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Monticello Nuclear Generating Plant Decommissioning Cost Analysis Document X01-1775-002, Rev. 0 Appendix B, Page 3 of 7

APPENDIX B

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

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Monticello Nuclear Generating Plant Decommissioning Cost Analysis Document X01-1775-002, Rev. 0 Appendix B, Page 4 of 7

APPENDIX B

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

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APPENDIX B

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	
Removal of below-grade suspended floors, \$/cubic yard	218.59
Removal of clean monolithic concrete structures, \$/cubic yard	1,160.31
Removal of contaminated monolithic concrete structures, \$/cubic yard	2,697.57
Removal of clean foundation concrete, \$/cubic yard	910.72
Removal of contaminated foundation concrete, \$/cubic yard	2,512.94
Explosive demolition of bulk concrete, \$/cubic yard	61.21
Removal of clean hollow masonry block wall, \$/cubic yard	27.85
Removal of contaminated hollow masonry block wall, \$/cubic yard	72.42
Removal of clean solid masonry block wall, \$/cubic yard	27.85
Removal of contaminated solid masonry block wall, \$/cubic yard	72.42
Backfill of below-grade voids, \$/cubic yard	36.73
Removal of subterranean tunnels/voids, \$/linear foot	143.27

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APPENDIX B

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

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APPENDIX B

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

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Xcel Energy

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APPENDIX C

DETAILED COST ANALYSIS

SCENARIO 1: DECON with 42 Year DFS

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Table C

Monticello Nuclear Generating Plant

DECON Decommissioning Cost Estimate with DOE Pickup of Industry Fuel Starting in 2035

(Thousands of 2020 Dollars)

							(T)	housands	s of 2020 Dolla	rs)											
						Off-Site	LLRW				NRC	Spent Fuel	Site	Processed		Burial	Volumes		Burial /		Utility and
Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Processing Costs	Disposal Costs	Other Costs	Total Contingency	Total Costs	Lic. Term. Costs	Management Costs	Restoration Costs	Volume Cu. Feet	Class A Cu. Feet	Class B	Class C	GTCC Cu. Feet	Processed Wt., Lbs.	Craft Manhours	Contractor Manhours
PERIOD	1a - Shutdown through Transition																				
Period 1a l	Direct Decommissioning Activities																				
1a.1.1	Prepare preliminary decommissioning cost	-	-	-	-	-	-	167	25	192	192	-	-	-	-	-	-	-	-	-	1,300
	Notification of Cessation of Operations Remove fuel & source material									a n/a											
1a.1.4	Notification of Permanent Defueling									а											
	Deactivate plant systems & process waste Prepare and submit PSDAR							257	39	a 296	296										2,000
1a.1.7	Review plant dwgs & specs.	-	-	-	-	-	-	591	89	680	680	-	-	-	-	-	-	-	-	-	4,600
	Perform detailed rad survey Estimate by-product inventory							129	19	a 148	148										1,000
	End product description	-	-	-	-	-	-	129	19	148	148	-	-	-	-	-	-	-	-	-	1,000
	Detailed by-product inventory	-	-	-	-	-	-	167	25	192	192	-	-	-	-	-	-	-	-	-	1,300
	Define major work sequence Perform SER and EA	-	-	-	-	-	-	964 398	145 60	1,108 458	1,108 458	-	-	-	-	-	-	-	-	-	7,500 3,100
	Prepare/submit Defueled Technical Specifications	-	-	-	-	-	-	964	145	1,108	1,108	-	-	-	-	-	-	-	-	-	7,500
	Perform Site-Specific Cost Study Prepare/submit Irradiated Fuel Management Plan	-	-	-	-	-	-	643 129	96 19	739 148	739 148	-	-	-	-	-	-	-	-	-	5,000 1,000
	pecifications																				
	Plant & temporary facilities Plant systems	-	-	-	-	-	-	632 536	95 80	727 616	654 554	-	73 62	-	-	-	-	-	-	-	4,920 4,167
	NSSS Decontamination Flush	-	-	-	-	-	-	64	10	74	74	-	- 02	-	-	-	-	-	-	-	500
	Reactor internals	-	-	-	-	-	-	912	137	1,049	1,049	-	-	-	-	-	-	-	-	-	7,100 6,500
	Reactor vessel Sacrificial shield	-	-	-	-	-	-	835 64	125 10	961 74	961 74	-	-	-	-	-	-	-		-	6,500 500
1a.1.17.7	Moisture separators/reheaters	-	-	-	-	-	-	129	19	148	148	-	-	-	-	-	-	-	-	-	1,000
	Reinforced concrete Main Turbine	-	-	-	-	-	-	206 268	31 40	236 309	118 309	-	118	-	-	-	-	-	-	-	1,600 2,088
1a.1.17.10	Main Condensers	-		-	-	-	-	268	40	309	309	-	-	-	-	-	-	-	-		2,088
1a.1.17.11 1a.1.17.12	Pressure suppression structure	Ē	-	-	-	-	-	257 206	39 31	296 236	296 236	-	-	-	-	-	-	-	-	-	2,000 1,600
	Plant structures & buildings	-	-	-	-	-	-	401	60	461	231	-	231	-	-	-	-	-	-	-	3,120
	Waste management	-	-	-	-	-	-	591	89	680	680	-	-	-	-	-	-	-	-	-	4,600
1a.1.17.15 1a.1.17	Facility & site closeout Total	-	-	-	-	-	-	$\frac{116}{5,486}$	17 823	133 6,308	67 5,759	-	67 550	-	-	-	-	-	-	-	900 42,683
	& Site Preparations																				
	Prepare dismantling sequence Plant prep. & temp. svces	-	-	-	-	-	-	308 3,500	46 525	355 4,025	355 4,025	-	-	-	-	-	-	-	-	-	2,400
	Design water clean-up system	-	-	-	-	-	-	180	27	207	207	-	-	-	-	-	-	-	-	-	1,400
	Rigging/Cont. Cntrl Envlps/tooling/etc. Procure casks/liners & containers	Ē	-	-	-	-	-	2,400 158	360 24	2,760 182	2,760 182	-	-	-	-	-	-	-	-	-	1,230
	Subtotal Period 1a Activity Costs	-	-	-	-	-	-	16,569	2,485	19,054	18,505	-	550	-	-	-	-	-	-	-	83,013
	Collateral Costs																				
1a.3.1 1a.3.2	Spent Fuel Capital and Transfer Retention and Severance	-	-	-	-	-	-	1,323 9,892	198 1.484	1,522 11,376	11,376	1,522	- -	-	-	-	-	-	-	-	-
	Subtotal Period 1a Collateral Costs	-	-	-	-	-	-	11,215	1,682	12,897	11,376	1,522	-	-	-	-	-	-	-	-	-
	Period-Dependent Costs Insurance							2.328	233	2.561	2,561										
	Property taxes	-		-	-	-	-	3,570	255 357	3,927	3,927	-	-	-	-	-	-	-	-	-	-
	Health physics supplies	-	614		-	-	-	-	153	767	767	-	-	-	-	-	-	-	-	-	-
	Heavy equipment rental Disposal of DAW generated	-	753 -	12	- 6	-	50	-	113 15	866 83	866 83	-	-	-	610	-	-	-	12,190	20	-
1a.4.6	Plant energy budget	-	-		-	-	-	1,817	272	2,089	2,089	-	-	-	-	-	-	-	-	-	-
	NRC Fees Emergency Planning Fees	-	-	-	-	-	-	1,137 3,428	114 343	1,251 3,770	1,251	3,770	-	-	-	-	-	-	-	-	-
1a.4.9	Fixed Overhead	-	-	-	-	•	-	2,616	392	3,009	3,009	-	-	-	-	-	-	-	-	-	-
	Spent Fuel Pool O&M	-	-	-	-	•	-	845 112	127 17	971 129	-	971	-	-	-	-	-	-	-	-	-
	ISFSI Operating Costs Railroad Track Maintenance	-	-	-	-		-	112	17	129 144	144	129	-	-	-	-	-	-	-	-	-
1a.4.13	Security Staff Cost	-	-	-	-		-	16,372	2,456	18,827	18,827	-	-	-	-	-	-	-	-	-	245,440
	Utility Staff Cost Subtotal Period 1a Period-Dependent Costs	-	1,367	12	- 6	-	50	27,285 59,634	4,093 8,703	31,378 69,772	31,378 64,902	4,870	-	-	610	-	-	-	12,190	20	422,240 667,680
			1,001	12	o o		00	55,554	5,100	00,.12	01,502	2,010			310				12,100	20	00.,000

