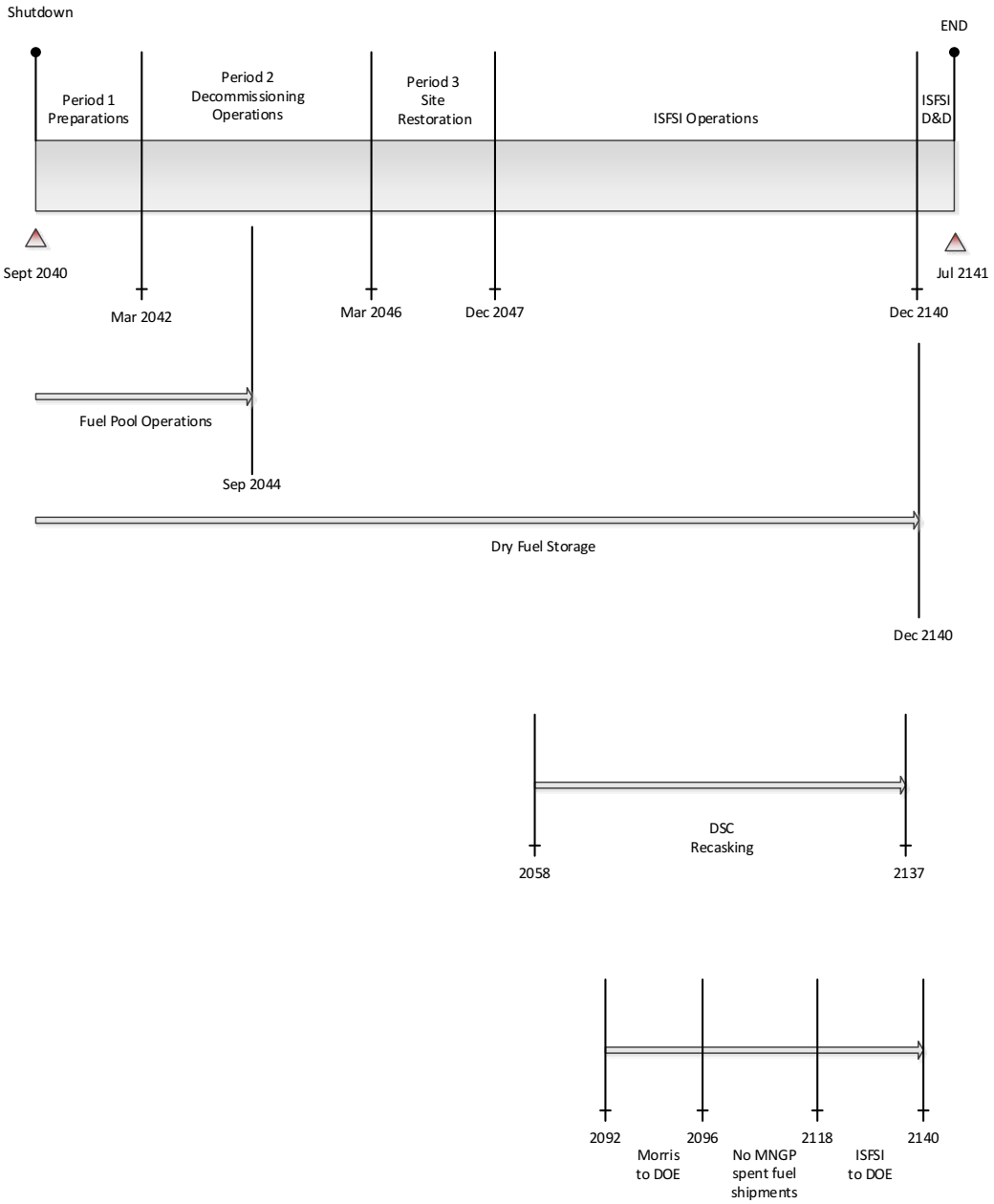
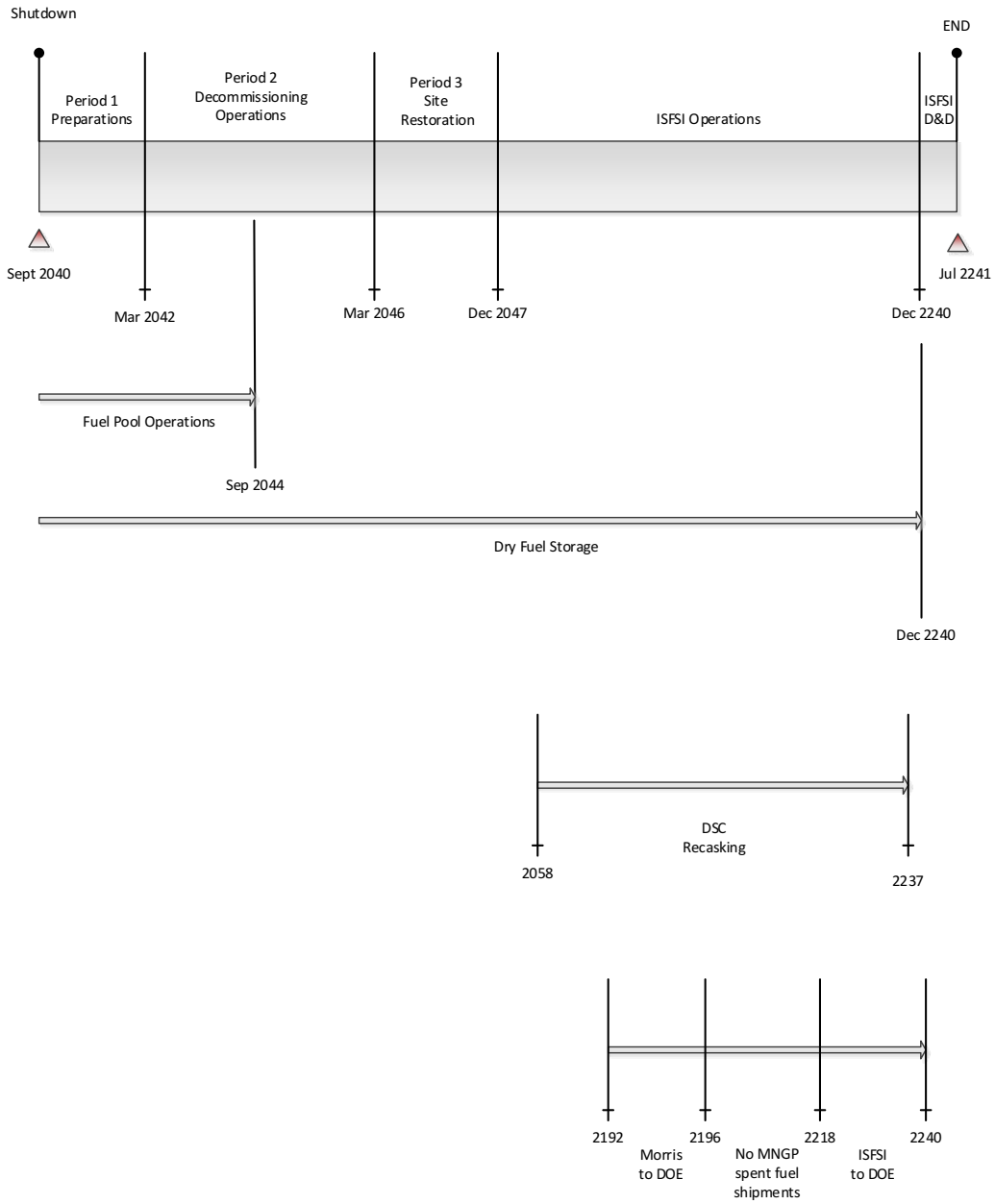


FIGURE 4.5
SCENARIO 4: DECON WITH 200 YEAR DFS
DECOMMISSIONING TIMELINE
(not to scale)



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, [44] 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.

While the dose rates decrease with time, radionuclides such as ^{137}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.

Energy*Solutions* 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.

FIGURE 5.1
RADIOACTIVE WASTE DISPOSITION

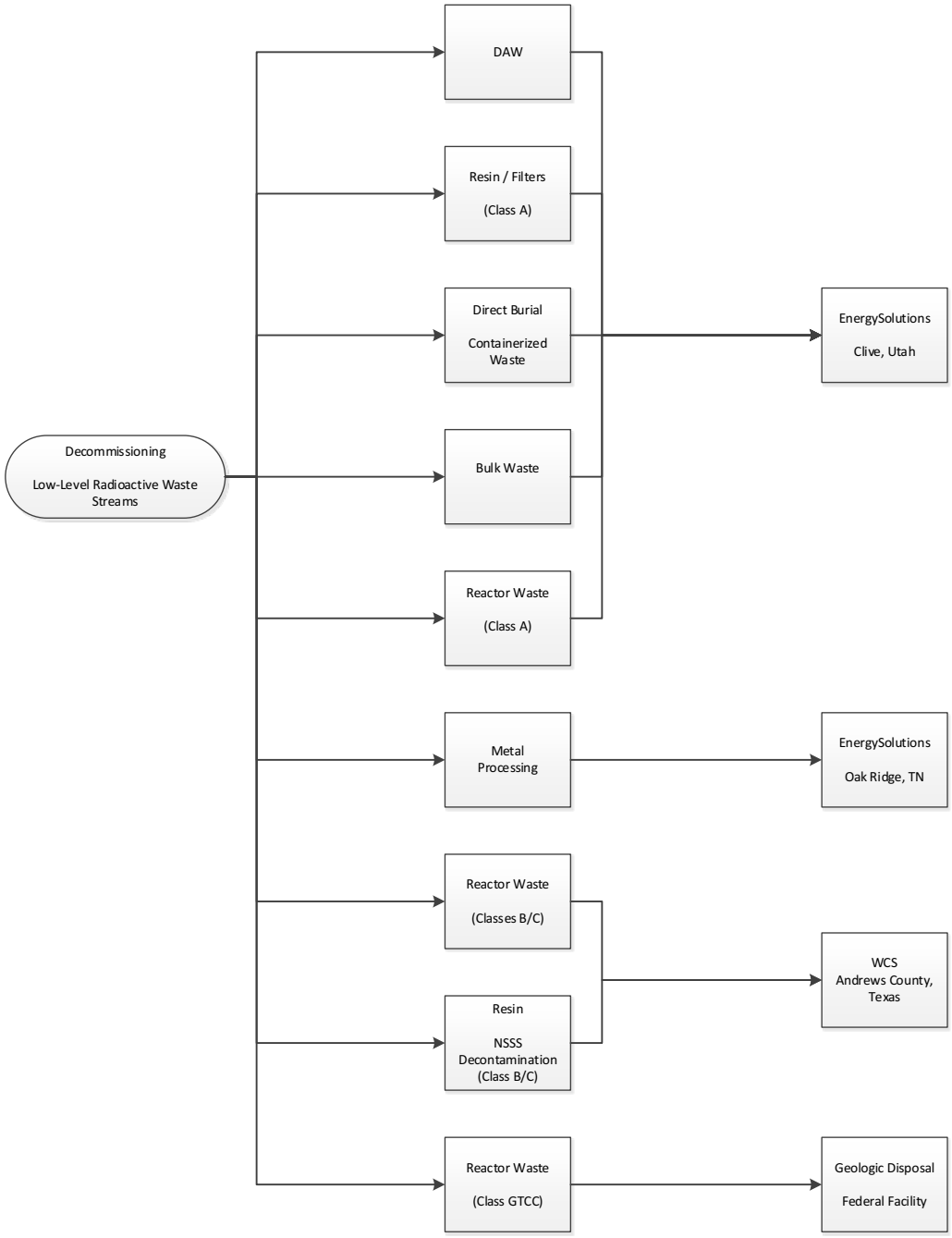
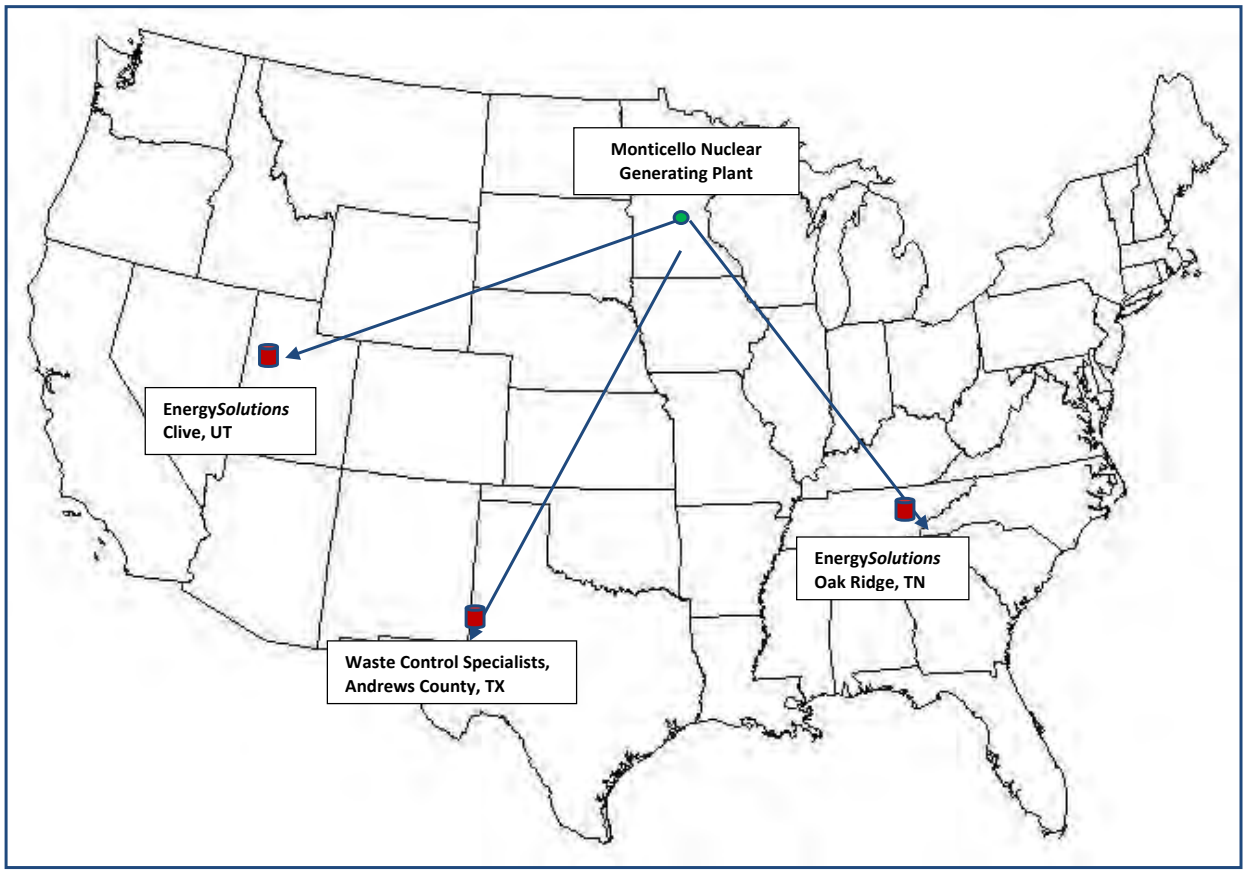


FIGURE 5.2
DECOMMISSIONING WASTE DESTINATIONS
RADIOLOGICAL



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.

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

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

Waste	Cost Basis	Class [1]	Waste Volume (cubic feet)	Mass (pounds)
Low-Level Radioactive Waste (near-surface disposal)	Energy*Solutions* Containerized	A	122,218	7,165,609
	Energy*Solutions* 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 [2]			201,320	12,348,620
Processed/Conditioned (off-site recycling center)	Recycling Vendors	A	288,203	12,125,960
Scrap Metal				46,246,000

[1] Waste is classified according to the requirements as delineated in Title 10 CFR, Part 61.55
[2] Columns may not add due to rounding

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

Waste	Cost Basis	Class [1]	Waste Volume (cubic feet)	Mass (pounds)
Low-Level Radioactive Waste (near-surface disposal)	Energy*Solutions* Containerized	A	122,218	7,165,609
	Energy*Solutions* 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 [2]			201,320	12,348,620
Processed/Conditioned (off-site recycling center)	Recycling Vendors	A	288,203	12,125,960
Scrap Metal				46,246,000

[1] Waste is classified according to the requirements as delineated in Title 10 CFR, Part 61.55
[2] Columns may not add due to rounding

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

Waste	Cost Basis	Class [1]	Waste Volume (cubic feet)	Mass (pounds)
Low-Level Radioactive Waste (near-surface disposal)	Energy*Solutions* Containerized	A	122,218	7,169,509
	Energy*Solutions* 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 [2]			201,315	12,352,426
Processed/Conditioned (off-site recycling center)	Recycling Vendors	A	288,203	12,125,960
Scrap Metal				46,246,000

[1] Waste is classified according to the requirements as delineated in Title 10 CFR, Part 61.55
[2] Columns may not add due to rounding

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

Waste	Cost Basis	Class [1]	Waste Volume (cubic feet)	Mass (pounds)
Low-Level Radioactive Waste (near-surface disposal)	Energy*Solutions* Containerized	A	122,218	7,169,509
	Energy*Solutions* 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 [2]			201,315	12,352,426
Processed/Conditioned (off-site recycling center)	Recycling Vendors	A	288,203	12,125,960
Scrap Metal				46,246,000

[1] Waste is classified according to the requirements as delineated in Title 10 CFR, Part 61.55
[2] Columns may not add due to rounding

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

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 Energy*Solutions* 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.

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.

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 [1]	291,789	20.8%
Security	300,346	21.5%
Spent Fuel Pool Isolation	14,576	1.0%
Spent Fuel Storage (Direct Costs) [2]	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%
Total [3]	1,399,471	100.0%

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

[1] Includes engineering

[2] 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

[3] Columns may not add due to rounding

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 [1]	317,530	19.6%
Security	389,426	24.1%
Spent Fuel Pool Isolation	14,576	0.9%
Spent Fuel Storage (Direct Costs) [2]	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%
Total [3]	1,618,023	100.0%

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

[1] Includes engineering

[2] 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

[3] Columns may not add due to rounding

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 [1]	502,435	18.4%
Security	587,397	21.6%
Spent Fuel Pool Isolation	14,576	0.5%
Spent Fuel Storage (Direct Costs) [2]	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%
Total [3]	2,725,392	100.0%

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%
Total [3]	2,725,392	100.0%

[1] Includes engineering

[2] 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

[3] Columns may not add due to rounding

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 [1]	782,364	16.1%
Security	1,082,311	22.3%
Spent Fuel Pool Isolation	14,576	0.3%
Spent Fuel Storage (Direct Costs) [2]	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%
Total [3]	4,852,175	100.0%

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%
Total [3]	4,852,175	100.0%

[1] Includes engineering

[2] 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

[3] Columns may not add due to rounding

7. REFERENCES

1. "Decommissioning Cost Analysis for the Monticello Nuclear Generating Plant," Document No. X01-1725-002, Rev. 0, TLG Services, Inc., October 2017 [Partial]

2. 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, 198 [Open]

3. U.S. Nuclear Regulatory Commission, Regulatory Guide 1.159, "Assuring the Availability of Funds for Decommissioning Nuclear Reactors," Rev. 2, October 2011 [Open]

4. U.S. Code of Federal Regulations, Title 10, Part 20, Subpart E, "Radiological Criteria for License Termination" [Open]

5. U.S. Code of Federal Regulations, Title 10, Parts 20 and 50, "Entombment Options for Power Reactors," Advance Notice of Proposed Rulemaking, 66 Fed. Reg. 52551, October 16, 2001 [Open]

6. 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 [Open]

7. 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 [Open]

8. "Nuclear Waste Policy Act of 1982," 42 U.S. Code 10101, et seq. [Open]

9. Charter of the Blue Ribbon Commission on America's Nuclear Future, "Objectives and Scope of Activities," 2010 [Open]

10. "Blue Ribbon Commission on America's Nuclear Future, Report to the Secretary of Energy," p. 27, 32, January 2012 [Open]

11. "Strategy for the Management and Disposal of Used Nuclear Fuel and High-Level Radioactive Waste," U.S. DOE, January 11, 2013 [Open]

7. REFERENCES
(continued)

12. United States Court of Appeals for the District of Columbia Circuit, In Re: Aiken County, Et Al., August 2013 [Open]

13. 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 …"

14. Minnesota Statute 216B.2445, "Nuclear Power Plant Decommissioning and Storage of Used Nuclear Fuel" [Open]

15. "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 [Open]

16. U.S. Code of Federal Regulations, Title 10, Part 50, "Domestic Licensing of Production and Utilization Facilities," Subpart 54 (bb), "Conditions of Licenses" [Open]

17. U.S. Code of Federal Regulations, Title 10, Part 72, Subpart K, "General License for Storage of Spent Fuel at Power Reactor Sites" [Open]

18. "Low-Level Radioactive Waste Policy Act," Public Law 96-573, 1980 [Open]

19. "Low-Level Radioactive Waste Policy Amendments Act of 1985," Public Law 99-240, January 15, 1986 [Open]

20. U.S. Code of Federal Regulations, Title 10, Part 61, "Licensing Requirements for Land Disposal of Radioactive Waste" [Open]

21. "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 [Open]

7. REFERENCES
(continued)

22. U.S. Code of Federal Regulations, Title 10, Part 20, Subpart E, "Final Rule, Radiological Criteria for License Termination," 62 Fed. Reg. 39058, July 21, 1997 [Open]

23. "Establishment of Cleanup Levels for CERCLA Sites with Radioactive Contamination," EPA Memorandum OSWER No. 9200.4-18, August 22, 1997 [Open]

24. "Maximum contaminant levels for radionuclides," U.S. Code of Federal Regulations, Title 40, Part 141.66, [Open]

25. "Memorandum of Understanding Between the Environmental Protection Agency and the Nuclear Regulatory Commission: Consultation and Finality on Decommissioning and Decontamination of Contaminated Sites," OSWER 9295.8-06a, October 9, 2002 [Open]

26. "Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM)," NUREG-1575, Rev. 1, EPA 402-R-97-016, Rev. 1, August 2000 [Open]

27. Minnesota Administrative Rule part 7035.0400 "General Requirements" [Open]

28. T.S. LaGuardia et al., "Guidelines for Producing Commercial Nuclear Power Plant Decommissioning Cost Estimates," AIF/NESP-036, May 1986 [Open]

29. W.J. Manion and T.S. LaGuardia, "Decommissioning Handbook," U.S. Department of Energy, DOE/EV/10128-1, November 1980 [Open]

30. "Building Construction Cost Data 2020," RSMeans (From the Gordian Group), Rockland, Massachusetts [Open]

31. "Decommissioning of Nuclear Power Reactors," Regulatory Guide 1.184, Nuclear Regulatory Commission, October 2013 [Open]

32. "Standard Format and Content of Decommissioning Cost Estimates for Nuclear Power Reactors," Regulatory Guide 1.202, Nuclear Regulatory Commission, February 2005 [Open]

33. Project and Cost Engineers' Handbook, Second Edition, p. 239, American Association of Cost Engineers, Marcel Dekker, Inc., New York, New York, 1984 [Open]

34. DOE/RW-0351, "Civilian Radioactive Waste Management System Waste Acceptance System Requirements Document", Revision 5, May 31, 2007 [Open]

7. REFERENCES
(continued)

35. "Civilian Radioactive Waste Management System Requirements Document, DOE/RW-0406, Revision 8, September 2007 [Open]

36. "Strategy for Management and Disposal of Greater-Than-Class C Low-Level Radioactive Waste," Federal Register Volume 60, Number 48 (p 13424 et seq.), March 1995 [Open]

37. U.S. Department of Transportation, Title 49 of the Code of Federal Regulations, "Transportation," Parts 173 through 178 [Open]

38. Tri-State Motor Transit Company, published tariffs Interstate Commerce Commission (ICC), Docket No. MC-427719 Rules Tariff, May 2014, Radioactive Materials Tariff, August 2014 [Open}

39. J.C. Evans et al., "Long-Lived Activation Products in Reactor Materials" NUREG/CR-3474, Pacific Northwest Laboratory for the Nuclear Regulatory Commission, August 1984 [Open]

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]

APPENDIX A

UNIT COST FACTOR DEVELOPMENT

APPENDIX A
UNIT COST FACTOR DEVELOPMENT

Example: Unit Factor for Removal of Contaminated Heat Exchanger < 3,000 lbs.

1. SCOPE

Heat exchangers weighing < 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	60	60
	Totals (Activity/Critical)	355	255

Duration adjustment(s):	
+ Respiratory protection adjustment (50 of critical duration)	128
+ Radiation/ALARA adjustment (37.1 of critical duration)	95
Adjusted work duration	478
+ Protective clothing adjustment (30 of adjusted duration)	143
Productive work duration	621
+ Work break adjustment (8.33 of productive duration)	52
Total work duration (minutes)	673

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

* alpha designators indicate activities that can be performed in parallel

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	$604.48
Total Labor Cost				$5,559.69

4. EQUIPMENT & CONSUMABLES COSTS

Equipment Costs	none
Consumables/Materials Costs	
• Universal Sorbent 50 @ $0.63 sq ft {1}	$31.50
• Tarpaulins (oil resistant/fire retardant) 50 @ $0.47/sq ft {2}	$23.50
• Gas torch consumables 1 @ $20.79/hr x 1 hr {3}	$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

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 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.

APPENDIX B

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

APPENDIX B

UNIT COST FACTOR LISTING
(Power Block Structures Only)

Unit Cost Factor	Cost/Unit
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

APPENDIX B

UNIT COST FACTOR LISTING
(Power Block Structures Only)

Unit Cost Factor	Cost/Unit
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

APPENDIX B

UNIT COST FACTOR LISTING
(Power Block Structures Only)

Unit Cost Factor	Cost/Unit
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

APPENDIX B

UNIT COST FACTOR LISTING
(Power Block Structures Only)

Unit Cost Factor	Cost/Unit
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

APPENDIX B

UNIT COST FACTOR LISTING
(Power Block Structures Only)

Unit Cost Factor	Cost/Unit
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

APPENDIX B

UNIT COST FACTOR LISTING
(Power Block Structures Only)

Unit Cost Factor	Cost/Unit
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

APPENDIX C

DETAILED COST ANALYSIS

SCENARIO 1: DECON with 42 Year DFS

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 Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes 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 1a - Shutdown through Transition																					
Period 1a Direct Decommissioning Activities																					
1a.1.1	Prepare preliminary decommissioning cost	-	-	-	-	-	-	167	25	192	192	-	-	-	-	-	-	-	-	-	1,300
1a.1.2	Notification of Cessation of Operations									a											
1a.1.3	Remove fuel & source material									n/a											
1a.1.4	Notification of Permanent Defueling									a											
1a.1.5	Deactivate plant systems & process waste									a											
1a.1.6	Prepare and submit PSDAR	-	-	-	-	-	-	257	39	296	296	-	-	-	-	-	-	-	-	-	2,000
1a.1.7	Review plant dwgs & specs.	-	-	-	-	-	-	591	89	680	680	-	-	-	-	-	-	-	-	-	4,600
1a.1.8	Perform detailed rad survey									a											
1a.1.9	Estimate by-product inventory	-	-	-	-	-	-	129	19	148	148	-	-	-	-	-	-	-	-	-	1,000
1a.1.10	End product description	-	-	-	-	-	-	129	19	148	148	-	-	-	-	-	-	-	-	-	1,000
1a.1.11	Detailed by-product inventory	-	-	-	-	-	-	167	25	192	192	-	-	-	-	-	-	-	-	-	1,300
1a.1.12	Define major work sequence	-	-	-	-	-	-	964	145	1,108	1,108	-	-	-	-	-	-	-	-	-	7,500
1a.1.13	Perform SER and EA	-	-	-	-	-	-	398	60	458	458	-	-	-	-	-	-	-	-	-	3,100
1a.1.14	Prepare/submit Defueled Technical Specifications	-	-	-	-	-	-	964	145	1,108	1,108	-	-	-	-	-	-	-	-	-	7,500
1a.1.15	Perform Site-Specific Cost Study	-	-	-	-	-	-	643	96	739	739	-	-	-	-	-	-	-	-	-	5,000
1a.1.16	Prepare/submit Irradiated Fuel Management Plan	-	-	-	-	-	-	129	19	148	148	-	-	-	-	-	-	-	-	-	1,000
Activity Specifications																					
1a.1.17.1	Plant & temporary facilities	-	-	-	-	-	-	632	95	727	654	-	73	-	-	-	-	-	-	-	4,920
1a.1.17.2	Plant systems	-	-	-	-	-	-	536	80	616	554	-	62	-	-	-	-	-	-	-	4,167
1a.1.17.3	NSSS Decontamination Flush	-	-	-	-	-	-	64	10	74	74	-	-	-	-	-	-	-	-	-	500
1a.1.17.4	Reactor internals	-	-	-	-	-	-	912	137	1,049	1,049	-	-	-	-	-	-	-	-	-	7,100
1a.1.17.5	Reactor vessel	-	-	-	-	-	-	835	125	961	961	-	-	-	-	-	-	-	-	-	6,500
1a.1.17.6	Sacrificial shield	-	-	-	-	-	-	64	10	74	74	-	-	-	-	-	-	-	-	-	500
1a.1.17.7	Moisture separators/reheaters	-	-	-	-	-	-	129	19	148	148	-	-	-	-	-	-	-	-	-	1,000
1a.1.17.8	Reinforced concrete	-	-	-	-	-	-	206	31	236	118	-	118	-	-	-	-	-	-	-	1,600
1a.1.17.9	Main Turbine	-	-	-	-	-	-	268	40	309	309	-	-	-	-	-	-	-	-	-	2,088
1a.1.17.10	Main Condensers	-	-	-	-	-	-	268	40	309	309	-	-	-	-	-	-	-	-	-	2,088
1a.1.17.11	Pressure suppression structure	-	-	-	-	-	-	257	39	296	296	-	-	-	-	-	-	-	-	-	2,000
1a.1.17.12	Drywell	-	-	-	-	-	-	206	31	236	236	-	-	-	-	-	-	-	-	-	1,600
1a.1.17.13	Plant structures & buildings	-	-	-	-	-	-	401	60	461	231	-	231	-	-	-	-	-	-	-	3,120
1a.1.17.14	Waste management	-	-	-	-	-	-	591	89	680	680	-	-	-	-	-	-	-	-	-	4,600
1a.1.17.15	Facility & site closeout	-	-	-	-	-	-	116	17	133	67	-	67	-	-	-	-	-	-	-	900
1a.1.17	Total	-	-	-	-	-	-	5,486	823	6,308	5,759	-	550	-	-	-	-	-	-	-	42,683
Planning & Site Preparations																					
1a.1.18	Prepare dismantling sequence	-	-	-	-	-	-	308	46	355	355	-	-	-	-	-	-	-	-	-	2,400
1a.1.19	Plant prep. & temp. svces	-	-	-	-	-	-	3,500	525	4,025	4,025	-	-	-	-	-	-	-	-	-	-
1a.1.20	Design water clean-up system	-	-	-	-	-	-	180	27	207	207	-	-	-	-	-	-	-	-	-	1,400
1a.1.21	Rigging/Cont. Cntrl Envlps/tooling/etc.	-	-	-	-	-	-	2,400	360	2,760	2,760	-	-	-	-	-	-	-	-	-	-
1a.1.22	Procure casks/liners & containers	-	-	-	-	-	-	158	24	182	182	-	-	-	-	-	-	-	-	-	1,230
1a.1	Subtotal Period 1a Activity Costs	-	-	-	-	-	-	16,569	2,485	19,054	18,505	-	550	-	-	-	-	-	-	-	83,013
Period 1a Collateral Costs																					
1a.3.1	Spent Fuel Capital and Transfer	-	-	-	-	-	-	6,288	943	7,232	-	7,232	-	-	-	-	-	-	-	-	-
1a.3.2	Retention and Severance	-	-	-	-	-	-	9,892	1,484	11,376	11,376	-	-	-	-	-	-	-	-	-	-
1a.3	Subtotal Period 1a Collateral Costs	-	-	-	-	-	-	16,180	2,427	18,607	11,376	7,232	-	-	-	-	-	-	-	-	-
Period 1a Period-Dependent Costs																					
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 physics supplies	-	614	-	-	-	-	-	153	767	767	-	-	-	-	-	-	-	-	-	-
1a.4.4	Heavy equipment rental	-	753	-	-	-	-	-	113	866	866	-	-	-	-	-	-	-	-	-	-
1a.4.5	Disposal of DAW generated	-	-	12	6	-	50	-	15	83	83	-	-	-	610	-	-	-	12,190	20	-
1a.4.6	Plant energy budget	-	-	-	-	-	-	1,817	272	2,089	2,089	-	-	-	-	-	-	-	-	-	-
1a.4.7	NRC Fees	-	-	-	-	-	-	1,137	114	1,251	1,251	-	-	-	-	-	-	-	-	-	-
1a.4.8	Emergency Planning Fees	-	-	-	-	-	-	3,428	343	3,770	-	3,770	-	-	-	-	-	-	-	-	-
1a.4.9	Fixed Overhead	-	-	-	-	-	-	2,616	392	3,009	3,009	-	-	-	-	-	-	-	-	-	-
1a.4.10	Spent Fuel Pool O&M	-	-	-	-	-	-	845	127	971	-	971	-	-	-	-	-	-	-	-	-
1a.4.11	ISFSI Operating Costs	-	-	-	-	-	-	112	17	129	-	129	-	-	-	-	-	-	-	-	-
1a.4.12	Railroad Track Maintenance	-	-	-	-	-	-	125	19	144	144	-	-	-	-	-	-	-	-	-	-
1a.4.13	Security Staff Cost	-	-	-	-	-	-	16,372	2,456	18,827	18,827	-	-	-	-	-	-	-	-	-	245,440
1a.4.14	Utility Staff Cost	-	-	-	-	-	-	27,285	4,093	31,378	31,378	-	-	-	-	-	-	-	-	-	422,240
1a.4	Subtotal Period 1a Period-Dependent Costs	-	1,367	12	6	-	50	59,634	8,703	69,772	64,902	4,870	-	-	610	-	-	-	12,190	20	667,680