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

							(11	iousanus	s of 2020 Dolla	115)											
Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Class A Cu. Feet	Class B	Volumes 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			50		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																				
	Plant systems	-	-	-	-	-	-	608	91	700	630	-	70	-	-	-	-	-	-	-	4,733
	NSSS Decontamination Flush	-	-	-	-	-	-	129	19	148	148	-	-	-	-	-	-	-	-	-	1,000
	Reactor internals	-	-	-	-	-	-	514 174	77	591 200	591 50	-	150	-	-	-	-	-	-	-	4,000 1,350
1b.1.1.4 1b.1.1.5	Remaining buildings CRD housings & NIs	-		-	-	-	_	129	26 19	148	148	-	150	_	-		-	-	-	-	1,000
	Incore instrumentation	-	-	_	-	-	_	129	19	148	148	-	-	_	-	_	-	-	-	-	1,000
	Removal primary containment	-	-	-	-	-	-	257	39	296	296	-	-	-	-	-	-	-	-	-	2,000
	Reactor vessel	-	-	-	-	-	-	467	70	537	537	-	-	-	-	-	-	-	-	-	3,630
1b.1.1.9	Facility closeout	-	-	-	-	-	-	154	23	177	89	-	89	-	-	-	-	-	-	-	1,200
	Sacrificial shield	-	-	-	-	-	-	154	23	177	177	-	-	-	-	-	-	-	-	-	1,200
	Reinforced concrete	-	-	-	-	-	-	129	19	148	74	-	74	-	-	-	-	-	-	-	1,000
	Main Turbine	-	-	-	-	-	-	267	40	307	307	-	-	-	-	-	-	-	-	-	2,080
	Main Condensers	-	-	-	-	-	-	268	40	309	309	-	-	-	-	-	-	-	-	-	2,088
	Moisture separators & reheaters Radwaste building	-	-	-	-	-	-	257 351	39 53	296 403	296 363	-	40	-	-	-	-	-	-	-	2,000 2,730
	Reactor building	-	-	-	-	-	-	351	53	403	363	-	40	-	-	-	-	-	-	-	2,730
1b.1.1.10 1b.1.1	Total	-	_	_	-	-	_	4,336	650	4,987	4,524	-	463	_			-	-	-	-	33,741
								,		,	<i></i>										,-
lb.1.2	Decon NSSS	296	-	-	-	-	-	-	148	444	444	-	-	-	-	-	-	-	-	1,067	-
b.1	Subtotal Period 1b Activity Costs	296	-	-	-	-	-	4,336	798	5,431	4,968	-	463	-	-	-	-	-	-	1,067	33,741
eriod 1b	Additional Costs																				
b.2.1	Spent Fuel Pool Isolation	-	-	_	-	-	-	12,675	1,901	14,576	14,576	_	-	-	-	_	-	-	-	-	-
b.2.2	Site Characterization	-	-	-	-	-	-	5,930	1,779	7,708	7,708	-	-	-	-	-	-	-	-	30,500	10,852
b.2.3	Mixed & RCRA Waste	-	-	28			-	-	9	80	80	-	-	43		-	-	-	5,253	161	-
b.2	Subtotal Period 1b Additional Costs	-	-	28	3 29	14	-	18,605	3,689	22,365	22,365	-	-	43	-	-	-	-	5,253	30,661	10,852
eriod 1b	Collateral Costs																				
b.3.1	Decon equipment	1,055	-	-	-	-	-	-	158	1,213	1,213	-	-	-	-	-	-	-	-	-	-
b.3.2	DOC staff relocation expenses	-	-	-	-	-	-	1,264	190	1,454	1,454	-	-	-	-	-	-	-	-	-	-
b.3.3	Process decommissioning water waste	38	-	25			102		53	263	263	-	-	-	233	-	-	-	13,991	45	-
b.3.4	Process decommissioning chemical flush waste	1	-	24	1 77	-	1,526	-	396	2,024	2,024	-	-	-	-	231	-	-	24,599	43	-
b.3.5	Small tool allowance	-	2	-	-	-	-	-	0	2	2	-	-	-	-	-	-	-	-	-	-
b.3.6	Pipe cutting equipment	- 0.104	1,200	-	-	-	-	-	180	1,380	1,380	-	-	-	-	-	-	-	-	-	-
lb.3.7 lb.3.8	Decon rig Spent Fuel Capital and Transfer	2,104	-	-	-	-		391	316 59	2,419 450	2,419	450	-	-	-	-	-	-	-	-	-
b.3.9	Retention and Severance	-	-	-	-	-	_	6,335	950	7,285	7,285	450	-		-	-	-	_	-	-	-
lb.3	Subtotal Period 1b Collateral Costs	3,197		49	122		1,628	7,990	2,302	16,490	16,040	450	-	-	233	231	-	-	38,589	89	-
Period 1h	Period-Dependent Costs																				
b.4.1	Decon supplies	39	-	-	-	-	-	-	10	48	48	-	-	-	-	-	-	-	-	-	-
b.4.2	Insurance	-	-	-	-	-	-	1,161	116	1,277	1,277	-	-	-	-	-	-	-	-	-	-
b.4.3	Property taxes	-	-	-	-	-	-	1,709	171	1,880	1,880	-	-	-	-	-	-	-	-	-	-
b.4.4	Health physics supplies	-	344	-	-	-	-	-	86	430	430	-	-	-	-	-	-	-	-	-	-
b.4.5	Heavy equipment rental	-	375	-	-	-	-	-	56	432	432	-	-	-	-	-	-	-	-	-	-
b.4.6	Disposal of DAW generated	-	-	7	7 4	-	29		9	49	49	-	-	-	356	-	-	-	7,122	12	-
b.4.7	Plant energy budget	-	-	-	-	-	-	1,812 323	272 32	2,083 355	2,083 355	-	-	-	-	-	-	-	-	-	-
b.4.8 b.4.9	NRC Fees	-	-	-	-	-	-		32 142	1,557		1 557	-	-	-	-	-	-	-	-	-
b.4.9 b.4.10	Emergency Planning Fees Fixed Overhead	-	-	-	-	-	-	1,416 1,305	142 196	1,557	1,500	1,557	-	-	-	-	-	-	-	-	-
b.4.10	Spent Fuel Pool O&M	-	-	-	-	-	-	421	63	484	1,500	484	-	-	-			-	-	-	-
b.4.11	ISFSI Operating Costs	-	_	-	-	-	_	56	8	64	-	64	-	_	_			-	-	-	-
b.4.13	Railroad Track Maintenance	-	_	_	-	-	_	62	9	72	72	-	-	_	_	-	-	-	-	-	-
b.4.14	Security Staff Cost	-	-	_	-	-	-	8,163	1,225	9,388	9,388	-	-	-	-	-	-	-	-	-	122,384
	DOC Staff Cost	-	-	-	-	-	-	5,846	877	6,723	6,723	-	-	-	-		-	-	-	-	63,266
b.4.16	Utility Staff Cost	-	-	-	-	-	-	13,682	2,052	15,734	15,734	-	-	-	-	-	-	-	-	-	211,579
b.4	Subtotal Period 1b Period-Dependent Costs	39	719	7	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
DEDIOD	1 TOTALS	3,531	3,288	96	3 160	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
TEMIOD	1 IUIALO	0,031	3,468	96	, 160	14	1,707	104,004	24,964	100,000	110,120	0,948	1,012	43	1,199	431	-	-	661,60	91,048	1,192,010

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

							(Th	ousands	of 2020 Dolla	rs)											
						Off-Site	LLRW				NRC	Spent Fuel	Site	Processed		Burial	Volumes		Burial /		Utility and
Activity		Decon	Removal	Packaging	Transport	Processing	Disposal	Other	Total	Total	Lic. Term.	Management	Restoration	Volume	Class A	Class B	Class C	GTCC	Processed	Craft	Contractor
Index	Activity Description	Cost	Cost	Costs	Costs	Costs	Costs	Costs	Contingency	Costs	Costs	Costs	Costs	Cu. Feet	Cu. Feet	Cu. Feet	Cu. Feet	Cu. Feet	Wt., Lbs.	Manhours	Manhours
PERIOD 2a - Large	e Component Removal																				
Period 2a Direct Dec	commissioning Activities																				
Nuclear Steam Supp	oly System Removal																				
	tion System Piping & Valves	111	94	27	50	-	528	-	221	1,031	1,031	-	-	-	1,430	-	-	-	99,742	2,905	-
	tion Pumps & Motors & NIs Removal	40 194	63 1,020	16 415	51 135	42	539 1,130	-	186 696	938 3,591	938 3,591	-	-	96	945 3,741	-	-	-	112,200 213,700	1,563 17,768	-
2a.1.1.4 Reactor V	Vessel Internals	244	6,722	12,852	2,696	-	29,845	364	24,027	76,749	76,749	-	-	-	1,252		898	-	343,150	30,515	1,379
2a.1.1.5 Reactor V 2a.1.1 Totals	7essel	113 702	9,121 $17,020$	2,672 15,982	1,167 4,099	42	5,861 37,903	364 728	10,842 35,973	30,140 112,449	30,140 112,449	-	-	96	16,169 23,536	1,761	898	-	1,105,210 1,874,002	30,515 83,267	1,379 2,758
Removal of Major Eq	quipment																				
	bine/Generator	-	385	1,356	521	6,139		-	1,341	10,182	10,182	-	-	24,835			-	-	1,577,959	5,438	-
2a.1.3 Main Con	ndensers	-	1,347	360	194	3,225	244	-	947	6,317	6,317	-	-	17,396	727	-	-	-	828,955	18,831	-
	m Clean Building Demolition																				
2a.1.4.1 Reactor B 2a.1.4.2 Radwaste		-	332 25	-	-	-	-	-	50 4	381 28	381 28	-	-	-	-	-	-	-	-	2,217 127	-
2a.1.4.3 Turbine		-	127	-	-	-	-	-	19	146	146	-	-	-	-	-	-	-	-	1,254	-
2a.1.4 Totals		-	483	-	-	-	-	-	72	556	556	-	-	-	-	-	-	-	-	3,598	-
Disposal of Plant Sys	stems																				
	c Press Relief	-	118	7	12 2	134		-	70	410	410	-	-	803		-	-	-	45,852	1,656	-
	y Sampling y Sampling - Insulated	-	27 2	0	0	26	13	-	14 1	83 3	83 3	-	-	156	37 1		-	-	8,681 72	400 28	-
2a.1.5.4 Circulatin	ng Water - RCA	-	207	14	62	1,114	-	-	230	1,626	1,626	-	-	6,656		-	-	-	270,307	2,860	-
	ible Gas Control - Insul - RCA	-	29	0	2	36	-	-	13	80	80	-	-	212		-	-	-	8,617	378	-
	ible Gas Control - RCA ate & Feedwater	-	18 987	183	3 329	48 3,337	2,464	-	12 1,431	81 8,731	81 8,731	-	-	285 19,947		-	-	-	11,577 1,275,810	245 14,196	-
	ate & Feedwater - Insulated	-	492	34	63	699	408	-	343	2,038	2,038	-	-	4,176		-	-	-	246,693	6,964	-
2a.1.5.9 Condensa		-	545	30	51	560		-	316	1,840	1,840	-	-	3,346			-	-	199,936	7,618	-
2a.1.5.10 Condensa		-	726 3	33 0	82	1,193	270	-	444	2,748	2,748	-	-	7,131 19		-	-	-	340,568	10,345	-
2a.1.5.11 Control R 2a.1.5.12 Control R		-	416	16	26	277	190		199	1,124	1,124	-	-	1,658			-	-	1,009 103,306	41 5,898	-
2a.1.5.13 Core Spra		-	79	20	51	734			184	1,244	1,244	-	-	4,384		-	-	-	211,329	1,163	-
2a.1.5.14 Core Spra		-	145	8	13	137	90	-	82	474	474	-	-	818	264	-	-	-	50,149	2,033	-
	ater - Insulated - RCA	-	15	0	1	14		-	6	36	36	-	-	85	-	-	-	-	3,445	181	-
2a.1.5.16 Demin Wa 2a.1.5.17 Diesel Oil		-	41	0	2	42 4	-	-	17 1	104 7	104 7	-	-	253 23	-		-	-	10,278 931	508 25	-
	Atmosphere Cooling - RCA	-	38	1	5	92	-	-	24	159	159	-	-	548		-	-	-	22,244	550	-
2a.1.5.19 EDG Eme	erg Service Water - Insul - RCA	-	0	0	0	0	-	-	0	1	1	-	-	2	-	-	-	-	84	4	-
2a.1.5.20 Electrical		-	13 21	- 0	- 1	- 23	-	-	2 9	15 55	- 55	-	15	107	-	-	-	-	5,544	182	-
	cy Service Water - Insul - RCA cy Service Water - RCA	-	21	0	0	23	-	-	1	55 5	99 5	-	-	137 13			-	-	5,544	281 22	-
2a.1.5.23 GEZIP - F		-	3	0	1	17	-	-	4	25	25	-	-	103			-	-	4,184	48	-
	r Physical Design - RCA	-	5	0	0	5	-	-	2	12	12	-	-	31		-	-	-	1,250	67	-
2a.1.5.25 H2-O2 Co	ontrol Analyzing ontrol Analyzing - Insulated	-	6	0	0	1	5 5	-	3	15 15	15 15	-	-	6	13 13	-	-	-	1,080 1,080	81 81	-
	ssure Coolant Injection	-	67	6	13	163	0	-	61	381	381	-	-	972			_	-	52,792	966	-
	ssure Coolant Injection - Insula	-	219	14	24	267	163	-	141	830	830	-	-	1,598	481	-	-	-	95,733	3,079	-
2a.1.5.29 Hydrogen 2a.1.5.30 Hydrogen		-	8 7	- 0	- 0	- 7	-	-	1 3	10 17	17	-	10	39	-	-	-	-	1,600	118 79	-
2a.1.5.30 Hydrogen 2a.1.5.31 Hydrogen		- -	17	0	2	32		-	9	60	60	-	-	189			-	-	7,669	212	-
2a.1.5.32 Hydrogen	n Water Chemistry - RCA	-	24	0	1	23		-	10	59	59	-	-	140	-	-	-	-	5,672	304	-
	ent & Service Air - RCA	-	225	4	17	296	-	-	103	644	644	-	-	1,768		-	-	-	71,810	2,733	-
2a.1.5.34 Main Con 2a.1.5.35 Main Stea		-	196 249	12 17	20 32	223 359		-	122 173	712 1,029	712 1.029	-	-	1,333 2,148		-	-	-	80,439 125,135	2,746 3,512	-
2a.1.5.36 Main Tur		-	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 Tur	bine - Insulated	-	214	18	37	423	225	-	180	1,097	1,097	-	-	2,530	667	-	-	-	145,208	3,069	-
2a.1.5.38 Miscelland 2a.1.5.39 Off Gas R		-	43	1	3	51	957	-	19	115	115	-	-	302	764	-	-	-	12,283	622	-
	Recombiner Recombiner - Insulated	-	189 387	19 19	32 27	300 229		-	163 197	960 1,100	960 1,100	-	-	1,795 1,366		-	-	-	121,554 100,933	2,708 5,385	-
2a.1.5.41 Post Accid		-	25	1	1	9		-	11	58	58	-	-	53			-	-	4,318	345	-
	dent Sampling - Insulated	-	17	1	1	3		-	8	43	43	-	-	17		-	-	-	3,116	212	
2a.1.5.43 RHR Serv 2a.1.5.44 RHR Serv	vice Water - Insulated - RCA	-	83 4	3	14 0	248 6	-	-	60 2	409 12	409 12	-	-	1,485 35		-	-	-	60,293 1,410	1,125 57	-
2a.1.5.44 RHR Serv 2a.1.5.45 Reactor F		-	56	2	4	32	33	-	28	155	155	-	-	193		-		-	14,009	773	
				-	-		30		20	100	100			100					11,000		