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 Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes 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
1a.0	TOTAL PERIOD 1a COST	-	1,367	12	6	-	50	92,383	13,615	107,434	94,783	12,102	550	-	610	-	-	-	12,190	20	750,693
PERIOD 1b - Decommissioning Preparations																					
Period 1b Direct Decommissioning Activities																					
Detailed Work Procedures																					
1b.1.1.1	Plant systems	-	-	-	-	-	-	608	91	700	630	-	70	-	-	-	-	-	-	-	4,733
1b.1.1.2	NSSS Decontamination Flush	-	-	-	-	-	-	129	19	148	148	-	-	-	-	-	-	-	-	-	1,000
1b.1.1.3	Reactor internals	-	-	-	-	-	-	514	77	591	591	-	-	-	-	-	-	-	-	-	4,000
1b.1.1.4	Remaining buildings	-	-	-	-	-	-	174	26	200	50	-	150	-	-	-	-	-	-	-	1,350
1b.1.1.5	CRD housings & NIs	-	-	-	-	-	-	129	19	148	148	-	-	-	-	-	-	-	-	-	1,000
1b.1.1.6	Incore instrumentation	-	-	-	-	-	-	129	19	148	148	-	-	-	-	-	-	-	-	-	1,000
1b.1.1.7	Removal primary containment	-	-	-	-	-	-	257	39	296	296	-	-	-	-	-	-	-	-	-	2,000
1b.1.1.8	Reactor vessel	-	-	-	-	-	-	467	70	537	537	-	-	-	-	-	-	-	-	-	3,630
1b.1.1.9	Facility closeout	-	-	-	-	-	-	154	23	177	89	-	89	-	-	-	-	-	-	-	1,200
1b.1.1.10	Sacrificial shield	-	-	-	-	-	-	154	23	177	177	-	-	-	-	-	-	-	-	-	1,200
1b.1.1.11	Reinforced concrete	-	-	-	-	-	-	129	19	148	74	-	74	-	-	-	-	-	-	-	1,000
1b.1.1.12	Main Turbine	-	-	-	-	-	-	267	40	307	307	-	-	-	-	-	-	-	-	-	2,080
1b.1.1.13	Main Condensers	-	-	-	-	-	-	268	40	309	309	-	-	-	-	-	-	-	-	-	2,088
1b.1.1.14	Moisture separators & reheaters	-	-	-	-	-	-	257	39	296	296	-	-	-	-	-	-	-	-	-	2,000
1b.1.1.15	Radwaste building	-	-	-	-	-	-	351	53	403	363	-	40	-	-	-	-	-	-	-	2,730
1b.1.1.16	Reactor building	-	-	-	-	-	-	351	53	403	363	-	40	-	-	-	-	-	-	-	2,730
1b.1.1	Total	-	-	-	-	-	-	4,336	650	4,987	4,524	-	463	-	-	-	-	-	-	-	33,741
1b.1.2	Decon NSSS	296	-	-	-	-	-	-	148	444	444	-	-	-	-	-	-	-	-	1,067	-
1b.1	Subtotal Period 1b Activity Costs	296	-	-	-	-	-	4,336	798	5,431	4,968	-	463	-	-	-	-	-	-	1,067	33,741
Period 1b Additional Costs																					
1b.2.1	Spent Fuel Pool Isolation	-	-	-	-	-	-	12,675	1,901	14,576	14,576	-	-	-	-	-	-	-	-	-	-
1b.2.2	Site Characterization	-	-	-	-	-	-	5,930	1,779	7,708	7,708	-	-	-	-	-	-	-	-	30,500	10,852
1b.2.3	Mixed & RCRA Waste	-	-	28	29	14	-	-	9	80	80	-	-	43	-	-	-	-	5,253	161	-
1b.2	Subtotal Period 1b Additional Costs	-	-	28	29	14	-	18,605	3,689	22,365	22,365	-	-	43	-	-	-	-	5,253	30,661	10,852
Period 1b Collateral Costs																					
1b.3.1	Decon equipment	1,055	-	-	-	-	-	-	158	1,213	1,213	-	-	-	-	-	-	-	-	-	-
1b.3.2	DOC staff relocation expenses	-	-	-	-	-	-	1,264	190	1,454	1,454	-	-	-	-	-	-	-	-	-	-
1b.3.3	Process decommissioning water waste	38	-	25	45	-	102	-	53	263	263	-	-	-	233	-	-	-	13,991	45	-
1b.3.4	Process decommissioning chemical flush waste	1	-	24	77	-	1,526	-	396	2,024	2,024	-	-	-	-	231	-	-	24,599	43	-
1b.3.5	Small tool allowance	-	2	-	-	-	-	-	0	2	2	-	-	-	-	-	-	-	-	-	-
1b.3.6	Pipe cutting equipment	-	1,200	-	-	-	-	-	180	1,380	1,380	-	-	-	-	-	-	-	-	-	-
1b.3.7	Decon rig	2,104	-	-	-	-	-	-	316	2,419	2,419	-	-	-	-	-	-	-	-	-	-
1b.3.8	Spent Fuel Capital and Transfer	-	-	-	-	-	-	360	54	414	-	414	-	-	-	-	-	-	-	-	-
1b.3.9	Retention and Severance	-	-	-	-	-	-	6,340	951	7,291	7,291	-	-	-	-	-	-	-	-	-	-
1b.3	Subtotal Period 1b Collateral Costs	3,197	1,202	49	122	-	1,628	7,964	2,298	16,460	16,046	414	-	-	233	231	-	-	38,589	89	-
Period 1b Period-Dependent Costs																					
1b.4.1	Decon supplies	39	-	-	-	-	-	-	10	48	48	-	-	-	-	-	-	-	-	-	-
1b.4.2	Insurance	-	-	-	-	-	-	1,161	116	1,277	1,277	-	-	-	-	-	-	-	-	-	-
1b.4.3	Property taxes	-	-	-	-	-	-	1,710	171	1,881	1,881	-	-	-	-	-	-	-	-	-	-
1b.4.4	Health physics supplies	-	344	-	-	-	-	-	86	430	430	-	-	-	-	-	-	-	-	-	-
1b.4.5	Heavy equipment rental	-	375	-	-	-	-	-	56	432	432	-	-	-	-	-	-	-	-	-	-
1b.4.6	Disposal of DAW generated	-	-	7	4	-	29	-	9	49	49	-	-	-	356	-	-	-	7,122	12	-
1b.4.7	Plant energy budget	-	-	-	-	-	-	1,812	272	2,083	2,083	-	-	-	-	-	-	-	-	-	-
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	Fixed Overhead	-	-	-	-	-	-	1,305	196	1,500	1,500	-	-	-	-	-	-	-	-	-	-
1b.4.11	Spent Fuel Pool O&M	-	-	-	-	-	-	421	63	484	-	484	-	-	-	-	-	-	-	-	-
1b.4.12	ISFSI Operating Costs	-	-	-	-	-	-	56	8	64	-	64	-	-	-	-	-	-	-	-	-
1b.4.13	Railroad Track Maintenance	-	-	-	-	-	-	62	9	72	72	-	-	-	-	-	-	-	-	-	-
1b.4.14	Security Staff Cost	-	-	-	-	-	-	8,163	1,225	9,388	9,388	-	-	-	-	-	-	-	-	-	122,384
1b.4.15	DOC Staff Cost	-	-	-	-	-	-	5,846	877	6,723	6,723	-	-	-	-	-	-	-	-	-	63,266
1b.4.16	Utility Staff Cost	-	-	-	-	-	-	13,682	2,052	15,734	15,734	-	-	-	-	-	-	-	-	-	211,579
1b.4	Subtotal Period 1b Period-Dependent Costs	39	719	7	4	-	29	35,956	5,323	42,078	39,972	2,106	-	-	356	-	-	-	7,122	12	397,229
1b.0	TOTAL PERIOD 1b COST	3,531	1,921	84	154	14	1,657	66,862	12,109	86,333	83,350	2,520	463	43	589	231	-	-	50,964	31,828	441,822
PERIOD 1 TOTALS		3,531	3,288	96	160	14	1,707	159,245	25,725	193,767	178,133	14,622	1,012	43	1,199	231	-	-	63,155	31,848	1,192,515

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(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 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 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	-	528	-	221	1,031	1,031	-	-	-	1,430	-	-	-	99,742	2,905	-
2a.1.1.2	Recirculation Pumps & Motors	40	63	16	51	42	539	-	186	938	938	-	-	96	945	-	-	-	112,200	1,563	-
2a.1.1.3	CRDMs & NIs Removal	194	1,020	415	135	-	1,130	-	696	3,591	3,591	-	-	-	3,741	-	-	-	213,700	17,768	-
2a.1.1.4	Reactor Vessel Internals	244	6,722	12,852	2,696	-	29,845	364	24,027	76,749	76,749	-	-	-	1,252	1,481	1,178	-	343,150	30,515	1,379
2a.1.1.5	Reactor Vessel	113	9,121	2,672	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	4,099	42	37,903	728	35,973	112,449	112,449	-	-	96	23,536	1,481	1,178	-	1,874,002	83,267	2,758
Removal of Major Equipment																					
2a.1.2	Main Turbine/Generator	-	385	1,356	521	6,139	439	-	1,341	10,182	10,182	-	-	24,835	1,383	-	-	-	1,577,959	5,438	-
2a.1.3	Main Condensers	-	1,347	360	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	Radwaste	-	25	-	-	-	-	-	4	28	28	-	-	-	-	-	-	-	-	127	-
2a.1.4.3	Turbine	-	127	-	-	-	-	-	19	146	146	-	-	-	-	-	-	-	-	1,254	-
2a.1.4	Totals	-	483	-	-	-	-	-	72	556	556	-	-	-	-	-	-	-	-	3,598	-
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	-	27	1	2	26	13	-	14	83	83	-	-	156	37	-	-	-	8,681	400	-
2a.1.5.3	Chemistry Sampling - Insulated	-	2	0	0	-	0	-	1	3	3	-	-	-	1	-	-	-	72	28	-
2a.1.5.4	Circulating Water - RCA	-	207	14	62	1,114	-	-	230	1,626	1,626	-	-	6,656	-	-	-	-	270,307	2,860	-
2a.1.5.5	Combustible Gas Control - Insul - RCA	-	29	0	2	36	-	-	13	80	80	-	-	212	-	-	-	-	8,617	378	-
2a.1.5.6	Combustible Gas Control - RCA	-	18	1	3	48	-	-	12	81	81	-	-	285	-	-	-	-	11,577	245	-
2a.1.5.7	Condensate & Feedwater	-	987	183	329	3,337	2,464	-	1,431	8,731	8,731	-	-	19,947	7,319	-	-	-	1,275,810	14,196	-
2a.1.5.8	Condensate & Feedwater - Insulated	-	492	34	63	699	408	-	343	2,038	2,038	-	-	4,176	1,207	-	-	-	246,693	6,964	-
2a.1.5.9	Condensate Demin	-	545	30	51	560	339	-	316	1,840	1,840	-	-	3,346	1,000	-	-	-	199,936	7,618	-
2a.1.5.10	Condensate Storage	-	726	33	82	1,193	270	-	444	2,748	2,748	-	-	7,131	795	-	-	-	340,568	10,345	-
2a.1.5.11	Control Rod Drive	-	3	0	0	3	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	-	79	20	51	734	176	-	184	1,244	1,244	-	-	4,384	521	-	-	-	211,329	1,163	-
2a.1.5.14	Core Spray - Insulated	-	145	8	13	137	90	-	82	474	474	-	-	818	264	-	-	-	50,149	2,033	-
2a.1.5.15	Demin Water - Insulated - RCA	-	15	0	1	14	-	-	6	36	36	-	-	85	-	-	-	-	3,445	181	-
2a.1.5.16	Demin Water - RCA	-	41	1	2	42	-	-	17	104	104	-	-	253	-	-	-	-	10,278	508	-
2a.1.5.17	Diesel Oil - RCA	-	2	0	0	4	-	-	1	7	7	-	-	23	-	-	-	-	931	25	-
2a.1.5.18	Drywell Atmosphere Cooling - RCA	-	38	1	5	92	-	-	24	159	159	-	-	548	-	-	-	-	22,244	550	-
2a.1.5.19	EDG Emerg Service Water - Insul - RCA	-	0	0	0	0	-	-	0	1	1	-	-	2	-	-	-	-	84	4	-
2a.1.5.20	Electrical - Clean	-	13	-	-	-	-	-	2	15	-	-	15	-	-	-	-	-	-	182	-
2a.1.5.21	Emergency Service Water - Insul - RCA	-	21	0	1	23	-	-	9	55	55	-	-	137	-	-	-	-	5,544	281	-
2a.1.5.22	Emergency Service Water - RCA	-	2	0	0	2	-	-	1	5	5	-	-	13	-	-	-	-	512	22	-
2a.1.5.23	GEZIP - RCA	-	3	0	1	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	-	6	0	0	1	5	-	3	15	15	-	-	6	13	-	-	-	1,080	81	-
2a.1.5.26	H2-O2 Control Analyzing - Insulated	-	6	0	0	1	5	-	3	15	15	-	-	6	13	-	-	-	1,080	81	-
2a.1.5.27	High Pressure Coolant Injection	-	67	6	13	163	70	-	61	381	381	-	-	972	209	-	-	-	52,792	966	-
2a.1.5.28	High Pressure Coolant Injection - Insula	-	219	14	24	267	163	-	141	830	830	-	-	1,598	481	-	-	-	95,733	3,079	-
2a.1.5.29	Hydrogen Cooling	-	8	-	-	-	-	-	1	10	-	-	10	-	-	-	-	-	-	118	-
2a.1.5.30	Hydrogen Cooling - RCA	-	7	0	0	7	-	-	3	17	17	-	-	39	-	-	-	-	1,600	79	-
2a.1.5.31	Hydrogen Seal Oil - RCA	-	17	0	2	32	-	-	9	60	60	-	-	189	-	-	-	-	7,669	212	-
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	296	-	-	103	644	644	-	-	1,768	-	-	-	-	71,810	2,733	-
2a.1.5.34	Main Condenser	-	196	12	20	223	139	-	122	712	712	-	-	1,333	411	-	-	-	80,439	2,746	-
2a.1.5.35	Main Steam	-	249	17	32	359	201	-	173	1,029	1,029	-	-	2,148	594	-	-	-	125,135	3,512	-
2a.1.5.36	Main Turbine	-	1,012	205	353	3,306	2,921	-	1,553	9,350	9,350	-	-	19,760	8,687	-	-	-	1,354,661	14,733	-
2a.1.5.37	Main Turbine - Insulated	-	214	18	37	423	225	-	180	1,097	1,097	-	-	2,230	667	-	-	-	145,208	3,069	-
2a.1.5.38	Miscellaneous	-	43	1	3	51	-	-	19	115	115	-	-	302	-	-	-	-	12,283	622	-
2a.1.5.39	Off Gas Recombiner	-	189	19	32	300	257	-	163	960	960	-	-	1,795	764	-	-	-	121,554	2,708	-
2a.1.5.40	Off Gas Recombiner - Insulated	-	387	19	27	229	240	-	197	1,100	1,100	-	-	1,366	709	-	-	-	100,933	5,385	-
2a.1.5.41	Post Accident Sampling	-	25	1	1	9	11	-	11	58	58	-	-	53	33	-	-	-	4,318	345	-
2a.1.5.42	Post Accident Sampling - Insulated	-	17	1	1	3	13	-	8	43	43	-	-	17	37	-	-	-	3,116	212	-
2a.1.5.43	RHR Service Water - Insulated - RCA	-	83	3	14	248	-	-	60	409	409	-	-	1,485	-	-	-	-	60,293	1,125	-
2a.1.5.44	RHR Service Water - RCA	-	4	0	0	6	-	-	2	12	12	-	-	35	-	-	-	-	1,410	57	-
2a.1.5.45	Reactor Feedwater Pump Seal	-	56	2	4	32	33	-	28	155	155	-	-	193	96	-	-	-	14,009	773	-

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 Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes 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
Disposal of Plant Systems (continued)																					
2a.1.5.46	Residual Heat Removal	362	252	172	178	1,072	2,051	-	962	5,049	5,049	-	-	6,406	6,012	-	-	-	647,941	4,135	-
2a.1.5.47	Residual Heat Removal - Insulated	622	554	61	82	563	880	-	772	3,535	3,535	-	-	3,367	2,607	-	-	-	303,087	10,340	-
2a.1.5.48	Rx Core Isolation Cooling	-	49	2	4	43	26	-	26	150	150	-	-	259	76	-	-	-	15,396	691	-
2a.1.5.49	Rx Core Isolation Cooling - Insulated	-	107	5	7	48	67	-	52	287	287	-	-	288	198	-	-	-	24,419	1,479	-
2a.1.5.50	Rx Recirculation	56	58	6	4	7	65	-	61	258	258	-	-	43	190	-	-	-	14,095	1,580	-
2a.1.5.51	Snubbers	-	169	2	5	63	30	-	69	331	331	-	-	377	90	-	-	-	21,009	2,548	-
2a.1.5.52	Standby Liquid Control - Insul - RCA	-	4	0	0	4	-	-	2	9	9	-	-	22	-	-	-	-	904	48	-
2a.1.5.53	Standby Liquid Control - RCA	-	26	1	2	41	-	-	13	83	83	-	-	245	-	-	-	-	9,969	341	-
2a.1.5.54	Stator Cooling - RCA	-	7	0	1	21	-	-	5	35	35	-	-	126	-	-	-	-	5,135	98	-
2a.1.5.55	Traversing Incore Probe	0	4	0	0	0	2	-	1	7	7	-	-	1	5	-	-	-	386	51	-
2a.1.5	Totals	1,040	8,221	924	1,572	16,339	11,425	-	8,209	47,730	47,706	-	24	97,654	33,808	-	-	-	6,125,515	119,943	-
2a.1.6	Scaffolding in support of decommissioning	-	2,265	22	12	191	31	-	607	3,127	3,127	-	-	1,030	91	-	-	-	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	180,360	180,336	-	24	141,010	59,545	1,481	1,178	-	10,458,540	253,640	2,758
Period 2a Collateral Costs																					
2a.3.1	Process decommissioning water waste	85	-	57	102	-	232	-	122	598	598	-	-	-	532	-	-	-	31,942	104	-
2a.3.2	Process decommissioning chemical flush waste	5	-	216	702	-	1,619	-	534	3,077	3,077	-	-	-	2,093	-	-	-	223,008	392	-
2a.3.3	Small tool allowance	-	324	-	-	-	-	-	49	373	336	-	37	-	-	-	-	-	-	-	-
2a.3.4	Spent Fuel Capital and Transfer	-	-	-	-	-	-	13,627	2,044	15,671	-	15,671	-	-	-	-	-	-	-	-	-
2a.3.5	Retention and Severance	-	-	-	-	-	-	13,145	1,972	15,117	15,117	-	-	-	-	-	-	-	-	-	-
2a.3	Subtotal Period 2a Collateral Costs	91	324	274	804	-	1,851	26,772	4,720	34,835	19,127	15,671	37	-	2,625	-	-	-	254,950	495	-
Period 2a Period-Dependent Costs																					
2a.4.1	Decon supplies	112	-	-	-	-	-	-	28	140	140	-	-	-	-	-	-	-	-	-	-
2a.4.2	Insurance	-	-	-	-	-	-	1,019	102	1,121	1,121	-	-	-	-	-	-	-	-	-	-
2a.4.3	Property taxes	-	-	-	-	-	-	4,383	438	4,821	4,821	-	-	-	-	-	-	-	-	-	-
2a.4.4	Health physics supplies	-	2,356	-	-	-	-	-	589	2,945	2,945	-	-	-	-	-	-	-	-	-	-
2a.4.5	Heavy equipment rental	-	3,627	-	-	-	-	-	544	4,171	4,171	-	-	-	-	-	-	-	-	-	-
2a.4.6	Disposal of DAW generated	-	-	110	57	-	457	-	134	758	758	-	-	-	5,551	-	-	-	111,023	181	-
2a.4.7	Plant energy budget	-	-	-	-	-	-	2,501	375	2,876	2,876	-	-	-	-	-	-	-	-	-	-
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	Spent Fuel Pool O&M	-	-	-	-	-	-	1,224	184	1,408	-	1,408	-	-	-	-	-	-	-	-	-
2a.4.12	ISFSI Operating Costs	-	-	-	-	-	-	162	24	187	-	187	-	-	-	-	-	-	-	-	-
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	Security Staff Cost	-	-	-	-	-	-	21,881	3,282	25,164	25,164	-	-	-	-	-	-	-	-	-	325,574
2a.4.16	DOC Staff Cost	-	-	-	-	-	-	21,021	3,153	24,174	24,174	-	-	-	-	-	-	-	-	-	229,108
2a.4.17	Utility Staff Cost	-	-	-	-	-	-	27,906	4,186	32,092	32,092	-	-	-	-	-	-	-	-	-	426,562
2a.4	Subtotal Period 2a Period-Dependent Costs	112	5,982	110	57	-	457	89,944	14,268	110,931	104,810	6,121	-	-	5,551	-	-	-	111,023	181	981,244
2a.0	TOTAL PERIOD 2a COST	1,945	36,028	19,028	7,259	25,937	52,350	117,444	66,136	326,126	304,273	21,791	62	141,010	67,722	1,481	1,178	-	10,824,520	254,317	984,002
PERIOD 2b - Site Decontamination																					
Period 2b Direct Decommissioning Activities																					
Disposal of Plant Systems																					
2b.1.1.1	ALARA/Radiological	-	18	0	1	6	3	-	6	35	35	-	-	35	10	-	-	-	2,060	277	-
2b.1.1.2	Alternate N2 - RCA	-	16	0	1	16	-	-	7	40	40	-	-	93	-	-	-	-	3,765	185	-
2b.1.1.3	Decontamination Projects	-	1	0	0	0	0	-	0	2	2	-	-	2	0	-	-	-	129	17	-
2b.1.1.4	Electrical - Contaminated	-	445	6	24	400	30	-	183	1,089	1,089	-	-	2,389	90	-	-	-	102,726	6,325	-
2b.1.1.5	Electrical - Decontaminated	-	2,698	48	218	3,906	-	-	1,298	8,167	8,167	-	-	23,344	-	-	-	-	948,013	37,107	-
2b.1.1.6	Fire - RCA	-	101	1	6	103	-	-	42	253	253	-	-	614	-	-	-	-	24,917	1,324	-
2b.1.1.7	HVAC Ductwork	-	305	7	27	446	34	-	156	975	975	-	-	2,665	100	-	-	-	114,598	4,111	-
2b.1.1.8	HVAC/Chilled Water - RCA	-	324	6	26	461	-	-	155	971	971	-	-	2,752	-	-	-	-	111,779	3,985	-
2b.1.1.9	Heating & Ventilation	-	483	16	61	1,007	76	-	302	1,945	1,945	-	-	6,018	227	-	-	-	258,789	7,101	-
2b.1.1.10	Heating Boiler - Insulated - RCA	-	3	0	0	4	-	-	1	9	9	-	-	26	-	-	-	-	1,058	35	-
2b.1.1.11	Liquid Radwaste	588	687	48	63	514	586	-	703	3,188	3,188	-	-	3,073	1,728	-	-	-	235,484	17,194	-
2b.1.1.12	Makeup Demin - RCA	-	103	3	14	246	-	-	65	431	431	-	-	1,471	-	-	-	-	59,747	1,412	-
2b.1.1.13	Non-Essential Diesel Generator - RCA	-	27	3	13	238	-	-	45	327	327	-	-	1,424	-	-	-	-	57,832	395	-
2b.1.1.14	Off Gas Holdup	-	342	21	38	461	214	-	216	1,291	1,291	-	-	2,755	630	-	-	-	152,277	4,769	-
2b.1.1.15	Primary Containment	-	455	42	87	1,038	507	-	414	2,543	2,543	-	-	6,201	1,506	-	-	-	347,704	6,454	-
2b.1.1.16	Process Radiation Monitors	-	46	2	2	24	18	-	20	111	111	-	-	142	52	-	-	-	9,115	649	-

Table C
Monticello Nuclear Generating Plant
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(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 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
Disposal of Plant Systems (continued)																					
2b.1.1.17	Rx Bldg Closed Clng Water - Insul - RCA	-	114	2	9	163	-	-	54	343	343	-	-	977	-	-	-	-	39,675	1,484	-
2b.1.1.18	Rx Bldg Closed Clng Water - RCA	-	184	15	66	1,187	-	-	235	1,687	1,687	-	-	7,093	-	-	-	-	288,031	2,489	-
2b.1.1.19	Rx Component Handling Equip	27	142	18	27	194	279	-	154	840	840	-	-	1,158	829	-	-	-	99,730	2,462	-
2b.1.1.20	Rx Pressure Vessel	28	47	6	5	13	78	-	48	225	225	-	-	75	230	-	-	-	17,816	1,051	-
2b.1.1.21	Rx Water Cleanup	172	265	19	16	22	251	-	222	965	965	-	-	130	737	-	-	-	52,670	5,736	-
2b.1.1.22	Secondary Containment	-	124	7	14	170	86	-	81	483	483	-	-	1,017	255	-	-	-	57,567	1,763	-
2b.1.1.23	Service & Seal Water - Insulated - RCA	-	120	2	11	197	-	-	62	392	392	-	-	1,180	-	-	-	-	47,917	1,565	-
2b.1.1.24	Service & Seal Water - RCA	-	159	4	17	303	-	-	88	570	570	-	-	1,809	-	-	-	-	73,453	2,016	-
2b.1.1.25	Service Air Blower - RCA	-	15	0	2	34	-	-	9	62	62	-	-	206	-	-	-	-	8,364	206	-
2b.1.1.26	Solid Radwaste	338	494	36	49	399	467	-	480	2,264	2,264	-	-	2,387	1,380	-	-	-	185,221	10,820	-
2b.1.1.27	Structures & Buildings	-	78	2	5	60	29	-	37	210	210	-	-	357	85	-	-	-	19,933	1,128	-
2b.1.1.28	Wells & Domestic Water	-	10	-	-	-	-	-	1	11	-	-	11	-	-	-	-	-	-	144	-
2b.1.1.29	Wells & Domestic Water - RCA	-	52	1	3	57	-	-	22	136	136	-	-	342	-	-	-	-	13,874	633	-
2b.1.1	Totals	1,153	7,860	315	804	11,668	2,657	-	5,107	29,563	29,552	-	11	69,735	7,859	-	-	-	3,334,244	122,835	-
2b.1.2	Scaffolding in support of decommissioning	-	2,831	28	16	239	38	-	758	3,909	3,909	-	-	1,287	114	-	-	-	65,139	28,205	-
Decontamination of Site Buildings																					
2b.1.3.1	Reactor Building	5,202	2,903	178	516	8,044	1,181	-	4,924	22,948	22,948	-	-	48,077	7,014	-	-	-	2,317,670	112,518	-
2b.1.3.2	Admin	106	6	0	3	-	15	-	59	189	189	-	-	-	145	-	-	-	6,840	1,600	-
2b.1.3.3	HPCI Room	29	28	1	3	20	14	-	29	123	123	-	-	118	125	-	-	-	10,759	789	-
2b.1.3.4	Hot Shop	17	4	0	2	-	11	-	12	46	46	-	-	-	103	-	-	-	4,860	286	-
2b.1.3.5	LLRW Storage & Shipping	58	24	2	8	5	45	-	48	191	191	-	-	31	433	-	-	-	21,708	1,127	-
2b.1.3.6	Offgas Stack	372	269	7	23	225	82	-	312	1,289	1,289	-	-	1,343	669	-	-	-	87,045	8,860	-
2b.1.3.7	Offgas Storage & Compressor	41	17	1	6	4	33	-	34	136	136	-	-	25	316	-	-	-	15,948	785	-
2b.1.3.8	Radwaste	121	61	3	17	29	96	-	107	435	435	-	-	172	910	-	-	-	49,943	2,503	-
2b.1.3.9	Radwaste Material Storage Warehouse	64	24	2	9	-	52	-	52	202	202	-	-	-	495	-	-	-	23,400	1,197	-
2b.1.3.10	Recombiner	27	25	1	5	33	24	-	32	148	148	-	-	199	216	-	-	-	18,405	695	-
2b.1.3.11	Turbine	705	353	21	104	215	564	-	632	2,594	2,594	-	-	1,283	5,299	-	-	-	303,150	14,443	-
2b.1.3.12	Turbine Building Addition	58	21	1	8	-	45	-	47	181	181	-	-	-	434	-	-	-	20,478	1,087	-
2b.1.3	Totals	6,799	3,736	218	704	8,574	2,164	-	6,288	28,483	28,483	-	-	51,247	16,159	-	-	-	2,880,206	145,889	-
2b.1.4	Prepare/submit License Termination Plan	-	-	-	-	-	-	526	79	605	605	-	-	-	-	-	-	-	-	-	4,096
2b.1.5	Receive NRC approval of termination plan									a											
2b.1	Subtotal Period 2b Activity Costs	7,952	14,427	560	1,524	20,481	4,859	526	12,232	62,561	62,549	-	11	122,269	24,132	-	-	-	6,279,589	296,929	4,096
Period 2b Additional Costs																					
2b.2.1	Operational Equipment	-	-	23	92	1,211	-	-	198	1,524	1,524	-	-	11,760	-	-	-	-	294,000	32	-
2b.2.2	Excavation of Underground Services	-	1,972	-	-	-	-	376	550	2,898	2,898	-	-	-	-	-	-	-	-	12,493	-
2b.2.3	Security Modifications	-	-	-	-	-	-	8,696	1,304	10,000	10,000	-	-	-	-	-	-	-	-	-	-
2b.2	Subtotal Period 2b Additional Costs	-	1,972	23	92	1,211	-	9,072	2,052	14,422	14,422	-	-	11,760	-	-	-	-	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	-	-	-	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	-	364	-	-	-	-	-	55	418	418	-	-	-	-	-	-	-	-	-	-
2b.3.4	Spent Fuel Capital and Transfer	-	-	-	-	-	-	117,112	17,567	134,679	-	134,679	-	-	-	-	-	-	-	-	-
2b.3.5	Retention and Severance	-	-	-	-	-	-	6,277	942	7,218	7,218	-	-	-	-	-	-	-	-	-	-
2b.3	Subtotal Period 2b Collateral Costs	199	364	178	378	-	865	123,389	18,953	144,326	9,647	134,679	-	-	1,666	-	-	-	119,165	322	-
Period 2b Period-Dependent Costs																					
2b.4.1	Decon supplies	1,440	-	-	-	-	-	-	360	1,799	1,799	-	-	-	-	-	-	-	-	-	-
2b.4.2	Insurance	-	-	-	-	-	-	742	74	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	Heavy equipment rental	-	2,711	-	-	-	-	-	407	3,117	3,117	-	-	-	-	-	-	-	-	-	-
2b.4.6	Disposal of DAW generated	-	-	101	52	-	419	-	123	694	694	-	-	-	5,084	-	-	-	101,679	166	-
2b.4.7	Plant energy budget	-	-	-	-	-	-	1,437	216	1,653	1,653	-	-	-	-	-	-	-	-	-	-
2b.4.8	NRC Fees	-	-	-	-	-	-	623	62	685	685	-	-	-	-	-	-	-	-	-	-
2b.4.9	Emergency Planning Fees	-	-	-	-	-	-	2,995	299	3,294	-	3,294	-	-	-	-	-	-	-	-	-
2b.4.10	Fixed Overhead	-	-	-	-	-	-	2,235	335	2,570	2,570	-	-	-	-	-	-	-	-	-	-
2b.4.11	Spent Fuel Pool O&M	-	-	-	-	-	-	891	134	1,024	-	1,024	-	-	-	-	-	-	-	-	-
2b.4.12	Liquid Radwaste Processing Equipment/Services	-	-	-	-	-	-	224	34	258	258	-	-	-	-	-	-	-	-	-	-
2b.4.13	ISFSI Operating Costs	-	-	-	-	-	-	118	18	136	-	136	-	-	-	-	-	-	-	-	-
2b.4.14	Railroad Track Maintenance	-	-	-	-	-	-	458	69	527	527	-	-	-	-	-	-	-	-	-	-
2b.4.15	Remedial Actions Surveys	-	-	-	-	-	-	1,182	177	1,359	1,359	-	-	-	-	-	-	-	-	-	-

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 Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes 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 Period-Dependent Costs (continued)																					
2b.4.16	Security Staff Cost	-	-	-	-	-	-	15,925	2,389	18,314	18,314	-	-	-	-	-	-	-	-	-	236,949
2b.4.17	DOC Staff Cost	-	-	-	-	-	-	14,772	2,216	16,988	16,988	-	-	-	-	-	-	-	-	-	160,160
2b.4.18	Utility Staff Cost	-	-	-	-	-	-	19,442	2,916	22,358	22,358	-	-	-	-	-	-	-	-	-	297,283
2b.4	Subtotal Period 2b Period-Dependent Costs	1,440	5,087	101	52	-	419	63,741	10,691	81,530	77,076	4,455	-	-	5,084	-	-	-	101,679	166	694,392
2b.0	TOTAL PERIOD 2b COST	9,591	21,850	861	2,046	21,692	6,143	196,728	43,928	302,839	163,694	139,134	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	Cranes/Heavy Loads/Rigging - RCA	-	3	0	1	17	-	-	4	25	25	-	-	103	-	-	-	-	4,184	48	-
2d.1.2.2	Electrical - Contaminated Fuel Pool	-	47	1	2	40	3	-	19	112	112	-	-	240	9	-	-	-	10,334	665	-
2d.1.2.3	Electrical - Decontam. Fuel Pool Area	-	297	5	23	411	-	-	140	876	876	-	-	2,457	-	-	-	-	99,783	4,090	-
2d.1.2.4	Fire - RCA - Fuel Pool Area	-	11	0	1	10	-	-	4	26	26	-	-	62	-	-	-	-	2,499	143	-
2d.1.2.5	Fuel Pool Cooling & Cleanup	246	428	34	37	197	455	-	382	1,781	1,781	-	-	1,179	1,341	-	-	-	133,939	8,380	-
2d.1.2.6	Fuel Pool Cooling & Cleanup - Insulated	27	41	3	3	11	40	-	36	161	161	-	-	67	117	-	-	-	10,220	848	-
2d.1.2.7	HVAC Ductwork - Fuel Pool Area	-	34	1	3	50	4	-	17	108	108	-	-	296	11	-	-	-	12,733	457	-
2d.1.2.8	HVAC/Chilled Water - RCA Fuel Pool Area	-	33	0	2	37	-	-	14	87	87	-	-	223	-	-	-	-	9,072	397	-
2d.1.2.9	Instrument & Service Air-RCA-Fuel Pool	-	29	1	2	45	-	-	14	91	91	-	-	267	-	-	-	-	10,841	357	-
2d.1.2	Totals	273	924	45	75	819	502	-	631	3,268	3,268	-	-	4,894	1,479	-	-	-	293,606	15,385	-
Decontamination of Site Buildings																					
2d.1.3.1	Reactor (Post Fuel)	946	2,599	172	913	329	10,216	-	3,880	19,056	19,056	-	-	1,969	62,698	-	-	-	2,732,406	45,703	-
2d.1.3	Totals	946	2,599	172	913	329	10,216	-	3,880	19,056	19,056	-	-	1,969	62,698	-	-	-	2,732,406	45,703	-
2d.1.4	Scaffolding in support of decommissioning	-	566	6	3	48	8	-	152	782	782	-	-	257	23	-	-	-	13,028	5,641	-
2d.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	67,635	-
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	-	-	-	504	-	-	-	30,239	98	-
2d.3.2	Process decommissioning chemical flush waste	1	-	26	84	-	193	-	64	366	366	-	-	-	249	-	-	-	26,553	47	-
2d.3.3	Small tool allowance	-	91	-	-	-	-	-	14	105	105	-	-	-	-	-	-	-	-	-	-
2d.3.4	Decommissioning Equipment Disposition	-	-	130	82	1,112	178	-	237	1,739	1,739	-	-	6,000	529	-	-	-	303,608	147	-
2d.3	Subtotal Period 2d Collateral Costs	80	91	210	262	1,112	590	-	428	2,773	2,773	-	-	6,000	1,282	-	-	-	360,400	292	-
Period 2d Period-Dependent Costs																					
2d.4.1	Decon supplies	244	-	-	-	-	-	-	61	305	305	-	-	-	-	-	-	-	-	-	-
2d.4.2	Insurance	-	-	-	-	-	-	530	53	583	583	-	-	-	-	-	-	-	-	-	-
2d.4.3	Property taxes	-	-	-	-	-	-	1,662	166	1,828	1,828	-	-	-	-	-	-	-	-	-	-
2d.4.4	Health physics supplies	-	806	-	-	-	-	-	202	1,008	1,008	-	-	-	-	-	-	-	-	-	-
2d.4.5	Heavy equipment rental	-	1,936	-	-	-	-	-	290	2,227	2,227	-	-	-	-	-	-	-	-	-	-
2d.4.6	Disposal of DAW generated	-	-	40	21	-	167	-	49	277	277	-	-	-	2,030	-	-	-	40,600	66	-
2d.4.7	Plant energy budget	-	-	-	-	-	-	547	82	630	630	-	-	-	-	-	-	-	-	-	-
2d.4.8	NRC Fees	-	-	-	-	-	-	424	42	466	466	-	-	-	-	-	-	-	-	-	-
2d.4.9	Emergency Planning Fees	-	-	-	-	-	-	112	11	123	-	123	-	-	-	-	-	-	-	-	-
2d.4.10	Fixed Overhead	-	-	-	-	-	-	1,597	239	1,836	1,836	-	-	-	-	-	-	-	-	-	-
2d.4.11	Liquid Radwaste Processing Equipment/Services	-	-	-	-	-	-	320	48	368	368	-	-	-	-	-	-	-	-	-	-
2d.4.12	ISFSI Operating Costs	-	-	-	-	-	-	84	13	97	-	97	-	-	-	-	-	-	-	-	-
2d.4.13	Railroad Track Maintenance	-	-	-	-	-	-	94	14	108	108	-	-	-	-	-	-	-	-	-	-
2d.4.14	Remedial Actions Surveys	-	-	-	-	-	-	844	127	971	971	-	-	-	-	-	-	-	-	-	-
2d.4.15	Security Staff Cost	-	-	-	-	-	-	10,999	1,650	12,649	8,918	3,732	-	-	-	-	-	-	-	-	162,981
2d.4.16	DOC Staff Cost	-	-	-	-	-	-	7,311	1,097	8,408	8,408	-	-	-	-	-	-	-	-	-	78,356
2d.4.17	Utility Staff Cost	-	-	-	-	-	-	10,052	1,508	11,560	10,670	890	-	-	-	-	-	-	-	-	149,660
2d.4	Subtotal Period 2d Period-Dependent Costs	244	2,743	40	21	-	167	34,577	5,652	43,444	38,602	4,842	-	-	2,030	-	-	-	40,600	66	390,997
2d.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	67,993	403,477