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

							(6 01 2020 Dolla	/											
						Off-Site	LLRW				NRC	Spent Fuel	Site	Processed		Burial '	Volumes		Burial /		Utility and
Activi		Decon		Packaging		Processing	Disposal	Other	Total	Total	Lic. Term.	Management	Restoration	Volume	Class A	Class B	Class C	GTCC	Processed	Craft	Contractor
Inde	x Activity Description	Cost	Cost	Costs	Costs	Costs	Costs	Costs	Contingency	Costs	Costs	Costs	Costs	Cu. Feet	Cu. Feet	Cu. reet	Cu. Feet	Cu. Feet	Wt., Lbs.	Manhours	Manhours
	al of Plant Systems (continued)																				
	46 Residual Heat Removal 47 Residual Heat Removal - Insulated	362 622	252 554	172 61	178 82	1,072 563	2,051 880	-	962 772	5,049 3,535	5,049 3,535	-	-	6,406 3,367	6,012 2,607	-	-	-	647,941 303,087	4,135 10,340	-
	48 Rx Core Isolation Cooling	622	49	2	4	43	26	-	26	150	5,555 150	-	-	259	76	-	-	-	15,396	691	-
	49 Rx Core Isolation Cooling - Insulated	-	107	5	7	48	67	-	52	287	287	-	-	288	198	-	-	-	24,419	1,479	-
	50 Rx Recirculation	56	58	6	4	7	65	-	61	258	258	-	-	43	190	-	-	-	14,095	1,580	-
	51 Snubbers 52 Standby Liquid Control - Insul - RCA	-	169 4	2	5 0	63 4	30	-	60	331 9	331 9	-	-	377 22	90	-	-	-	21,009 904	2,548 48	-
	53 Standby Liquid Control - RCA	-	26	1	2	41	-	-	13	83	83	-	-	245	-	-	-	-	9,969	341	-
	54 Stator Cooling - RCA	-	7	0	1	21		-	5	35	35	-	-	126	-	-	-	-	5,135	98	-
	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
	2a Collateral Costs	e=		57	102		999		122	* 00	×00				* 00				01.070	104	
2a.3.1 2a.3.2	Process decommissioning water waste Process decommissioning chemical flush waste	85 5	-	57 216	102 702	-	232 1,619	-	122 534	598 3,077	598 3,077	-	-	-	532 2,093	-	-	-	31,942 223,008	104 392	-
2a.3.3	Small tool allowance	-	324	-	-	-	- 1,010	-	49	373	336	-	37	_	2,000	-	-	-	-	-	-
2a.3.4	Spent Fuel Capital and Transfer	-	-	-	-	-	-	13,661	2,049	15,710	-	15,710	-	-	-	-	-	-	-	-	-
2a.3.5	Retention and Severance Subtotal Period 2a Collateral Costs	- 01	- 004	274	- 00.4	-	1.051	13,127	1,969	15,097	15,097	15.510	-	-	- 0.005	-	-	-	-	-	-
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	-
	2a Period-Dependent Costs																				
2a.4.1	Decon supplies Insurance	112	-	-	-	-	-	1,019	28 102	140 1,121	140	-	-	-	-	-	-	-	-	-	-
2a.4.2 2a.4.3	Property taxes	-	-	-	-	-	-	4,377	438	4,814	1,121 4,814	-	-	-	-	-	-	-	-	-	-
2a.4.4	Health physics supplies	-	2,356	-	_	-	-	- 4,011	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	0.501	134	758	758	-	-	-	5,551	-	-	-	111,023	181	-
2a.4.7 2a.4.8	Plant energy budget NRC Fees	-		-	-	-		2,501 856	375 86	2,876 942	2,876 942	-	-	-			-	-	-	-	-
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		-	-	-	-	-	-	1,224 162	184 24	1,408 187	-	1,408 187	-	-	-	-	-	-	-	-	-
2a.4.12 2a.4.13		-	-	-	-	-	-	181	24 27	208	208	107	-	-	-	-	-	-	-	-	-
2a.4.14		-	-	-	-	-	-	1,624	244	1,867	1,867	-	-	-	-	-	-	-	-	-	-
2a.4.15		=	-	-	-	-	-	21,881	3,282	25,164	25,164	-	-	-	-	-	-	-	-	-	325,574
2a.4.16 2a.4.17		-	-	-	-	-	-	21,021 27,906	3,153 4,186	24,174 $32,092$	24,174 32,092	-	-	-	-	-	-	-	-	-	229,108 426,562
2a.4.17	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
PERIO	DD 2b - Site Decontamination																				
	2b Direct Decommissioning Activities																				
	al of Plant Systems																				
2b.1.1.1		-	18	0	1	6	3	-	6	35	35	_	-	35	10	-	-	-	2,060	277	-
2b.1.1.2	2 Alternate N2 - RCA	-	16	0	1	16	-	-	7	40	40	-	-	93	-	-	-	-	3,765	185	
2b.1.1.3		-	1	0	0	0	0	-	0	2	2	-	-	2	0	-	-	-	129	17	
2b.1.1.4 2b.1.1.5		-	445 2,698	6 48	24 218	400 3,906	30	-	183 1,298	1,089 8,167	1,089 8,167	-	-	2,389 23,344	90	-	-	-	102,726 948,013	6,325 37,107	-
2b.1.1.6		-	101	1	6	103	-	-	42	253	253	-	-	614	-	-	-	-	24,917	1,324	-
2b.1.1.7	7 HVAC Ductwork	-	305	7	27	446	34	-	156	975	975	-	-	2,665	100	-	-	-	114,598	4,111	-
2b.1.1.8		-	324	6	26	461	-	-	155	971	971	-	-	2,752	- 007	-	-	-	111,779	3,985	-
2b.1.1.9	Heating & Ventilation Heating Boiler - Insulated - RCA	-	483	16 0	61	1,007	76	-	302	1,945 9	1,945	-	-	6,018 26	227	-	-	-	258,789 1,058	7,101 35	-
	11 Liquid Radwaste	588	687	48	63	514	586	-	703	3,188	3,188	-	-	3,073	1,728	-	-	-	235,484	17,194	-
	12 Makeup Demin - RCA	-	103	3	14	246	-	-	65	431	431	-	-	1,471	-	-	-	-	59,747	1,412	-
	13 Non-Essential Diesel Generator - RCA 14 Off Gas Holdup	-	27 342	3 21	13 38	238 461	214	-	45 216	327 1,291	327 1,291	-	-	1,424 2,755	630	-	-	-	57,832 152,277	395 4,769	-
	14 Off Gas Holdup 15 Primary Containment	-	342 455	21 42	38 87	1,038	507	-	216 414	2,543	1,291 2,543	-	-	6,201	1,506	-	-	-	347,704	4,769 6,454	-
	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 Decommissioning Cost Analysis

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

							(11	lousanus	s of 2020 Dolla	13)											
						Off-Site	LLRW				NRC	Spent Fuel	Site	Processed		Burial	Volumes		Burial /		Utility and
Activity Index		Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Processing Costs	Disposal Costs	Other Costs	Total Contingency	Total Costs	Lic. Term. Costs	Management Costs	Restoration Costs	Volume Cu. Feet	Class A Cu. Feet	Class B	Class C Cu. Feet	GTCC Cu. Foot	Processed Wt., Lbs.	Craft Manhours	Contractor Manhours
index	Activity Description	Cost	Cost	Costs	Costs	Costs	Costs	Costs	Contingency	Costs	Costs	Costs	Costs	Cu. reet	Cu. Feet	Cu. Feet	Cu. Feet	Cu. Feet	Wt., LDS.	Mannours	Mannours
	of Plant Systems (continued)									0.10	0.40										
	Rx Bldg Closed Clng Water - Insul - RCA Rx Bldg Closed Clng Water - RCA	-	114 184	2 15	9 66	163 1,187	-	-	54 235	343 1,687	343 1,687	-	-	977 7,093	-	-	-	-	39,675 288,031	1,484 2,489	
	Rx Component Handling Equip	27	142		27	194	279	-	154	840	840	-	-	1,158	829	-	-	-	99,730	2,462	
	Rx Pressure Vessel	28	47	6	5	13		-	48	225	225	-	-	75	230	-	-	-	17,816	1,051	-
	Rx Water Cleanup Secondary Containment	172	265 124	19 7	16 14	22 170	251 86	-	222 81	965 483	965 483	-	-	130 1,017	737 255	-	-	-	52,670 57,567	5,736 1,763	-
	Service & Seal Water - Insulated - RCA	-	120	2	11	197	-	-	62	392	392	-	-	1,180	- 200	-	-	-	47,917	1,765	-
2b.1.1.24	Service & Seal Water - RCA	-	159	4	17	303	-	-	88	570	570	-	-	1,809	-	-	-	-	73,453	2,016	
	Service Air Blower - RCA Solid Radwaste	338	15 494	0 36	2 49	34 399	467	-	9 480	62 2,264	62 2,264	-	-	206 2,387	1,380	-	-	-	8,364 185,221	206 10,820	
	Structures & Buildings	-	78	2	5	60	29	-	37	2,204	2,204	-	-	357	1,380			-	19,933	1,128	
2b.1.1.28	Wells & Domestic Water	-	10	-	-	-	-	-	1	11	-	-	11	-	-	-	-	-	-	144	-
	Wells & Domestic Water - RCA Totals	1,153	52 7,860	1 315	3 804	57 11,668	2,657	-	22 5,107	136 29,563	136 29,552	-	- 11	342	7,859	-	-	-	13,874 3,334,244	633 122,835	
2b.1.1	Totals	1,155	1,000	919	004	11,000	2,697	-	5,107	29,000	29,552	-	11	69,735	1,009	-	-	-	5,554,244	122,000	-
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	-
	mination of Site Buildings																				
2b.1.3.1 2b.1.3.2		5,202 106	2,903 6	178	516 3	8,044	1,181 15	-	4,924 59	22,948 189	22,948 189	-	-	48,077	7,014 145	-	-	-	2,317,670 6,840	112,518 1.600	
2b.1.3.2 2b.1.3.3		29	28	1	3	20	14	-	29	123	123	-	-	118	125	-	-	-	10,759	789	
	Hot Shop	17	4		2	-	11	-	12	46	46	-	-	-	103	-	-	-	4,860	286	
2b.1.3.5 2b.1.3.6		58 372	24 269	2	8 23	5 225	45 82	-	48 312	191 1,289	191 1,289	-	-	31 1,343	433 669	-	-	-	21,708 87,045	1,127 8,860	
2b.1.3.6 2b.1.3.7		41	17	1	6	4	33	-	34	1,269	1,269	-	-	1,545	316	-	-	-	15,948	0,000 785	
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 2b.1.3.11	Recombiner Turbine	27 705	25 353	1 21	5 104	33 215	24 564	-	32 632	148 2,594	148 2,594	-	-	199 1,283	216 5,299	-	-	-	18,405 303,150	695 14,443	
	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 2b.1.5	Prepare/submit License Termination Plan Receive NRC approval of termination plan	-	-	-	-	-	-	526	79	605 a	605	-	-	-	-	-	-	-	-	-	4,096
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 2l	b Additional Costs																				
2b.2.1	Operational Equipment	-		23	92	1,211	-		198	1,524	1,524	-	-	11,760	-	-	-	-	294,000	32	
2b.2.2 2b.2.3	Excavation of Underground Services Security Modifications	-	1,972	-	-	-	-	376 8,696	550 1,304	2,898 10,000	2,898 10,000	-	-	-	-	-	-	-	-	12,493	-
2b.2.3	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 2l	o 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 2b.3.3	Process decommissioning chemical flush waste Small tool allowance	1	364	43	138	-	319	-	105 55	607 418	607 418	-	-	-	413	-	-	-	43,978	77	-
2b.3.4	Spent Fuel Capital and Transfer	-	- 364	-	-	-	-	117,254	17,588	134,843	416	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	-
	b Period-Dependent Costs	1 4/0							360	1.500	1.500										
2b.4.1 2b.4.2	Decon supplies Insurance	1,440	-	-	-	-		742		1,799 816	1,799 816	-	-	-	-	-	-	-	-	-	-
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 2b.4.6	Heavy equipment rental Disposal of DAW generated	-	2,711	101	- 52	-	419	-	407 123	3,117 694	3,117 694	-	-	-	5,084	-	-	-	101,679	166	-
2b.4.7	Plant energy budget	-	-	-	- 52	-	- 413	1,437	216	1,653	1,653	-	-	-		-	-	-	-	-	-
2b.4.8	NRC Fees	-	-	-	-	-	-	623	62	685	685	-	-	-	-	-	-	-	-	-	-
2b.4.9 2b.4.10	Emergency Planning Fees Fixed Overhead	-	-	-	-	-	-	2,995 2,235	299 335	3,294 2,570	2,570	3,294	-	-	-	-	-	-	-	-	-
2b.4.10 2b.4.11	Spent Fuel Pool O&M	-	-	-	-	-	-	2,233 891	134	1,024	4,810 -	1,024	-		-	-	-		-		-
2b.4.12	Liquid Radwaste Processing Equipment/Services	-	-	-	-	-	-	224	34	258	258	-	-	-	-	-	-	-	-	-	-
2b.4.13	ISFSI Operating Costs Railroad Track Maintenance	-	-	-	-	-	-	118 458	18 69	136 527	- 527	136	-	-	-	-	-	-	-	-	-
2b.4.14 2b.4.15	Remedial Actions Surveys	-	-	-	-	-	-	1,182	177	1,359	1,359	-	-	-	-	-	-	-	-	-	-
								-,	1.,	-,-50	-,0										