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 Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes 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 2f - License Termination																					
Period 2f Direct Decommissioning Activities																					
2f.1.1	ORISE confirmatory survey	-	-	-	-	-	-	166	50	216	216	-	-	-	-	-	-	-	-	-	-
2f.1.2	Terminate license									a											
2f.1	Subtotal Period 2f Activity Costs	-	-	-	-	-	-	166	50	216	216	-	-	-	-	-	-	-	-	-	-
Period 2f Additional Costs																					
2f.2.1	License Termination Survey	-	-	-	-	-	-	6,920	2,076	8,995	8,995	-	-	-	-	-	-	-	-	95,048	6,240
2f.2	Subtotal Period 2f Additional Costs	-	-	-	-	-	-	6,920	2,076	8,995	8,995	-	-	-	-	-	-	-	-	95,048	6,240
Period 2f Collateral Costs																					
2f.3.1	DOC staff relocation expenses	-	-	-	-	-	-	1,264	190	1,454	1,454	-	-	-	-	-	-	-	-	-	-
2f.3	Subtotal Period 2f Collateral 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	-	-	-	-	-	-	1,471	147	1,618	1,618	-	-	-	-	-	-	-	-	-	-
2f.4.3	Health physics supplies	-	708	-	-	-	-	-	177	884	884	-	-	-	-	-	-	-	-	-	-
2f.4.4	Disposal of DAW generated	-	-	7	4	-	29	-	9	48	48	-	-	-	355	-	-	-	7,097	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	11	123	-	123	-	-	-	-	-	-	-	-	-
2f.4.8	Fixed Overhead	-	-	-	-	-	-	1,597	239	1,836	1,836	-	-	-	-	-	-	-	-	-	-
2f.4.9	ISFSI Operating Costs	-	-	-	-	-	-	84	13	97	-	97	-	-	-	-	-	-	-	-	-
2f.4.10	Railroad Track Maintenance	-	-	-	-	-	-	94	14	108	108	-	-	-	-	-	-	-	-	-	-
2f.4.11	Security Staff Cost	-	-	-	-	-	-	10,999	1,650	12,649	8,918	3,732	-	-	-	-	-	-	-	-	162,981
2f.4.12	DOC Staff Cost	-	-	-	-	-	-	5,393	809	6,201	6,201	-	-	-	-	-	-	-	-	-	57,200
2f.4.13	Utility Staff Cost	-	-	-	-	-	-	5,762	864	6,626	5,738	888	-	-	-	-	-	-	-	-	80,707
2f.4	Subtotal Period 2f Period-Dependent Costs	-	708	7	4	-	29	26,741	4,070	31,558	26,719	4,839	-	-	355	-	-	-	7,097	12	300,888
2f.0	TOTAL PERIOD 2f COST	-	708	7	4	-	29	35,090	6,385	42,223	37,383	4,839	-	-	355	-	-	-	7,097	95,059	307,128
PERIOD 2 TOTALS		13,731	65,566	20,473	10,731	49,937	72,577	385,298	128,647	746,960	576,281	170,606	73	288,160	174,123	1,481	1,178	-	21,552,260	727,310	2,393,096
PERIOD 3b - Site Restoration																					
Period 3b Direct Decommissioning Activities																					
Demolition of Remaining Site Buildings																					
3b.1.1.1	Reactor Building	-	1,971	-	-	-	-	-	296	2,267	-	-	2,267	-	-	-	-	-	-	13,911	-
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	HPCI Room	-	19	-	-	-	-	-	3	22	-	-	22	-	-	-	-	-	-	97	-
3b.1.1.5	Hot Shop	-	16	-	-	-	-	-	2	19	-	-	19	-	-	-	-	-	-	177	-
3b.1.1.6	Hydrogen & Oxygen Storage	-	2	-	-	-	-	-	0	2	-	-	2	-	-	-	-	-	-	19	-
3b.1.1.7	LLRW Storage & Shipping	-	83	-	-	-	-	-	12	95	-	-	95	-	-	-	-	-	-	662	-
3b.1.1.8	MSIV	-	4	-	-	-	-	-	1	4	-	-	4	-	-	-	-	-	-	42	-
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	Radwaste	-	228	-	-	-	-	-	34	262	-	-	262	-	-	-	-	-	-	1,220	-
3b.1.1.13	Recombiner	-	128	-	-	-	-	-	19	147	-	-	147	-	-	-	-	-	-	713	-
3b.1.1.14	Security Barrier	-	186	-	-	-	-	-	28	214	-	-	214	-	-	-	-	-	-	933	-
3b.1.1.15	Structures Greater than 3' Below Grade	-	2,461	-	-	-	-	-	369	2,830	-	-	2,830	-	-	-	-	-	-	12,649	-
3b.1.1.16	Tank Farm	-	4	-	-	-	-	-	1	5	-	-	5	-	-	-	-	-	-	21	-
3b.1.1.17	Turbine	-	1,259	-	-	-	-	-	189	1,448	-	-	1,448	-	-	-	-	-	-	13,036	-
3b.1.1.18	Turbine Building Addition	-	55	-	-	-	-	-	8	63	-	-	63	-	-	-	-	-	-	618	-
3b.1.1.19	Turbine Pedestal	-	182	-	-	-	-	-	27	209	-	-	209	-	-	-	-	-	-	926	-
3b.1.1	Totals	-	8,169	-	-	-	-	-	1,225	9,394	-	-	9,394	-	-	-	-	-	-	58,885	-
Site Closeout Activities																					
3b.1.2	Grade & landscape site	-	896	-	-	-	-	-	134	1,031	-	-	1,031	-	-	-	-	-	-	1,841	-
3b.1.3	Final report to NRC	-	-	-	-	-	-	200	30	231	231	-	-	-	-	-	-	-	-	-	1,560
3b.1	Subtotal Period 3b Activity Costs	-	9,065	-	-	-	-	200	1,390	10,655	231	-	10,425	-	-	-	-	-	-	60,726	1,560
Period 3b Additional Costs																					
3b.2.1	Clean Concrete Disposal	-	3,322	-	-	-	-	13	500	3,835	-	-	3,835	-	-	-	-	-	-	12	-

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 Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes 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 3b Additional Costs (continued)																					
3b.2.2	Intake Structure Cofferdam	-	335	-	-	-	-	-	50	385	-	-	385	-	-	-	-	-	-	2,584	-
3b.2.3	Construction Debris	-	-	-	-	-	-	1,170	176	1,346	-	-	1,346	-	-	-	-	-	-	-	-
3b.2.4	Backfill	-	5,583	-	-	-	-	-	837	6,421	-	-	6,421	-	-	-	-	-	-	5,422	-
3b.2.5	Discharge Structure Cofferdam	-	442	-	-	-	-	-	66	508	-	-	508	-	-	-	-	-	-	3,552	-
3b.2	Subtotal Period 3b Additional Costs	-	9,682	-	-	-	-	1,183	1,630	12,495	-	-	12,495	-	-	-	-	-	-	11,570	-
Period 3b Collateral Costs																					
3b.3.1	Small tool allowance	-	110	-	-	-	-	-	17	127	-	-	127	-	-	-	-	-	-	-	-
3b.3	Subtotal Period 3b Collateral Costs	-	110	-	-	-	-	-	17	127	-	-	127	-	-	-	-	-	-	-	-
Period 3b Period-Dependent Costs																					
3b.4.1	Insurance	-	-	-	-	-	-	1,220	122	1,342	1,342	-	-	-	-	-	-	-	-	-	-
3b.4.2	Property taxes	-	-	-	-	-	-	2,543	254	2,797	-	2,797	-	-	-	-	-	-	-	-	-
3b.4.3	Heavy equipment rental	-	5,842	-	-	-	-	-	876	6,719	-	-	6,719	-	-	-	-	-	-	-	-
3b.4.4	Plant energy budget	-	-	-	-	-	-	315	47	362	-	362	-	-	-	-	-	-	-	-	-
3b.4.5	NRC ISFSI Fees	-	-	-	-	-	-	356	36	391	-	391	-	-	-	-	-	-	-	-	-
3b.4.6	Emergency Planning Fees	-	-	-	-	-	-	257	26	283	-	283	-	-	-	-	-	-	-	-	-
3b.4.7	Fixed Overhead	-	-	-	-	-	-	1,122	168	1,290	429	860	-	-	-	-	-	-	-	-	-
3b.4.8	ISFSI Operating Costs	-	-	-	-	-	-	194	29	223	-	223	-	-	-	-	-	-	-	-	-
3b.4.9	Railroad Track Maintenance	-	-	-	-	-	-	543	81	624	249	375	-	-	-	-	-	-	-	-	-
3b.4.10	Security Staff Cost	-	-	-	-	-	-	25,319	3,798	29,117	0	8,589	20,527	-	-	-	-	-	-	-	375,152
3b.4.11	DOC Staff Cost	-	-	-	-	-	-	11,729	1,759	13,489	-	-	13,489	-	-	-	-	-	-	-	122,646
3b.4.12	Utility Staff Cost	-	-	-	-	-	-	6,873	1,031	7,904	-	2,047	5,857	-	-	-	-	-	-	-	98,297
3b.4	Subtotal Period 3b Period-Dependent Costs	-	5,842	-	-	-	-	50,470	8,228	64,540	2,020	15,928	46,591	-	-	-	-	-	-	-	596,095
3b.0	TOTAL PERIOD 3b COST	-	24,700	-	-	-	-	51,853	11,264	87,817	2,251	15,928	69,638	-	-	-	-	-	-	72,296	597,655
PERIOD 3c - Fuel Storage Operations/Shipping																					
Period 3c Direct Decommissioning Activities																					
Period 3c Collateral Costs																					
3c.3.1	Spent Fuel Capital and Transfer	-	-	-	-	-	-	30,633	4,595	35,228	-	35,228	-	-	-	-	-	-	-	-	-
3c.3	Subtotal Period 3c Collateral Costs	-	-	-	-	-	-	30,633	4,595	35,228	-	35,228	-	-	-	-	-	-	-	-	-
Period 3c Period-Dependent Costs																					
3c.4.1	Insurance	-	-	-	-	-	-	24,659	2,466	27,125	-	27,125	-	-	-	-	-	-	-	-	-
3c.4.2	Property taxes	-	-	-	-	-	-	31,863	3,186	35,049	-	35,049	-	-	-	-	-	-	-	-	-
3c.4.4	NRC ISFSI Fees	-	-	-	-	-	-	10,863	1,086	11,950	-	11,950	-	-	-	-	-	-	-	-	-
3c.4.5	Emergency Planning Fees	-	-	-	-	-	-	5,198	520	5,718	-	5,718	-	-	-	-	-	-	-	-	-
3c.4.6	Fixed Overhead	-	-	-	-	-	-	7,552	1,133	8,685	-	8,685	-	-	-	-	-	-	-	-	-
3c.4.7	ISFSI Operating Costs	-	-	-	-	-	-	3,924	589	4,513	-	4,513	-	-	-	-	-	-	-	-	-
3c.4.8	Railroad Track Maintenance	-	-	-	-	-	-	4,384	658	5,042	-	5,042	-	-	-	-	-	-	-	-	-
3c.4.9	Security Staff Cost	-	-	-	-	-	-	150,786	22,618	173,404	-	173,404	-	-	-	-	-	-	-	-	1,896,060
3c.4.10	Utility Staff Cost	-	-	-	-	-	-	36,020	5,403	41,423	-	41,423	-	-	-	-	-	-	-	-	492,246
3c.4	Subtotal Period 3c Period-Dependent Costs	-	-	-	-	-	-	275,250	37,658	312,908	-	312,908	-	-	-	-	-	-	-	-	2,388,306
3c.0	TOTAL PERIOD 3c COST	-	-	-	-	-	-	305,883	42,253	348,136	-	348,136	-	-	-	-	-	-	-	-	2,388,306
PERIOD 3d - GTCC shipping																					
Period 3d Direct Decommissioning Activities																					
Nuclear Steam Supply System Removal																					
3d.1.1.1	Vessel & Internals GTCC Disposal	-	-	1,083	-	-	4,313	-	918	6,314	6,314	-	-	-	-	-	-	1,160	225,765	-	-
3d.1.1	Totals	-	-	1,083	-	-	4,313	-	918	6,314	6,314	-	-	-	-	-	-	1,160	225,765	-	-
3d.1	Subtotal Period 3d Activity Costs	-	-	1,083	-	-	4,313	-	918	6,314	6,314	-	-	-	-	-	-	1,160	225,765	-	-
Period 3d Collateral Costs																					
3d.3.1	Spent Fuel Capital and Transfer	-	-	-	-	-	-	28	4	32	-	32	-	-	-	-	-	-	-	-	-
3d.3	Subtotal Period 3d Collateral Costs	-	-	-	-	-	-	28	4	32	-	32	-	-	-	-	-	-	-	-	-
Period 3d Period-Dependent Costs																					
3d.4.1	Insurance	-	-	-	-	-	-	27	3	30	30	-	-	-	-	-	-	-	-	-	-
3d.4.2	Property taxes	-	-	-	-	-	-	35	3	38	38	-	-	-	-	-	-	-	-	-	-
3d.4.4	NRC ISFSI Fees	-	-	-	-	-	-	8	1	9	-	9	-	-	-	-	-	-	-	-	-
3d.4.5	Emergency Planning Fees	-	-	-	-	-	-	6	1	6	-	6	-	-	-	-	-	-	-	-	-

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 Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes 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 3d Period-Dependent Costs (continued)																					
3d.4.6	Fixed Overhead	-	-	-	-	-	-	8	1	10	10	-	-	-	-	-	-	-	-	-	-
3d.4.7	Railroad Track Maintenance	-	-	-	-	-	-	5	1	6	6	-	-	-	-	-	-	-	-	-	-
3d.4.8	Security Staff Cost	-	-	-	-	-	-	165	25	190	190	-	-	-	-	-	-	-	-	-	2,074
3d.4.9	Utility Staff Cost	-	-	-	-	-	-	39	6	45	45	-	-	-	-	-	-	-	-	-	539
3d.4	Subtotal Period 3d Period-Dependent Costs	-	-	-	-	-	-	293	40	333	318	15	-	-	-	-	-	-	-	-	2,613
3d.0	TOTAL PERIOD 3d COST	-	-	1,083	-	-	4,313	321	962	6,678	6,632	47	-	-	-	-	-	1,160	225,765	-	2,613
PERIOD 3e - ISFSI Decontamination																					
Period 3e Direct Decommissioning Activities																					
Period 3e Additional Costs																					
3e.2.1	License Termination ISFSI	-	57	188	987	-	5,925	2,185	2,336	11,678	11,678	-	-	-	21,949	-	-	-	2,633,402	11,541	2,249
3e.2	Subtotal Period 3e Additional Costs	-	57	188	987	-	5,925	2,185	2,336	11,678	11,678	-	-	-	21,949	-	-	-	2,633,402	11,541	2,249
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	Plant energy budget	-	-	-	-	-	-	12	3	15	15	-	-	-	-	-	-	-	-	-	-
3e.4.4	Fixed Overhead	-	-	-	-	-	-	71	18	89	89	-	-	-	-	-	-	-	-	-	-
3e.4.5	Railroad Track Maintenance	-	-	-	-	-	-	41	10	52	52	-	-	-	-	-	-	-	-	-	-
3e.4.6	Security Staff Cost	-	-	-	-	-	-	352	88	440	440	-	-	-	-	-	-	-	-	-	4,999
3e.4.7	Utility Staff Cost	-	-	-	-	-	-	261	65	326	326	-	-	-	-	-	-	-	-	-	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	3,290	2,612	13,059	13,059	-	-	-	21,949	-	-	-	2,633,402	11,541	11,041
PERIOD 3f - ISFSI Site Restoration																					
Period 3f Direct Decommissioning Activities																					
Period 3f Additional Costs																					
3f.2.1	Demolition and Site Restoration of ISFSI	-	1,786	-	-	-	-	270	308	2,365	-	-	2,365	-	-	-	-	-	-	8,361	160
3f.2	Subtotal Period 3f Additional Costs	-	1,786	-	-	-	-	270	308	2,365	-	-	2,365	-	-	-	-	-	-	8,361	160
Period 3f Collateral Costs																					
3f.3.1	Small tool allowance	-	12	-	-	-	-	-	2	14	-	-	14	-	-	-	-	-	-	-	-
3f.3	Subtotal Period 3f Collateral Costs	-	12	-	-	-	-	-	2	14	-	-	14	-	-	-	-	-	-	-	-
Period 3f Period-Dependent Costs																					
3f.4.2	Property taxes	-	-	-	-	-	-	126	13	138	-	-	138	-	-	-	-	-	-	-	-
3f.4.3	Heavy equipment rental	-	117	-	-	-	-	-	17	134	-	-	134	-	-	-	-	-	-	-	-
3f.4.4	Plant energy budget	-	-	-	-	-	-	6	1	7	-	-	7	-	-	-	-	-	-	-	-
3f.4.5	Fixed Overhead	-	-	-	-	-	-	36	5	41	-	-	41	-	-	-	-	-	-	-	-
3f.4.6	Railroad Track Maintenance	-	-	-	-	-	-	21	3	24	-	-	24	-	-	-	-	-	-	-	-
3f.4.7	Security Staff Cost	-	-	-	-	-	-	177	27	204	-	-	204	-	-	-	-	-	-	-	2,520
3f.4.8	Utility Staff Cost	-	-	-	-	-	-	109	16	126	-	-	126	-	-	-	-	-	-	-	1,564
3f.4	Subtotal Period 3f Period-Dependent Costs	-	117	-	-	-	-	475	82	674	-	-	674	-	-	-	-	-	-	-	4,084
3f.0	TOTAL PERIOD 3f COST	-	1,915	-	-	-	-	745	393	3,053	-	-	3,053	-	-	-	-	-	-	8,361	4,244
PERIOD 3 TOTALS		-	26,671	1,271	987	-	10,238	362,092	57,484	458,744	21,942	364,111	72,691	-	21,949	-	-	1,160	2,859,167	92,198	3,003,859
TOTAL COST TO DECOMMISSION		17,263	95,526	21,839	11,878	49,952	84,523	906,635	211,856	1,399,471	776,355	549,339	73,776	288,203	197,270	1,711	1,178	1,160	24,474,580	851,356	6,589,469

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 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	GTCC Cu. Feet			

TOTAL COST TO DECOMMISSION WITH 17.82% CONTINGENCY:	$1,399,471	thousands of 2020 dollars
TOTAL NRC LICENSE TERMINATION COST IS 55.32% OR:	$776,355	thousands of 2020 dollars
SPENT FUEL MANAGEMENT COST IS 39.42% OR:	$549,339	thousands of 2020 dollars
NON-NUCLEAR DEMOLITION COST IS 5.26% OR:	$73,776	thousands of 2020 dollars
TOTAL LOW-LEVEL RADIOACTIVE WASTE VOLUME BURIED (EXCLUDING GTCC):	200,160	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:	851,356	Man-hours

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

APPENDIX D

DETAILED COST ANALYSIS

SCENARIO 2: DECON with 60 Year DFS

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 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 1a - Shutdown through Transition																					
Period 1a Direct Decommissioning Activities																					
1a.1.1	Prepare preliminary decommissioning cost	-	-	-	-	-	-	167	25	192	192	-	-	-	-	-	-	-	-	-	1,300
1a.1.2	Notification of Cessation of Operations									a											
1a.1.3	Remove fuel & source material									n/a											
1a.1.4	Notification of Permanent Defueling									a											
1a.1.5	Deactivate plant systems & process waste									a											
1a.1.6	Prepare and submit PSDAR	-	-	-	-	-	-	257	39	296	296	-	-	-	-	-	-	-	-	-	2,000
1a.1.7	Review plant dwgs & specs.	-	-	-	-	-	-	591	89	680	680	-	-	-	-	-	-	-	-	-	4,600
1a.1.8	Perform detailed rad survey									a											
1a.1.9	Estimate by-product inventory	-	-	-	-	-	-	129	19	148	148	-	-	-	-	-	-	-	-	-	1,000
1a.1.10	End product description	-	-	-	-	-	-	129	19	148	148	-	-	-	-	-	-	-	-	-	1,000
1a.1.11	Detailed by-product inventory	-	-	-	-	-	-	167	25	192	192	-	-	-	-	-	-	-	-	-	1,300
1a.1.12	Define major work sequence	-	-	-	-	-	-	964	145	1,108	1,108	-	-	-	-	-	-	-	-	-	7,500
1a.1.13	Perform SER and EA	-	-	-	-	-	-	398	60	458	458	-	-	-	-	-	-	-	-	-	3,100
1a.1.14	Prepare/submit Defueled Technical Specifications	-	-	-	-	-	-	964	145	1,108	1,108	-	-	-	-	-	-	-	-	-	7,500
1a.1.15	Perform Site-Specific Cost Study	-	-	-	-	-	-	643	96	739	739	-	-	-	-	-	-	-	-	-	5,000
1a.1.16	Prepare/submit Irradiated Fuel Management Plan	-	-	-	-	-	-	129	19	148	148	-	-	-	-	-	-	-	-	-	1,000
Activity Specifications																					
1a.1.17.1	Plant & temporary facilities	-	-	-	-	-	-	632	95	727	654	-	73	-	-	-	-	-	-	-	4,920
1a.1.17.2	Plant systems	-	-	-	-	-	-	536	80	616	554	-	62	-	-	-	-	-	-	-	4,167
1a.1.17.3	NSSS Decontamination Flush	-	-	-	-	-	-	64	10	74	74	-	-	-	-	-	-	-	-	-	500
1a.1.17.4	Reactor internals	-	-	-	-	-	-	912	137	1,049	1,049	-	-	-	-	-	-	-	-	-	7,100
1a.1.17.5	Reactor vessel	-	-	-	-	-	-	835	125	961	961	-	-	-	-	-	-	-	-	-	6,500
1a.1.17.6	Sacrificial shield	-	-	-	-	-	-	64	10	74	74	-	-	-	-	-	-	-	-	-	500
1a.1.17.7	Moisture separators/reheaters	-	-	-	-	-	-	129	19	148	148	-	-	-	-	-	-	-	-	-	1,000
1a.1.17.8	Reinforced concrete	-	-	-	-	-	-	206	31	236	118	-	118	-	-	-	-	-	-	-	1,600
1a.1.17.9	Main Turbine	-	-	-	-	-	-	268	40	309	309	-	-	-	-	-	-	-	-	-	2,088
1a.1.17.10	Main Condensers	-	-	-	-	-	-	268	40	309	309	-	-	-	-	-	-	-	-	-	2,088
1a.1.17.11	Pressure suppression structure	-	-	-	-	-	-	257	39	296	296	-	-	-	-	-	-	-	-	-	2,000
1a.1.17.12	Drywell	-	-	-	-	-	-	206	31	236	236	-	-	-	-	-	-	-	-	-	1,600
1a.1.17.13	Plant structures & buildings	-	-	-	-	-	-	401	60	461	231	-	231	-	-	-	-	-	-	-	3,120
1a.1.17.14	Waste management	-	-	-	-	-	-	591	89	680	680	-	-	-	-	-	-	-	-	-	4,600
1a.1.17.15	Facility & site closeout	-	-	-	-	-	-	116	17	133	67	-	67	-	-	-	-	-	-	-	900
1a.1.17	Total	-	-	-	-	-	-	5,486	823	6,308	5,759	-	550	-	-	-	-	-	-	-	42,683
Planning & Site Preparations																					
1a.1.18	Prepare dismantling sequence	-	-	-	-	-	-	308	46	355	355	-	-	-	-	-	-	-	-	-	2,400
1a.1.19	Plant prep. & temp. svces	-	-	-	-	-	-	3,500	525	4,025	4,025	-	-	-	-	-	-	-	-	-	-
1a.1.20	Design water clean-up system	-	-	-	-	-	-	180	27	207	207	-	-	-	-	-	-	-	-	-	1,400
1a.1.21	Rigging/Cont. Cntrl Envlps/tooling/etc.	-	-	-	-	-	-	2,400	360	2,760	2,760	-	-	-	-	-	-	-	-	-	-
1a.1.22	Procure casks/liners & containers	-	-	-	-	-	-	158	24	182	182	-	-	-	-	-	-	-	-	-	1,230
1a.1	Subtotal Period 1a Activity Costs	-	-	-	-	-	-	16,569	2,485	19,054	18,505	-	550	-	-	-	-	-	-	-	83,013
Period 1a Collateral Costs																					
1a.3.1	Spent Fuel Capital and Transfer	-	-	-	-	-	-	1,323	198	1,522	-	1,522	-	-	-	-	-	-	-	-	-
1a.3.2	Retention and Severance	-	-	-	-	-	-	9,892	1,484	11,376	11,376	-	-	-	-	-	-	-	-	-	-
1a.3	Subtotal Period 1a Collateral Costs	-	-	-	-	-	-	11,215	1,682	12,897	11,376	1,522	-	-	-	-	-	-	-	-	-
Period 1a Period-Dependent Costs																					
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 physics supplies	-	614	-	-	-	-	-	153	767	767	-	-	-	-	-	-	-	-	-	-
1a.4.4	Heavy equipment rental	-	753	-	-	-	-	-	113	866	866	-	-	-	-	-	-	-	-	-	-
1a.4.5	Disposal of DAW generated	-	-	12	6	-	50	-	15	83	83	-	-	-	610	-	-	-	12,190	20	-
1a.4.6	Plant energy budget	-	-	-	-	-	-	1,817	272	2,089	2,089	-	-	-	-	-	-	-	-	-	-
1a.4.7	NRC Fees	-	-	-	-	-	-	1,137	114	1,251	1,251	-	-	-	-	-	-	-	-	-	-
1a.4.8	Emergency Planning Fees	-	-	-	-	-	-	3,428	343	3,770	-	3,770	-	-	-	-	-	-	-	-	-
1a.4.9	Fixed Overhead	-	-	-	-	-	-	2,616	392	3,009	3,009	-	-	-	-	-	-	-	-	-	-
1a.4.10	Spent Fuel Pool O&M	-	-	-	-	-	-	845	127	971	-	971	-	-	-	-	-	-	-	-	-
1a.4.11	ISFSI Operating Costs	-	-	-	-	-	-	112	17	129	-	129	-	-	-	-	-	-	-	-	-
1a.4.12	Railroad Track Maintenance	-	-	-	-	-	-	125	19	144	144	-	-	-	-	-	-	-	-	-	-
1a.4.13	Security Staff Cost	-	-	-	-	-	-	16,372	2,456	18,827	18,827	-	-	-	-	-	-	-	-	-	245,440
1a.4.14	Utility Staff Cost	-	-	-	-	-	-	27,285	4,093	31,378	31,378	-	-	-	-	-	-	-	-	-	422,240
1a.4	Subtotal Period 1a Period-Dependent Costs	-	1,367	12	6	-	50	59,634	8,703	69,772	64,902	4,870	-	-	610	-	-	-	12,190	20	667,680

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 Class A Cu. Feet	Burial Volumes Class B Cu. Feet	Burial Volumes Class C Cu. Feet	Burial Volumes GTCC Cu. Feet	Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
1a.0	TOTAL PERIOD 1a COST	-	1,367	12	6	-	50	87,418	12,871	101,724	94,783	6,392	550	-	610	-	-	-	12,190	20	750,693
PERIOD 1b - Decommissioning Preparations																					
Period 1b Direct Decommissioning Activities																					
Detailed Work Procedures																					
1b.1.1.1	Plant systems	-	-	-	-	-	-	608	91	700	630	-	70	-	-	-	-	-	-	-	4,733
1b.1.1.2	NSSS Decontamination Flush	-	-	-	-	-	-	129	19	148	148	-	-	-	-	-	-	-	-	-	1,000
1b.1.1.3	Reactor internals	-	-	-	-	-	-	514	77	591	591	-	-	-	-	-	-	-	-	-	4,000
1b.1.1.4	Remaining buildings	-	-	-	-	-	-	174	26	200	50	-	150	-	-	-	-	-	-	-	1,350
1b.1.1.5	CRD housings & NIs	-	-	-	-	-	-	129	19	148	148	-	-	-	-	-	-	-	-	-	1,000
1b.1.1.6	Incore instrumentation	-	-	-	-	-	-	129	19	148	148	-	-	-	-	-	-	-	-	-	1,000
1b.1.1.7	Removal primary containment	-	-	-	-	-	-	257	39	296	296	-	-	-	-	-	-	-	-	-	2,000
1b.1.1.8	Reactor vessel	-	-	-	-	-	-	467	70	537	537	-	-	-	-	-	-	-	-	-	3,630
1b.1.1.9	Facility closeout	-	-	-	-	-	-	154	23	177	89	-	89	-	-	-	-	-	-	-	1,200
1b.1.1.10	Sacrificial shield	-	-	-	-	-	-	154	23	177	177	-	-	-	-	-	-	-	-	-	1,200
1b.1.1.11	Reinforced concrete	-	-	-	-	-	-	129	19	148	74	-	74	-	-	-	-	-	-	-	1,000
1b.1.1.12	Main Turbine	-	-	-	-	-	-	267	40	307	307	-	-	-	-	-	-	-	-	-	2,080
1b.1.1.13	Main Condensers	-	-	-	-	-	-	268	40	309	309	-	-	-	-	-	-	-	-	-	2,088
1b.1.1.14	Moisture separators & reheaters	-	-	-	-	-	-	257	39	296	296	-	-	-	-	-	-	-	-	-	2,000
1b.1.1.15	Radwaste building	-	-	-	-	-	-	351	53	403	363	-	40	-	-	-	-	-	-	-	2,730
1b.1.1.16	Reactor building	-	-	-	-	-	-	351	53	403	363	-	40	-	-	-	-	-	-	-	2,730
1b.1.1	Total	-	-	-	-	-	-	4,336	650	4,987	4,524	-	463	-	-	-	-	-	-	-	33,741
1b.1.2	Decon NSSS	296	-	-	-	-	-	-	148	444	444	-	-	-	-	-	-	-	-	1,067	-
1b.1	Subtotal Period 1b Activity Costs	296	-	-	-	-	-	4,336	798	5,431	4,968	-	463	-	-	-	-	-	-	1,067	33,741
Period 1b Additional Costs																					
1b.2.1	Spent Fuel Pool Isolation	-	-	-	-	-	-	12,675	1,901	14,576	14,576	-	-	-	-	-	-	-	-	-	-
1b.2.2	Site Characterization	-	-	-	-	-	-	5,930	1,779	7,708	7,708	-	-	-	-	-	-	-	-	30,500	10,852
1b.2.3	Mixed & RCRA Waste	-	-	28	29	14	-	-	9	80	80	-	-	43	-	-	-	-	5,253	161	-
1b.2	Subtotal Period 1b Additional Costs	-	-	28	29	14	-	18,605	3,689	22,365	22,365	-	-	43	-	-	-	-	5,253	30,661	10,852
Period 1b Collateral Costs																					
1b.3.1	Decon equipment	1,055	-	-	-	-	-	-	158	1,213	1,213	-	-	-	-	-	-	-	-	-	-
1b.3.2	DOC staff relocation expenses	-	-	-	-	-	-	1,264	190	1,454	1,454	-	-	-	-	-	-	-	-	-	-
1b.3.3	Process decommissioning water waste	38	-	25	45	-	102	-	53	263	263	-	-	-	233	-	-	-	13,991	45	-
1b.3.4	Process decommissioning chemical flush waste	1	-	24	77	-	1,526	-	396	2,024	2,024	-	-	-	-	231	-	-	24,599	43	-
1b.3.5	Small tool allowance	-	2	-	-	-	-	-	0	2	2	-	-	-	-	-	-	-	-	-	-
1b.3.6	Pipe cutting equipment	-	1,200	-	-	-	-	-	180	1,380	1,380	-	-	-	-	-	-	-	-	-	-
1b.3.7	Decon rig	2,104	-	-	-	-	-	-	316	2,419	2,419	-	-	-	-	-	-	-	-	-	-
1b.3.8	Spent Fuel Capital and Transfer	-	-	-	-	-	-	392	59	450	-	450	-	-	-	-	-	-	-	-	-
1b.3.9	Retention and Severance	-	-	-	-	-	-	6,340	951	7,291	7,291	-	-	-	-	-	-	-	-	-	-
1b.3	Subtotal Period 1b Collateral Costs	3,197	1,202	49	122	-	1,628	7,996	2,303	16,496	16,046	450	-	-	233	231	-	-	38,589	89	-
Period 1b Period-Dependent Costs																					
1b.4.1	Decon supplies	39	-	-	-	-	-	-	10	48	48	-	-	-	-	-	-	-	-	-	-
1b.4.2	Insurance	-	-	-	-	-	-	1,161	116	1,277	1,277	-	-	-	-	-	-	-	-	-	-
1b.4.3	Property taxes	-	-	-	-	-	-	1,710	171	1,881	1,881	-	-	-	-	-	-	-	-	-	-
1b.4.4	Health physics supplies	-	344	-	-	-	-	-	86	430	430	-	-	-	-	-	-	-	-	-	-
1b.4.5	Heavy equipment rental	-	375	-	-	-	-	-	56	432	432	-	-	-	-	-	-	-	-	-	-
1b.4.6	Disposal of DAW generated	-	-	7	4	-	29	-	9	49	49	-	-	-	356	-	-	-	7,122	12	-
1b.4.7	Plant energy budget	-	-	-	-	-	-	1,812	272	2,083	2,083	-	-	-	-	-	-	-	-	-	-
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	Fixed Overhead	-	-	-	-	-	-	1,305	196	1,500	1,500	-	-	-	-	-	-	-	-	-	-
1b.4.11	Spent Fuel Pool O&M	-	-	-	-	-	-	421	63	484	-	484	-	-	-	-	-	-	-	-	-
1b.4.12	ISFSI Operating Costs	-	-	-	-	-	-	56	8	64	-	64	-	-	-	-	-	-	-	-	-
1b.4.13	Railroad Track Maintenance	-	-	-	-	-	-	62	9	72	72	-	-	-	-	-	-	-	-	-	-
1b.4.14	Security Staff Cost	-	-	-	-	-	-	8,163	1,225	9,388	9,388	-	-	-	-	-	-	-	-	-	122,384
1b.4.15	DOC Staff Cost	-	-	-	-	-	-	5,846	877	6,723	6,723	-	-	-	-	-	-	-	-	-	63,266
1b.4.16	Utility Staff Cost	-	-	-	-	-	-	13,682	2,052	15,734	15,734	-	-	-	-	-	-	-	-	-	211,579
1b.4	Subtotal Period 1b Period-Dependent Costs	39	719	7	4	-	29	35,956	5,323	42,078	39,972	2,106	-	-	356	-	-	-	7,122	12	397,229
1b.0	TOTAL PERIOD 1b COST	3,531	1,921	84	154	14	1,657	66,893	12,114	86,369	83,350	2,556	463	43	589	231	-	-	50,964	31,828	441,822
PERIOD 1 TOTALS		3,531	3,288	96	160	14	1,707	154,311	24,985	188,093	178,133	8,948	1,012	43	1,199	231	-	-	63,155	31,848	1,192,515

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 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 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	-	528	-	221	1,031	1,031	-	-	-	1,430	-	-	-	99,742	2,905	-
2a.1.1.2	Recirculation Pumps & Motors	40	63	16	51	42	539	-	186	938	938	-	-	96	945	-	-	-	112,200	1,563	-
2a.1.1.3	CRDMs & NIs Removal	194	1,020	415	135	-	1,130	-	696	3,591	3,591	-	-	-	3,741	-	-	-	213,700	17,768	-
2a.1.1.4	Reactor Vessel Internals	244	6,722	12,852	2,696	-	29,845	364	24,027	76,749	76,749	-	-	-	1,252	1,481	1,178	-	343,150	30,515	1,379
2a.1.1.5	Reactor Vessel	113	9,121	2,672	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	4,099	42	37,903	728	35,973	112,449	112,449	-	-	96	23,536	1,481	1,178	-	1,874,002	83,267	2,758
Removal of Major Equipment																					
2a.1.2	Main Turbine/Generator	-	385	1,356	521	6,139	439	-	1,341	10,182	10,182	-	-	24,835	1,383	-	-	-	1,577,959	5,438	-
2a.1.3	Main Condensers	-	1,347	360	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	Radwaste	-	25	-	-	-	-	-	4	28	28	-	-	-	-	-	-	-	-	127	-
2a.1.4.3	Turbine	-	127	-	-	-	-	-	19	146	146	-	-	-	-	-	-	-	-	1,254	-
2a.1.4	Totals	-	483	-	-	-	-	-	72	556	556	-	-	-	-	-	-	-	-	3,598	-
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	-	27	1	2	26	13	-	14	83	83	-	-	156	37	-	-	-	8,681	400	-
2a.1.5.3	Chemistry Sampling - Insulated	-	2	0	0	-	0	-	1	3	3	-	-	-	1	-	-	-	72	28	-
2a.1.5.4	Circulating Water - RCA	-	207	14	62	1,114	-	-	230	1,626	1,626	-	-	6,656	-	-	-	-	270,307	2,860	-
2a.1.5.5	Combustible Gas Control - Insul - RCA	-	29	0	2	36	-	-	13	80	80	-	-	212	-	-	-	-	8,617	378	-
2a.1.5.6	Combustible Gas Control - RCA	-	18	1	3	48	-	-	12	81	81	-	-	285	-	-	-	-	11,577	245	-
2a.1.5.7	Condensate & Feedwater	-	987	183	329	3,337	2,464	-	1,431	8,731	8,731	-	-	19,947	7,319	-	-	-	1,275,810	14,196	-
2a.1.5.8	Condensate & Feedwater - Insulated	-	492	34	63	699	408	-	343	2,038	2,038	-	-	4,176	1,207	-	-	-	246,693	6,964	-
2a.1.5.9	Condensate Demin	-	545	30	51	560	339	-	316	1,840	1,840	-	-	3,346	1,000	-	-	-	199,936	7,618	-
2a.1.5.10	Condensate Storage	-	726	33	82	1,193	270	-	444	2,748	2,748	-	-	7,131	795	-	-	-	340,568	10,345	-
2a.1.5.11	Control Rod Drive	-	3	0	0	3	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	-	79	20	51	734	176	-	184	1,244	1,244	-	-	4,384	521	-	-	-	211,329	1,163	-
2a.1.5.14	Core Spray - Insulated	-	145	8	13	137	90	-	82	474	474	-	-	818	264	-	-	-	50,149	2,033	-
2a.1.5.15	Demin Water - Insulated - RCA	-	15	0	1	14	-	-	6	36	36	-	-	85	-	-	-	-	3,445	181	-
2a.1.5.16	Demin Water - RCA	-	41	1	2	42	-	-	17	104	104	-	-	253	-	-	-	-	10,278	508	-
2a.1.5.17	Diesel Oil - RCA	-	2	0	0	4	-	-	1	7	7	-	-	23	-	-	-	-	931	25	-
2a.1.5.18	Drywell Atmosphere Cooling - RCA	-	38	1	5	92	-	-	24	159	159	-	-	548	-	-	-	-	22,244	550	-
2a.1.5.19	EDG Emerg Service Water - Insul - RCA	-	0	0	0	0	-	-	0	1	1	-	-	2	-	-	-	-	84	4	-
2a.1.5.20	Electrical - Clean	-	13	-	-	-	-	-	2	15	-	-	15	-	-	-	-	-	-	182	-
2a.1.5.21	Emergency Service Water - Insul - RCA	-	21	0	1	23	-	-	9	55	55	-	-	137	-	-	-	-	5,544	281	-
2a.1.5.22	Emergency Service Water - RCA	-	2	0	0	2	-	-	1	5	5	-	-	13	-	-	-	-	512	22	-
2a.1.5.23	GEZIP - RCA	-	3	0	1	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	-	6	0	0	1	5	-	3	15	15	-	-	6	13	-	-	-	1,080	81	-
2a.1.5.26	H2-O2 Control Analyzing - Insulated	-	6	0	0	1	5	-	3	15	15	-	-	6	13	-	-	-	1,080	81	-
2a.1.5.27	High Pressure Coolant Injection	-	67	6	13	163	70	-	61	381	381	-	-	972	209	-	-	-	52,792	966	-
2a.1.5.28	High Pressure Coolant Injection - Insula	-	219	14	24	267	163	-	141	830	830	-	-	1,598	481	-	-	-	95,733	3,079	-
2a.1.5.29	Hydrogen Cooling	-	8	-	-	-	-	-	1	10	-	-	10	-	-	-	-	-	-	118	-
2a.1.5.30	Hydrogen Cooling - RCA	-	7	0	0	7	-	-	3	17	17	-	-	39	-	-	-	-	1,600	79	-
2a.1.5.31	Hydrogen Seal Oil - RCA	-	17	0	2	32	-	-	9	60	60	-	-	189	-	-	-	-	7,669	212	-
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	296	-	-	103	644	644	-	-	1,768	-	-	-	-	71,810	2,733	-
2a.1.5.34	Main Condenser	-	196	12	20	223	139	-	122	712	712	-	-	1,333	411	-	-	-	80,439	2,746	-
2a.1.5.35	Main Steam	-	249	17	32	359	201	-	173	1,029	1,029	-	-	2,148	594	-	-	-	125,135	3,512	-
2a.1.5.36	Main Turbine	-	1,012	205	353	3,306	2,921	-	1,553	9,350	9,350	-	-	19,760	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	-	-	-	145,298	3,069	-
2a.1.5.38	Miscellaneous	-	43	1	3	51	-	-	19	115	115	-	-	302	-	-	-	-	12,283	622	-
2a.1.5.39	Off Gas Recombiner	-	189	19	32	300	257	-	163	960	960	-	-	1,795	764	-	-	-	121,554	2,708	-
2a.1.5.40	Off Gas Recombiner - Insulated	-	387	19	27	229	240	-	197	1,100	1,100	-	-	1,366	709	-	-	-	100,933	5,385	-
2a.1.5.41	Post Accident Sampling	-	25	1	1	9	11	-	11	58	58	-	-	53	33	-	-	-	4,318	345	-
2a.1.5.42	Post Accident Sampling - Insulated	-	17	1	1	3	13	-	8	43	43	-	-	17	37	-	-	-	3,116	212	-
2a.1.5.43	RHR Service Water - Insulated - RCA	-	83	3	14	248	-	-	60	409	409	-	-	1,485	-	-	-	-	60,293	1,125	-
2a.1.5.44	RHR Service Water - RCA	-	4	0	0	6	-	-	2	12	12	-	-	35	-	-	-	-	1,410	57	-
2a.1.5.45	Reactor Feedwater Pump Seal	-	56	2	4	32	33	-	28	155	155	-	-	193	96	-	-	-	14,009	773	-

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 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
Disposal of Plant Systems (continued)																					
2a.1.5.46	Residual Heat Removal	362	252	172	178	1,072	2,051	-	962	5,049	5,049	-	-	6,406	6,012	-	-	-	647,941	4,135	-
2a.1.5.47	Residual Heat Removal - Insulated	622	554	61	82	563	880	-	772	3,535	3,535	-	-	3,367	2,607	-	-	-	303,087	10,340	-
2a.1.5.48	Rx Core Isolation Cooling	-	49	2	4	43	26	-	26	150	150	-	-	259	76	-	-	-	15,396	691	-
2a.1.5.49	Rx Core Isolation Cooling - Insulated	-	107	5	7	48	67	-	52	287	287	-	-	288	198	-	-	-	24,419	1,479	-
2a.1.5.50	Rx Recirculation	56	58	6	4	7	65	-	61	258	258	-	-	43	190	-	-	-	14,095	1,580	-
2a.1.5.51	Snubbers	-	169	2	5	63	30	-	60	331	331	-	-	377	90	-	-	-	21,009	2,548	-
2a.1.5.52	Standby Liquid Control - Insul - RCA	-	4	0	0	4	-	-	2	9	9	-	-	22	-	-	-	-	904	48	-
2a.1.5.53	Standby Liquid Control - RCA	-	26	1	2	41	-	-	13	83	83	-	-	245	-	-	-	-	9,969	341	-
2a.1.5.54	Stator Cooling - RCA	-	7	0	1	21	-	-	5	35	35	-	-	126	-	-	-	-	5,135	98	-
2a.1.5.55	Traversing Incore Probe	0	4	0	0	0	2	-	1	7	7	-	-	1	5	-	-	-	386	51	-
2a.1.5	Totals	1,040	8,221	924	1,572	16,339	11,425	-	8,209	47,730	47,706	-	24	97,654	33,808	-	-	-	6,125,515	119,943	-
2a.1.6	Scaffolding in support of decommissioning	-	2,265	22	12	191	31	-	607	3,127	3,127	-	-	1,030	91	-	-	-	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	180,360	180,336	-	24	141,010	59,545	1,481	1,178	-	10,458,540	253,640	2,758
Period 2a Collateral Costs																					
2a.3.1	Process decommissioning water waste	85	-	57	102	-	232	-	122	598	598	-	-	-	532	-	-	-	31,942	104	-
2a.3.2	Process decommissioning chemical flush waste	5	-	216	702	-	1,619	-	534	3,077	3,077	-	-	-	2,093	-	-	-	223,008	392	-
2a.3.3	Small tool allowance	-	324	-	-	-	-	-	49	373	336	-	37	-	-	-	-	-	-	-	-
2a.3.4	Spent Fuel Capital and Transfer	-	-	-	-	-	-	13,717	2,058	15,775	-	15,775	-	-	-	-	-	-	-	-	-
2a.3.5	Retention and Severance	-	-	-	-	-	-	13,145	1,972	15,117	15,117	-	-	-	-	-	-	-	-	-	-
2a.3	Subtotal Period 2a Collateral Costs	91	324	274	804	-	1,851	26,862	4,734	34,939	19,127	15,775	37	-	2,625	-	-	-	254,950	495	-
Period 2a Period-Dependent Costs																					
2a.4.1	Decon supplies	112	-	-	-	-	-	-	28	140	140	-	-	-	-	-	-	-	-	-	-
2a.4.2	Insurance	-	-	-	-	-	-	1,019	102	1,121	1,121	-	-	-	-	-	-	-	-	-	-
2a.4.3	Property taxes	-	-	-	-	-	-	4,383	438	4,821	4,821	-	-	-	-	-	-	-	-	-	-
2a.4.4	Health physics supplies	-	2,356	-	-	-	-	-	589	2,945	2,945	-	-	-	-	-	-	-	-	-	-
2a.4.5	Heavy equipment rental	-	3,627	-	-	-	-	-	544	4,171	4,171	-	-	-	-	-	-	-	-	-	-
2a.4.6	Disposal of DAW generated	-	-	110	57	-	457	-	134	758	758	-	-	-	5,551	-	-	-	111,023	181	-
2a.4.7	Plant energy budget	-	-	-	-	-	-	2,501	375	2,876	2,876	-	-	-	-	-	-	-	-	-	-
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	Spent Fuel Pool O&M	-	-	-	-	-	-	1,224	184	1,408	-	1,408	-	-	-	-	-	-	-	-	-
2a.4.12	ISFSI Operating Costs	-	-	-	-	-	-	162	24	187	-	187	-	-	-	-	-	-	-	-	-
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	Security Staff Cost	-	-	-	-	-	-	21,881	3,282	25,164	25,164	-	-	-	-	-	-	-	-	-	325,574
2a.4.16	DOC Staff Cost	-	-	-	-	-	-	21,021	3,153	24,174	24,174	-	-	-	-	-	-	-	-	-	229,108
2a.4.17	Utility Staff Cost	-	-	-	-	-	-	27,906	4,186	32,092	32,092	-	-	-	-	-	-	-	-	-	426,562
2a.4	Subtotal Period 2a Period-Dependent Costs	112	5,982	110	57	-	457	89,944	14,268	110,931	104,810	6,121	-	-	5,551	-	-	-	111,023	181	981,244
2a.0	TOTAL PERIOD 2a COST	1,945	36,028	19,028	7,259	25,937	52,350	117,535	66,150	326,231	304,273	21,896	62	141,010	67,722	1,481	1,178	-	10,824,520	254,317	984,002
PERIOD 2b - Site Decontamination																					
Period 2b Direct Decommissioning Activities																					
Disposal of Plant Systems																					
2b.1.1.1	ALARA/Radiological	-	18	0	1	6	3	-	6	35	35	-	-	35	10	-	-	-	2,060	277	-
2b.1.1.2	Alternate N2 - RCA	-	16	0	1	16	-	-	7	40	40	-	-	93	-	-	-	-	3,765	185	-
2b.1.1.3	Decontamination Projects	-	1	0	0	0	0	-	0	2	2	-	-	2	0	-	-	-	129	17	-
2b.1.1.4	Electrical - Contaminated	-	445	6	24	400	30	-	183	1,089	1,089	-	-	2,389	90	-	-	-	102,726	6,325	-
2b.1.1.5	Electrical - Decontaminated	-	2,698	48	218	3,906	-	-	1,298	8,167	8,167	-	-	23,344	-	-	-	-	948,013	37,107	-
2b.1.1.6	Fire - RCA	-	101	1	6	103	-	-	42	253	253	-	-	614	-	-	-	-	24,917	1,324	-
2b.1.1.7	HVAC Ductwork	-	305	7	27	446	34	-	156	975	975	-	-	2,665	100	-	-	-	114,598	4,111	-
2b.1.1.8	HVAC/Chilled Water - RCA	-	324	6	26	461	-	-	155	971	971	-	-	2,752	-	-	-	-	111,779	3,985	-
2b.1.1.9	Heating & Ventilation	-	483	16	61	1,007	76	-	302	1,945	1,945	-	-	6,018	227	-	-	-	258,789	7,101	-
2b.1.1.10	Heating Boiler - Insulated - RCA	-	3	0	0	4	-	-	1	9	9	-	-	26	-	-	-	-	1,058	35	-
2b.1.1.11	Liquid Radwaste	588	687	48	63	514	586	-	703	3,188	3,188	-	-	3,073	1,728	-	-	-	235,484	17,194	-
2b.1.1.12	Makeup Demin - RCA	-	103	3	14	246	-	-	65	431	431	-	-	1,471	-	-	-	-	59,747	1,412	-
2b.1.1.13	Non-Essential Diesel Generator - RCA	-	27	3	13	238	-	-	45	327	327	-	-	1,424	-	-	-	-	57,832	395	-
2b.1.1.14	Off Gas Holdup	-	342	21	38	461	214	-	216	1,291	1,291	-	-	2,755	630	-	-	-	152,277	4,769	-
2b.1.1.15	Primary Containment	-	455	42	87	1,038	507	-	414	2,543	2,543	-	-	6,201	1,506	-	-	-	347,704	6,454	-
2b.1.1.16	Process Radiation Monitors	-	46	2	2	24	18	-	20	111	111	-	-	142	52	-	-	-	9,115	649	-

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Monticello Nuclear Generating Plant
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(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 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
Disposal of Plant Systems (continued)																					
2b.1.1.17	Rx Bldg Closed Clng Water - Insul - RCA	-	114	2	9	163	-	-	54	343	343	-	-	977	-	-	-	-	39,675	1,484	-
2b.1.1.18	Rx Bldg Closed Clng Water - RCA	-	184	15	66	1,187	-	-	235	1,687	1,687	-	-	7,093	-	-	-	-	288,031	2,489	-
2b.1.1.19	Rx Component Handling Equip	27	142	18	27	194	279	-	154	840	840	-	-	1,158	829	-	-	-	99,730	2,462	-
2b.1.1.20	Rx Pressure Vessel	28	47	6	5	13	78	-	48	225	225	-	-	75	230	-	-	-	17,816	1,051	-
2b.1.1.21	Rx Water Cleanup	172	265	19	16	22	251	-	222	965	965	-	-	130	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	Service & Seal Water - Insulated - RCA	-	120	2	11	197	-	-	62	392	392	-	-	1,180	-	-	-	-	47,917	1,565	-
2b.1.1.24	Service & Seal Water - RCA	-	159	4	17	303	-	-	88	570	570	-	-	1,809	-	-	-	-	73,453	2,016	-
2b.1.1.25	Service Air Blower - RCA	-	15	0	2	34	-	-	9	62	62	-	-	206	-	-	-	-	8,364	206	-
2b.1.1.26	Solid Radwaste	338	494	36	49	399	467	-	480	2,264	2,264	-	-	2,387	1,380	-	-	-	185,221	10,820	-
2b.1.1.27	Structures & Buildings	-	78	2	5	60	29	-	37	210	210	-	-	357	85	-	-	-	19,933	1,128	-
2b.1.1.28	Wells & Domestic Water	-	10	-	-	-	-	-	1	11	-	-	11	-	-	-	-	-	-	144	-
2b.1.1.29	Wells & Domestic Water - RCA	-	52	1	3	57	-	-	22	136	136	-	-	342	-	-	-	-	13,874	633	-
2b.1.1	Totals	1,153	7,860	315	804	11,668	2,657	-	5,107	29,563	29,552	-	11	69,735	7,859	-	-	-	3,334,244	122,835	-
2b.1.2	Scaffolding in support of decommissioning	-	2,831	28	16	239	38	-	758	3,909	3,909	-	-	1,287	114	-	-	-	65,139	28,205	-
Decontamination of Site Buildings																					
2b.1.3.1	Reactor Building	5,202	2,903	178	516	8,044	1,181	-	4,924	22,948	22,948	-	-	48,077	7,014	-	-	-	2,317,670	112,518	-
2b.1.3.2	Admin	106	6	0	3	-	15	-	59	189	189	-	-	-	145	-	-	-	6,840	1,600	-
2b.1.3.3	HPCI Room	29	28	1	3	20	14	-	29	123	123	-	-	118	125	-	-	-	10,759	789	-
2b.1.3.4	Hot Shop	17	4	0	2	-	11	-	12	46	46	-	-	-	103	-	-	-	4,860	286	-
2b.1.3.5	LLRW Storage & Shipping	58	24	2	8	5	45	-	48	191	191	-	-	31	433	-	-	-	21,708	1,127	-
2b.1.3.6	Offgas Stack	372	269	7	23	225	82	-	312	1,289	1,289	-	-	1,343	669	-	-	-	87,045	8,860	-
2b.1.3.7	Offgas Storage & Compressor	41	17	1	6	4	33	-	34	136	136	-	-	25	316	-	-	-	15,948	785	-
2b.1.3.8	Radwaste	121	61	3	17	29	96	-	107	435	435	-	-	172	910	-	-	-	49,943	2,503	-
2b.1.3.9	Radwaste Material Storage Warehouse	64	24	2	9	-	52	-	52	202	202	-	-	-	495	-	-	-	23,400	1,197	-
2b.1.3.10	Recombiner	27	25	1	5	33	24	-	32	148	148	-	-	199	216	-	-	-	18,405	695	-
2b.1.3.11	Turbine	705	353	21	104	215	564	-	632	2,594	2,594	-	-	1,283	5,299	-	-	-	303,150	14,443	-
2b.1.3.12	Turbine Building Addition	58	21	1	8	-	45	-	47	181	181	-	-	-	434	-	-	-	20,478	1,087	-
2b.1.3	Totals	6,799	3,736	218	704	8,574	2,164	-	6,288	28,483	28,483	-	-	51,247	16,159	-	-	-	2,880,206	145,889	-
2b.1.4	Prepare/submit License Termination Plan	-	-	-	-	-	-	526	79	605	605	-	-	-	-	-	-	-	-	-	4,096
2b.1.5	Receive NRC approval of termination plan									a											
2b.1	Subtotal Period 2b Activity Costs	7,952	14,427	560	1,524	20,481	4,859	526	12,232	62,561	62,549	-	11	122,269	24,132	-	-	-	6,279,589	296,929	4,096
Period 2b Additional Costs																					
2b.2.1	Operational Equipment	-	-	23	92	1,211	-	-	198	1,524	1,524	-	-	11,760	-	-	-	-	294,000	32	-
2b.2.2	Excavation of Underground Services	-	1,972	-	-	-	-	376	550	2,898	2,898	-	-	-	-	-	-	-	-	12,493	-
2b.2.3	Security Modifications	-	-	-	-	-	-	8,696	1,304	10,000	10,000	-	-	-	-	-	-	-	-	-	-
2b.2	Subtotal Period 2b Additional Costs	-	1,972	23	92	1,211	-	9,072	2,052	14,422	14,422	-	-	11,760	-	-	-	-	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	-	-	-	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	-	364	-	-	-	-	-	55	418	418	-	-	-	-	-	-	-	-	-	-
2b.3.4	Spent Fuel Capital and Transfer	-	-	-	-	-	-	117,198	17,580	134,778	-	134,778	-	-	-	-	-	-	-	-	-
2b.3.5	Retention and Severance	-	-	-	-	-	-	6,277	942	7,218	7,218	-	-	-	-	-	-	-	-	-	-
2b.3	Subtotal Period 2b Collateral Costs	199	364	178	378	-	865	123,475	18,966	144,425	9,647	134,778	-	-	1,666	-	-	-	119,165	322	-
Period 2b Period-Dependent Costs																					
2b.4.1	Decon supplies	1,440	-	-	-	-	-	-	360	1,799	1,799	-	-	-	-	-	-	-	-	-	-
2b.4.2	Insurance	-	-	-	-	-	-	742	74	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	Heavy equipment rental	-	2,711	-	-	-	-	-	407	3,117	3,117	-	-	-	-	-	-	-	-	-	-
2b.4.6	Disposal of DAW generated	-	-	101	52	-	419	-	123	694	694	-	-	-	5,084	-	-	-	101,679	166	-
2b.4.7	Plant energy budget	-	-	-	-	-	-	1,437	216	1,653	1,653	-	-	-	-	-	-	-	-	-	-
2b.4.8	NRC Fees	-	-	-	-	-	-	623	62	685	685	-	-	-	-	-	-	-	-	-	-
2b.4.9	Emergency Planning Fees	-	-	-	-	-	-	2,995	299	3,294	-	3,294	-	-	-	-	-	-	-	-	-
2b.4.10	Fixed Overhead	-	-	-	-	-	-	2,235	335	2,570	2,570	-	-	-	-	-	-	-	-	-	-
2b.4.11	Spent Fuel Pool O&M	-	-	-	-	-	-	891	134	1,024	-	1,024	-	-	-	-	-	-	-	-	-
2b.4.12	Liquid Radwaste Processing Equipment/Services	-	-	-	-	-	-	224	34	258	258	-	-	-	-	-	-	-	-	-	-
2b.4.13	ISFSI Operating Costs	-	-	-	-	-	-	118	18	136	-	136	-	-	-	-	-	-	-	-	-
2b.4.14	Railroad Track Maintenance	-	-	-	-	-	-	458	69	527	527	-	-	-	-	-	-	-	-	-	-
2b.4.15	Remedial Actions Surveys	-	-	-	-	-	-	1,182	177	1,359	1,359	-	-	-	-	-	-	-	-	-	-

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Period 2b Period-Dependent Costs (continued)																					
2b.4.16	Security Staff Cost	-	-	-	-	-	-	15,925	2,389	18,314	18,314	-	-	-	-	-	-	-	-	-	236,949
2b.4.17	DOC Staff Cost	-	-	-	-	-	-	14,772	2,216	16,988	16,988	-	-	-	-	-	-	-	-	-	160,160
2b.4.18	Utility Staff Cost	-	-	-	-	-	-	19,442	2,916	22,358	22,358	-	-	-	-	-	-	-	-	-	297,283
2b.4	Subtotal Period 2b Period-Dependent Costs	1,440	5,087	101	52	-	419	63,741	10,691	81,530	77,076	4,455	-	-	5,084	-	-	-	101,679	166	694,392
2b.0	TOTAL PERIOD 2b COST	9,591	21,850	861	2,046	21,692	6,143	196,814	43,941	302,937	163,694	139,232	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	Cranes/Heavy Loads/Rigging - RCA	-	3	0	1	17	-	-	4	25	25	-	-	103	-	-	-	-	4,184	48	-
2d.1.2.2	Electrical - Contaminated Fuel Pool	-	47	1	2	40	3	-	19	112	112	-	-	240	9	-	-	-	10,334	665	-
2d.1.2.3	Electrical - Decontam. Fuel Pool Area	-	297	5	23	411	-	-	140	876	876	-	-	2,457	-	-	-	-	99,783	4,090	-
2d.1.2.4	Fire - RCA - Fuel Pool Area	-	11	0	1	10	-	-	4	26	26	-	-	62	-	-	-	-	2,499	143	-
2d.1.2.5	Fuel Pool Cooling & Cleanup	246	428	34	37	197	455	-	382	1,781	1,781	-	-	1,179	1,341	-	-	-	133,939	8,380	-
2d.1.2.6	Fuel Pool Cooling & Cleanup - Insulated	27	41	3	3	11	40	-	36	161	161	-	-	67	117	-	-	-	10,220	848	-
2d.1.2.7	HVAC Ductwork - Fuel Pool Area	-	34	1	3	50	4	-	17	108	108	-	-	296	11	-	-	-	12,733	457	-
2d.1.2.8	HVAC/Chilled Water - RCA Fuel Pool Area	-	33	0	2	37	-	-	14	87	87	-	-	223	-	-	-	-	9,072	397	-
2d.1.2.9	Instrument & Service Air-RCA-Fuel Pool	-	29	1	2	45	-	-	14	91	91	-	-	267	-	-	-	-	10,841	357	-
2d.1.2	Totals	273	924	45	75	819	502	-	631	3,268	3,268	-	-	4,894	1,479	-	-	-	293,606	15,385	-
Decontamination of Site Buildings																					
2d.1.3.1	Reactor (Post Fuel)	946	2,599	172	913	329	10,216	-	3,880	19,056	19,056	-	-	1,969	62,698	-	-	-	2,732,406	45,703	-
2d.1.3	Totals	946	2,599	172	913	329	10,216	-	3,880	19,056	19,056	-	-	1,969	62,698	-	-	-	2,732,406	45,703	-
2d.1.4	Scaffolding in support of decommissioning	-	566	6	3	48	8	-	152	782	782	-	-	257	23	-	-	-	13,028	5,641	-
2d.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	67,635	-
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	-	-	-	504	-	-	-	30,239	98	-
2d.3.2	Process decommissioning chemical flush waste	1	-	26	84	-	193	-	64	366	366	-	-	-	249	-	-	-	26,553	47	-
2d.3.3	Small tool allowance	-	91	-	-	-	-	-	14	105	105	-	-	-	-	-	-	-	-	-	-
2d.3.4	Decommissioning Equipment Disposition	-	-	130	82	1,112	178	-	237	1,739	1,739	-	-	6,000	529	-	-	-	303,608	147	-
2d.3.5	Spent Fuel Capital and Transfer	-	-	-	-	-	-	27	4	32	-	32	-	-	-	-	-	-	-	-	-
2d.3	Subtotal Period 2d Collateral Costs	80	91	210	262	1,112	590	27	432	2,805	2,773	32	-	6,000	1,282	-	-	-	360,400	292	-
Period 2d Period-Dependent Costs																					
2d.4.1	Decon supplies	244	-	-	-	-	-	-	61	305	305	-	-	-	-	-	-	-	-	-	-
2d.4.2	Insurance	-	-	-	-	-	-	530	53	583	583	-	-	-	-	-	-	-	-	-	-
2d.4.3	Property taxes	-	-	-	-	-	-	1,662	166	1,828	1,828	-	-	-	-	-	-	-	-	-	-
2d.4.4	Health physics supplies	-	806	-	-	-	-	-	202	1,008	1,008	-	-	-	-	-	-	-	-	-	-
2d.4.5	Heavy equipment rental	-	1,936	-	-	-	-	-	290	2,227	2,227	-	-	-	-	-	-	-	-	-	-
2d.4.6	Disposal of DAW generated	-	-	40	21	-	167	-	49	277	277	-	-	-	2,030	-	-	-	40,600	66	-
2d.4.7	Plant energy budget	-	-	-	-	-	-	547	82	630	630	-	-	-	-	-	-	-	-	-	-
2d.4.8	NRC Fees	-	-	-	-	-	-	424	42	466	466	-	-	-	-	-	-	-	-	-	-
2d.4.9	Emergency Planning Fees	-	-	-	-	-	-	112	11	123	-	123	-	-	-	-	-	-	-	-	-
2d.4.10	Fixed Overhead	-	-	-	-	-	-	1,597	239	1,836	1,836	-	-	-	-	-	-	-	-	-	-
2d.4.11	Liquid Radwaste Processing Equipment/Services	-	-	-	-	-	-	320	48	368	368	-	-	-	-	-	-	-	-	-	-
2d.4.12	ISFSI Operating Costs	-	-	-	-	-	-	84	13	97	-	97	-	-	-	-	-	-	-	-	-
2d.4.13	Railroad Track Maintenance	-	-	-	-	-	-	94	14	108	108	-	-	-	-	-	-	-	-	-	-
2d.4.14	Remedial Actions Surveys	-	-	-	-	-	-	844	127	971	971	-	-	-	-	-	-	-	-	-	-
2d.4.15	Security Staff Cost	-	-	-	-	-	-	10,999	1,650	12,649	8,918	3,732	-	-	-	-	-	-	-	-	162,981
2d.4.16	DOC Staff Cost	-	-	-	-	-	-	7,311	1,097	8,408	8,408	-	-	-	-	-	-	-	-	-	78,356
2d.4.17	Utility Staff Cost	-	-	-	-	-	-	10,052	1,508	11,560	10,670	890	-	-	-	-	-	-	-	-	149,660
2d.4	Subtotal Period 2d Period-Dependent Costs	244	2,743	40	21	-	167	34,577	5,652	43,444	38,602	4,842	-	-	2,030	-	-	-	40,600	66	390,997
2d.0	TOTAL PERIOD 2d COST	2,196	6,981	576	1,422	2,308	14,055	36,062	12,202	75,803	70,930	4,873	-	13,120	75,164	-	-	-	3,926,210	67,993	403,477

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 Class A Cu. Feet	Burial Volumes Class B Cu. Feet	Burial Volumes Class C Cu. Feet	Burial Volumes GTCC Cu. Feet	Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
PERIOD 2f - License Termination																					
Period 2f Direct Decommissioning Activities																					
2f.1.1	ORISE confirmatory survey	-	-	-	-	-	-	166	50	216	216	-	-	-	-	-	-	-	-	-	-
2f.1.2	Terminate license									a											
2f.1	Subtotal Period 2f Activity Costs	-	-	-	-	-	-	166	50	216	216	-	-	-	-	-	-	-	-	-	-
Period 2f Additional Costs																					
2f.2.1	License Termination Survey	-	-	-	-	-	-	6,920	2,076	8,995	8,995	-	-	-	-	-	-	-	-	95,048	6,240
2f.2	Subtotal Period 2f Additional Costs	-	-	-	-	-	-	6,920	2,076	8,995	8,995	-	-	-	-	-	-	-	-	95,048	6,240
Period 2f Collateral Costs																					
2f.3.1	DOC staff relocation expenses	-	-	-	-	-	-	1,264	190	1,454	1,454	-	-	-	-	-	-	-	-	-	-
2f.3.2	Spent Fuel Capital and Transfer	-	-	-	-	-	-	47	7	54	-	54	-	-	-	-	-	-	-	-	-
2f.3	Subtotal Period 2f Collateral Costs	-	-	-	-	-	-	1,311	197	1,508	1,454	54	-	-	-	-	-	-	-	-	-
Period 2f Period-Dependent Costs																					
2f.4.1	Insurance	-	-	-	-	-	-	530	53	583	583	-	-	-	-	-	-	-	-	-	-
2f.4.2	Property taxes	-	-	-	-	-	-	1,471	147	1,618	1,618	-	-	-	-	-	-	-	-	-	-
2f.4.3	Health physics supplies	-	708	-	-	-	-	-	177	884	884	-	-	-	-	-	-	-	-	-	-
2f.4.4	Disposal of DAW generated	-	-	7	4	-	29	-	9	48	48	-	-	-	355	-	-	-	7,097	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	11	123	-	123	-	-	-	-	-	-	-	-	-
2f.4.8	Fixed Overhead	-	-	-	-	-	-	1,597	239	1,836	1,836	-	-	-	-	-	-	-	-	-	-
2f.4.9	ISFSI Operating Costs	-	-	-	-	-	-	84	13	97	-	97	-	-	-	-	-	-	-	-	-
2f.4.10	Railroad Track Maintenance	-	-	-	-	-	-	94	14	108	108	-	-	-	-	-	-	-	-	-	-
2f.4.11	Security Staff Cost	-	-	-	-	-	-	10,999	1,650	12,649	8,918	3,732	-	-	-	-	-	-	-	-	162,981
2f.4.12	DOC Staff Cost	-	-	-	-	-	-	5,393	809	6,201	6,201	-	-	-	-	-	-	-	-	-	57,200
2f.4.13	Utility Staff Cost	-	-	-	-	-	-	5,762	864	6,626	5,738	888	-	-	-	-	-	-	-	-	80,707
2f.4	Subtotal Period 2f Period-Dependent Costs	-	708	7	4	-	29	26,741	4,070	31,558	26,719	4,839	-	-	355	-	-	-	7,097	12	300,888
2f.0	TOTAL PERIOD 2f COST	-	708	7	4	-	29	35,137	6,392	42,277	37,383	4,894	-	-	355	-	-	-	7,097	95,059	307,128
PERIOD 2 TOTALS		13,731	65,566	20,473	10,731	49,937	72,577	385,548	128,685	747,248	576,281	170,894	73	288,160	174,123	1,481	1,178	-	21,552,260	727,310	2,393,096
PERIOD 3b - Site Restoration																					
Period 3b Direct Decommissioning Activities																					
Demolition of Remaining Site Buildings																					
3b.1.1.1	Reactor Building	-	1,971	-	-	-	-	-	296	2,267	-	-	2,267	-	-	-	-	-	-	13,911	-
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	HPCI Room	-	19	-	-	-	-	-	3	22	-	-	22	-	-	-	-	-	-	97	-
3b.1.1.5	Hot Shop	-	16	-	-	-	-	-	2	19	-	-	19	-	-	-	-	-	-	177	-
3b.1.1.6	Hydrogen & Oxygen Storage	-	2	-	-	-	-	-	0	2	-	-	2	-	-	-	-	-	-	19	-
3b.1.1.7	LLRW Storage & Shipping	-	83	-	-	-	-	-	12	95	-	-	95	-	-	-	-	-	-	662	-
3b.1.1.8	MSIV	-	4	-	-	-	-	-	1	4	-	-	4	-	-	-	-	-	-	42	-
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	Radwaste	-	228	-	-	-	-	-	34	262	-	-	262	-	-	-	-	-	-	1,220	-
3b.1.1.13	Recombiner	-	128	-	-	-	-	-	19	147	-	-	147	-	-	-	-	-	-	713	-
3b.1.1.14	Security Barrier	-	186	-	-	-	-	-	28	214	-	-	214	-	-	-	-	-	-	933	-
3b.1.1.15	Structures Greater than 3' Below Grade	-	2,461	-	-	-	-	-	369	2,830	-	-	2,830	-	-	-	-	-	-	12,649	-
3b.1.1.16	Tank Farm	-	4	-	-	-	-	-	1	5	-	-	5	-	-	-	-	-	-	21	-
3b.1.1.17	Turbine	-	1,259	-	-	-	-	-	189	1,448	-	-	1,448	-	-	-	-	-	-	13,036	-
3b.1.1.18	Turbine Building Addition	-	55	-	-	-	-	-	8	63	-	-	63	-	-	-	-	-	-	618	-
3b.1.1.19	Turbine Pedestal	-	182	-	-	-	-	-	27	209	-	-	209	-	-	-	-	-	-	926	-
3b.1.1	Totals	-	8,169	-	-	-	-	-	1,225	9,394	-	-	9,394	-	-	-	-	-	-	58,885	-
Site Closeout Activities																					
3b.1.2	Grade & landscape site	-	896	-	-	-	-	-	134	1,031	-	-	1,031	-	-	-	-	-	-	1,841	-
3b.1.3	Final report to NRC	-	-	-	-	-	-	200	30	231	231	-	-	-	-	-	-	-	-	-	1,560
3b.1	Subtotal Period 3b Activity Costs	-	9,065	-	-	-	-	200	1,390	10,655	231	-	10,425	-	-	-	-	-	-	60,726	1,560

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 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 3b Additional Costs																					
3b.2.1	Clean Concrete Disposal	-	3,322	-	-	-	-	13	500	3,835	-	-	3,835	-	-	-	-	-	-	12	-
3b.2.2	Intake Structure Cofferdam	-	335	-	-	-	-	-	50	385	-	-	385	-	-	-	-	-	-	2,584	-
3b.2.3	Construction Debris	-	-	-	-	-	-	1,170	176	1,346	-	-	1,346	-	-	-	-	-	-	-	-
3b.2.4	Backfill	-	5,583	-	-	-	-	-	837	6,421	-	-	6,421	-	-	-	-	-	-	5,422	-
3b.2.5	Discharge Structure Cofferdam	-	442	-	-	-	-	-	66	508	-	-	508	-	-	-	-	-	-	3,552	-
3b.2	Subtotal Period 3b Additional Costs	-	9,682	-	-	-	-	1,183	1,630	12,495	-	-	12,495	-	-	-	-	-	-	11,570	-
Period 3b Collateral Costs																					
3b.3.1	Small tool allowance	-	110	-	-	-	-	-	17	127	-	-	127	-	-	-	-	-	-	-	-
3b.3.2	Spent Fuel Capital and Transfer	-	-	-	-	-	-	109	16	125	-	125	-	-	-	-	-	-	-	-	-
3b.3	Subtotal Period 3b Collateral Costs	-	110	-	-	-	-	109	33	252	-	125	127	-	-	-	-	-	-	-	-
Period 3b Period-Dependent Costs																					
3b.4.1	Insurance	-	-	-	-	-	-	1,220	122	1,342	1,342	-	-	-	-	-	-	-	-	-	-
3b.4.2	Property taxes	-	-	-	-	-	-	2,543	254	2,797	-	2,797	-	-	-	-	-	-	-	-	-
3b.4.3	Heavy equipment rental	-	5,842	-	-	-	-	-	876	6,719	-	-	6,719	-	-	-	-	-	-	-	-
3b.4.4	Plant energy budget	-	-	-	-	-	-	315	47	362	-	362	-	-	-	-	-	-	-	-	-
3b.4.5	NRC ISFSI Fees	-	-	-	-	-	-	356	36	391	-	391	-	-	-	-	-	-	-	-	-
3b.4.6	Emergency Planning Fees	-	-	-	-	-	-	257	26	283	-	283	-	-	-	-	-	-	-	-	-
3b.4.7	Fixed Overhead	-	-	-	-	-	-	1,122	168	1,290	429	860	-	-	-	-	-	-	-	-	-
3b.4.8	ISFSI Operating Costs	-	-	-	-	-	-	194	29	223	-	223	-	-	-	-	-	-	-	-	-
3b.4.9	Railroad Track Maintenance	-	-	-	-	-	-	543	81	624	249	375	-	-	-	-	-	-	-	-	-
3b.4.10	Security Staff Cost	-	-	-	-	-	-	25,319	3,798	29,117	0	8,589	20,527	-	-	-	-	-	-	-	375,152
3b.4.11	DOC Staff Cost	-	-	-	-	-	-	11,729	1,759	13,489	-	-	13,489	-	-	-	-	-	-	-	122,646
3b.4.12	Utility Staff Cost	-	-	-	-	-	-	6,873	1,031	7,904	-	2,047	5,857	-	-	-	-	-	-	-	98,297
3b.4	Subtotal Period 3b Period-Dependent Costs	-	5,842	-	-	-	-	50,470	8,228	64,540	2,020	15,928	46,591	-	-	-	-	-	-	-	596,095
3b.0	TOTAL PERIOD 3b COST	-	24,700	-	-	-	-	51,962	11,280	87,942	2,251	16,053	69,638	-	-	-	-	-	-	72,296	597,655
PERIOD 3c - Fuel Storage Operations/Shipping																					
Period 3c Direct Decommissioning Activities																					
Period 3c Collateral Costs																					
3c.3.1	Spent Fuel Capital and Transfer	-	-	-	-	-	-	89,394	13,409	102,804	-	102,804	-	-	-	-	-	-	-	-	-
3c.3	Subtotal Period 3c Collateral Costs	-	-	-	-	-	-	89,394	13,409	102,804	-	102,804	-	-	-	-	-	-	-	-	-
Period 3c Period-Dependent Costs																					
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	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3c.4.4	NRC ISFSI Fees	-	-	-	-	-	-	12,359	1,236	13,595	-	13,595	-	-	-	-	-	-	-	-	-
3c.4.5	Emergency Planning Fees	-	-	-	-	-	-	7,869	787	8,655	-	8,655	-	-	-	-	-	-	-	-	-
3c.4.6	Fixed Overhead	-	-	-	-	-	-	11,431	1,715	13,146	-	13,146	-	-	-	-	-	-	-	-	-
3c.4.7	ISFSI Operating Costs	-	-	-	-	-	-	5,940	891	6,831	-	6,831	-	-	-	-	-	-	-	-	-
3c.4.8	Railroad Track Maintenance	-	-	-	-	-	-	6,636	995	7,632	-	7,632	-	-	-	-	-	-	-	-	-
3c.4.9	Security Staff Cost	-	-	-	-	-	-	228,247	34,237	262,484	-	262,484	-	-	-	-	-	-	-	-	2,870,092
3c.4.10	Utility Staff Cost	-	-	-	-	-	-	54,525	8,179	62,703	-	62,703	-	-	-	-	-	-	-	-	745,120
3c.4	Subtotal Period 3c Period-Dependent Costs	-	-	-	-	-	-	412,552	56,594	469,146	-	469,146	-	-	-	-	-	-	-	-	3,615,213
3c.0	TOTAL PERIOD 3c COST	-	-	-	-	-	-	501,946	70,003	571,949	-	571,949	-	-	-	-	-	-	-	-	3,615,213
PERIOD 3d - GTCC shipping																					
Period 3d Direct Decommissioning Activities																					
Nuclear Steam Supply System Removal																					
3d.1.1.1	Vessel & Internals GTCC Disposal	-	-	1,083	-	-	4,313	-	918	6,314	6,314	-	-	-	-	-	-	1,160	225,765	-	-
3d.1.1	Totals	-	-	1,083	-	-	4,313	-	918	6,314	6,314	-	-	-	-	-	-	1,160	225,765	-	-
3d.1	Subtotal Period 3d Activity Costs	-	-	1,083	-	-	4,313	-	918	6,314	6,314	-	-	-	-	-	-	1,160	225,765	-	-
Period 3d Collateral Costs																					
3d.3.1	Spent Fuel Capital and Transfer	-	-	-	-	-	-	28	4	32	-	32	-	-	-	-	-	-	-	-	-
3d.3	Subtotal Period 3d Collateral Costs	-	-	-	-	-	-	28	4	32	-	32	-	-	-	-	-	-	-	-	-
Period 3d Period-Dependent Costs																					
3d.4.1	Insurance	-	-	-	-	-	-	27	3	30	30	-	-	-	-	-	-	-	-	-	-