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

							(11)	iousanus	6 01 2020 Dolla	irs)											
						Off-Site	LLRW	0.1			NRC	Spent Fuel	Site	Processed			Volumes	amaa	Burial /	G 0	Utility and
Activi Inde		Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Processing Costs	Disposal Costs	Other Costs	Total Contingency	Total Costs	Lic. Term. Costs	Management Costs	Restoration Costs	Volume Cu. Feet	Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet	Processed Wt., Lbs.	Craft Manhours	Contractor Manhours
	b Period-Dependent Costs (continued)																				
2b.4.16		-	-	-	-	-	-	15,925	2,389	18,314	18,314	-	-	-	-	-	-	-	-	-	236,949
2b.4.17 2b.4.18		-	-	-	-	-	-	14,772 19,442	2,216 2,916	16,988 22,358	16,988 22,358	-	-	-	-	-	-	-	-	-	160,160 297,283
2b.4.16 2b.4	Subtotal Period 2b Period-Dependent Costs	1,440	5,087	101	52	-	419		10,692	81,536			-	-	5,084	-			101,679	166	694,392
2b.0	TOTAL PERIOD 2b COST	9,591	21,850	861	2,046				43,954	303,035	163,726		11	134,029	30,882				6,794,433	309,941	698,488
	D 2d - Decontamination Following Wet Fuel Storage	5,001	21,000	001	2,040	21,002	0,140	100,000	10,001	505,000	100,720	100,201	- 11	104,020	50,002				0,104,400	500,541	000,400
2d.1.1	d Direct Decommissioning Activities Remove spent fuel racks	654	58	103	149	-	2,572	-	1,017	4,553	4,553	-	-	-	7,653	-	-	-	486,170	906	-
	l of Plant Systems																				
2d.1.2.1 2d.1.2.2		-	3 47	0	$\frac{1}{2}$	17 40		-	4 19	25 112	25 112		-	103 240	- 0	-	-	-	4,184 10,334	48 665	-
2d.1.2.2		-	297		23			-	140	876			-	2,457	-		-		99,783	4,090	-
2d.1.2.4		-	11		1	10	-	-	4	26	26		-	62	-	-	-	-	2,499	143	-
2d.1.2.5		246	428						382	1,781	1,781		-	1,179		-	-	-	133,939	8,380	-
2d.1.2.6		27	41		3			-	36	161	161		-	67	117		-	-	10,220	848	-
2d.1.2.7 2d.1.2.8		-	34 33		3 2			-	17 14	108 87	108 87		-	296 223	11	-	-	-	12,733 9,072	457 397	-
2d.1.2.9		-	29		2			-	14	91	91		-	267	-	-	_	-	10,841	357	-
2d.1.2	Totals	273	924		75			-	631	3,268	3,268		-	4,894	1,479	-	-	-	293,606	15,385	-
	mination of Site Buildings																				
2d.1.3.1		946 946	2,599 2,599				10,216 10,216		3,880 3,880	19,056 19,056	19,056 19,056		-	1,969 1,969	62,698 62,698	-	-	-	2,732,406	45,703 45,703	-
2d.1.3	Totals							-					-			-	-	-	2,732,406		-
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	-
	d Additional Costs																				40.400
2d.2.1 2d.2	License Termination Survey Planning Subtotal Period 2d Additional Costs	-	-	-	-	-	-	1,458 1,458	437 437	1,896 1,896	1,896 1,896		-	-	-	-	-	-	-	-	12,480 12,480
		-	-			•	-	1,400	497	1,000	1,050	_	-	_		_	-	-	_	-	12,400
Period 2 2d.3.1	d Collateral Costs	79		54	96		220		114	563	563				504				30,239	98	
2d.3.1 2d.3.2	Process decommissioning water waste Process decommissioning chemical flush waste	79 1	-	54 26		-	193	-	64	366	366		-	-	249	-	-		26,553	98 47	-
2d.3.3	Small tool allowance	-	91		-	-	-	-	14	105			-	-	-	-	-	-	-		-
2d.3.4	Decommissioning Equipment Disposition	-	-	130	82	1,112	178		237	1,739			-	6,000	529	-	-	-	303,608	147	-
2d.3.5	Spent Fuel Capital and Transfer	80	-	-	-	-	-	27	4 432	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	-
	d Period-Dependent Costs	944							61	305	305										
2d.4.1 2d.4.2	Decon supplies Insurance	244		-	-	-	-	530	53	583			-	-	-	-	-		-	-	-
2d.4.2	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	277 630	277 630		-	-	2,030	-	-	-	40,600	66	-
2d.4.7 2d.4.8	Plant energy budget NRC Fees	-	_	-	-	-	-	547 424	82 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		-	-	-	-	-	-	84 94	13 14	97 108	108	97	-	-	-	-	-	-	-	-	-
2d.4.13 2d.4.14	Railroad Track Maintenance Remedial Actions Surveys	-	-	-	-	-	-	94 844	14 127	971	971	-	-	-	-	-	-	-	-	-	-
2d.4.14		-	-	-	-	-	-	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		-				-	-	10,052	1,508	11,560	10,670		-	-	-	-	-	-	-	-	149,660
2d.4	Subtotal Period 2d Period-Dependent Costs	244	2,743				167		5,652	43,446	38,604		-	-	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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Table C
Monticello Nuclear Generating Plant
DECON Decommissioning Cost Estimate with DOE Pickup of Industry Fuel Starting in 2035
(Thousands of 2020 Dollars)

Property								(Tł	housand	s of 2020 Dolla	rs)											
Part							Off Site	I I DW				NDC	Snort Fuel	Site.	Drogggad		Dunial	Volumes		Puriol /		Hility and
Part	Activity		Decon	Removal	Packaging	Transport			Other	Total	Total					Class A			GTCC		Craft	
Part	Index	Activity Description	Cost	Cost	Costs	Costs	Costs	Costs	Costs	Contingency	Costs	Costs	Costs	Costs	Cu. Feet	Wt., Lbs.	Manhours	Manhours				
Section Sect	PERIOD 2	2f - License Termination																				
Contame Cont	Period 2f I	Direct Decommissioning Activities																				
Second Process			-	-	-	-	-	-	166	50		216	-	-	-	-	-	-	-	-	-	-
Part			_	-	_	_	_	_	166	50		216	-	-	-	-	_	_	-	-	_	-
Second S																						
Second Part			_	_	_	_	_	_	6 920	2.076	8 995	8 995	_	_	_	_	_	_	_		95.048	6.240
Ministry			-	-	-	-	-	-						-	-	-	-	-	-	-		
Ministry	Powind 9f C	Callataval Casta																				
Main			-	-	-	-	-	-						-	-	-	-	-	-	-	-	-
Professional Content	2f.3.2	Spent Fuel Capital and Transfer	-	-	-	-	-	-							-	-	-	-	-	-	-	-
	21.3	Subtotal Period 2f Collateral Costs	-	-	-	-	-	-	1,790	268	2,058	1,454	605	-	-	-	-	-	-	-	-	-
1. 1. 1. 1. 1. 1. 1. 1.									***	#-a	*^^	***										
			-	-		-	-	-						-	-			-	-	-	-	-
			-	708	-	-	-	-						-	-	-	-	-	-	-	-	- -
Mile	2f.4.4	Disposal of DAW generated	-	-	7	4	-	29						-	-	355	-	-	-	7,097	12	-
Marging Planting Ros			-	-	-	-	-	-						-	-	-	-	-	-	-	-	-
Figure F			-	-	-	-	-	-						-	-	-	-	-	-	-	-	-
Facility Section Part	2f.4.8	Fixed Overhead	-	-	-	-	-	-	1,597	239	1,836		-	-	-	-	-	-	-	-	-	-
Secretary Stanff Cent			-	-	-	-	-	-						-	-	-	-	-	-	-	-	-
24.13			-	-	-	-	-	-						-	-	-	-	-	-	-		162 981
Principal Prin			-	-	-	_	-	-						-	_	-	-	_	-	-		
Part			-	<u>-</u>		-	-							-	-	-	-	-	-	_ 5		
PERIOD 2 TOTALS 1,071 1,07		-	-							,			,		-			-	-			
Period 3b Direct Decominisolating Activities			10.701		·	_									-			-	-			
Period & Direct Decominisoning Activities			13,731	69,966	20,475	10,751	49,957	12,811	366,033	126,756	141,006	910,201	171,445	19	200,100	174,125	1,761	090	-	21,552,260	121,310	2,393,096
Demolition of Remaining Site Buildings																						
Sal. 1.1 Reactor Building 1.971																						
Sab.1.1.2 Condensate Tanks Foundation 10			_	1 971	_	_	_	_	_	296	2 267		_	2 267	_	_	_	_	_		13 911	_
Sh.1.1 HCI Room	3b.1.1.2	Condensate Tanks Foundation	-		-	-	-	-	-			-	-		-	-	-	-	-	-		-
Sh.1.15 Hot Shop			-	-	-	-	-	-	-			-	-		-	-	-	-	-	-		-
Sab.1.1.6 Hydrogen & Oxygen Storage 2 0 0 2 2 2 1 4 6 5 5 6 5 5 5 5 5 5			-		-	-	-	-	-				-		-	-	-	-	-	-		-
Sab.1.1.7 LLRW Storage & Shipping			-		-	_	-	-	-			-	-	2	_	-	-	_	-	-		-
35.1.1.9 Misc Structures 2017 1.410	3b.1.1.7	LLRW Storage & Shipping	-		-	-	-	-	-			-	-		-	-	-	-	-	-		-
Sh.1.1.0 Offgas Stack 108			-		-	-	-	-	-	-		-	-	•	-	-	-	-	-	-		
35 1.1.11 Offgas Storage & Compressor 39			-			-	-	-				-	-		-					-		
3b.1.1.13 Recombiner 128 147	3b.1.1.11	Offgas Storage & Compressor	-	39	-	-	-	-	-	6	45		-	45	-	-	-	-	-	-	199	-
Sh.1.14 Security Barrier			-		-	-	-	-	-			-	-		-	-	-	-	-	-		
Structures Greater than 3' Below Grade 2,461			-		-	-	-	-	-			-	-			-	-	-	-	-		
3b.1.17 Turbine	3b.1.1.15	Structures Greater than 3' Below Grade	-		-	-	-	-	-	369	2,830		-		-	-	-	-	-	-	12,649	
3b.1.18 Turbine Building Addition 55 8 63 - 63 - 63 - 618 - 3b.1.19 Turbine Pedestal 5b.1.19 Turbine Pedestal 5b.1.20 182 - 27 209 - 209 - 209 - 926 - 320			-	- 1	-	-	-	-	-	1			-	O	-	-	-	-	-	-		
3b.1.19 Turbine Pedestal			-		-	-	-	-	-				-		-	-	-	-	-	-		
3b.1.1 Totals			-		-	-	-	-	-				-		-	-	-	-	-	-		
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			-	8,169	-	-	-	-	-	1,225	9,394	-	-	9,394	-	-	-	-	-	-	58,885	-
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																						
			-		-	-	-	-				-	-		-	-	-	-	-	-		
			-		-	-		-							-	-		-		-		