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 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 3d	Period-Dependent Costs (continued)																				
3d.4.2	Property taxes	-	-	-	-	-	-	35	3	38	38	-	-	-	-	-	-	-	-	-	-
3d.4.4	NRC ISFSI Fees	-	-	-	-	-	-	8	1	9	-	9	-	-	-	-	-	-	-	-	-
3d.4.5	Emergency Planning Fees	-	-	-	-	-	-	6	1	6	-	6	-	-	-	-	-	-	-	-	-
3d.4.6	Fixed Overhead	-	-	-	-	-	-	8	1	10	10	-	-	-	-	-	-	-	-	-	-
3d.4.7	Railroad Track Maintenance	-	-	-	-	-	-	5	1	6	6	-	-	-	-	-	-	-	-	-	-
3d.4.8	Security Staff Cost	-	-	-	-	-	-	165	25	190	190	-	-	-	-	-	-	-	-	-	2,074
3d.4.9	Utility Staff Cost	-	-	-	-	-	-	39	6	45	45	-	-	-	-	-	-	-	-	-	539
3d.4	Subtotal Period 3d Period-Dependent Costs	-	-	-	-	-	-	293	40	333	318	15	-	-	-	-	-	-	-	-	2,613
3d.0	TOTAL PERIOD 3d COST	-	-	1,083	-	-	4,313	321	962	6,678	6,632	47	-	-	-	-	-	1,160	225,765	-	2,613
PERIOD 3e - ISFSI Decontamination																					
Period 3e	Direct Decommissioning Activities																				
Period 3e	Additional Costs																				
3e.2.1	License Termination ISFSI	-	57	188	987	-	5,925	2,185	2,336	11,678	11,678	-	-	-	21,949	-	-	-	2,633,402	11,541	2,249
3e.2	Subtotal Period 3e Additional Costs	-	57	188	987	-	5,925	2,185	2,336	11,678	11,678	-	-	-	21,949	-	-	-	2,633,402	11,541	2,249
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	Plant energy budget	-	-	-	-	-	-	12	3	15	15	-	-	-	-	-	-	-	-	-	-
3e.4.4	Fixed Overhead	-	-	-	-	-	-	71	18	89	89	-	-	-	-	-	-	-	-	-	-
3e.4.5	Railroad Track Maintenance	-	-	-	-	-	-	41	10	52	52	-	-	-	-	-	-	-	-	-	-
3e.4.6	Security Staff Cost	-	-	-	-	-	-	352	88	440	440	-	-	-	-	-	-	-	-	-	4,999
3e.4.7	Utility Staff Cost	-	-	-	-	-	-	261	65	326	326	-	-	-	-	-	-	-	-	-	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	3,290	2,612	13,059	13,059	-	-	-	21,949	-	-	-	2,633,402	11,541	11,041
PERIOD 3f - ISFSI Site Restoration																					
Period 3f	Direct Decommissioning Activities																				
Period 3f	Additional Costs																				
3f.2.1	Demolition and Site Restoration of ISFSI	-	1,786	-	-	-	-	270	308	2,365	-	-	2,365	-	-	-	-	-	-	8,361	160
3f.2	Subtotal Period 3f Additional Costs	-	1,786	-	-	-	-	270	308	2,365	-	-	2,365	-	-	-	-	-	-	8,361	160
Period 3f	Collateral Costs																				
3f.3.1	Small tool allowance	-	12	-	-	-	-	-	2	14	-	-	14	-	-	-	-	-	-	-	-
3f.3	Subtotal Period 3f Collateral Costs	-	12	-	-	-	-	-	2	14	-	-	14	-	-	-	-	-	-	-	-
Period 3f	Period-Dependent Costs																				
3f.4.2	Property taxes	-	-	-	-	-	-	126	13	138	-	-	138	-	-	-	-	-	-	-	-
3f.4.3	Heavy equipment rental	-	117	-	-	-	-	-	17	134	-	-	134	-	-	-	-	-	-	-	-
3f.4.4	Plant energy budget	-	-	-	-	-	-	6	1	7	-	-	7	-	-	-	-	-	-	-	-
3f.4.5	Fixed Overhead	-	-	-	-	-	-	36	5	41	-	-	41	-	-	-	-	-	-	-	-
3f.4.6	Railroad Track Maintenance	-	-	-	-	-	-	21	3	24	-	-	24	-	-	-	-	-	-	-	-
3f.4.7	Security Staff Cost	-	-	-	-	-	-	177	27	204	-	-	204	-	-	-	-	-	-	-	2,520
3f.4.8	Utility Staff Cost	-	-	-	-	-	-	109	16	126	-	-	126	-	-	-	-	-	-	-	1,564
3f.4	Subtotal Period 3f Period-Dependent Costs	-	117	-	-	-	-	475	82	674	-	-	674	-	-	-	-	-	-	-	4,084
3f.0	TOTAL PERIOD 3f COST	-	1,915	-	-	-	-	745	393	3,053	-	-	3,053	-	-	-	-	-	-	8,361	4,244
PERIOD 3 TOTALS		-	26,671	1,271	987	-	10,238	558,264	85,250	682,682	21,942	588,049	72,691	-	21,949	-	-	1,160	2,859,167	92,198	4,230,766
TOTAL COST TO DECOMMISSION		17,263	95,526	21,839	11,878	49,952	84,523	1,098,123	238,920	1,618,023	776,355	767,892	73,776	288,203	197,270	1,711	1,178	1,160	24,474,580	851,356	7,816,376

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 Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
TOTAL COST TO DECOMMISSION WITH 17.31% CONTINGENCY:					$1,618,023	thousands of 2020 dollars															
TOTAL NRC LICENSE TERMINATION COST IS 47.87% OR:					$776,355	thousands of 2020 dollars															
SPENT FUEL MANAGEMENT COST IS 47.58% OR:					$767,892	thousands of 2020 dollars															
NON-NUCLEAR DEMOLITION COST IS 4.55% OR:					$73,776	thousands of 2020 dollars															
TOTAL LOW-LEVEL RADIOACTIVE WASTE VOLUME BURIED (EXCLUDING GTCC):					200,160	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:					851,356	Man-hours															

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

APPENDIX E

DETAILED COST ANALYSIS

SCENARIO 3: DECON with 100 Year DFS

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 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 1a - Shutdown through Transition																					
Period 1a Direct Decommissioning Activities																					
1a.1.1	Prepare preliminary decommissioning cost	-	-	-	-	-	-	167	25	192	192	-	-	-	-	-	-	-	-	-	1,300
1a.1.2	Notification of Cessation of Operations									a											
1a.1.3	Remove fuel & source material									n/a											
1a.1.4	Notification of Permanent Defueling									a											
1a.1.5	Deactivate plant systems & process waste									a											
1a.1.6	Prepare and submit PSDAR	-	-	-	-	-	-	257	39	296	296	-	-	-	-	-	-	-	-	-	2,000
1a.1.7	Review plant dwgs & specs.	-	-	-	-	-	-	591	89	680	680	-	-	-	-	-	-	-	-	-	4,600
1a.1.8	Perform detailed rad survey									a											
1a.1.9	Estimate by-product inventory	-	-	-	-	-	-	129	19	148	148	-	-	-	-	-	-	-	-	-	1,000
1a.1.10	End product description	-	-	-	-	-	-	129	19	148	148	-	-	-	-	-	-	-	-	-	1,000
1a.1.11	Detailed by-product inventory	-	-	-	-	-	-	167	25	192	192	-	-	-	-	-	-	-	-	-	1,300
1a.1.12	Define major work sequence	-	-	-	-	-	-	964	145	1,108	1,108	-	-	-	-	-	-	-	-	-	7,500
1a.1.13	Perform SER and EA	-	-	-	-	-	-	398	60	458	458	-	-	-	-	-	-	-	-	-	3,100
1a.1.14	Prepare/submit Defueled Technical Specifications	-	-	-	-	-	-	964	145	1,108	1,108	-	-	-	-	-	-	-	-	-	7,500
1a.1.15	Perform Site-Specific Cost Study	-	-	-	-	-	-	643	96	739	739	-	-	-	-	-	-	-	-	-	5,000
1a.1.16	Prepare/submit Irradiated Fuel Management Plan	-	-	-	-	-	-	129	19	148	148	-	-	-	-	-	-	-	-	-	1,000
Activity Specifications																					
1a.1.17.1	Plant & temporary facilities	-	-	-	-	-	-	632	95	727	654	-	73	-	-	-	-	-	-	-	4,920
1a.1.17.2	Plant systems	-	-	-	-	-	-	536	80	616	554	-	62	-	-	-	-	-	-	-	4,167
1a.1.17.3	NSSS Decontamination Flush	-	-	-	-	-	-	64	10	74	74	-	-	-	-	-	-	-	-	-	500
1a.1.17.4	Reactor internals	-	-	-	-	-	-	912	137	1,049	1,049	-	-	-	-	-	-	-	-	-	7,100
1a.1.17.5	Reactor vessel	-	-	-	-	-	-	835	125	961	961	-	-	-	-	-	-	-	-	-	6,500
1a.1.17.6	Sacrificial shield	-	-	-	-	-	-	64	10	74	74	-	-	-	-	-	-	-	-	-	500
1a.1.17.7	Moisture separators/reheaters	-	-	-	-	-	-	129	19	148	148	-	-	-	-	-	-	-	-	-	1,000
1a.1.17.8	Reinforced concrete	-	-	-	-	-	-	206	31	236	118	-	118	-	-	-	-	-	-	-	1,600
1a.1.17.9	Main Turbine	-	-	-	-	-	-	268	40	309	309	-	-	-	-	-	-	-	-	-	2,088
1a.1.17.10	Main Condensers	-	-	-	-	-	-	268	40	309	309	-	-	-	-	-	-	-	-	-	2,088
1a.1.17.11	Pressure suppression structure	-	-	-	-	-	-	257	39	296	296	-	-	-	-	-	-	-	-	-	2,000
1a.1.17.12	Drywell	-	-	-	-	-	-	206	31	236	236	-	-	-	-	-	-	-	-	-	1,600
1a.1.17.13	Plant structures & buildings	-	-	-	-	-	-	401	60	461	231	-	231	-	-	-	-	-	-	-	3,120
1a.1.17.14	Waste management	-	-	-	-	-	-	591	89	680	680	-	-	-	-	-	-	-	-	-	4,600
1a.1.17.15	Facility & site closeout	-	-	-	-	-	-	116	17	133	67	-	67	-	-	-	-	-	-	-	900
1a.1.17	Total	-	-	-	-	-	-	5,486	823	6,308	5,759	-	550	-	-	-	-	-	-	-	42,683
Planning & Site Preparations																					
1a.1.18	Prepare dismantling sequence	-	-	-	-	-	-	308	46	355	355	-	-	-	-	-	-	-	-	-	2,400
1a.1.19	Plant prep. & temp. svces	-	-	-	-	-	-	3,500	525	4,025	4,025	-	-	-	-	-	-	-	-	-	-
1a.1.20	Design water clean-up system	-	-	-	-	-	-	180	27	207	207	-	-	-	-	-	-	-	-	-	1,400
1a.1.21	Rigging/Cont. Cntrl Envlps/tooling/etc.	-	-	-	-	-	-	2,400	360	2,760	2,760	-	-	-	-	-	-	-	-	-	-
1a.1.22	Procure casks/liners & containers	-	-	-	-	-	-	158	24	182	182	-	-	-	-	-	-	-	-	-	1,230
1a.1	Subtotal Period 1a Activity Costs	-	-	-	-	-	-	16,569	2,485	19,054	18,505	-	550	-	-	-	-	-	-	-	83,013
Period 1a Collateral Costs																					
1a.3.1	Spent Fuel Capital and Transfer	-	-	-	-	-	-	1,323	198	1,522	-	1,522	-	-	-	-	-	-	-	-	-
1a.3.2	Retention and Severance	-	-	-	-	-	-	9,892	1,484	11,376	11,376	-	-	-	-	-	-	-	-	-	-
1a.3	Subtotal Period 1a Collateral Costs	-	-	-	-	-	-	11,215	1,682	12,897	11,376	1,522	-	-	-	-	-	-	-	-	-
Period 1a Period-Dependent Costs																					
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 physics supplies	-	614	-	-	-	-	-	153	767	767	-	-	-	-	-	-	-	-	-	-
1a.4.4	Heavy equipment rental	-	753	-	-	-	-	-	113	866	866	-	-	-	-	-	-	-	-	-	-
1a.4.5	Disposal of DAW generated	-	-	12	6	-	50	-	15	83	83	-	-	-	610	-	-	-	12,190	20	-
1a.4.6	Plant energy budget	-	-	-	-	-	-	1,817	272	2,089	2,089	-	-	-	-	-	-	-	-	-	-
1a.4.7	NRC Fees	-	-	-	-	-	-	1,137	114	1,251	1,251	-	-	-	-	-	-	-	-	-	-
1a.4.8	Emergency Planning Fees	-	-	-	-	-	-	3,428	343	3,770	-	3,770	-	-	-	-	-	-	-	-	-
1a.4.9	Fixed Overhead	-	-	-	-	-	-	2,616	392	3,009	3,009	-	-	-	-	-	-	-	-	-	-
1a.4.10	Spent Fuel Pool O&M	-	-	-	-	-	-	845	127	971	-	971	-	-	-	-	-	-	-	-	-
1a.4.11	ISFSI Operating Costs	-	-	-	-	-	-	112	17	129	-	129	-	-	-	-	-	-	-	-	-
1a.4.12	Railroad Track Maintenance	-	-	-	-	-	-	125	19	144	144	-	-	-	-	-	-	-	-	-	-
1a.4.13	Security Staff Cost	-	-	-	-	-	-	16,372	2,456	18,827	18,827	-	-	-	-	-	-	-	-	-	245,440
1a.4.14	Utility Staff Cost	-	-	-	-	-	-	27,285	4,093	31,378	31,378	-	-	-	-	-	-	-	-	-	422,240
1a.4	Subtotal Period 1a Period-Dependent Costs	-	1,367	12	6	-	50	59,634	8,703	69,772	64,902	4,870	-	-	610	-	-	-	12,190	20	667,680

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 Class A Cu. Feet	Burial Volumes Class B Cu. Feet	Burial Volumes Class C Cu. Feet	Burial Volumes GTCC Cu. Feet	Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
1a.0	TOTAL PERIOD 1a COST	-	1,367	12	6	-	50	87,418	12,871	101,724	94,783	6,392	550	-	610	-	-	-	12,190	20	750,693
PERIOD 1b - Decommissioning Preparations																					
Period 1b Direct Decommissioning Activities																					
Detailed Work Procedures																					
1b.1.1.1	Plant systems	-	-	-	-	-	-	608	91	700	630	-	70	-	-	-	-	-	-	-	4,733
1b.1.1.2	NSSS Decontamination Flush	-	-	-	-	-	-	129	19	148	148	-	-	-	-	-	-	-	-	-	1,000
1b.1.1.3	Reactor internals	-	-	-	-	-	-	514	77	591	591	-	-	-	-	-	-	-	-	-	4,000
1b.1.1.4	Remaining buildings	-	-	-	-	-	-	174	26	200	50	-	150	-	-	-	-	-	-	-	1,350
1b.1.1.5	CRD housings & NIs	-	-	-	-	-	-	129	19	148	148	-	-	-	-	-	-	-	-	-	1,000
1b.1.1.6	Incore instrumentation	-	-	-	-	-	-	129	19	148	148	-	-	-	-	-	-	-	-	-	1,000
1b.1.1.7	Removal primary containment	-	-	-	-	-	-	257	39	296	296	-	-	-	-	-	-	-	-	-	2,000
1b.1.1.8	Reactor vessel	-	-	-	-	-	-	467	70	537	537	-	-	-	-	-	-	-	-	-	3,630
1b.1.1.9	Facility closeout	-	-	-	-	-	-	154	23	177	89	-	89	-	-	-	-	-	-	-	1,200
1b.1.1.10	Sacrificial shield	-	-	-	-	-	-	154	23	177	177	-	-	-	-	-	-	-	-	-	1,200
1b.1.1.11	Reinforced concrete	-	-	-	-	-	-	129	19	148	74	-	74	-	-	-	-	-	-	-	1,000
1b.1.1.12	Main Turbine	-	-	-	-	-	-	267	40	307	307	-	-	-	-	-	-	-	-	-	2,080
1b.1.1.13	Main Condensers	-	-	-	-	-	-	268	40	309	309	-	-	-	-	-	-	-	-	-	2,088
1b.1.1.14	Moisture separators & reheaters	-	-	-	-	-	-	257	39	296	296	-	-	-	-	-	-	-	-	-	2,000
1b.1.1.15	Radwaste building	-	-	-	-	-	-	351	53	403	363	-	40	-	-	-	-	-	-	-	2,730
1b.1.1.16	Reactor building	-	-	-	-	-	-	351	53	403	363	-	40	-	-	-	-	-	-	-	2,730
1b.1.1	Total	-	-	-	-	-	-	4,336	650	4,987	4,524	-	463	-	-	-	-	-	-	-	33,741
1b.1.2	Decon NSSS	296	-	-	-	-	-	-	148	444	444	-	-	-	-	-	-	-	-	1,067	-
1b.1	Subtotal Period 1b Activity Costs	296	-	-	-	-	-	4,336	798	5,431	4,968	-	463	-	-	-	-	-	-	1,067	33,741
Period 1b Additional Costs																					
1b.2.1	Spent Fuel Pool Isolation	-	-	-	-	-	-	12,675	1,901	14,576	14,576	-	-	-	-	-	-	-	-	-	-
1b.2.2	Site Characterization	-	-	-	-	-	-	5,930	1,779	7,708	7,708	-	-	-	-	-	-	-	-	30,500	10,852
1b.2.3	Mixed & RCRA Waste	-	-	28	29	14	-	-	9	80	80	-	-	43	-	-	-	-	5,253	161	-
1b.2	Subtotal Period 1b Additional Costs	-	-	28	29	14	-	18,605	3,689	22,365	22,365	-	-	43	-	-	-	-	5,253	30,661	10,852
Period 1b Collateral Costs																					
1b.3.1	Decon equipment	1,055	-	-	-	-	-	-	158	1,213	1,213	-	-	-	-	-	-	-	-	-	-
1b.3.2	DOC staff relocation expenses	-	-	-	-	-	-	1,264	190	1,454	1,454	-	-	-	-	-	-	-	-	-	-
1b.3.3	Process decommissioning water waste	38	-	25	45	-	102	-	53	263	263	-	-	-	233	-	-	-	13,991	45	-
1b.3.4	Process decommissioning chemical flush waste	1	-	24	77	-	1,526	-	396	2,024	2,024	-	-	-	-	231	-	-	24,599	43	-
1b.3.5	Small tool allowance	-	2	-	-	-	-	-	0	2	2	-	-	-	-	-	-	-	-	-	-
1b.3.6	Pipe cutting equipment	-	1,200	-	-	-	-	-	180	1,380	1,380	-	-	-	-	-	-	-	-	-	-
1b.3.7	Decon rig	2,104	-	-	-	-	-	-	316	2,419	2,419	-	-	-	-	-	-	-	-	-	-
1b.3.8	Spent Fuel Capital and Transfer	-	-	-	-	-	-	2,742	411	3,153	-	3,153	-	-	-	-	-	-	-	-	-
1b.3.9	Retention and Severance	-	-	-	-	-	-	6,340	951	7,291	7,291	-	-	-	-	-	-	-	-	-	-
1b.3	Subtotal Period 1b Collateral Costs	3,197	1,202	49	122	-	1,628	10,346	2,655	19,198	16,046	3,153	-	-	233	231	-	-	38,589	89	-
Period 1b Period-Dependent Costs																					
1b.4.1	Decon supplies	39	-	-	-	-	-	-	10	48	48	-	-	-	-	-	-	-	-	-	-
1b.4.2	Insurance	-	-	-	-	-	-	1,161	116	1,277	1,277	-	-	-	-	-	-	-	-	-	-
1b.4.3	Property taxes	-	-	-	-	-	-	1,710	171	1,881	1,881	-	-	-	-	-	-	-	-	-	-
1b.4.4	Health physics supplies	-	344	-	-	-	-	-	86	430	430	-	-	-	-	-	-	-	-	-	-
1b.4.5	Heavy equipment rental	-	375	-	-	-	-	-	56	432	432	-	-	-	-	-	-	-	-	-	-
1b.4.6	Disposal of DAW generated	-	-	7	4	-	29	-	9	49	49	-	-	-	356	-	-	-	7,122	12	-
1b.4.7	Plant energy budget	-	-	-	-	-	-	1,812	272	2,083	2,083	-	-	-	-	-	-	-	-	-	-
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	Fixed Overhead	-	-	-	-	-	-	1,305	196	1,500	1,500	-	-	-	-	-	-	-	-	-	-
1b.4.11	Spent Fuel Pool O&M	-	-	-	-	-	-	421	63	484	-	484	-	-	-	-	-	-	-	-	-
1b.4.12	ISFSI Operating Costs	-	-	-	-	-	-	56	8	64	-	64	-	-	-	-	-	-	-	-	-
1b.4.13	Railroad Track Maintenance	-	-	-	-	-	-	62	9	72	72	-	-	-	-	-	-	-	-	-	-
1b.4.14	Security Staff Cost	-	-	-	-	-	-	8,163	1,225	9,388	9,388	-	-	-	-	-	-	-	-	-	122,384
1b.4.15	DOC Staff Cost	-	-	-	-	-	-	5,846	877	6,723	6,723	-	-	-	-	-	-	-	-	-	63,266
1b.4.16	Utility Staff Cost	-	-	-	-	-	-	13,682	2,052	15,734	15,734	-	-	-	-	-	-	-	-	-	211,579
1b.4	Subtotal Period 1b Period-Dependent Costs	39	719	7	4	-	29	35,956	5,323	42,078	39,972	2,106	-	-	356	-	-	-	7,122	12	397,229
1b.0	TOTAL PERIOD 1b COST	3,531	1,921	84	154	14	1,657	69,243	12,466	89,072	83,350	5,259	463	43	589	231	-	-	50,964	31,828	441,822
PERIOD 1 TOTALS		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	-	-	63,155	31,848	1,192,515

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 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 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	-	528	-	221	1,031	1,031	-	-	-	1,430	-	-	-	99,742	2,905	-
2a.1.1.2	Recirculation Pumps & Motors	40	63	16	51	42	539	-	186	938	938	-	-	96	945	-	-	-	112,200	1,563	-
2a.1.1.3	CRDMs & NIs Removal	194	1,020	415	135	-	1,130	-	696	3,591	3,591	-	-	-	3,741	-	-	-	213,700	17,768	-
2a.1.1.4	Reactor Vessel Internals	244	6,722	12,852	2,696	-	29,845	364	24,027	76,749	76,749	-	-	-	1,252	1,481	1,178	-	343,150	30,515	1,379
2a.1.1.5	Reactor Vessel	113	9,121	2,672	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	4,099	42	37,903	728	35,973	112,449	112,449	-	-	96	23,536	1,481	1,178	-	1,874,002	83,267	2,758
Removal of Major Equipment																					
2a.1.2	Main Turbine/Generator	-	385	1,356	521	6,139	439	-	1,341	10,182	10,182	-	-	24,835	1,383	-	-	-	1,577,959	5,438	-
2a.1.3	Main Condensers	-	1,347	360	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	Radwaste	-	25	-	-	-	-	-	4	28	28	-	-	-	-	-	-	-	-	127	-
2a.1.4.3	Turbine	-	127	-	-	-	-	-	19	146	146	-	-	-	-	-	-	-	-	1,254	-
2a.1.4	Totals	-	483	-	-	-	-	-	72	556	556	-	-	-	-	-	-	-	-	3,598	-
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	-	27	1	2	26	13	-	14	83	83	-	-	156	37	-	-	-	8,681	400	-
2a.1.5.3	Chemistry Sampling - Insulated	-	2	0	0	-	0	-	1	3	3	-	-	-	1	-	-	-	72	28	-
2a.1.5.4	Circulating Water - RCA	-	207	14	62	1,114	-	-	230	1,626	1,626	-	-	6,656	-	-	-	-	270,307	2,860	-
2a.1.5.5	Combustible Gas Control - Insul - RCA	-	29	0	2	36	-	-	13	80	80	-	-	212	-	-	-	-	8,617	378	-
2a.1.5.6	Combustible Gas Control - RCA	-	18	1	3	48	-	-	12	81	81	-	-	285	-	-	-	-	11,577	245	-
2a.1.5.7	Condensate & Feedwater	-	987	183	329	3,337	2,464	-	1,431	8,731	8,731	-	-	19,947	7,319	-	-	-	1,275,810	14,196	-
2a.1.5.8	Condensate & Feedwater - Insulated	-	492	34	63	699	408	-	343	2,038	2,038	-	-	4,176	1,207	-	-	-	246,693	6,964	-
2a.1.5.9	Condensate Demin	-	545	30	51	560	339	-	316	1,840	1,840	-	-	3,346	1,000	-	-	-	199,936	7,618	-
2a.1.5.10	Condensate Storage	-	726	33	82	1,193	270	-	444	2,748	2,748	-	-	7,131	795	-	-	-	340,568	10,345	-
2a.1.5.11	Control Rod Drive	-	3	0	0	3	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	-	79	20	51	734	176	-	184	1,244	1,244	-	-	4,384	521	-	-	-	211,329	1,163	-
2a.1.5.14	Core Spray - Insulated	-	145	8	13	137	90	-	82	474	474	-	-	818	264	-	-	-	50,149	2,033	-
2a.1.5.15	Demin Water - Insulated - RCA	-	15	0	1	14	-	-	6	36	36	-	-	85	-	-	-	-	3,445	181	-
2a.1.5.16	Demin Water - RCA	-	41	1	2	42	-	-	17	104	104	-	-	253	-	-	-	-	10,278	508	-
2a.1.5.17	Diesel Oil - RCA	-	2	0	0	4	-	-	1	7	7	-	-	23	-	-	-	-	931	25	-
2a.1.5.18	Drywell Atmosphere Cooling - RCA	-	38	1	5	92	-	-	24	159	159	-	-	548	-	-	-	-	22,244	550	-
2a.1.5.19	EDG Emerg Service Water - Insul - RCA	-	0	0	0	0	-	-	0	1	1	-	-	2	-	-	-	-	84	4	-
2a.1.5.20	Electrical - Clean	-	13	-	-	-	-	-	2	15	-	-	15	-	-	-	-	-	-	182	-
2a.1.5.21	Emergency Service Water - Insul - RCA	-	21	0	1	23	-	-	9	55	55	-	-	137	-	-	-	-	5,544	281	-
2a.1.5.22	Emergency Service Water - RCA	-	2	0	0	2	-	-	1	5	5	-	-	13	-	-	-	-	512	22	-
2a.1.5.23	GEZIP - RCA	-	3	0	1	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	-	6	0	0	1	5	-	3	15	15	-	-	6	13	-	-	-	1,080	81	-
2a.1.5.26	H2-O2 Control Analyzing - Insulated	-	6	0	0	1	5	-	3	15	15	-	-	6	13	-	-	-	1,080	81	-
2a.1.5.27	High Pressure Coolant Injection	-	67	6	13	163	70	-	61	381	381	-	-	972	209	-	-	-	52,792	966	-
2a.1.5.28	High Pressure Coolant Injection - Insula	-	219	14	24	267	163	-	141	830	830	-	-	1,598	481	-	-	-	95,733	3,079	-
2a.1.5.29	Hydrogen Cooling	-	8	-	-	-	-	-	1	10	-	-	10	-	-	-	-	-	-	118	-
2a.1.5.30	Hydrogen Cooling - RCA	-	7	0	0	7	-	-	3	17	17	-	-	39	-	-	-	-	1,600	79	-
2a.1.5.31	Hydrogen Seal Oil - RCA	-	17	0	2	32	-	-	9	60	60	-	-	189	-	-	-	-	7,669	212	-
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	296	-	-	103	644	644	-	-	1,768	-	-	-	-	71,810	2,733	-
2a.1.5.34	Main Condenser	-	196	12	20	223	139	-	122	712	712	-	-	1,333	411	-	-	-	80,439	2,746	-
2a.1.5.35	Main Steam	-	249	17	32	359	201	-	173	1,029	1,029	-	-	2,148	594	-	-	-	125,135	3,512	-
2a.1.5.36	Main Turbine	-	1,012	205	353	3,306	2,921	-	1,553	9,350	9,350	-	-	19,760	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	-	-	-	145,298	3,069	-
2a.1.5.38	Miscellaneous	-	43	1	3	51	-	-	19	115	115	-	-	302	-	-	-	-	12,283	622	-
2a.1.5.39	Off Gas Recombiner	-	189	19	32	300	257	-	163	960	960	-	-	1,795	764	-	-	-	121,554	2,708	-
2a.1.5.40	Off Gas Recombiner - Insulated	-	387	19	27	229	240	-	197	1,100	1,100	-	-	1,366	709	-	-	-	100,933	5,385	-
2a.1.5.41	Post Accident Sampling	-	25	1	1	9	11	-	11	58	58	-	-	53	33	-	-	-	4,318	345	-
2a.1.5.42	Post Accident Sampling - Insulated	-	17	1	1	3	13	-	8	43	43	-	-	17	37	-	-	-	3,116	212	-
2a.1.5.43	RHR Service Water - Insulated - RCA	-	83	3	14	248	-	-	60	409	409	-	-	1,485	-	-	-	-	60,293	1,125	-
2a.1.5.44	RHR Service Water - RCA	-	4	0	0	6	-	-	2	12	12	-	-	35	-	-	-	-	1,410	57	-
2a.1.5.45	Reactor Feedwater Pump Seal	-	56	2	4	32	33	-	28	155	155	-	-	193	96	-	-	-	14,009	773	-

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 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
Disposal of Plant Systems (continued)																					
2a.1.5.46	Residual Heat Removal	362	252	172	178	1,072	2,051	-	962	5,049	5,049	-	-	6,406	6,012	-	-	-	647,941	4,135	-
2a.1.5.47	Residual Heat Removal - Insulated	622	554	61	82	563	880	-	772	3,535	3,535	-	-	3,367	2,607	-	-	-	303,087	10,340	-
2a.1.5.48	Rx Core Isolation Cooling	-	49	2	4	43	26	-	26	150	150	-	-	259	76	-	-	-	15,396	691	-
2a.1.5.49	Rx Core Isolation Cooling - Insulated	-	107	5	7	48	67	-	52	287	287	-	-	288	198	-	-	-	24,419	1,479	-
2a.1.5.50	Rx Recirculation	56	58	6	4	7	65	-	61	258	258	-	-	43	190	-	-	-	14,095	1,580	-
2a.1.5.51	Snubbers	-	169	2	5	63	30	-	60	331	331	-	-	377	90	-	-	-	21,009	2,548	-
2a.1.5.52	Standby Liquid Control - Insul - RCA	-	4	0	0	4	-	-	2	9	9	-	-	22	-	-	-	-	904	48	-
2a.1.5.53	Standby Liquid Control - RCA	-	26	1	2	41	-	-	13	83	83	-	-	245	-	-	-	-	9,969	341	-
2a.1.5.54	Stator Cooling - RCA	-	7	0	1	21	-	-	5	35	35	-	-	126	-	-	-	-	5,135	98	-
2a.1.5.55	Traversing Incore Probe	0	4	0	0	0	2	-	1	7	7	-	-	1	5	-	-	-	386	51	-
2a.1.5	Totals	1,040	8,221	924	1,572	16,339	11,425	-	8,209	47,730	47,706	-	24	97,654	33,808	-	-	-	6,125,515	119,943	-
2a.1.6	Scaffolding in support of decommissioning	-	2,265	22	12	191	31	-	607	3,127	3,127	-	-	1,030	91	-	-	-	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	180,360	180,336	-	24	141,010	59,545	1,481	1,178	-	10,458,540	253,640	2,758
Period 2a Collateral Costs																					
2a.3.1	Process decommissioning water waste	85	-	57	102	-	232	-	122	598	598	-	-	-	532	-	-	-	31,942	104	-
2a.3.2	Process decommissioning chemical flush waste	5	-	216	702	-	1,619	-	534	3,077	3,077	-	-	-	2,093	-	-	-	223,008	392	-
2a.3.3	Small tool allowance	-	324	-	-	-	-	-	49	373	336	-	37	-	-	-	-	-	-	-	-
2a.3.4	Spent Fuel Capital and Transfer	-	-	-	-	-	-	24,169	3,625	27,795	-	27,795	-	-	-	-	-	-	-	-	-
2a.3.5	Retention and Severance	-	-	-	-	-	-	13,145	1,972	15,117	15,117	-	-	-	-	-	-	-	-	-	-
2a.3	Subtotal Period 2a Collateral Costs	91	324	274	804	-	1,851	37,314	6,302	46,959	19,127	27,795	37	-	2,625	-	-	-	254,950	495	-
Period 2a Period-Dependent Costs																					
2a.4.1	Decon supplies	112	-	-	-	-	-	-	28	140	140	-	-	-	-	-	-	-	-	-	-
2a.4.2	Insurance	-	-	-	-	-	-	1,019	102	1,121	1,121	-	-	-	-	-	-	-	-	-	-
2a.4.3	Property taxes	-	-	-	-	-	-	4,383	438	4,821	4,821	-	-	-	-	-	-	-	-	-	-
2a.4.4	Health physics supplies	-	2,356	-	-	-	-	-	589	2,945	2,945	-	-	-	-	-	-	-	-	-	-
2a.4.5	Heavy equipment rental	-	3,627	-	-	-	-	-	544	4,171	4,171	-	-	-	-	-	-	-	-	-	-
2a.4.6	Disposal of DAW generated	-	-	110	57	-	457	-	134	758	758	-	-	-	5,551	-	-	-	111,023	181	-
2a.4.7	Plant energy budget	-	-	-	-	-	-	2,501	375	2,876	2,876	-	-	-	-	-	-	-	-	-	-
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	Spent Fuel Pool O&M	-	-	-	-	-	-	1,224	184	1,408	-	1,408	-	-	-	-	-	-	-	-	-
2a.4.12	ISFSI Operating Costs	-	-	-	-	-	-	162	24	187	-	187	-	-	-	-	-	-	-	-	-
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	Security Staff Cost	-	-	-	-	-	-	21,881	3,282	25,164	25,164	-	-	-	-	-	-	-	-	-	325,574
2a.4.16	DOC Staff Cost	-	-	-	-	-	-	21,021	3,153	24,174	24,174	-	-	-	-	-	-	-	-	-	229,108
2a.4.17	Utility Staff Cost	-	-	-	-	-	-	27,906	4,186	32,092	32,092	-	-	-	-	-	-	-	-	-	426,562
2a.4	Subtotal Period 2a Period-Dependent Costs	112	5,982	110	57	-	457	89,944	14,268	110,931	104,810	6,121	-	-	5,551	-	-	-	111,023	181	981,244
2a.0	TOTAL PERIOD 2a COST	1,945	36,028	19,028	7,259	25,937	52,350	127,987	67,717	338,250	304,273	33,915	62	141,010	67,722	1,481	1,178	-	10,824,520	254,317	984,002
PERIOD 2b - Site Decontamination																					
Period 2b Direct Decommissioning Activities																					
Disposal of Plant Systems																					
2b.1.1.1	ALARA/Radiological	-	18	0	1	6	3	-	6	35	35	-	-	35	10	-	-	-	2,060	277	-
2b.1.1.2	Alternate N2 - RCA	-	16	0	1	16	-	-	7	40	40	-	-	93	-	-	-	-	3,765	185	-
2b.1.1.3	Decontamination Projects	-	1	0	0	0	0	-	0	2	2	-	-	2	0	-	-	-	129	17	-
2b.1.1.4	Electrical - Contaminated	-	445	6	24	400	30	-	183	1,089	1,089	-	-	2,389	90	-	-	-	102,726	6,325	-
2b.1.1.5	Electrical - Decontaminated	-	2,698	48	218	3,906	-	-	1,298	8,167	8,167	-	-	23,344	-	-	-	-	948,013	37,107	-
2b.1.1.6	Fire - RCA	-	101	1	6	103	-	-	42	253	253	-	-	614	-	-	-	-	24,917	1,324	-
2b.1.1.7	HVAC Ductwork	-	305	7	27	446	34	-	156	975	975	-	-	2,665	100	-	-	-	114,598	4,111	-
2b.1.1.8	HVAC/Chilled Water - RCA	-	324	6	26	461	-	-	155	971	971	-	-	2,752	-	-	-	-	111,779	3,985	-
2b.1.1.9	Heating & Ventilation	-	483	16	61	1,007	76	-	302	1,945	1,945	-	-	6,018	227	-	-	-	258,789	7,101	-
2b.1.1.10	Heating Boiler - Insulated - RCA	-	3	0	0	4	-	-	1	9	9	-	-	26	-	-	-	-	1,058	35	-
2b.1.1.11	Liquid Radwaste	588	687	48	63	514	586	-	703	3,188	3,188	-	-	3,073	1,728	-	-	-	235,484	17,194	-
2b.1.1.12	Makeup Demin - RCA	-	103	3	14	246	-	-	65	431	431	-	-	1,471	-	-	-	-	59,747	1,412	-
2b.1.1.13	Non-Essential Diesel Generator - RCA	-	27	3	13	238	-	-	45	327	327	-	-	1,424	-	-	-	-	57,832	395	-
2b.1.1.14	Off Gas Holdup	-	342	21	38	461	214	-	216	1,291	1,291	-	-	2,755	630	-	-	-	152,277	4,769	-
2b.1.1.15	Primary Containment	-	455	42	87	1,038	507	-	414	2,543	2,543	-	-	6,201	1,506	-	-	-	347,704	6,454	-
2b.1.1.16	Process Radiation Monitors	-	46	2	2	24	18	-	20	111	111	-	-	142	52	-	-	-	9,115	649	-

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 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
Disposal of Plant Systems (continued)																					
2b.1.1.17	Rx Bldg Closed Clng Water - Insul - RCA	-	114	2	9	163	-	-	54	343	343	-	-	977	-	-	-	-	39,675	1,484	-
2b.1.1.18	Rx Bldg Closed Clng Water - RCA	-	184	15	66	1,187	-	-	235	1,687	1,687	-	-	7,093	-	-	-	-	288,031	2,489	-
2b.1.1.19	Rx Component Handling Equip	27	142	18	27	194	279	-	154	840	840	-	-	1,158	829	-	-	-	99,730	2,462	-
2b.1.1.20	Rx Pressure Vessel	28	47	6	5	13	78	-	48	225	225	-	-	75	230	-	-	-	17,816	1,051	-
2b.1.1.21	Rx Water Cleanup	172	265	19	16	22	251	-	222	965	965	-	-	130	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	Service & Seal Water - Insulated - RCA	-	120	2	11	197	-	-	62	392	392	-	-	1,180	-	-	-	-	47,917	1,565	-
2b.1.1.24	Service & Seal Water - RCA	-	159	4	17	303	-	-	88	570	570	-	-	1,809	-	-	-	-	73,453	2,016	-
2b.1.1.25	Service Air Blower - RCA	-	15	0	2	34	-	-	9	62	62	-	-	206	-	-	-	-	8,364	206	-
2b.1.1.26	Solid Radwaste	338	494	36	49	399	467	-	480	2,264	2,264	-	-	2,387	1,380	-	-	-	185,221	10,820	-
2b.1.1.27	Structures & Buildings	-	78	2	5	60	29	-	37	210	210	-	-	357	85	-	-	-	19,933	1,128	-
2b.1.1.28	Wells & Domestic Water	-	10	-	-	-	-	-	1	11	-	-	11	-	-	-	-	-	-	144	-
2b.1.1.29	Wells & Domestic Water - RCA	-	52	1	3	57	-	-	22	136	136	-	-	342	-	-	-	-	13,874	633	-
2b.1.1	Totals	1,153	7,860	315	804	11,668	2,657	-	5,107	29,563	29,552	-	11	69,735	7,859	-	-	-	3,334,244	122,835	-
2b.1.2	Scaffolding in support of decommissioning	-	2,831	28	16	239	38	-	758	3,909	3,909	-	-	1,287	114	-	-	-	65,139	28,205	-
Decontamination of Site Buildings																					
2b.1.3.1	Reactor Building	5,202	2,903	178	516	8,044	1,181	-	4,924	22,948	22,948	-	-	48,077	7,014	-	-	-	2,317,670	112,518	-
2b.1.3.2	Admin	106	6	0	3	-	15	-	59	189	189	-	-	-	145	-	-	-	6,840	1,600	-
2b.1.3.3	HPCI Room	29	28	1	3	20	14	-	29	123	123	-	-	118	125	-	-	-	10,759	789	-
2b.1.3.4	Hot Shop	17	4	0	2	-	11	-	12	46	46	-	-	-	103	-	-	-	4,860	286	-
2b.1.3.5	LLRW Storage & Shipping	58	24	2	8	5	45	-	48	191	191	-	-	31	433	-	-	-	21,708	1,127	-
2b.1.3.6	Offgas Stack	372	269	7	23	225	82	-	312	1,289	1,289	-	-	1,343	669	-	-	-	87,045	8,860	-
2b.1.3.7	Offgas Storage & Compressor	41	17	1	6	4	33	-	34	136	136	-	-	25	316	-	-	-	15,948	785	-
2b.1.3.8	Radwaste	121	61	3	17	29	96	-	107	435	435	-	-	172	910	-	-	-	49,943	2,503	-
2b.1.3.9	Radwaste Material Storage Warehouse	64	24	2	9	-	52	-	52	202	202	-	-	-	495	-	-	-	23,400	1,197	-
2b.1.3.10	Recombiner	27	25	1	5	33	24	-	32	148	148	-	-	199	216	-	-	-	18,405	695	-
2b.1.3.11	Turbine	705	353	21	104	215	564	-	632	2,594	2,594	-	-	1,283	5,299	-	-	-	303,150	14,443	-
2b.1.3.12	Turbine Building Addition	58	21	1	8	-	45	-	47	181	181	-	-	-	434	-	-	-	20,478	1,087	-
2b.1.3	Totals	6,799	3,736	218	704	8,574	2,164	-	6,288	28,483	28,483	-	-	51,247	16,159	-	-	-	2,880,206	145,889	-
2b.1.4	Prepare/submit License Termination Plan	-	-	-	-	-	-	526	79	605	605	-	-	-	-	-	-	-	-	-	4,096
2b.1.5	Receive NRC approval of termination plan									a											
2b.1	Subtotal Period 2b Activity Costs	7,952	14,427	560	1,524	20,481	4,859	526	12,232	62,561	62,549	-	11	122,269	24,132	-	-	-	6,279,589	296,929	4,096
Period 2b Additional Costs																					
2b.2.1	Operational Equipment	-	-	23	92	1,211	-	-	198	1,524	1,524	-	-	11,760	-	-	-	-	294,000	32	-
2b.2.2	Excavation of Underground Services	-	1,972	-	-	-	-	376	550	2,898	2,898	-	-	-	-	-	-	-	-	12,493	-
2b.2.3	Security Modifications	-	-	-	-	-	-	8,696	1,304	10,000	10,000	-	-	-	-	-	-	-	-	-	-
2b.2	Subtotal Period 2b Additional Costs	-	1,972	23	92	1,211	-	9,072	2,052	14,422	14,422	-	-	11,760	-	-	-	-	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	-	-	-	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	-	364	-	-	-	-	-	55	418	418	-	-	-	-	-	-	-	-	-	-
2b.3.4	Spent Fuel Capital and Transfer	-	-	-	-	-	-	117,198	17,580	134,778	-	134,778	-	-	-	-	-	-	-	-	-
2b.3.5	Retention and Severance	-	-	-	-	-	-	6,277	942	7,218	7,218	-	-	-	-	-	-	-	-	-	-
2b.3	Subtotal Period 2b Collateral Costs	199	364	178	378	-	865	123,475	18,966	144,425	9,647	134,778	-	-	1,666	-	-	-	119,165	322	-
Period 2b Period-Dependent Costs																					
2b.4.1	Decon supplies	1,440	-	-	-	-	-	-	360	1,799	1,799	-	-	-	-	-	-	-	-	-	-
2b.4.2	Insurance	-	-	-	-	-	-	742	74	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	Heavy equipment rental	-	2,711	-	-	-	-	-	407	3,117	3,117	-	-	-	-	-	-	-	-	-	-
2b.4.6	Disposal of DAW generated	-	-	101	52	-	419	-	123	694	694	-	-	-	5,084	-	-	-	101,679	166	-
2b.4.7	Plant energy budget	-	-	-	-	-	-	1,437	216	1,653	1,653	-	-	-	-	-	-	-	-	-	-
2b.4.8	NRC Fees	-	-	-	-	-	-	623	62	685	685	-	-	-	-	-	-	-	-	-	-
2b.4.9	Emergency Planning Fees	-	-	-	-	-	-	2,995	299	3,294	-	3,294	-	-	-	-	-	-	-	-	-
2b.4.10	Fixed Overhead	-	-	-	-	-	-	2,235	335	2,570	2,570	-	-	-	-	-	-	-	-	-	-
2b.4.11	Spent Fuel Pool O&M	-	-	-	-	-	-	891	134	1,024	-	1,024	-	-	-	-	-	-	-	-	-
2b.4.12	Liquid Radwaste Processing Equipment/Services	-	-	-	-	-	-	224	34	258	258	-	-	-	-	-	-	-	-	-	-
2b.4.13	ISFSI Operating Costs	-	-	-	-	-	-	118	18	136	-	136	-	-	-	-	-	-	-	-	-
2b.4.14	Railroad Track Maintenance	-	-	-	-	-	-	458	69	527	527	-	-	-	-	-	-	-	-	-	-
2b.4.15	Remedial Actions Surveys	-	-	-	-	-	-	1,182	177	1,359	1,359	-	-	-	-	-	-	-	-	-	-

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 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 Period-Dependent Costs (continued)																					
2b.4.16	Security Staff Cost	-	-	-	-	-	-	15,925	2,389	18,314	18,314	-	-	-	-	-	-	-	-	-	236,949
2b.4.17	DOC Staff Cost	-	-	-	-	-	-	14,772	2,216	16,988	16,988	-	-	-	-	-	-	-	-	-	160,160
2b.4.18	Utility Staff Cost	-	-	-	-	-	-	19,442	2,916	22,358	22,358	-	-	-	-	-	-	-	-	-	297,283
2b.4	Subtotal Period 2b Period-Dependent Costs	1,440	5,087	101	52	-	419	63,741	10,691	81,530	77,076	4,455	-	-	5,084	-	-	-	101,679	166	694,392
2b.0	TOTAL PERIOD 2b COST	9,591	21,850	861	2,046	21,692	6,143	196,814	43,941	302,937	163,694	139,232	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	Cranes/Heavy Loads/Rigging - RCA	-	3	0	1	17	-	-	4	25	25	-	-	103	-	-	-	-	4,184	48	-
2d.1.2.2	Electrical - Contaminated Fuel Pool	-	47	1	2	40	3	-	19	112	112	-	-	240	9	-	-	-	10,334	665	-
2d.1.2.3	Electrical - Decontam. Fuel Pool Area	-	297	5	23	411	-	-	140	876	876	-	-	2,457	-	-	-	-	99,783	4,090	-
2d.1.2.4	Fire - RCA - Fuel Pool Area	-	11	0	1	10	-	-	4	26	26	-	-	62	-	-	-	-	2,499	143	-
2d.1.2.5	Fuel Pool Cooling & Cleanup	246	428	34	37	197	455	-	382	1,781	1,781	-	-	1,179	1,341	-	-	-	133,939	8,380	-
2d.1.2.6	Fuel Pool Cooling & Cleanup - Insulated	27	41	3	3	11	40	-	36	161	161	-	-	67	117	-	-	-	10,220	848	-
2d.1.2.7	HVAC Ductwork - Fuel Pool Area	-	34	1	3	50	4	-	17	108	108	-	-	296	11	-	-	-	12,733	457	-
2d.1.2.8	HVAC/Chilled Water - RCA Fuel Pool Area	-	33	0	2	37	-	-	14	87	87	-	-	223	-	-	-	-	9,072	397	-
2d.1.2.9	Instrument & Service Air-RCA-Fuel Pool	-	29	1	2	45	-	-	14	91	91	-	-	267	-	-	-	-	10,841	357	-
2d.1.2	Totals	273	924	45	75	819	502	-	631	3,268	3,268	-	-	4,894	1,479	-	-	-	293,606	15,385	-
Decontamination of Site Buildings																					
2d.1.3.1	Reactor (Post Fuel)	946	2,599	172	913	329	10,216	-	3,880	19,056	19,056	-	-	1,969	62,698	-	-	-	2,732,406	45,703	-
2d.1.3	Totals	946	2,599	172	913	329	10,216	-	3,880	19,056	19,056	-	-	1,969	62,698	-	-	-	2,732,406	45,703	-
2d.1.4	Scaffolding in support of decommissioning	-	566	6	3	48	8	-	152	782	782	-	-	257	23	-	-	-	13,028	5,641	-
2d.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	67,635	-
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	-	-	-	504	-	-	-	30,239	98	-
2d.3.2	Process decommissioning chemical flush waste	1	-	26	84	-	193	-	64	366	366	-	-	-	249	-	-	-	26,553	47	-
2d.3.3	Small tool allowance	-	91	-	-	-	-	-	14	105	105	-	-	-	-	-	-	-	-	-	-
2d.3.4	Decommissioning Equipment Disposition	-	-	130	82	1,112	178	-	237	1,739	1,739	-	-	6,000	529	-	-	-	303,608	147	-
2d.3.5	Spent Fuel Capital and Transfer	-	-	-	-	-	-	27	4	32	-	32	-	-	-	-	-	-	-	-	-
2d.3	Subtotal Period 2d Collateral Costs	80	91	210	262	1,112	590	27	432	2,805	2,773	32	-	6,000	1,282	-	-	-	360,400	292	-
Period 2d Period-Dependent Costs																					
2d.4.1	Decon supplies	244	-	-	-	-	-	-	61	305	305	-	-	-	-	-	-	-	-	-	-
2d.4.2	Insurance	-	-	-	-	-	-	530	53	583	583	-	-	-	-	-	-	-	-	-	-
2d.4.3	Property taxes	-	-	-	-	-	-	1,662	166	1,828	1,828	-	-	-	-	-	-	-	-	-	-
2d.4.4	Health physics supplies	-	806	-	-	-	-	-	202	1,008	1,008	-	-	-	-	-	-	-	-	-	-
2d.4.5	Heavy equipment rental	-	1,936	-	-	-	-	-	290	2,227	2,227	-	-	-	-	-	-	-	-	-	-
2d.4.6	Disposal of DAW generated	-	-	40	21	-	167	-	49	277	277	-	-	-	2,030	-	-	-	40,600	66	-
2d.4.7	Plant energy budget	-	-	-	-	-	-	547	82	630	630	-	-	-	-	-	-	-	-	-	-
2d.4.8	NRC Fees	-	-	-	-	-	-	424	42	466	466	-	-	-	-	-	-	-	-	-	-
2d.4.9	Emergency Planning Fees	-	-	-	-	-	-	112	11	123	-	123	-	-	-	-	-	-	-	-	-
2d.4.10	Fixed Overhead	-	-	-	-	-	-	1,597	239	1,836	1,836	-	-	-	-	-	-	-	-	-	-
2d.4.11	Liquid Radwaste Processing Equipment/Services	-	-	-	-	-	-	320	48	368	368	-	-	-	-	-	-	-	-	-	-
2d.4.12	ISFSI Operating Costs	-	-	-	-	-	-	84	13	97	-	97	-	-	-	-	-	-	-	-	-
2d.4.13	Railroad Track Maintenance	-	-	-	-	-	-	94	14	108	108	-	-	-	-	-	-	-	-	-	-
2d.4.14	Remedial Actions Surveys	-	-	-	-	-	-	844	127	971	971	-	-	-	-	-	-	-	-	-	-
2d.4.15	Security Staff Cost	-	-	-	-	-	-	10,999	1,650	12,649	8,918	3,732	-	-	-	-	-	-	-	-	162,981
2d.4.16	DOC Staff Cost	-	-	-	-	-	-	7,311	1,097	8,408	8,408	-	-	-	-	-	-	-	-	-	78,356
2d.4.17	Utility Staff Cost	-	-	-	-	-	-	10,052	1,508	11,560	10,670	890	-	-	-	-	-	-	-	-	149,660
2d.4	Subtotal Period 2d Period-Dependent Costs	244	2,743	40	21	-	167	34,577	5,652	43,444	38,602	4,842	-	-	2,030	-	-	-	40,600	66	390,997
2d.0	TOTAL PERIOD 2d COST	2,196	6,981	576	1,422	2,308	14,055	36,062	12,202	75,803	70,930	4,873	-	13,120	75,164	-	-	-	3,926,210	67,993	403,477

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 Class A Cu. Feet	Burial Volumes Class B Cu. Feet	Burial Volumes Class C Cu. Feet	Burial Volumes GTCC Cu. Feet	Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
PERIOD 2f - License Termination																					
Period 2f Direct Decommissioning Activities																					
2f.1.1	ORISE confirmatory survey	-	-	-	-	-	-	166	50	216	216	-	-	-	-	-	-	-	-	-	-
2f.1.2	Terminate license									a											
2f.1	Subtotal Period 2f Activity Costs	-	-	-	-	-	-	166	50	216	216	-	-	-	-	-	-	-	-	-	-
Period 2f Additional Costs																					
2f.2.1	License Termination Survey	-	-	-	-	-	-	6,920	2,076	8,995	8,995	-	-	-	-	-	-	-	-	95,048	6,240
2f.2	Subtotal Period 2f Additional Costs	-	-	-	-	-	-	6,920	2,076	8,995	8,995	-	-	-	-	-	-	-	-	95,048	6,240
Period 2f Collateral Costs																					
2f.3.1	DOC staff relocation expenses	-	-	-	-	-	-	1,264	190	1,454	1,454	-	-	-	-	-	-	-	-	-	-
2f.3.2	Spent Fuel Capital and Transfer	-	-	-	-	-	-	47	7	54	-	54	-	-	-	-	-	-	-	-	-
2f.3	Subtotal Period 2f Collateral Costs	-	-	-	-	-	-	1,311	197	1,508	1,454	54	-	-	-	-	-	-	-	-	-
Period 2f Period-Dependent Costs																					
2f.4.1	Insurance	-	-	-	-	-	-	530	53	583	583	-	-	-	-	-	-	-	-	-	-
2f.4.2	Property taxes	-	-	-	-	-	-	1,471	147	1,618	1,618	-	-	-	-	-	-	-	-	-	-
2f.4.3	Health physics supplies	-	708	-	-	-	-	-	177	884	884	-	-	-	-	-	-	-	-	-	-
2f.4.4	Disposal of DAW generated	-	-	7	4	-	29	-	9	48	48	-	-	-	355	-	-	-	7,097	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	11	123	-	123	-	-	-	-	-	-	-	-	-
2f.4.8	Fixed Overhead	-	-	-	-	-	-	1,597	239	1,836	1,836	-	-	-	-	-	-	-	-	-	-
2f.4.9	ISFSI Operating Costs	-	-	-	-	-	-	84	13	97	-	97	-	-	-	-	-	-	-	-	-
2f.4.10	Railroad Track Maintenance	-	-	-	-	-	-	94	14	108	108	-	-	-	-	-	-	-	-	-	-
2f.4.11	Security Staff Cost	-	-	-	-	-	-	10,999	1,650	12,649	8,918	3,732	-	-	-	-	-	-	-	-	162,981
2f.4.12	DOC Staff Cost	-	-	-	-	-	-	5,393	809	6,201	6,201	-	-	-	-	-	-	-	-	-	57,200
2f.4.13	Utility Staff Cost	-	-	-	-	-	-	5,762	864	6,626	5,738	888	-	-	-	-	-	-	-	-	80,707
2f.4	Subtotal Period 2f Period-Dependent Costs	-	708	7	4	-	29	26,741	4,070	31,558	26,719	4,839	-	-	355	-	-	-	7,097	12	300,888
2f.0	TOTAL PERIOD 2f COST	-	708	7	4	-	29	35,137	6,392	42,277	37,383	4,894	-	-	355	-	-	-	7,097	95,059	307,128
PERIOD 2 TOTALS		13,731	65,566	20,473	10,731	49,937	72,577	396,000	130,253	759,268	576,281	182,914	73	288,160	174,123	1,481	1,178	-	21,552,260	727,310	2,393,096
PERIOD 3b - Site Restoration																					
Period 3b Direct Decommissioning Activities																					
Demolition of Remaining Site Buildings																					
3b.1.1.1	Reactor Building	-	1,971	-	-	-	-	-	296	2,267	-	-	2,267	-	-	-	-	-	-	13,911	-
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	HPCI Room	-	19	-	-	-	-	-	3	22	-	-	22	-	-	-	-	-	-	97	-
3b.1.1.5	Hot Shop	-	16	-	-	-	-	-	2	19	-	-	19	-	-	-	-	-	-	177	-
3b.1.1.6	Hydrogen & Oxygen Storage	-	2	-	-	-	-	-	0	2	-	-	2	-	-	-	-	-	-	19	-
3b.1.1.7	LLRW Storage & Shipping	-	83	-	-	-	-	-	12	95	-	-	95	-	-	-	-	-	-	662	-
3b.1.1.8	MSIV	-	4	-	-	-	-	-	1	4	-	-	4	-	-	-	-	-	-	42	-
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	Radwaste	-	228	-	-	-	-	-	34	262	-	-	262	-	-	-	-	-	-	1,220	-
3b.1.1.13	Recombiner	-	128	-	-	-	-	-	19	147	-	-	147	-	-	-	-	-	-	713	-
3b.1.1.14	Security Barrier	-	186	-	-	-	-	-	28	214	-	-	214	-	-	-	-	-	-	933	-
3b.1.1.15	Structures Greater than 3' Below Grade	-	2,461	-	-	-	-	-	369	2,830	-	-	2,830	-	-	-	-	-	-	12,649	-
3b.1.1.16	Tank Farm	-	4	-	-	-	-	-	1	5	-	-	5	-	-	-	-	-	-	21	-
3b.1.1.17	Turbine	-	1,259	-	-	-	-	-	189	1,448	-	-	1,448	-	-	-	-	-	-	13,036	-
3b.1.1.18	Turbine Building Addition	-	55	-	-	-	-	-	8	63	-	-	63	-	-	-	-	-	-	618	-
3b.1.1.19	Turbine Pedestal	-	182	-	-	-	-	-	27	209	-	-	209	-	-	-	-	-	-	926	-
3b.1.1	Totals	-	8,169	-	-	-	-	-	1,225	9,394	-	-	9,394	-	-	-	-	-	-	58,885	-
Site Closeout Activities																					
3b.1.2	Grade & landscape site	-	896	-	-	-	-	-	134	1,031	-	-	1,031	-	-	-	-	-	-	1,841	-
3b.1.3	Final report to NRC	-	-	-	-	-	-	200	30	231	231	-	-	-	-	-	-	-	-	-	1,560
3b.1	Subtotal Period 3b Activity Costs	-	9,065	-	-	-	-	200	1,390	10,655	231	-	10,425	-	-	-	-	-	-	60,726	1,560

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 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 3b Additional Costs																					
3b.2.1	Clean Concrete Disposal	-	3,322	-	-	-	-	13	500	3,835	-	-	3,835	-	-	-	-	-	-	12	-
3b.2.2	Intake Structure Cofferdam	-	335	-	-	-	-	-	50	385	-	-	385	-	-	-	-	-	-	2,584	-
3b.2.3	Construction Debris	-	-	-	-	-	-	1,170	176	1,346	-	-	1,346	-	-	-	-	-	-	-	-
3b.2.4	Backfill	-	5,583	-	-	-	-	-	837	6,421	-	-	6,421	-	-	-	-	-	-	5,422	-
3b.2.5	Discharge Structure Cofferdam	-	442	-	-	-	-	-	66	508	-	-	508	-	-	-	-	-	-	3,552	-
3b.2.6	Disposition of Original MPC Canisters	-	-	-	954	-	5,641	-	1,649	8,244	8,244	-	-	-	21,097	-	-	-	2,501,800	-	-
3b.2	Subtotal Period 3b Additional Costs	-	9,682	-	954	-	5,641	1,183	3,279	20,739	8,244	-	12,495	-	21,097	-	-	-	2,501,800	11,570	-
Period 3b Collateral Costs																					
3b.3.1	Small tool allowance	-	110	-	-	-	-	-	17	127	-	-	127	-	-	-	-	-	-	-	-
3b.3.2	Spent Fuel Capital and Transfer	-	-	-	-	-	-	109	16	125	-	125	-	-	-	-	-	-	-	-	-
3b.3	Subtotal Period 3b Collateral Costs	-	110	-	-	-	-	109	33	252	-	125	127	-	-	-	-	-	-	-	-
Period 3b Period-Dependent Costs																					
3b.4.1	Insurance	-	-	-	-	-	-	1,220	122	1,342	1,342	-	-	-	-	-	-	-	-	-	-
3b.4.2	Property taxes	-	-	-	-	-	-	2,543	254	2,797	-	2,797	-	-	-	-	-	-	-	-	-
3b.4.3	Heavy equipment rental	-	5,842	-	-	-	-	-	876	6,719	-	-	6,719	-	-	-	-	-	-	-	-
3b.4.4	Plant energy budget	-	-	-	-	-	-	315	47	362	-	362	-	-	-	-	-	-	-	-	-
3b.4.5	NRC ISFSI Fees	-	-	-	-	-	-	356	36	391	-	391	-	-	-	-	-	-	-	-	-
3b.4.6	Emergency Planning Fees	-	-	-	-	-	-	257	26	283	-	283	-	-	-	-	-	-	-	-	-
3b.4.7	Fixed Overhead	-	-	-	-	-	-	1,122	168	1,290	429	860	-	-	-	-	-	-	-	-	-
3b.4.8	ISFSI Operating Costs	-	-	-	-	-	-	194	29	223	-	223	-	-	-	-	-	-	-	-	-
3b.4.9	Railroad Track Maintenance	-	-	-	-	-	-	543	81	624	249	375	-	-	-	-	-	-	-	-	-
3b.4.10	Security Staff Cost	-	-	-	-	-	-	25,319	3,798	29,117	0	8,589	20,527	-	-	-	-	-	-	-	375,152
3b.4.11	DOC Staff Cost	-	-	-	-	-	-	11,729	1,759	13,489	-	-	13,489	-	-	-	-	-	-	-	122,646
3b.4.12	Utility Staff Cost	-	-	-	-	-	-	7,148	1,072	8,220	-	2,129	6,091	-	-	-	-	-	-	-	101,904
3b.4	Subtotal Period 3b Period-Dependent Costs	-	5,842	-	-	-	-	50,745	8,269	64,857	2,020	16,010	46,826	-	-	-	-	-	-	-	599,702
3b.0	TOTAL PERIOD 3b COST	-	24,700	-	954	-	5,641	52,237	12,971	96,502	10,495	16,135	69,872	-	21,097	-	-	-	2,501,800	72,296	601,262
PERIOD 3c - Fuel Storage Operations/Shipping																					
Period 3c Direct Decommissioning Activities																					
Period 3c Collateral Costs																					
3c.3.1	Spent Fuel Capital and Transfer	-	-	-	-	-	-	621,735	93,260	714,995	-	714,995	-	-	-	-	-	-	-	-	-
3c.3	Subtotal Period 3c Collateral Costs	-	-	-	-	-	-	621,735	93,260	714,995	-	714,995	-	-	-	-	-	-	-	-	-
Period 3c Period-Dependent Costs																					
3c.4.1	Insurance	-	-	-	-	-	-	65,480	6,548	72,028	-	72,028	-	-	-	-	-	-	-	-	-
3c.4.2	Property taxes	-	-	-	-	-	-	84,564	8,456	93,020	-	93,020	-	-	-	-	-	-	-	-	-
3c.4.4	NRC ISFSI Fees	-	-	-	-	-	-	20,571	2,057	22,628	-	22,628	-	-	-	-	-	-	-	-	-
3c.4.5	Emergency Planning Fees	-	-	-	-	-	-	13,803	1,380	15,183	-	15,183	-	-	-	-	-	-	-	-	-
3c.4.6	Fixed Overhead	-	-	-	-	-	-	20,053	3,008	23,061	-	23,061	-	-	-	-	-	-	-	-	-
3c.4.7	ISFSI Operating Costs	-	-	-	-	-	-	10,420	1,563	11,983	-	11,983	-	-	-	-	-	-	-	-	-
3c.4.8	Railroad Track Maintenance	-	-	-	-	-	-	11,641	1,746	13,387	-	13,387	-	-	-	-	-	-	-	-	-
3c.4.9	Security Staff Cost	-	-	-	-	-	-	400,396	60,059	460,455	-	460,455	-	-	-	-	-	-	-	-	5,034,774
3c.4.10	DOC Staff Cost	-	-	-	-	-	-	28,541	4,281	32,822	-	32,822	-	-	-	-	-	-	-	-	193,645
3c.4.11	Utility Staff Cost	-	-	-	-	-	-	177,875	26,681	204,556	-	204,556	-	-	-	-	-	-	-	-	2,565,798
3c.4	Subtotal Period 3c Period-Dependent Costs	-	-	-	-	-	-	833,343	115,781	949,123	-	949,123	-	-	-	-	-	-	-	-	7,794,217
3c.0	TOTAL PERIOD 3c COST	-	-	-	-	-	-	1,455,078	209,041	1,664,118	-	1,664,118	-	-	-	-	-	-	-	-	7,794,217
PERIOD 3d - GTCC shipping																					
Period 3d Direct Decommissioning Activities																					
Nuclear Steam Supply System Removal																					
3d.1.1.1	Vessel & Internals GTCC Disposal	-	-	1,083	-	-	4,313	-	918	6,314	6,314	-	-	-	-	-	-	1,160	225,765	-	-
3d.1.1	Totals	-	-	1,083	-	-	4,313	-	918	6,314	6,314	-	-	-	-	-	-	1,160	225,765	-	-
3d.1	Subtotal Period 3d Activity Costs	-	-	1,083	-	-	4,313	-	918	6,314	6,314	-	-	-	-	-	-	1,160	225,765	-	-
Period 3d Collateral Costs																					
3d.3.1	Spent Fuel Capital and Transfer	-	-	-	-	-	-	28	4	32	-	32	-	-	-	-	-	-	-	-	-
3d.3	Subtotal Period 3d Collateral Costs	-	-	-	-	-	-	28	4	32	-	32	-	-	-	-	-	-	-	-	-
Period 3d Period-Dependent Costs																					

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 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
3d.4.1	Insurance	-	-	-	-	-	-	27	3	30	30	-	-	-	-	-	-	-	-	-	-
3d.4.2	Property taxes	-	-	-	-	-	-	35	3	38	38	-	-	-	-	-	-	-	-	-	-
3d.4.4	NRC ISFSI Fees	-	-	-	-	-	-	8	1	9	-	9	-	-	-	-	-	-	-	-	-
3d.4.5	Emergency Planning Fees	-	-	-	-	-	-	6	1	6	-	6	-	-	-	-	-	-	-	-	-
3d.4.6	Fixed Overhead	-	-	-	-	-	-	8	1	10	10	-	-	-	-	-	-	-	-	-	-
3d.4.7	Railroad Track Maintenance	-	-	-	-	-	-	5	1	6	6	-	-	-	-	-	-	-	-	-	-
3d.4.8	Security Staff Cost	-	-	-	-	-	-	165	25	190	190	-	-	-	-	-	-	-	-	-	2,074
3d.4.9	Utility Staff Cost	-	-	-	-	-	-	39	6	45	45	-	-	-	-	-	-	-	-	-	539
3d.4	Subtotal Period 3d Period-Dependent Costs	-	-	-	-	-	-	293	40	333	318	15	-	-	-	-	-	-	-	-	2,613
3d.0	TOTAL PERIOD 3d COST	-	-	1,083	-	-	4,313	320	962	6,678	6,632	47	-	-	-	-	-	1,160	225,765	-	2,613
PERIOD 3e - ISFSI Decontamination																					
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	-	-	-	848	-	-	-	131,507	11,351	2,273
3e.2	Subtotal Period 3e Additional Costs	-	0	3	33	-	283	2,223	636	3,178	3,178	-	-	-	848	-	-	-	131,507	11,351	2,273
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	Plant energy budget	-	-	-	-	-	-	12	3	15	15	-	-	-	-	-	-	-	-	-	-
3e.4.4	Fixed Overhead	-	-	-	-	-	-	71	18	89	89	-	-	-	-	-	-	-	-	-	-
3e.4.5	Railroad Track Maintenance	-	-	-	-	-	-	41	10	52	52	-	-	-	-	-	-	-	-	-	-
3e.4.6	Security Staff Cost	-	-	-	-	-	-	352	88	440	440	-	-	-	-	-	-	-	-	-	4,999
3e.4.7	Utility Staff Cost	-	-	-	-	-	-	261	65	326	326	-	-	-	-	-	-	-	-	-	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	-	0	3	33	-	283	3,328	912	4,559	4,559	-	-	-	848	-	-	-	131,507	11,351	11,065
PERIOD 3f - ISFSI Site Restoration																					
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	-	-	15	-	-	-	-	-	-	-	-
3f.3	Subtotal Period 3f Collateral Costs	-	13	-	-	-	-	-	2	15	-	-	15	-	-	-	-	-	-	-	-
Period 3f Period-Dependent Costs																					
3f.4.2	Property taxes	-	-	-	-	-	-	126	13	138	-	-	138	-	-	-	-	-	-	-	-
3f.4.3	Heavy equipment rental	-	117	-	-	-	-	-	17	134	-	-	134	-	-	-	-	-	-	-	-
3f.4.4	Plant energy budget	-	-	-	-	-	-	6	1	7	-	-	7	-	-	-	-	-	-	-	-
3f.4.5	Fixed Overhead	-	-	-	-	-	-	36	5	41	-	-	41	-	-	-	-	-	-	-	-
3f.4.6	Railroad Track Maintenance	-	-	-	-	-	-	21	3	24	-	-	24	-	-	-	-	-	-	-	-
3f.4.7	Security Staff Cost	-	-	-	-	-	-	177	27	204	-	-	204	-	-	-	-	-	-	-	2,520
3f.4.8	Utility Staff Cost	-	-	-	-	-	-	109	16	126	-	-	126	-	-	-	-	-	-	-	1,564
3f.4	Subtotal Period 3f Period-Dependent Costs	-	117	-	-	-	-	475	82	674	-	-	674	-	-	-	-	-	-	-	4,084
3f.0	TOTAL PERIOD 3f COST	-	1,993	-	-	-	-	768	408	3,169	-	-	3,169	-	-	-	-	-	-	8,713	4,244
PERIOD 3 TOTALS		-	26,693	1,086	987	-	10,238	1,511,731	224,293	1,775,028	21,686	1,680,300	73,041	-	21,944	-	-	1,160	2,859,072	92,360	8,413,401
TOTAL COST TO DECOMMISSION		17,263	95,603	21,839	11,878	49,952	84,522	2,064,392	379,943	2,725,392	776,400	1,874,865	74,127	288,203	197,266	1,711	1,178	1,160	24,478,380	851,855	11,999,010

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 Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
TOTAL COST TO DECOMMISSION WITH 16.19% CONTINGENCY:					$2,725,392	thousands of 2020 dollars															
TOTAL NRC LICENSE TERMINATION COST IS 28.44% OR:					$776,400	thousands of 2020 dollars															
SPENT FUEL MANAGEMENT COST IS 68.84% OR:					$1,874,865	thousands of 2020 dollars															
NON-NUCLEAR DEMOLITION COST IS 2.72% OR:					$74,127	thousands of 2020 dollars															
TOTAL LOW-LEVEL RADIOACTIVE WASTE VOLUME BURIED (EXCLUDING GTCC):					200,155	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:					851,518	Man-hours															