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

							(T	housands	of 2020 Dolla	rs)											
_						Off-Site	LLRW				NRC	Spent Fuel	Site	Processed		Dunial	Volumes		Burial /		Utility and
Activit	v	Decon	Removal	Packaging	Transport			Other	Total	Total	Lic. Term.	Management	Restoration	Volume	Class A	Class B	Class C	GTCC	Processed	Craft	Contractor
Index		Cost	Cost	Costs	Costs	Costs	Costs	Costs	Contingency	Costs	Costs	Costs	Costs	Cu. Feet	Cu. Feet		Cu. Feet	Cu. Feet	Wt., Lbs.	Manhours	Manhours
Dowind 9	b 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	_	-	-	-	-	-	2,001	_
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 3	b 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 3	b 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		-	-	-	-	-	-	-	-	-
3b.4.8	ISFSI Operating Costs	-	-	-	-	-	-	194	29	223	-	223	-	-	-	-	-	-	-	-	-
3b.4.9	Railroad Track Maintenance	-	-	-	-	-	-	543	81	624			-	-	-	-	-	-	-	-	-
3b.4.10	Security Staff Cost	-	-	-	-	-	-	25,319	3,798	29,117		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
PERIO	O 3c - Fuel Storage Operations/Shipping																				
Period 3	c Direct Decommissioning Activities																				
3c.3.1	c Collateral Costs 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	-	-	-	-		-	-	-	-
D . 10	D 11D 1 10																				
	c Period-Dependent Costs								2 100												
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	964 520	10,606		10,606	-	-	-	-	-	-	-	-	-
3c.4.5 3c.4.6	Emergency Planning Fees Fixed Overhead	-	-	-	-	-	-	5,199 7,552	1.133	5,718 8,685	-	5,718 8,685	-	-	-	-	-	-	-	-	-
3c.4.7	ISFSI Operating Costs	-	-	-	-	-	-	3,925	589	4,513		4,513	-	-	-	-	-	-	-	-	-
3c.4.7	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
PERIO	O 3d - GTCC shipping																				
	d Direct Decommissioning Activities																				
	Steam Supply System Removal																				
	Vessel & Internals GTCC Disposal	_	-	1,083	_	-	4,313		918	6,314	6,314	_	_	_	_	_	_	1,160	225,765	_	_
3d.1.1	Totals	<u>-</u>	-	1,083		-	4,313		918	6,314	6,314		-	-	-	-	-	1,160	225,765		-
3d.1.1	Subtotal Period 3d Activity Costs	-	-	1,083		-	4,313		918	6,314	6,314		-	-	-	-	-	1,160	225,765		-
Pariod 9	d 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	-	-	-	-	-	-	-	-	-

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

							(11	lousanus	6 01 2020 Dona	13)											
Activity	7	Decon	Removal	Packaging	Transport	Off-Site Processing	LLRW Disposal	Other	Total	Total	NRC Lic. Term.	Spent Fuel Management	Site Restoration	Processed Volume	Class A	Burial Class B	Volumes Class C	GTCC	Burial / Processed	Craft	Utility and Contractor
Index		Cost	Cost	Costs	Costs	Costs	Costs	Costs	Contingency	Costs	Costs	Costs	Costs	Cu. Feet	Cu. Feet	Cu. Feet	Cu. Feet	Cu. Feet	Wt., Lbs.	Manhours	Manhours
Period 3d	l Period-Dependent Costs																				
3d.4.1	Insurance	-	-	-	-	-	-	27	3	30	30	-	-	-	-	-	-	-	-	-	-
3d.4.2	Property taxes NRC ISFSI Fees	-	-	-	-	-	-	35	3	38 9	38	- 9	-	-	-	-	-	-	-	-	-
3d.4.4 3d.4.5	Emergency Planning Fees	-	-	-	-	-	-	8	1	6	-	6	-	-	-	-	-	-	-	-	-
3d.4.6	Fixed Overhead	-	-	-	-	-	-	8	1	10	10	-	-	-	-	-	-	-	-	-	-
3d.4.7 3d.4.8	Railroad Track Maintenance Security Staff Cost	-	-	-	-	-	-	5 165	$\frac{1}{25}$	6 190	6 190	-	-	-	-	-	-	-	-	-	2.074
3d.4.9	Utility Staff Cost	- -	-		-	-	-	39	6	45	45	-	-	-	-	-	-	-	-	-	2,074 539
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	e Additional Costs																				
3e.2.1	License Termination ISFSI	-	57	188			5,925		2,292	11,462	11,462	-	-	-	21,949		-	-	2,633,402		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	e Period-Dependent Costs																				
3e.4.1	Insurance	-	-	-	-	-	-	118	30	148	148	-	-	-	-	-	-	-	-	-	-
3e.4.2 3e.4.3	Property taxes Plant energy budget	-	-	-	-	-	-	249 12	62	312 15	312 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 Utility Staff Cost	-	-	-	-	-	-	352 261	88 65	440 326	440 326	-	-	-	-	-	-	-	-	-	4,999 3,792
3e.4.7 3e.4	Subtotal Period 3e Period-Dependent Costs	-	-	-	-	-	-	1,105	276	1,381	1,381	-	-	-	-	-	-	-	-	-	8,792 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 3f.2	Demolition and Site Restoration of ISFSI Subtotal Period 3f Additional Costs	-	1,486 1,486	-	-	-	-	233 233	258 258	1,977	-	-	1,977 1,977	-	-	-	-	-	-	6,957 6,957	160 160
31.2	Subtotal Period 3f Additional Costs	-	1,486	-	-	-	-	233	298	1,977	-	-	1,977	-	-	-	-	-	-	6,997	160
	Collateral Costs																				
3f.3.1	Small tool allowance Subtotal Period 3f Collateral Costs	-	10 10	-	-	-	-	-	2 2	12 12	-	-	12 12	-	-	-	-	-	-	-	-
3f.3	Subtotal Period 3f Collateral Costs	-	10	-	-	-	-	-	2	12	-	-	12	-	-	-	-	-	-	-	-
	Period-Dependent Costs																				
3f.4.2 3f.4.3	Property taxes Heavy equipment rental	-	117	-	-	-	-	126	13 17	138 134	-	-	138 134	-	-	-	-	-	-	-	-
3f.4.4	Plant energy budget	-	-		-	-	-	- 6	1	7	-	-	7	-		-		-	-	-	-
3f.4.5	Fixed Overhead	-	-	-	-	-	-	36	5	41	-	-	41	-	-	-	-	-	-	-	-
3f.4.6 3f.4.7	Railroad Track Maintenance Security Staff Cost	-	-	-	-	-	-	21 177	$\frac{3}{27}$	24 204	-	-	24 204	-	-	-	-	-	-	-	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

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GTCC Burial /
Processed
Cu. Feet Wt., Lbs.