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

APPENDIX F

DETAILED COST ANALYSIS

SCENARIO 4: DECON with 200 Year DFS

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 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 1a - Shutdown through Transition																					
Period 1a Direct Decommissioning Activities																					
1a.1.1	Prepare preliminary decommissioning cost	-	-	-	-	-	-	167	25	192	192	-	-	-	-	-	-	-	-	-	1,300
1a.1.2	Notification of Cessation of Operations									a											
1a.1.3	Remove fuel & source material									n/a											
1a.1.4	Notification of Permanent Defueling									a											
1a.1.5	Deactivate plant systems & process waste									a											
1a.1.6	Prepare and submit PSDAR	-	-	-	-	-	-	257	39	296	296	-	-	-	-	-	-	-	-	-	2,000
1a.1.7	Review plant dwgs & specs.	-	-	-	-	-	-	591	89	680	680	-	-	-	-	-	-	-	-	-	4,600
1a.1.8	Perform detailed rad survey									a											
1a.1.9	Estimate by-product inventory	-	-	-	-	-	-	129	19	148	148	-	-	-	-	-	-	-	-	-	1,000
1a.1.10	End product description	-	-	-	-	-	-	129	19	148	148	-	-	-	-	-	-	-	-	-	1,000
1a.1.11	Detailed by-product inventory	-	-	-	-	-	-	167	25	192	192	-	-	-	-	-	-	-	-	-	1,300
1a.1.12	Define major work sequence	-	-	-	-	-	-	964	145	1,108	1,108	-	-	-	-	-	-	-	-	-	7,500
1a.1.13	Perform SER and EA	-	-	-	-	-	-	398	60	458	458	-	-	-	-	-	-	-	-	-	3,100
1a.1.14	Prepare/submit Defueled Technical Specifications	-	-	-	-	-	-	964	145	1,108	1,108	-	-	-	-	-	-	-	-	-	7,500
1a.1.15	Perform Site-Specific Cost Study	-	-	-	-	-	-	643	96	739	739	-	-	-	-	-	-	-	-	-	5,000
1a.1.16	Prepare/submit Irradiated Fuel Management Plan	-	-	-	-	-	-	129	19	148	148	-	-	-	-	-	-	-	-	-	1,000
Activity Specifications																					
1a.1.17.1	Plant & temporary facilities	-	-	-	-	-	-	632	95	727	654	-	73	-	-	-	-	-	-	-	4,920
1a.1.17.2	Plant systems	-	-	-	-	-	-	536	80	616	554	-	62	-	-	-	-	-	-	-	4,167
1a.1.17.3	NSSS Decontamination Flush	-	-	-	-	-	-	64	10	74	74	-	-	-	-	-	-	-	-	-	500
1a.1.17.4	Reactor internals	-	-	-	-	-	-	912	137	1,049	1,049	-	-	-	-	-	-	-	-	-	7,100
1a.1.17.5	Reactor vessel	-	-	-	-	-	-	835	125	961	961	-	-	-	-	-	-	-	-	-	6,500
1a.1.17.6	Sacrificial shield	-	-	-	-	-	-	64	10	74	74	-	-	-	-	-	-	-	-	-	500
1a.1.17.7	Moisture separators/reheaters	-	-	-	-	-	-	129	19	148	148	-	-	-	-	-	-	-	-	-	1,000
1a.1.17.8	Reinforced concrete	-	-	-	-	-	-	206	31	236	118	-	118	-	-	-	-	-	-	-	1,600
1a.1.17.9	Main Turbine	-	-	-	-	-	-	268	40	309	309	-	-	-	-	-	-	-	-	-	2,088
1a.1.17.10	Main Condensers	-	-	-	-	-	-	268	40	309	309	-	-	-	-	-	-	-	-	-	2,088
1a.1.17.11	Pressure suppression structure	-	-	-	-	-	-	257	39	296	296	-	-	-	-	-	-	-	-	-	2,000
1a.1.17.12	Drywell	-	-	-	-	-	-	206	31	236	236	-	-	-	-	-	-	-	-	-	1,600
1a.1.17.13	Plant structures & buildings	-	-	-	-	-	-	401	60	461	231	-	231	-	-	-	-	-	-	-	3,120
1a.1.17.14	Waste management	-	-	-	-	-	-	591	89	680	680	-	-	-	-	-	-	-	-	-	4,600
1a.1.17.15	Facility & site closeout	-	-	-	-	-	-	116	17	133	67	-	67	-	-	-	-	-	-	-	900
1a.1.17	Total	-	-	-	-	-	-	5,486	823	6,308	5,759	-	550	-	-	-	-	-	-	-	42,683
Planning & Site Preparations																					
1a.1.18	Prepare dismantling sequence	-	-	-	-	-	-	308	46	355	355	-	-	-	-	-	-	-	-	-	2,400
1a.1.19	Plant prep. & temp. svces	-	-	-	-	-	-	3,500	525	4,025	4,025	-	-	-	-	-	-	-	-	-	-
1a.1.20	Design water clean-up system	-	-	-	-	-	-	180	27	207	207	-	-	-	-	-	-	-	-	-	1,400
1a.1.21	Rigging/Cont. Cntrl Envlps/tooling/etc.	-	-	-	-	-	-	2,400	360	2,760	2,760	-	-	-	-	-	-	-	-	-	-
1a.1.22	Procure casks/liners & containers	-	-	-	-	-	-	158	24	182	182	-	-	-	-	-	-	-	-	-	1,230
1a.1	Subtotal Period 1a Activity Costs	-	-	-	-	-	-	16,569	2,485	19,054	18,505	-	550	-	-	-	-	-	-	-	83,013
Period 1a Collateral Costs																					
1a.3.1	Spent Fuel Capital and Transfer	-	-	-	-	-	-	1,323	198	1,522	-	1,522	-	-	-	-	-	-	-	-	-
1a.3.2	Retention and Severance	-	-	-	-	-	-	9,892	1,484	11,376	11,376	-	-	-	-	-	-	-	-	-	-
1a.3	Subtotal Period 1a Collateral Costs	-	-	-	-	-	-	11,215	1,682	12,897	11,376	1,522	-	-	-	-	-	-	-	-	-
Period 1a Period-Dependent Costs																					
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 physics supplies	-	614	-	-	-	-	-	153	767	767	-	-	-	-	-	-	-	-	-	-
1a.4.4	Heavy equipment rental	-	753	-	-	-	-	-	113	866	866	-	-	-	-	-	-	-	-	-	-
1a.4.5	Disposal of DAW generated	-	-	12	6	-	50	-	15	83	83	-	-	-	610	-	-	-	12,190	20	-
1a.4.6	Plant energy budget	-	-	-	-	-	-	1,817	272	2,089	2,089	-	-	-	-	-	-	-	-	-	-
1a.4.7	NRC Fees	-	-	-	-	-	-	1,137	114	1,251	1,251	-	-	-	-	-	-	-	-	-	-
1a.4.8	Emergency Planning Fees	-	-	-	-	-	-	3,428	343	3,770	-	3,770	-	-	-	-	-	-	-	-	-
1a.4.9	Fixed Overhead	-	-	-	-	-	-	2,616	392	3,009	3,009	-	-	-	-	-	-	-	-	-	-
1a.4.10	Spent Fuel Pool O&M	-	-	-	-	-	-	845	127	971	-	971	-	-	-	-	-	-	-	-	-
1a.4.11	ISFSI Operating Costs	-	-	-	-	-	-	112	17	129	-	129	-	-	-	-	-	-	-	-	-
1a.4.12	Railroad Track Maintenance	-	-	-	-	-	-	125	19	144	144	-	-	-	-	-	-	-	-	-	-
1a.4.13	Security Staff Cost	-	-	-	-	-	-	16,372	2,456	18,827	18,827	-	-	-	-	-	-	-	-	-	245,440
1a.4.14	Utility Staff Cost	-	-	-	-	-	-	27,285	4,093	31,378	31,378	-	-	-	-	-	-	-	-	-	422,240
1a.4	Subtotal Period 1a Period-Dependent Costs	-	1,367	12	6	-	50	59,634	8,703	69,772	64,902	4,870	-	-	610	-	-	-	12,190	20	667,680

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 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
1a.0	TOTAL PERIOD 1a COST	-	1,367	12	6	-	50	87,418	12,871	101,724	94,783	6,392	550	-	610	-	-	-	12,190	20	750,693
1a.0	TOTAL PERIOD 1a COST	-	1,367	12	6	-	50	88,295	12,958	102,689	94,783	7,357	550	-	610	-	-	-	12,190	20	750,693
PERIOD 1b - Decommissioning Preparations																					
Period 1b Direct Decommissioning Activities																					
Detailed Work Procedures																					
1b.1.1.1	Plant systems	-	-	-	-	-	-	608	91	700	630	-	70	-	-	-	-	-	-	-	4,733
1b.1.1.2	NSSS Decontamination Flush	-	-	-	-	-	-	129	19	148	148	-	-	-	-	-	-	-	-	-	1,000
1b.1.1.3	Reactor internals	-	-	-	-	-	-	514	77	591	591	-	-	-	-	-	-	-	-	-	4,000
1b.1.1.4	Remaining buildings	-	-	-	-	-	-	174	26	200	50	-	150	-	-	-	-	-	-	-	1,350
1b.1.1.5	CRD housings & NIs	-	-	-	-	-	-	129	19	148	148	-	-	-	-	-	-	-	-	-	1,000
1b.1.1.6	Incore instrumentation	-	-	-	-	-	-	129	19	148	148	-	-	-	-	-	-	-	-	-	1,000
1b.1.1.7	Removal primary containment	-	-	-	-	-	-	257	39	296	296	-	-	-	-	-	-	-	-	-	2,000
1b.1.1.8	Reactor vessel	-	-	-	-	-	-	467	70	537	537	-	-	-	-	-	-	-	-	-	3,630
1b.1.1.9	Facility closeout	-	-	-	-	-	-	154	23	177	89	-	89	-	-	-	-	-	-	-	1,200
1b.1.1.10	Sacrificial shield	-	-	-	-	-	-	154	23	177	177	-	-	-	-	-	-	-	-	-	1,200
1b.1.1.11	Reinforced concrete	-	-	-	-	-	-	129	19	148	74	-	74	-	-	-	-	-	-	-	1,000
1b.1.1.12	Main Turbine	-	-	-	-	-	-	267	40	307	307	-	-	-	-	-	-	-	-	-	2,080
1b.1.1.13	Main Condensers	-	-	-	-	-	-	268	40	309	309	-	-	-	-	-	-	-	-	-	2,088
1b.1.1.14	Moisture separators & reheaters	-	-	-	-	-	-	257	39	296	296	-	-	-	-	-	-	-	-	-	2,000
1b.1.1.15	Radwaste building	-	-	-	-	-	-	351	53	403	363	-	40	-	-	-	-	-	-	-	2,730
1b.1.1.16	Reactor building	-	-	-	-	-	-	351	53	403	363	-	40	-	-	-	-	-	-	-	2,730
1b.1.1	Total	-	-	-	-	-	-	4,336	650	4,987	4,524	-	463	-	-	-	-	-	-	-	33,741
1b.1.2	Decon NSSS	296	-	-	-	-	-	-	148	444	444	-	-	-	-	-	-	-	-	1,067	-
1b.1	Subtotal Period 1b Activity Costs	296	-	-	-	-	-	4,336	798	5,431	4,968	-	463	-	-	-	-	-	-	1,067	33,741
Period 1b Additional Costs																					
1b.2.1	Spent Fuel Pool Isolation	-	-	-	-	-	-	12,675	1,901	14,576	14,576	-	-	-	-	-	-	-	-	-	-
1b.2.2	Site Characterization	-	-	-	-	-	-	5,930	1,779	7,708	7,708	-	-	-	-	-	-	-	-	30,500	10,852
1b.2.3	Mixed & RCRA Waste	-	-	28	29	14	-	-	9	80	80	-	-	43	-	-	-	-	5,253	161	-
1b.2	Subtotal Period 1b Additional Costs	-	-	28	29	14	-	18,605	3,689	22,365	22,365	-	-	43	-	-	-	-	5,253	30,661	10,852
Period 1b Collateral Costs																					
1b.3.1	Decon equipment	1,055	-	-	-	-	-	-	158	1,213	1,213	-	-	-	-	-	-	-	-	-	-
1b.3.2	DOC staff relocation expenses	-	-	-	-	-	-	1,264	190	1,454	1,454	-	-	-	-	-	-	-	-	-	-
1b.3.3	Process decommissioning water waste	38	-	25	45	-	102	-	53	263	263	-	-	-	233	-	-	-	13,991	45	-
1b.3.4	Process decommissioning chemical flush waste	1	-	24	77	-	1,526	-	396	2,024	2,024	-	-	-	-	231	-	-	24,599	43	-
1b.3.5	Small tool allowance	-	2	-	-	-	-	-	0	2	2	-	-	-	-	-	-	-	-	-	-
1b.3.6	Pipe cutting equipment	-	1,200	-	-	-	-	-	180	1,380	1,380	-	-	-	-	-	-	-	-	-	-
1b.3.7	Decon rig	2,104	-	-	-	-	-	-	316	2,419	2,419	-	-	-	-	-	-	-	-	-	-
1b.3.8	Spent Fuel Capital and Transfer	-	-	-	-	-	-	2,742	411	3,153	-	3,153	-	-	-	-	-	-	-	-	-
1b.3.9	Retention and Severance	-	-	-	-	-	-	6,340	951	7,291	7,291	-	-	-	-	-	-	-	-	-	-
1b.3	Subtotal Period 1b Collateral Costs	3,197	1,202	49	122	-	1,628	10,346	2,655	19,198	16,046	3,153	-	-	233	231	-	-	38,589	89	-
Period 1b Period-Dependent Costs																					
1b.4.1	Decon supplies	39	-	-	-	-	-	-	10	48	48	-	-	-	-	-	-	-	-	-	-
1b.4.2	Insurance	-	-	-	-	-	-	1,161	116	1,277	1,277	-	-	-	-	-	-	-	-	-	-
1b.4.3	Property taxes	-	-	-	-	-	-	1,710	171	1,881	1,881	-	-	-	-	-	-	-	-	-	-
1b.4.4	Health physics supplies	-	344	-	-	-	-	-	86	430	430	-	-	-	-	-	-	-	-	-	-
1b.4.5	Heavy equipment rental	-	375	-	-	-	-	-	56	432	432	-	-	-	-	-	-	-	-	-	-
1b.4.6	Disposal of DAW generated	-	-	7	4	-	29	-	9	49	49	-	-	-	356	-	-	-	7,122	12	-
1b.4.7	Plant energy budget	-	-	-	-	-	-	1,812	272	2,083	2,083	-	-	-	-	-	-	-	-	-	-
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	Fixed Overhead	-	-	-	-	-	-	1,305	196	1,500	1,500	-	-	-	-	-	-	-	-	-	-
1b.4.11	Spent Fuel Pool O&M	-	-	-	-	-	-	421	63	484	-	484	-	-	-	-	-	-	-	-	-
1b.4.12	ISFSI Operating Costs	-	-	-	-	-	-	56	8	64	-	64	-	-	-	-	-	-	-	-	-
1b.4.13	Railroad Track Maintenance	-	-	-	-	-	-	62	9	72	72	-	-	-	-	-	-	-	-	-	-
1b.4.14	Security Staff Cost	-	-	-	-	-	-	8,163	1,225	9,388	9,388	-	-	-	-	-	-	-	-	-	122,384
1b.4.15	DOC Staff Cost	-	-	-	-	-	-	5,846	877	6,723	6,723	-	-	-	-	-	-	-	-	-	63,266
1b.4.16	Utility Staff Cost	-	-	-	-	-	-	13,682	2,052	15,734	15,734	-	-	-	-	-	-	-	-	-	211,579
1b.4	Subtotal Period 1b Period-Dependent Costs	39	719	7	4	-	29	35,956	5,323	42,078	39,972	2,106	-	-	356	-	-	-	7,122	12	397,229
1b.0	TOTAL PERIOD 1b COST	3,531	1,921	84	154	14	1,657	69,243	12,466	89,072	83,350	5,259	463	43	589	231	-	-	50,964	31,828	441,822
PERIOD 1 TOTALS		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	-	-	63,155	31,848	1,192,515

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 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 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	-	528	-	221	1,031	1,031	-	-	-	1,430	-	-	-	99,742	2,905	-
2a.1.1.2	Recirculation Pumps & Motors	40	63	16	51	42	539	-	186	938	938	-	-	96	945	-	-	-	112,200	1,563	-
2a.1.1.3	CRDMs & NIs Removal	194	1,020	415	135	-	1,130	-	696	3,591	3,591	-	-	-	3,741	-	-	-	213,700	17,768	-
2a.1.1.4	Reactor Vessel Internals	244	6,722	12,852	2,696	-	29,845	364	24,027	76,749	76,749	-	-	-	1,252	1,481	1,178	-	343,150	30,515	1,379
2a.1.1.5	Reactor Vessel	113	9,121	2,672	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	4,099	42	37,903	728	35,973	112,449	112,449	-	-	96	23,536	1,481	1,178	-	1,874,002	83,267	2,758
Removal of Major Equipment																					
2a.1.2	Main Turbine/Generator	-	385	1,356	521	6,139	439	-	1,341	10,182	10,182	-	-	24,835	1,383	-	-	-	1,577,959	5,438	-
2a.1.3	Main Condensers	-	1,347	360	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	Radwaste	-	25	-	-	-	-	-	4	28	28	-	-	-	-	-	-	-	-	127	-
2a.1.4.3	Turbine	-	127	-	-	-	-	-	19	146	146	-	-	-	-	-	-	-	-	1,254	-
2a.1.4	Totals	-	483	-	-	-	-	-	72	556	556	-	-	-	-	-	-	-	-	3,598	-
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	-	27	1	2	26	13	-	14	83	83	-	-	156	37	-	-	-	8,681	400	-
2a.1.5.3	Chemistry Sampling - Insulated	-	2	0	0	-	0	-	1	3	3	-	-	-	1	-	-	-	72	28	-
2a.1.5.4	Circulating Water - RCA	-	207	14	62	1,114	-	-	230	1,626	1,626	-	-	6,656	-	-	-	-	270,307	2,860	-
2a.1.5.5	Combustible Gas Control - Insul - RCA	-	29	0	2	36	-	-	13	80	80	-	-	212	-	-	-	-	8,617	378	-
2a.1.5.6	Combustible Gas Control - RCA	-	18	1	3	48	-	-	12	81	81	-	-	285	-	-	-	-	11,577	245	-
2a.1.5.7	Condensate & Feedwater	-	987	183	329	3,337	2,464	-	1,431	8,731	8,731	-	-	19,947	7,319	-	-	-	1,275,810	14,196	-
2a.1.5.8	Condensate & Feedwater - Insulated	-	492	34	63	699	408	-	343	2,038	2,038	-	-	4,176	1,207	-	-	-	246,693	6,964	-
2a.1.5.9	Condensate Demin	-	545	30	51	560	339	-	316	1,840	1,840	-	-	3,346	1,000	-	-	-	199,936	7,618	-
2a.1.5.10	Condensate Storage	-	726	33	82	1,193	270	-	444	2,748	2,748	-	-	7,131	795	-	-	-	340,568	10,345	-
2a.1.5.11	Control Rod Drive	-	3	0	0	3	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	-	79	20	51	734	176	-	184	1,244	1,244	-	-	4,384	521	-	-	-	211,329	1,163	-
2a.1.5.14	Core Spray - Insulated	-	145	8	13	137	90	-	82	474	474	-	-	818	264	-	-	-	50,149	2,033	-
2a.1.5.15	Demin Water - Insulated - RCA	-	15	0	1	14	-	-	6	36	36	-	-	85	-	-	-	-	3,445	181	-
2a.1.5.16	Demin Water - RCA	-	41	1	2	42	-	-	17	104	104	-	-	253	-	-	-	-	10,278	508	-
2a.1.5.17	Diesel Oil - RCA	-	2	0	0	4	-	-	1	7	7	-	-	23	-	-	-	-	931	25	-
2a.1.5.18	Drywell Atmosphere Cooling - RCA	-	38	1	5	92	-	-	24	159	159	-	-	548	-	-	-	-	22,244	550	-
2a.1.5.19	EDG Emerg Service Water - Insul - RCA	-	0	0	0	0	-	-	0	1	1	-	-	2	-	-	-	-	84	4	-
2a.1.5.20	Electrical - Clean	-	13	-	-	-	-	-	2	15	-	-	15	-	-	-	-	-	-	182	-
2a.1.5.21	Emergency Service Water - Insul - RCA	-	21	0	1	23	-	-	9	55	55	-	-	137	-	-	-	-	5,544	281	-
2a.1.5.22	Emergency Service Water - RCA	-	2	0	0	2	-	-	1	5	5	-	-	13	-	-	-	-	512	22	-
2a.1.5.23	GEZIP - RCA	-	3	0	1	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	-	6	0	0	1	5	-	3	15	15	-	-	6	13	-	-	-	1,080	81	-
2a.1.5.26	H2-O2 Control Analyzing - Insulated	-	6	0	0	1	5	-	3	15	15	-	-	6	13	-	-	-	1,080	81	-
2a.1.5.27	High Pressure Coolant Injection	-	67	6	13	163	70	-	61	381	381	-	-	972	209	-	-	-	52,792	966	-
2a.1.5.28	High Pressure Coolant Injection - Insula	-	219	14	24	267	163	-	141	830	830	-	-	1,598	481	-	-	-	95,733	3,079	-
2a.1.5.29	Hydrogen Cooling	-	8	-	-	-	-	-	1	10	-	-	10	-	-	-	-	-	-	118	-
2a.1.5.30	Hydrogen Cooling - RCA	-	7	0	0	7	-	-	3	17	17	-	-	39	-	-	-	-	1,600	79	-
2a.1.5.31	Hydrogen Seal Oil - RCA	-	17	0	2	32	-	-	9	60	60	-	-	189	-	-	-	-	7,669	212	-
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	296	-	-	103	644	644	-	-	1,768	-	-	-	-	71,810	2,733	-
2a.1.5.34	Main Condenser	-	196	12	20	223	139	-	122	712	712	-	-	1,333	411	-	-	-	80,439	2,746	-
2a.1.5.35	Main Steam	-	249	17	32	359	201	-	173	1,029	1,029	-	-	2,148	594	-	-	-	125,135	3,512	-
2a.1.5.36	Main Turbine	-	1,012	205	353	3,306	2,921	-	1,553	9,350	9,350	-	-	19,760	8,687	-	-	-	1,354,661	14,733	-
2a.1.5.37	Main Turbine - Insulated	-	214	18	37	423	225	-	180	1,097	1,097	-	-	2,330	667	-	-	-	145,298	3,069	-
2a.1.5.38	Miscellaneous	-	43	1	3	51	-	-	19	115	115	-	-	302	-	-	-	-	12,283	622	-
2a.1.5.39	Off Gas Recombiner	-	189	19	32	300	257	-	163	960	960	-	-	1,795	764	-	-	-	121,554	2,708	-
2a.1.5.40	Off Gas Recombiner - Insulated	-	387	19	27	229	240	-	197	1,100	1,100	-	-	1,366	709	-	-	-	100,933	5,385	-
2a.1.5.41	Post Accident Sampling	-	25	1	1	9	11	-	11	58	58	-	-	53	33	-	-	-	4,318	345	-
2a.1.5.42	Post Accident Sampling - Insulated	-	17	1	1	3	13	-	8	43	43	-	-	17	37	-	-	-	3,116	212	-
2a.1.5.43	RHR Service Water - Insulated - RCA	-	83	3	14	248	-	-	60	409	409	-	-	1,485	-	-	-	-	60,293	1,125	-
2a.1.5.44	RHR Service Water - RCA	-	4	0	0	6	-	-	2	12	12	-	-	35	-	-	-	-	1,410	57	-
2a.1.5.45	Reactor Feedwater Pump Seal	-	56	2	4	32	33	-	28	155	155	-	-	193	96	-	-	-	14,009	773	-

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 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
Disposal of Plant Systems (continued)																					
2a.1.5.46	Residual Heat Removal	362	252	172	178	1,072	2,051	-	962	5,049	5,049	-	-	6,406	6,012	-	-	-	647,941	4,135	-
2a.1.5.47	Residual Heat Removal - Insulated	622	554	61	82	563	880	-	772	3,535	3,535	-	-	3,367	2,607	-	-	-	303,087	10,340	-
2a.1.5.48	Rx Core Isolation Cooling	-	49	2	4	43	26	-	26	150	150	-	-	259	76	-	-	-	15,396	691	-
2a.1.5.49	Rx Core Isolation Cooling - Insulated	-	107	5	7	48	67	-	52	287	287	-	-	288	198	-	-	-	24,419	1,479	-
2a.1.5.50	Rx Recirculation	56	58	6	4	7	65	-	61	258	258	-	-	43	190	-	-	-	14,095	1,580	-
2a.1.5.51	Snubbers	-	169	2	5	63	30	-	60	331	331	-	-	377	90	-	-	-	21,009	2,548	-
2a.1.5.52	Standby Liquid Control - Insul - RCA	-	4	0	0	4	-	-	2	9	9	-	-	22	-	-	-	-	904	48	-
2a.1.5.53	Standby Liquid Control - RCA	-	26	1	2	41	-	-	13	83	83	-	-	245	-	-	-	-	9,969	341	-
2a.1.5.54	Stator Cooling - RCA	-	7	0	1	21	-	-	5	35	35	-	-	126	-	-	-	-	5,135	98	-
2a.1.5.55	Traversing Incore Probe	0	4	0	0	0	2	-	1	7	7	-	-	1	5	-	-	-	386	51	-
2a.1.5	Totals	1,040	8,221	924	1,572	16,339	11,425	-	8,209	47,730	47,706	-	24	97,654	33,808	-	-	-	6,125,515	119,943	-
2a.1.6	Scaffolding in support of decommissioning	-	2,265	22	12	191	31	-	607	3,127	3,127	-	-	1,030	91	-	-	-	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	180,360	180,336	-	24	141,010	59,545	1,481	1,178	-	10,458,540	253,640	2,758
Period 2a Collateral Costs																					
2a.3.1	Process decommissioning water waste	85	-	57	102	-	232	-	122	598	598	-	-	-	532	-	-	-	31,942	104	-
2a.3.2	Process decommissioning chemical flush waste	5	-	216	702	-	1,619	-	534	3,077	3,077	-	-	-	2,093	-	-	-	223,008	392	-
2a.3.3	Small tool allowance	-	324	-	-	-	-	-	49	373	336	-	37	-	-	-	-	-	-	-	-
2a.3.4	Spent Fuel Capital and Transfer	-	-	-	-	-	-	24,169	3,625	27,795	-	27,795	-	-	-	-	-	-	-	-	-
2a.3.5	Retention and Severance	-	-	-	-	-	-	13,145	1,972	15,117	15,117	-	-	-	-	-	-	-	-	-	-
2a.3	Subtotal Period 2a Collateral Costs	91	324	274	804	-	1,851	37,314	6,302	46,959	19,127	27,795	37	-	2,625	-	-	-	254,950	495	-
Period 2a Period-Dependent Costs																					
2a.4.1	Decon supplies	112	-	-	-	-	-	-	28	140	140	-	-	-	-	-	-	-	-	-	-
2a.4.2	Insurance	-	-	-	-	-	-	1,019	102	1,121	1,121	-	-	-	-	-	-	-	-	-	-
2a.4.3	Property taxes	-	-	-	-	-	-	4,383	438	4,821	4,821	-	-	-	-	-	-	-	-	-	-
2a.4.4	Health physics supplies	-	2,356	-	-	-	-	-	589	2,945	2,945	-	-	-	-	-	-	-	-	-	-
2a.4.5	Heavy equipment rental	-	3,627	-	-	-	-	-	544	4,171	4,171	-	-	-	-	-	-	-	-	-	-
2a.4.6	Disposal of DAW generated	-	-	110	57	-	457	-	134	758	758	-	-	-	5,551	-	-	-	111,023	181	-
2a.4.7	Plant energy budget	-	-	-	-	-	-	2,501	375	2,876	2,876	-	-	-	-	-	-	-	-	-	-
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	Spent Fuel Pool O&M	-	-	-	-	-	-	1,224	184	1,408	-	1,408	-	-	-	-	-	-	-	-	-
2a.4.12	ISFSI Operating Costs	-	-	-	-	-	-	162	24	187	-	187	-	-	-	-	-	-	-	-	-
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	Security Staff Cost	-	-	-	-	-	-	21,881	3,282	25,164	25,164	-	-	-	-	-	-	-	-	-	325,574
2a.4.16	DOC Staff Cost	-	-	-	-	-	-	21,021	3,153	24,174	24,174	-	-	-	-	-	-	-	-	-	229,108
2a.4.17	Utility Staff Cost	-	-	-	-	-	-	27,906	4,186	32,092	32,092	-	-	-	-	-	-	-	-	-	426,562
2a.4	Subtotal Period 2a Period-Dependent Costs	112	5,982	110	57	-	457	89,944	14,268	110,931	104,810	6,121	-	-	5,551	-	-	-	111,023	181	981,244
2a.0	TOTAL PERIOD 2a COST	1,945	36,028	19,028	7,259	25,937	52,350	127,987	67,717	338,250	304,273	33,915	62	141,010	67,722	1,481	1,178	-	10,824,520	254,317	984,002
PERIOD 2b - Site Decontamination																					
Period 2b Direct Decommissioning Activities																					
Disposal of Plant Systems																					
2b.1.1.1	ALARA/Radiological	-	18	0	1	6	3	-	6	35	35	-	-	35	10	-	-	-	2,060	277	-
2b.1.1.2	Alternate N2 - RCA	-	16	0	1	16	-	-	7	40	40	-	-	93	-	-	-	-	3,765	185	-
2b.1.1.3	Decontamination Projects	-	1	0	0	0	0	-	0	2	2	-	-	2	0	-	-	-	129	17	-
2b.1.1.4	Electrical - Contaminated	-	445	6	24	400	30	-	183	1,089	1,089	-	-	2,389	90	-	-	-	102,726	6,325	-
2b.1.1.5	Electrical - Decontaminated	-	2,698	48	218	3,906	-	-	1,298	8,167	8,167	-	-	23,344	-	-	-	-	948,013	37,107	-
2b.1.1.6	Fire - RCA	-	101	1	6	103	-	-	42	253	253	-	-	614	-	-	-	-	24,917	1,324	-
2b.1.1.7	HVAC Ductwork	-	305	7	27	446	34	-	156	975	975	-	-	2,665	100	-	-	-	114,598	4,111	-
2b.1.1.8	HVAC/Chilled Water - RCA	-	324	6	26	461	-	-	155	971	971	-	-	2,752	-	-	-	-	111,779	3,985	-
2b.1.1.9	Heating & Ventilation	-	483	16	61	1,007	76	-	302	1,945	1,945	-	-	6,018	227	-	-	-	258,789	7,101	-
2b.1.1.10	Heating Boiler - Insulated - RCA	-	3	0	0	4	-	-	1	9	9	-	-	26	-	-	-	-	1,058	35	-
2b.1.1.11	Liquid Radwaste	588	687	48	63	514	586	-	703	3,188	3,188	-	-	3,073	1,728	-	-	-	235,484	17,194	-
2b.1.1.12	Makeup Demin - RCA	-	103	3	14	246	-	-	65	431	431	-	-	1,471	-	-	-	-	59,747	1,412	-
2b.1.1.13	Non-Essential Diesel Generator - RCA	-	27	3	13	238	-	-	45	327	327	-	-	1,424	-	-	-	-	57,832	395	-
2b.1.1.14	Off Gas Holdup	-	342	21	38	461	214	-	216	1,291	1,291	-	-	2,755	630	-	-	-	152,277	4,769	-
2b.1.1.15	Primary Containment	-	455	42	87	1,038	507	-	414	2,543	2,543	-	-	6,201	1,506	-	-	-	347,704	6,454	-
2b.1.1.16	Process Radiation Monitors	-	46	2	2	24	18	-	20	111	111	-	-	142	52	-	-	-	9,115	649	-

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 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
Disposal of Plant Systems (continued)																					
2b.1.1.17	Rx Bldg Closed Clng Water - Insul - RCA	-	114	2	9	163	-	-	54	343	343	-	-	977	-	-	-	-	39,675	1,484	-
2b.1.1.18	Rx Bldg Closed Clng Water - RCA	-	184	15	66	1,187	-	-	235	1,687	1,687	-	-	7,093	-	-	-	-	288,031	2,489	-
2b.1.1.19	Rx Component Handling Equip	27	142	18	27	194	279	-	154	840	840	-	-	1,158	829	-	-	-	99,730	2,462	-
2b.1.1.20	Rx Pressure Vessel	28	47	6	5	13	78	-	48	225	225	-	-	75	230	-	-	-	17,816	1,051	-
2b.1.1.21	Rx Water Cleanup	172	265	19	16	22	251	-	222	965	965	-	-	130	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	Service & Seal Water - Insulated - RCA	-	120	2	11	197	-	-	62	392	392	-	-	1,180	-	-	-	-	47,917	1,565	-
2b.1.1.24	Service & Seal Water - RCA	-	159	4	17	303	-	-	88	570	570	-	-	1,809	-	-	-	-	73,453	2,016	-
2b.1.1.25	Service Air Blower - RCA	-	15	0	2	34	-	-	9	62	62	-	-	206	-	-	-	-	8,364	206	-
2b.1.1.26	Solid Radwaste	338	494	36	49	399	467	-	480	2,264	2,264	-	-	2,387	1,380	-	-	-	185,221	10,820	-
2b.1.1.27	Structures & Buildings	-	78	2	5	60	29	-	37	210	210	-	-	357	85	-	-	-	19,933	1,128	-
2b.1.1.28	Wells & Domestic Water	-	10	-	-	-	-	-	1	11	-	-	11	-	-	-	-	-	-	144	-
2b.1.1.29	Wells & Domestic Water - RCA	-	52	1	3	57	-	-	22	136	136	-	-	342	-	-	-	-	13,874	633	-
2b.1.1	Totals	1,153	7,860	315	804	11,668	2,657	-	5,107	29,563	29,552	-	11	69,735	7,859	-	-	-	3,334,244	122,835	-
2b.1.2	Scaffolding in support of decommissioning	-	2,831	28	16	239	38	-	758	3,909	3,909	-	-	1,287	114	-	-	-	65,139	28,205	-
Decontamination of Site Buildings																					
2b.1.3.1	Reactor Building	5,202	2,903	178	516	8,044	1,181	-	4,924	22,948	22,948	-	-	48,077	7,014	-	-	-	2,317,670	112,518	-
2b.1.3.2	Admin	106	6	0	3	-	15	-	59	189	189	-	-	-	145	-	-	-	6,840	1,600	-
2b.1.3.3	HPCI Room	29	28	1	3	20	14	-	29	123	123	-	-	118	125	-	-	-	10,759	789	-
2b.1.3.4	Hot Shop	17	4	0	2	-	11	-	12	46	46	-	-	-	103	-	-	-	4,860	286	-
2b.1.3.5	LLRW Storage & Shipping	58	24	2	8	5	45	-	48	191	191	-	-	31	433	-	-	-	21,708	1,127	-
2b.1.3.6	Offgas Stack	372	269	7	23	225	82	-	312	1,289	1,289	-	-	1,343	669	-	-	-	87,045	8,860	-
2b.1.3.7	Offgas Storage & Compressor	41	17	1	6	4	33	-	34	136	136	-	-	25	316	-	-	-	15,948	785	-
2b.1.3.8	Radwaste	121	61	3	17	29	96	-	107	435	435	-	-	172	910	-	-	-	49,943	2,503	-
2b.1.3.9	Radwaste Material Storage Warehouse	64	24	2	9	-	52	-	52	202	202	-	-	-	495	-	-	-	23,400	1,197	-
2b.1.3.10	Recombiner	27	25	1	5	33	24	-	32	148	148	-	-	199	216	-	-	-	18,405	695	-
2b.1.3.11	Turbine	705	353	21	104	215	564	-	632	2,594	2,594	-	-	1,283	5,299	-	-	-	303,150	14,443	-
2b.1.3.12	Turbine Building Addition	58	21	1	8	-	45	-	47	181	181	-	-	-	434	-	-	-	20,478	1,087	-
2b.1.3	Totals	6,799	3,736	218	704	8,574	2,164	-	6,288	28,483	28,483	-	-	51,247	16,159	-	-	-	2,880,206	145,889	-
2b.1.4	Prepare/submit License Termination Plan	-	-	-	-	-	-	526	79	605	605	-	-	-	-	-	-	-	-	-	4,096
2b.1.5	Receive NRC approval of termination plan									a											
2b.1	Subtotal Period 2b Activity Costs	7,952	14,427	560	1,524	20,481	4,859	526	12,232	62,561	62,549	-	11	122,269	24,132	-	-	-	6,279,589	296,929	4,096
Period 2b Additional Costs																					
2b.2.1	Operational Equipment	-	-	23	92	1,211	-	-	198	1,524	1,524	-	-	11,760	-	-	-	-	294,000	32	-
2b.2.2	Excavation of Underground Services	-	1,972	-	-	-	-	376	550	2,898	2,898	-	-	-	-	-	-	-	-	12,493	-
2b.2.3	Security Modifications	-	-	-	-	-	-	8,696	1,304	10,000	10,000	-	-	-	-	-	-	-	-	-	-
2b.2	Subtotal Period 2b Additional Costs	-	1,972	23	92	1,211	-	9,072	2,052	14,422	14,422	-	-	11,760	-	-	-	-	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	-	-	-	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	-	364	-	-	-	-	-	55	418	418	-	-	-	-	-	-	-	-	-	-
2b.3.4	Spent Fuel Capital and Transfer	-	-	-	-	-	-	117,198	17,580	134,778	-	134,778	-	-	-	-	-	-	-	-	-
2b.3.5	Retention and Severance	-	-	-	-	-	-	6,277	942	7,218	7,218	-	-	-	-	-	-	-	-	-	-
2b.3	Subtotal Period 2b Collateral Costs	199	364	178	378	-	865	123,475	18,966	144,425	9,647	134,778	-	-	1,666	-	-	-	119,165	322	-
Period 2b Period-Dependent Costs																					
2b.4.1	Decon supplies	1,440	-	-	-	-	-	-	360	1,799	1,799	-	-	-	-	-	-	-	-	-	-
2b.4.2	Insurance	-	-	-	-	-	-	742	74	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	Heavy equipment rental	-	2,711	-	-	-	-	-	407	3,117	3,117	-	-	-	-	-	-	-	-	-	-
2b.4.6	Disposal of DAW generated	-	-	101	52	-	419	-	123	694	694	-	-	-	5,084	-	-	-	101,679	166	-
2b.4.7	Plant energy budget	-	-	-	-	-	-	1,437	216	1,653	1,653	-	-	-	-	-	-	-	-	-	-
2b.4.8	NRC Fees	-	-	-	-	-	-	623	62	685	685	-	-	-	-	-	-	-	-	-	-
2b.4.9	Emergency Planning Fees	-	-	-	-	-	-	2,995	299	3,294	-	3,294	-	-	-	-	-	-	-	-	-
2b.4.10	Fixed Overhead	-	-	-	-	-	-	2,235	335	2,570	2,570	-	-	-	-	-	-	-	-	-	-
2b.4.11	Spent Fuel Pool O&M	-	-	-	-	-	-	891	134	1,024	-	1,024	-	-	-	-	-	-	-	-	-
2b.4.12	Liquid Radwaste Processing Equipment/Services	-	-	-	-	-	-	224	34	258	258	-	-	-	-	-	-	-	-	-	-
2b.4.13	ISFSI Operating Costs	-	-	-	-	-	-	118	18	136	-	136	-	-	-	-	-	-	-	-	-
2b.4.14	Railroad Track Maintenance	-	-	-	-	-	-	458	69	527	527	-	-	-	-	-	-	-	-	-	-
2b.4.15	Remedial Actions Surveys	-	-	-	-	-	-	1,182	177	1,359	1,359	-	-	-	-	-	-	-	-	-	-

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 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	Period-Dependent Costs (continued)																				
2b.4.16	Security Staff Cost	-	-	-	-	-	-	15,925	2,389	18,314	18,314	-	-	-	-	-	-	-	-	-	236,949
2b.4.17	DOC Staff Cost	-	-	-	-	-	-	14,772	2,216	16,988	16,988	-	-	-	-	-	-	-	-	-	160,160
2b.4.18	Utility Staff Cost	-	-	-	-	-	-	19,442	2,916	22,358	22,358	-	-	-	-	-	-	-	-	-	297,283
2b.4	Subtotal Period 2b Period-Dependent Costs	1,440	5,087	101	52	-	419	63,741	10,691	81,530	77,076	4,455	-	-	5,084	-	-	-	101,679	166	694,392
2b.0	TOTAL PERIOD 2b COST	9,591	21,850	861	2,046	21,692	6,143	196,814	43,941	302,937	163,694	139,232	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	Cranes/Heavy Loads/Rigging - RCA	-	3	0	1	17	-	-	4	25	25	-	-	103	-	-	-	-	4,184	48	-
2d.1.2.2	Electrical - Contaminated Fuel Pool	-	47	1	2	40	3	-	19	112	112	-	-	240	9	-	-	-	10,334	665	-
2d.1.2.3	Electrical - Decontam. Fuel Pool Area	-	297	5	23	411	-	-	140	876	876	-	-	2,457	-	-	-	-	99,783	4,090	-
2d.1.2.4	Fire - RCA - Fuel Pool Area	-	11	0	1	10	-	-	4	26	26	-	-	62	-	-	-	-	2,499	143	-
2d.1.2.5	Fuel Pool Cooling & Cleanup	246	428	34	37	197	455	-	382	1,781	1,781	-	-	1,179	1,341	-	-	-	133,939	8,380	-
2d.1.2.6	Fuel Pool Cooling & Cleanup - Insulated	27	41	3	3	11	40	-	36	161	161	-	-	67	117	-	-	-	10,220	848	-
2d.1.2.7	HVAC Ductwork - Fuel Pool Area	-	34	1	3	50	4	-	17	108	108	-	-	296	11	-	-	-	12,733	457	-
2d.1.2.8	HVAC/Chilled Water - RCA Fuel Pool Area	-	33	0	2	37	-	-	14	87	87	-	-	223	-	-	-	-	9,072	397	-
2d.1.2.9	Instrument & Service Air-RCA-Fuel Pool	-	29	1	2	45	-	-	14	91	91	-	-	267	-	-	-	-	10,841	357	-
2d.1.2	Totals	273	924	45	75	819	502	-	631	3,268	3,268	-	-	4,894	1,479	-	-	-	293,606	15,385	-
	Decontamination of Site Buildings																				
2d.1.3.1	Reactor (Post Fuel)	946	2,599	172	913	329	10,216	-	3,880	19,056	19,056	-	-	1,969	62,698	-	-	-	2,732,406	45,703	-
2d.1.3	Totals	946	2,599	172	913	329	10,216	-	3,880	19,056	19,056	-	-	1,969	62,698	-	-	-	2,732,406	45,703	-
2d.1.4	Scaffolding in support of decommissioning	-	566	6	3	48	8	-	152	782	782	-	-	257	23	-	-	-	13,028	5,641	-
2d.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	67,635	-
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	-	-	-	504	-	-	-	30,239	98	-
2d.3.2	Process decommissioning chemical flush waste	1	-	26	84	-	193	-	64	366	366	-	-	-	249	-	-	-	26,553	47	-
2d.3.3	Small tool allowance	-	91	-	-	-	-	-	14	105	105	-	-	-	-	-	-	-	-	-	-
2d.3.4	Decommissioning Equipment Disposition	-	-	130	82	1,112	178	-	237	1,739	1,739	-	-	6,000	529	-	-	-	303,608	147	-
2d.3.5	Spent Fuel Capital and Transfer	-	-	-	-	-	-	27	4	32	-	32	-	-	-	-	-	-	-	-	-
2d.3	Subtotal Period 2d Collateral Costs	80	91	210	262	1,112	590	27	432	2,805	2,773	32	-	6,000	1,282	-	-	-	360,400	292	-
Period 2d	Period-Dependent Costs																				
2d.4.1	Decon supplies	244	-	-	-	-	-	-	61	305	305	-	-	-	-	-	-	-	-	-	-
2d.4.2	Insurance	-	-	-	-	-	-	530	53	583	583	-	-	-	-	-	-	-	-	-	-
2d.4.3	Property taxes	-	-	-	-	-	-	1,662	166	1,828	1,828	-	-	-	-	-	-	-	-	-	-
2d.4.4	Health physics supplies	-	806	-	-	-	-	-	202	1,008	1,008	-	-	-	-	-	-	-	-	-	-
2d.4.5	Heavy equipment rental	-	1,936	-	-	-	-	-	290	2,227	2,227	-	-	-	-	-	-	-	-	-	-
2d.4.6	Disposal of DAW generated	-	-	40	21	-	167	-	49	277	277	-	-	-	2,030	-	-	-	40,600	66	-
2d.4.7	Plant energy budget	-	-	-	-	-	-	547	82	630	630	-	-	-	-	-	-	-	-	-	-
2d.4.8	NRC Fees	-	-	-	-	-	-	424	42	466	466	-	-	-	-	-	-	-	-	-	-
2d.4.9	Emergency Planning Fees	-	-	-	-	-	-	112	11	123	-	123	-	-	-	-	-	-	-	-	-
2d.4.10	Fixed Overhead	-	-	-	-	-	-	1,597	239	1,836	1,836	-	-	-	-	-	-	-	-	-	-
2d.4.11	Liquid Radwaste Processing Equipment/Services	-	-	-	-	-	-	320	48	368	368	-	-	-	-	-	-	-	-	-	-
2d.4.12	ISFSI Operating Costs	-	-	-	-	-	-	84	13	97	-	97	-	-	-	-	-	-	-	-	-
2d.4.13	Railroad Track Maintenance	-	-	-	-	-	-	94	14	108	108	-	-	-	-	-	-	-	-	-	-
2d.4.14	Remedial Actions Surveys	-	-	-	-	-	-	844	127	971	971	-	-	-	-	-	-	-	-	-	-
2d.4.15	Security Staff Cost	-	-	-	-	-	-	10,999	1,650	12,649	8,918	3,732	-	-	-	-	-	-	-	-	162,981
2d.4.16	DOC Staff Cost	-	-	-	-	-	-	7,311	1,097	8,408	8,408	-	-	-	-	-	-	-	-	-	78,356
2d.4.17	Utility Staff Cost	-	-	-	-	-	-	10,052	1,508	11,560	10,670	890	-	-	-	-	-	-	-	-	149,660
2d.4	Subtotal Period 2d Period-Dependent Costs	244	2,743	40	21	-	167	34,577	5,652	43,444	38,602	4,842	-	-	2,030	-	-	-	40,600	66	390,997
2d.0	TOTAL PERIOD 2d COST	2,196	6,981	576	1,422	2,308	14,055	36,062	12,202	75,803	70,930	4,873	-	13,120	75,164	-	-	-	3,926,210	67,993	403,477

Table F
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(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 Class A Cu. Feet	Burial Volumes Class B Cu. Feet	Burial Volumes Class C Cu. Feet	Burial Volumes GTCC Cu. Feet	Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
PERIOD 2f - License Termination																					
Period 2f Direct Decommissioning Activities																					
2f.1.1	ORISE confirmatory survey	-	-	-	-	-	-	166	50	216	216	-	-	-	-	-	-	-	-	-	-
2f.1.2	Terminate license									a											
2f.1	Subtotal Period 2f Activity Costs	-	-	-	-	-	-	166	50	216	216	-	-	-	-	-	-	-	-	-	-
Period 2f Additional Costs																					
2f.2.1	License Termination Survey	-	-	-	-	-	-	6,920	2,076	8,995	8,995	-	-	-	-	-	-	-	-	95,048	6,240
2f.2	Subtotal Period 2f Additional Costs	-	-	-	-	-	-	6,920	2,076	8,995	8,995	-	-	-	-	-	-	-	-	95,048	6,240
Period 2f Collateral Costs																					
2f.3.1	DOC staff relocation expenses	-	-	-	-	-	-	1,264	190	1,454	1,454	-	-	-	-	-	-	-	-	-	-
2f.3.2	Spent Fuel Capital and Transfer	-	-	-	-	-	-	47	7	54	-	54	-	-	-	-	-	-	-	-	-
2f.3	Subtotal Period 2f Collateral Costs	-	-	-	-	-	-	1,311	197	1,508	1,454	54	-	-	-	-	-	-	-	-	-
Period 2f Period-Dependent Costs																					
2f.4.1	Insurance	-	-	-	-	-	-	530	53	583	583	-	-	-	-	-	-	-	-	-	-
2f.4.2	Property taxes	-	-	-	-	-	-	1,471	147	1,618	1,618	-	-	-	-	-	-	-	-	-	-
2f.4.3	Health physics supplies	-	708	-	-	-	-	-	177	884	884	-	-	-	-	-	-	-	-	-	-
2f.4.4	Disposal of DAW generated	-	-	7	4	-	29	-	9	48	48	-	-	-	355	-	-	-	7,097	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	11	123	-	123	-	-	-	-	-	-	-	-	-
2f.4.8	Fixed Overhead	-	-	-	-	-	-	1,597	239	1,836	1,836	-	-	-	-	-	-	-	-	-	-
2f.4.9	ISFSI Operating Costs	-	-	-	-	-	-	84	13	97	-	97	-	-	-	-	-	-	-	-	-
2f.4.10	Railroad Track Maintenance	-	-	-	-	-	-	94	14	108	108	-	-	-	-	-	-	-	-	-	-
2f.4.11	Security Staff Cost	-	-	-	-	-	-	10,999	1,650	12,649	8,918	3,732	-	-	-	-	-	-	-	-	162,981
2f.4.12	DOC Staff Cost	-	-	-	-	-	-	5,393	809	6,201	6,201	-	-	-	-	-	-	-	-	-	57,200
2f.4.13	Utility Staff Cost	-	-	-	-	-	-	5,762	864	6,626	5,738	888	-	-	-	-	-	-	-	-	80,707
2f.4	Subtotal Period 2f Period-Dependent Costs	-	708	7	4	-	29	26,741	4,070	31,558	26,719	4,839	-	-	355	-	-	-	7,097	12	300,888
2f.0	TOTAL PERIOD 2f COST	-	708	7	4	-	29	35,137	6,392	42,277	37,383	4,894	-	-	355	-	-	-	7,097	95,059	307,128
PERIOD 2 TOTALS		13,731	65,566	20,473	10,731	49,937	72,577	396,000	130,253	759,268	576,281	182,914	73	288,160	174,123	1,481	1,178	-	21,552,260	727,310	2,393,096
PERIOD 3b - Site Restoration																					
Period 3b Direct Decommissioning Activities																					
Demolition of Remaining Site Buildings																					
3b.1.1.1	Reactor Building	-	1,971	-	-	-	-	-	296	2,267	-	-	2,267	-	-	-	-	-	-	13,911	-
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	HPCI Room	-	19	-	-	-	-	-	3	22	-	-	22	-	-	-	-	-	-	97	-
3b.1.1.5	Hot Shop	-	16	-	-	-	-	-	2	19	-	-	19	-	-	-	-	-	-	177	-
3b.1.1.6	Hydrogen & Oxygen Storage	-	2	-	-	-	-	-	0	2	-	-	2	-	-	-	-	-	-	19	-
3b.1.1.7	LLRW Storage & Shipping	-	83	-	-	-	-	-	12	95	-	-	95	-	-	-	-	-	-	662	-
3b.1.1.8	MSIV	-	4	-	-	-	-	-	1	4	-	-	4	-	-	-	-	-	-	42	-
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	Radwaste	-	228	-	-	-	-	-	34	262	-	-	262	-	-	-	-	-	-	1,220	-
3b.1.1.13	Recombiner	-	128	-	-	-	-	-	19	147	-	-	147	-	-	-	-	-	-	713	-
3b.1.1.14	Security Barrier	-	186	-	-	-	-	-	28	214	-	-	214	-	-	-	-	-	-	933	-
3b.1.1.15	Structures Greater than 3' Below Grade	-	2,461	-	-	-	-	-	369	2,830	-	-	2,830	-	-	-	-	-	-	12,649	-
3b.1.1.16	Tank Farm	-	4	-	-	-	-	-	1	5	-	-	5	-	-	-	-	-	-	21	-
3b.1.1.17	Turbine	-	1,259	-	-	-	-	-	189	1,448	-	-	1,448	-	-	-	-	-	-	13,036	-
3b.1.1.18	Turbine Building Addition	-	55	-	-	-	-	-	8	63	-	-	63	-	-	-	-	-	-	618	-
3b.1.1.19	Turbine Pedestal	-	182	-	-	-	-	-	27	209	-	-	209	-	-	-	-	-	-	926	-
3b.1.1	Totals	-	8,169	-	-	-	-	-	1,225	9,394	-	-	9,394	-	-	-	-	-	-	58,885	-
Site Closeout Activities																					
3b.1.2	Grade & landscape site	-	896	-	-	-	-	-	134	1,031	-	-	1,031	-	-	-	-	-	-	1,841	-
3b.1.3	Final report to NRC	-	-	-	-	-	-	200	30	231	231	-	-	-	-	-	-	-	-	-	1,560
3b.1	Subtotal Period 3b Activity Costs	-	9,065	-	-	-	-	200	1,390	10,655	231	-	10,425	-	-	-	-	-	-	60,726	1,560

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 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 3b Additional Costs																					
3b.2.1	Clean Concrete Disposal	-	3,322	-	-	-	-	13	500	3,835	-	-	3,835	-	-	-	-	-	-	12	-
3b.2.2	Intake Structure Cofferdam	-	335	-	-	-	-	-	50	385	-	-	385	-	-	-	-	-	-	2,584	-
3b.2.3	Construction Debris	-	-	-	-	-	-	1,170	176	1,346	-	-	1,346	-	-	-	-	-	-	-	-
3b.2.4	Backfill	-	5,583	-	-	-	-	-	837	6,421	-	-	6,421	-	-	-	-	-	-	5,422	-
3b.2.5	Discharge Structure Cofferdam	-	442	-	-	-	-	-	66	508	-	-	508	-	-	-	-	-	-	3,552	-
3b.2.6	Disposition of Original MPC Canisters	-	-	-	954	-	5,641	-	1,649	8,244	8,244	-	-	-	21,097	-	-	-	2,501,800	-	-
3b.2	Subtotal Period 3b Additional Costs	-	9,682	-	954	-	5,641	1,183	3,279	20,739	8,244	-	12,495	-	21,097	-	-	-	2,501,800	11,570	-
Period 3b Collateral Costs																					
3b.3.1	Small tool allowance	-	110	-	-	-	-	-	17	127	-	-	127	-	-	-	-	-	-	-	-
3b.3.2	Spent Fuel Capital and Transfer	-	-	-	-	-	-	109	16	125	-	125	-	-	-	-	-	-	-	-	-
3b.3	Subtotal Period 3b Collateral Costs	-	110	-	-	-	-	109	33	252	-	125	127	-	-	-	-	-	-	-	-
Period 3b Period-Dependent Costs																					
3b.4.1	Insurance	-	-	-	-	-	-	1,220	122	1,342	1,342	-	-	-	-	-	-	-	-	-	-
3b.4.2	Property taxes	-	-	-	-	-	-	2,543	254	2,797	-	2,797	-	-	-	-	-	-	-	-	-
3b.4.3	Heavy equipment rental	-	5,842	-	-	-	-	-	876	6,719	-	-	6,719	-	-	-	-	-	-	-	-
3b.4.4	Plant energy budget	-	-	-	-	-	-	315	47	362	-	362	-	-	-	-	-	-	-	-	-
3b.4.5	NRC ISFSI Fees	-	-	-	-	-	-	356	36	391	-	391	-	-	-	-	-	-	-	-	-
3b.4.6	Emergency Planning Fees	-	-	-	-	-	-	257	26	283	-	283	-	-	-	-	-	-	-	-	-
3b.4.7	Fixed Overhead	-	-	-	-	-	-	1,122	168	1,290	429	860	-	-	-	-	-	-	-	-	-
3b.4.8	ISFSI Operating Costs	-	-	-	-	-	-	194	29	223	-	223	-	-	-	-	-	-	-	-	-
3b.4.9	Railroad Track Maintenance	-	-	-	-	-	-	543	81	624	249	375	-	-	-	-	-	-	-	-	-
3b.4.10	Security Staff Cost	-	-	-	-	-	-	25,319	3,798	29,117	0	8,589	20,527	-	-	-	-	-	-	-	375,152
3b.4.11	DOC Staff Cost	-	-	-	-	-	-	11,729	1,759	13,489	-	-	13,489	-	-	-	-	-	-	-	122,646
3b.4.12	Utility Staff Cost	-	-	-	-	-	-	7,148	1,072	8,220	-	2,129	6,091	-	-	-	-	-	-	-	101,904
3b.4	Subtotal Period 3b Period-Dependent Costs	-	5,842	-	-	-	-	50,745	8,269	64,857	2,020	16,010	46,826	-	-	-	-	-	-	-	599,702
3b.0	TOTAL PERIOD 3b COST	-	24,700	-	954	-	5,641	52,237	12,971	96,502	10,495	16,135	69,872	-	21,097	-	-	-	2,501,800	72,296	601,262
PERIOD 3c - Fuel Storage Operations/Shipping																					
Period 3c Direct Decommissioning Activities																					
Period 3c Collateral Costs																					
3c.3.1	Spent Fuel Capital and Transfer	-	-	-	-	-	-	1,585,563	237,834	1,823,397	-	1,823,397	-	-	-	-	-	-	-	-	-
3c.3	Subtotal Period 3c Collateral Costs	-	-	-	-	-	-	1,585,563	237,834	1,823,397	-	1,823,397	-	-	-	-	-	-	-	-	-
Period 3c Period-Dependent Costs																					
3c.4.1	Insurance	-	-	-	-	-	-	135,860	13,586	149,445	-	149,445	-	-	-	-	-	-	-	-	-
3c.4.2	Property taxes	-	-	-	-	-	-	175,427	17,543	192,970	-	192,970	-	-	-	-	-	-	-	-	-
3c.4.3	Plant energy budget	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3c.4.4	NRC ISFSI Fees	-	-	-	-	-	-	41,099	4,110	45,209	-	45,209	-	-	-	-	-	-	-	-	-
3c.4.5	Emergency Planning Fees	-	-	-	-	-	-	28,639	2,864	31,503	-	31,503	-	-	-	-	-	-	-	-	-
3c.4.6	Fixed Overhead	-	-	-	-	-	-	41,607	6,241	47,848	-	47,848	-	-	-	-	-	-	-	-	-
3c.4.7	ISFSI Operating Costs	-	-	-	-	-	-	21,621	3,243	24,864	-	24,864	-	-	-	-	-	-	-	-	-
3c.4.8	Railroad Track Maintenance	-	-	-	-	-	-	24,154	3,623	27,777	-	27,777	-	-	-	-	-	-	-	-	-
3c.4.9	Security Staff Cost	-	-	-	-	-	-	830,756	124,613	955,369	-	955,369	-	-	-	-	-	-	-	-	10,446,330
3c.4.10	DOC Staff Cost	-	-	-	-	-	-	59,217	8,883	68,100	-	68,100	-	-	-	-	-	-	-	-	401,782
3c.4.11	Utility Staff Cost	-	-	-	-	-	-	369,061	55,359	424,420	-	424,420	-	-	-	-	-	-	-	-	5,323,611
3c.4	Subtotal Period 3c Period-Dependent Costs	-	-	-	-	-	-	1,727,440	240,065	1,967,505	-	1,967,505	-	-	-	-	-	-	-	-	16,171,720
3c.0	TOTAL PERIOD 3c COST	-	-	-	-	-	-	3,313,003	477,899	3,790,902	-	3,790,902	-	-	-	-	-	-	-	-	16,171,720
PERIOD 3d - GTCC shipping																					
Period 3d Direct Decommissioning Activities																					
Nuclear Steam Supply System Removal																					
3d.1.1.1	Vessel & Internals GTCC Disposal	-	-	1,083	-	-	4,313	-	918	6,314	6,314	-	-	-	-	-	-	1,160	225,765	-	-
3d.1.1	Totals	-	-	1,083	-	-	4,313	-	918	6,314	6,314	-	-	-	-	-	-	1,160	225,765	-	-
3d.1	Subtotal Period 3d Activity Costs	-	-	1,083	-	-	4,313	-	918	6,314	6,314	-	-	-	-	-	-	1,160	225,765	-	-
Period 3d Collateral Costs																					
3d.3.1	Spent Fuel Capital and Transfer	-	-	-	-	-	-	28	4	32	-	32	-	-	-	-	-	-	-	-	-
3d.3	Subtotal Period 3d Collateral Costs	-	-	-	-	-	-	28	4	32	-	32	-	-	-	-	-	-	-	-	-

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 Class A Cu. Feet	Burial Volumes Class B Cu. Feet	Burial Volumes Class C Cu. Feet	Burial Volumes GTCC Cu. Feet	Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
Period 3d Period-Dependent Costs																					
3d.4.1	Insurance	-	-	-	-	-	-	27	3	30	30	-	-	-	-	-	-	-	-	-	-
3d.4.2	Property taxes	-	-	-	-	-	-	35	3	38	38	-	-	-	-	-	-	-	-	-	-
3d.4.3	Plant energy budget	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3d.4.4	NRC ISFSI Fees	-	-	-	-	-	-	8	1	9	-	9	-	-	-	-	-	-	-	-	-
3d.4.5	Emergency Planning Fees	-	-	-	-	-	-	6	1	6	-	6	-	-	-	-	-	-	-	-	-
3d.4.6	Fixed Overhead	-	-	-	-	-	-	8	1	10	10	-	-	-	-	-	-	-	-	-	-
3d.4.7	Railroad Track Maintenance	-	-	-	-	-	-	5	1	6	6	-	-	-	-	-	-	-	-	-	-
3d.4.8	Security Staff Cost	-	-	-	-	-	-	165	25	190	190	-	-	-	-	-	-	-	-	-	2,074
3d.4.9	Utility Staff Cost	-	-	-	-	-	-	39	6	45	45	-	-	-	-	-	-	-	-	-	539
3d.4	Subtotal Period 3d Period-Dependent Costs	-	-	-	-	-	-	293	40	333	318	15	-	-	-	-	-	-	-	-	2,613
3d.0	TOTAL PERIOD 3d COST	-	-	1,083	-	-	4,313	320	962	6,678	6,632	47	-	-	-	-	-	1,160	225,765	-	2,613
PERIOD 3e - ISFSI Decontamination																					
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	-	-	-	848	-	-	-	131,507	11,351	2,273
3e.2	Subtotal Period 3e Additional Costs	-	0	3	33	-	283	2,223	636	3,178	3,178	-	-	-	848	-	-	-	131,507	11,351	2,273
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	Plant energy budget	-	-	-	-	-	-	12	3	15	15	-	-	-	-	-	-	-	-	-	-
3e.4.4	Fixed Overhead	-	-	-	-	-	-	71	18	89	89	-	-	-	-	-	-	-	-	-	-
3e.4.5	Railroad Track Maintenance	-	-	-	-	-	-	41	10	52	52	-	-	-	-	-	-	-	-	-	-
3e.4.6	Security Staff Cost	-	-	-	-	-	-	352	88	440	440	-	-	-	-	-	-	-	-	-	4,999
3e.4.7	Utility Staff Cost	-	-	-	-	-	-	261	65	326	326	-	-	-	-	-	-	-	-	-	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	-	0	3	33	-	283	3,328	912	4,559	4,559	-	-	-	848	-	-	-	131,507	11,351	11,065
PERIOD 3f - ISFSI Site Restoration																					
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	-	-	15	-	-	-	-	-	-	-	-
3f.3	Subtotal Period 3f Collateral Costs	-	13	-	-	-	-	-	2	15	-	-	15	-	-	-	-	-	-	-	-
Period 3f Period-Dependent Costs																					
3f.4.2	Property taxes	-	-	-	-	-	-	126	13	138	-	-	138	-	-	-	-	-	-	-	-
3f.4.3	Heavy equipment rental	-	117	-	-	-	-	-	17	134	-	-	134	-	-	-	-	-	-	-	-
3f.4.4	Plant energy budget	-	-	-	-	-	-	6	1	7	-	-	7	-	-	-	-	-	-	-	-
3f.4.5	Fixed Overhead	-	-	-	-	-	-	36	5	41	-	-	41	-	-	-	-	-	-	-	-
3f.4.6	Railroad Track Maintenance	-	-	-	-	-	-	21	3	24	-	-	24	-	-	-	-	-	-	-	-
3f.4.7	Security Staff Cost	-	-	-	-	-	-	177	27	204	-	-	204	-	-	-	-	-	-	-	2,520
3f.4.8	Utility Staff Cost	-	-	-	-	-	-	109	16	126	-	-	126	-	-	-	-	-	-	-	1,564
3f.4	Subtotal Period 3f Period-Dependent Costs	-	117	-	-	-	-	475	82	674	-	-	674	-	-	-	-	-	-	-	4,084
3f.0	TOTAL PERIOD 3f COST	-	1,993	-	-	-	-	768	408	3,169	-	-	3,169	-	-	-	-	-	-	8,713	4,244
PERIOD 3 TOTALS		-	26,693	1,086	987	-	10,238	3,369,655	493,152	3,901,811	21,686	3,807,084	73,041	-	21,944	-	-	1,160	2,859,072	92,360	16,790,910
TOTAL COST TO DECOMMISSION		17,263	95,603	21,839	11,878	49,952	84,522	3,922,317	648,801	4,852,175	776,400	4,001,648	74,127	288,203	197,266	1,711	1,178	1,160	24,478,380	851,855	20,376,520

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				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
TOTAL COST TO DECOMMISSION WITH 15.43% CONTINGENCY:					$4,852,175	thousands of 2020 dollars															
TOTAL NRC LICENSE TERMINATION COST IS 15.98% OR:					$776,400	thousands of 2020 dollars															
SPENT FUEL MANAGEMENT COST IS 82.49% OR:					$4,001,648	thousands of 2020 dollars															
NON-NUCLEAR DEMOLITION COST IS 1.53% OR:					$74,127	thousands of 2020 dollars															
TOTAL LOW-LEVEL RADIOACTIVE WASTE VOLUME BURIED (EXCLUDING GTCC):					200,155	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:					851,518	Man-hours															

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

APPENDIX G

ISFSI DECOMMISSIONING

Page

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
Decommissioning Contractor									
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	-
Subtotal	**57**	**188**	**987**	**5,925**	**1,715**	**8,872**	**21,949**	**11,541**	**1,096**
Supporting Costs									
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
Subtotal	-	-	-	-	**1,575**	**1,575**	-	-	**13,737**
Total (w/o contingency)	**57**	**188**	**987**	**5,925**	**3,290**	**10,447**	**21,949**	**11,541**	**14,833**
Total (w/25% contingency)	**71**	**235**	**1,234**	**7,406**	**4,112**	**13,059**			

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
Decommissioning Contractor									
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	-
Subtotal	**0**	**3**	**33**	**283**	**1,751**	**2,071**	**848**	**11,351**	**1,120**
Supporting Costs									
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
Subtotal	-	-	-	-	**1,576**	**1,576**	-	-	**9,945**
Total (w/o contingency)	**0**	**3**	**33**	**283**	**3,328**	**3,648**	**848**	**11,351**	**11,065**
Total (w/25% contingency)	**0**	**4**	**41**	**354**	**4,160**	**4,559**			

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 X01-1775-001, Rev. 0

DECOMMISSIONING COST ANALYSIS

for the

PRAIRIE ISLAND NUCLEAR GENERATING PLANT

prepared for

Xcel Energy

prepared by

TLG Services, LLC
Bridgewater, Connecticut

October 2020

APPROVALS

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REVISION LOG

No.	Date	Item Revised	Reason for Revision
0	10-21-2020		Original Issue

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, [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.

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

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

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). [2] 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.[3] 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

2 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.

3 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

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

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."[5] 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."[6] 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

4 Ibid. Page FR24022, Column 3

5 Ibid.

6 Ibid. Page FR24023, Column 2

means of enhancing efficiency and uniformity in the decommissioning process.[7] 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. [8]

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.[9] 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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7 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

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

9 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

Scenario	1st Spent Fuel Canister Replacement	1st 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+
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.

Methodology

The methodology used to develop the estimates follows the basic approach originally presented in the cost estimating guidelines [10] 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."[11] 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

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

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

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, [12] and its Amendments of 1985, [13] 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 [14]) can be sent to Energy*Solutions*' 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[15]).

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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12 "Low-Level Radioactive Waste Policy Act," Public Law 96-573, 1980

13 "Low-Level Radioactive Waste Policy Amendments Act of 1985," Public Law 99-240, 1986

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

15 U.S. Code of Federal Regulations, Title 10, Part 61, "Licensing Requirements for Land Disposal of Radioactive Waste"

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.[16] 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.

<u>High-Level Radioactive Waste Management</u>

Congress passed the "Nuclear Waste Policy Act" [17] (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

16 "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

17 "Nuclear Waste Policy Act of 1982 and Amendments," DOE's Office of Civilian Radioactive Management, 1982

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."[18] 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."[19]

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"[20]
- "[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."[21]

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..."[22] This document states:

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18 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

19 Ibid.

20 "Blue Ribbon Commission on America's Nuclear Future, Report to the Secretary of Energy,", p. 32, January 2012

21 Ibid., p.27

22 "Strategy for the Management and Disposal of Used Nuclear Fuel and High-Level Radioactive Waste," U.S. DOE, January 11, 2013

"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."[23]

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) [24] 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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23 Ibid., p.2

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

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.[25] 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."[26]

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25 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 …"

26 Minnesota Statute 216B.2445, "Nuclear Power Plant Decommissioning and Storage of Used Nuclear Fuel"

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." [27]

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. [28]

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). [29] 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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27 Ibid.

28 "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

29 U.S. Code of Federal Regulations, Title 10, Part 50, "Domestic Licensing of Production and Utilization Facilities," Subpart 54 (bb), "Conditions of Licenses"

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[30]), 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

30 U.S. Code of Federal Regulations, Title 10, Part 72.40

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 [31]. 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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31 Minnesota Administrative Rule part 7035.0400 "General Requirements"

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.

SCENARIO 1: DECON WITH 42 YEARS DFS
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 [1]	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) [2]	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
Total [3]	996,753	1,008,829	2,005,582

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
Total [3]	996,753	1,008,829	2,005,582

[1] Includes engineering costs

[2] 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

[3] Columns may not add due to rounding

SCENARIO 2: DECON WITH 60 YEAR DFS
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 [1]	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) [2]	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
Total [3]	1,017,865	1,029,941	2,047,805

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
Total [3]	1,017,865	1,029,941	2,047,805

[1] Includes engineering costs

[2] 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

[3] Columns may not add due to rounding

SCENARIO 3: DECON WITH 100 YEAR DFS
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 [1]	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) [2]	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
Total [3]	1,634,199	1,646,275	3,280,474

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
Total [3]	1,634,199	1,646,275	3,280,474

[1] Includes engineering costs

[2] 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

[3] Columns may not add due to rounding

SCENARIO 4: DECON WITH 200 YEAR DFS
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 [1]	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) [2]	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
Total [3]	2,774,456	2,786,532	5,560,987

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
Total [3]	2,774,456	2,786,532	5,560,987

[1] Includes engineering costs

[2] 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

[3] Columns may not add due to rounding

SCENARIO 5: SAFSTOR WITH 42 YEAR DFS
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 [1]	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) [2]	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
Total [3]	1,310,629	1,300,016	2,610,645

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
Total [3]	1,310,629	1,300,016	2,610,645

[1] Includes engineering costs

[2] 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

[3] Columns may not add due to rounding

SCENARIO 6: SAFSTOR WITH 60 YEAR DFS
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 [1]	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) [2]	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
Total [3]	1,323,393	1,323,304	2,646,697

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
Total [3]	1,323,393	1,323,304	2,646,697

[1] Includes engineering costs

[2] 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

[3] Columns may not add due to rounding

SCENARIO 7: SAFSTOR WITH 100 YEAR DFS
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 [1]	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) [2]	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
Total [3]	1,856,374	1,894,569	3,750,943

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
Total [3]	1,856,374	1,894,569	3,750,943

[1] Includes engineering costs

[2] 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

[3] Columns may not add due to rounding

SCENARIO 8: SAFSTOR WITH 200 YEAR DFS
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 [1]	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) [2]	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
Total [3]	2,968,256	3,006,518	5,974,774

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
Total [3]	2,968,256	3,006,518	5,974,774

[1] Includes engineering costs

[2] 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

[3] Columns may not add due to rounding

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, [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 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

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

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.

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.[2] 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,[3]" 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, [4] 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

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.[5] 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. [6] 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).

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.[7] 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" [8] (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."[9]

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"[10]
- "[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."

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..." [11] 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) [12] 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.

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.[13] 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."[14]

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. [15]

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). [16] 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 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[17]), 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

"Low-Level Radioactive Waste Policy Act" in 1980, [18] and its Amendments of 1985, [19] 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 [20]) can be sent to Energy*Solutions*' 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.[21] 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 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]

An additional and separate limit of 4 millirem per year, as defined in 40 CFR §141.66, is applied to drinking water. [24]

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) [25] 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.

FIGURE 1.1
PRAIRIE ISLAND NUCLEAR GENERATING PLANT
GENERAL PLAN

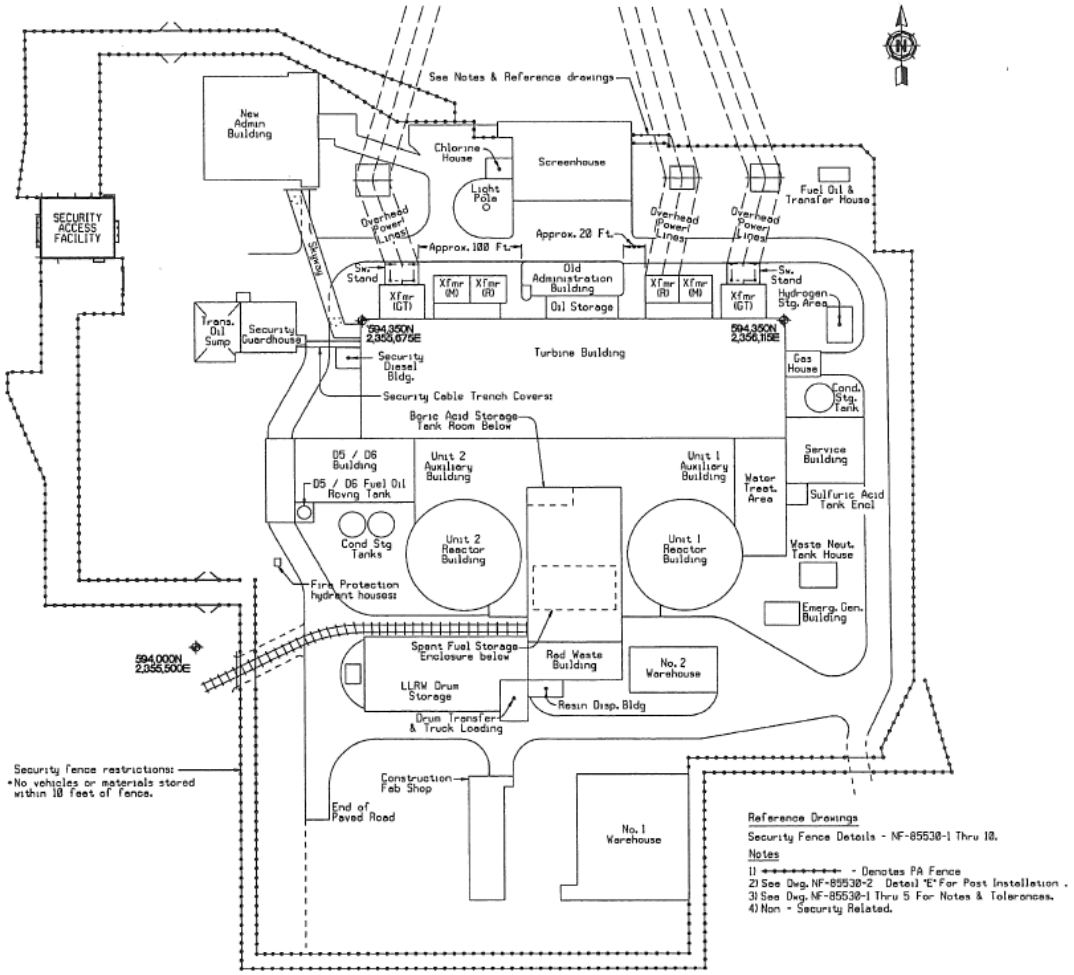
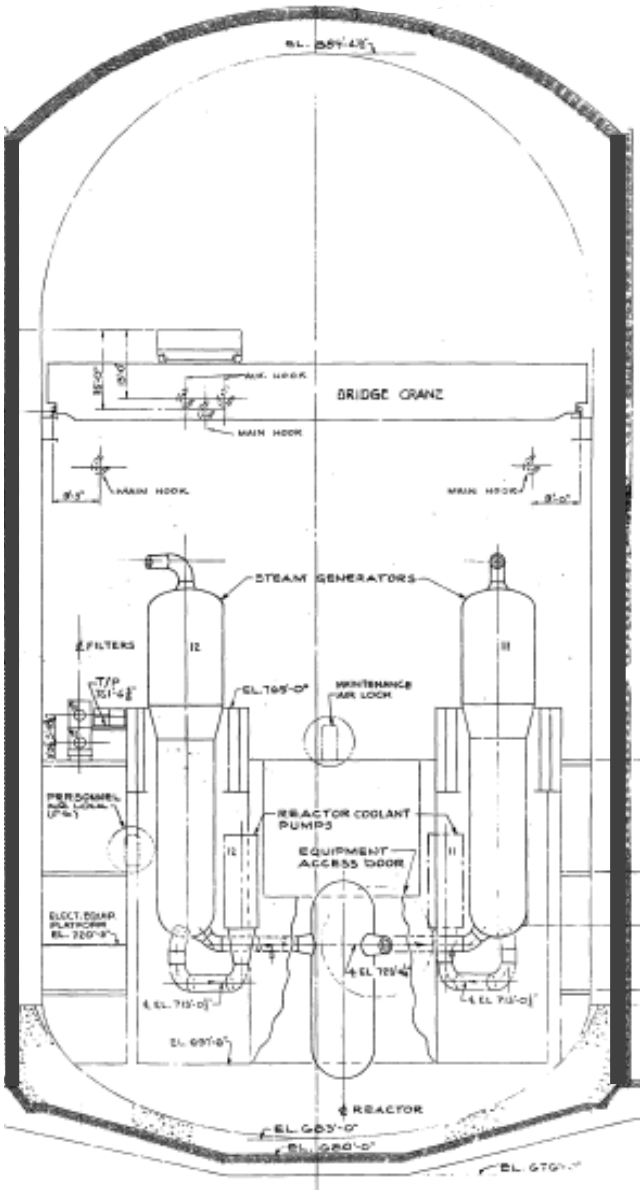


FIGURE 1.2
PRAIRIE ISLAND NUCLEAR GENERATING PLANT
AERIAL VIEW

FIGURE 1.3
PRAIRIE ISLAND NUCLEAR GENERATING PLANT
REACTOR BUILDING SECTION



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	1st Spent Fuel Canister Replacement	1st 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+
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.

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 de-activation 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.

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)

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

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

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

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

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)."[26] 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.