 Burial Volumes

 Class A
 Class B
 Class C
 GTCC

 Cu. Feet
 Cu. Feet
 Cu. Feet
 Cu. Feet

Monticello Nuclear Generating Plant Decommissioning Cost Analysis

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

NRC Spent Fuel Site
Total Lic. Term. Management Restoration
Costs Costs Costs Costs

Processed Volume Cu. Feet

Class A

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	C
TOTAL COST TO	DECOMMISSION WITH 17.83% CONTING	ENCY:			\$1,405,104	thousands of	2020 dolla	rs	1
TOTAL NRC LICE	ENSE TERMINATION COST IS 55.24% OR:				\$776,139	thousands of	2020 dolla	rs	
SPENT FUEL MA	NAGEMENT COST IS 39.54% OR:				\$555,579	thousands of	2020 dolla	rs	
NON-NUCLEAR I	DEMOLITION COST IS 5.22% OR:				\$73,386	thousands of	2020 dolla	rs	
TOTAL LOW-LEV	EL RADIOACTIVE WASTE VOLUME BUR	IED (EXCLUDING	G GTCC):		200,160	Cubic Feet			
TOTAL GREATE	R THAN CLASS C RADWASTE VOLUME G	ENERATED:			1,160	Cubic Feet			
TOTAL SCRAP M	IETAL REMOVED:				23,123	Tons			
TOTAL CRAFT L	ABOR 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

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APPENDIX D

DETAILED COST ANALYSIS

SCENARIO 2: DECON with 60 Year DFS

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Table D

Monticello Nuclear Generating Plant

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

Property								(11	поизиниз	oi 2020 Dollai	,											
Section Sect							Processing	Disposal				Lic. Term.	Management	Restoration	Volume		Class B	Class C		Processed		Contractor
1.00 1.00			Cost	Cost	Costs	Costs	Costs	Costs	Costs	Contingency	Costs	Costs	Costs	Costs	Cu. Feet	Wt., LDS.	Mannours	Wannours				
1.00 1.00		_																				
Section Sect			-	-	-	_	-	_	167	25	192	192	-	-		_	_	_	-	_	-	1,300
Ministry Markensemblands	1a.1.2	Notification of Cessation of Operations									a											,
Marie Mari																						
1.10 Segree of some (SME) Segree of som																						
This form form form form form form form form		Prepare and submit PSDAR	-	-	-	-	-	-			296		-	-	-	-	-	-	-	-	-	
1.10 1.10			-	-	-	-	-	-	591	89		680	-	-	-	-	-	-	-	-	-	4,600
1.10 1.10			_	_	_	_	_	_	199	19		148	_	_	_	_	_	_	_	_	_	1 000
1.1 1.1			-	-	-	-	-	-					-	-	-	-	-	-	-	-	-	
1.1.1 1.1.2 1.1.			-	-	-	-	-	-					-	-	-	-	-	-	-	-	-	
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Math Profession Stroke 10			-	-	-	-	-	-					-	-	-	-		-	-	-	-	
Part	1a.1.15	Perform Site-Specific Cost Study	-	-	-	-	-	-	643	96	739	739	-	-	-	-	-	-	-	-	-	5,000
1.11 1.11	1a.1.16	Prepare/submit Irradiated Fuel Management Plan	-	-	-	-	-	-	129	19	148	148	-	-	-	-	-	-	-	-	-	1,000
Life Series Life Series Serie									600	OF	707	G = 4		79								4.000
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Section Personal suppression structure 2.00			-	-	-	-	-	-					-	-	-	-	-	-	-	-	-	
1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.			-	-	-	-	-	-					-	-	-	-	-	-	-	-	-	
1.1.1.1.1 1.			-	-	-	-	-	-					-	-	-	-	-	-	-	-	-	
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1.1.1 1.1.			-	-	-	-	-	-					-		-	-	-	-	-	-	-	
1.1.1 1.1.	Planning	& Site Preparations																				
1.1 1.2			-	-	-	-	-	_	308	46	355	355	-	-	-	-	-	-	-	-	-	2,400
1.1 1.2			-	-	-	-	-	-					-	-	-	-	-	-	-	-	-	
1.12 1.12			-	-	-	-	-	-					-	-	-	-	-	-	-	-	-	
1			-	-	-	-	-	-					-	-	-	-	-	-	-	-	-	
1.3.1 1.3.2 1.3.			-	-	-	-	-	-					-	550	-	-	-	-	-	-	-	
1.3.2 Setention and Severance 1.3.6 1.3.6 1.3.7																						
Residence Resi			-	-	-	-	-	-						-	-	-	-	-	-	-	-	-
1a.4.1 Insurance 2,328 23,57 2,561 </td <td></td> <td></td> <td>-</td> <td>-</td> <td>-</td> <td>-</td> <td>-</td> <td>-</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>-</td> <td>-</td> <td>-</td> <td>-</td> <td>-</td> <td>-</td> <td>-</td> <td>-</td> <td>-</td>			-	-	-	-	-	-						-	-	-	-	-	-	-	-	-
1a.4.2 Property taxes 5.0 3,570 3,570 3,927 <td>Period 1a</td> <td>a Period-Dependent Costs</td> <td></td>	Period 1a	a Period-Dependent Costs																				
			-	-	-	-	-	-					-	-	-	-	-	-	-	-	-	-
1a.4.4 Heavy equipment rental 753 753 113 866 866 1			-	- 614	-	-	-	-					-	-	-	-	-	-	-	-	-	-
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$			-			-	-	-					-	-	-	-	-	-	-	-		-
1a.4.7 NRC Fees 1,137 114 1,251 1,251 - - - - - - - - - - - - - - - - - <t< td=""><td></td><td>Disposal of DAW generated</td><td>-</td><td>-</td><td></td><td>6</td><td>-</td><td>50</td><td></td><td>15</td><td>83</td><td>83</td><td>-</td><td>-</td><td>-</td><td>610</td><td>-</td><td>-</td><td>-</td><td>12,190</td><td>20</td><td>-</td></t<>		Disposal of DAW generated	-	-		6	-	50		15	83	83	-	-	-	610	-	-	-	12,190	20	-
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$			-	-	-	-	-	-					-	-	-	-	-	-	-	-	-	-
1a.4.9 Fixed Overhead - - 2,616 392 3,009 - <t< td=""><td></td><td></td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td></td><td></td><td></td><td></td><td>9 770</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td></t<>			-	-	-	-	-	-					9 770	-	-	-	-	-	-	-	-	-
1a.4.10 Spent Fuel Pool O&M			-	-	-	-	-	-					5,110	-	-	-	-	-	-	-	-	-
1a. 4.12 Railroad Track Maintenance - - - - 1.25 19 144 144 - - - - - - 1a. 4.13 Security Staff Cost - - - - 16.372 2,456 18.827 - - - - - - 245,440 1a. 4.14 Utility Staff Cost -	1a.4.10	Spent Fuel Pool O&M	-	-	-	-	-	-	845	127	971	-		-	-	-	-	-	-	-	-	-
1a. 4.13 Security Staff Cost - - - - - - 16.372 2.456 18.827 - - - - - - 245,440 1a. 4.14 Utility Staff Cost -			-	-	-	-	-	-					129	-	-	-	-	-	-	-	-	-
1a.4.14 Utility Staff Cost			-	-	-	-	-	-					-	-	-	-	-	-	-	-	-	945 440
			-	-	-	-	-	-					-	-	-	-	-	-	-	-	-	
			=	1,367	7 12	6	-	50					4,870	-	-	610	-	-	-	12,190	20	

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Table D

Monticello Nuclear Generating Plant

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

							`		or 2020 Donar	/											
Activit; Index		Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Class A Cu. Feet	Class B	Volumes Class C Cu. Feet	GTCC Cu. Feet		Craft Manhours	Utility and Contractor Manhours
1a.0	TOTAL PERIOD 1a COST	-	1,367	12	2 6	-	50	87,418	12,871	101,724	94,783	6,392	550	-	610	=	-	-	12,190	20	750,693
PERIOI	D 1b - Decommissioning Preparations																				
Period 1	b Direct Decommissioning Activities																				
	Work Procedures Plant systems							608	91	700	630		70								4,733
1b.1.1.1 1b.1.1.2		-	-	-	-	-	-	129	19	148	148	-	70	-	-	-	-	-	-	-	1,000
1b.1.1.3		-	-	-	-	-	-	514	77	591	591	-	-	-	-	-	-	-	-	-	4,000
	Remaining buildings	-	-	-	-	-	-	174	26	200	50	-	150	-	-	-	-	-	-	-	1,350
1b.1.1.5 1b.1.1.6	CRD housings & NIs Incore instrumentation	-	-	-	-	-	-	129 129	19 19	148 148	148 148	-	-	-	-	-	-	-	-	-	1,000 1,000
1b.1.1.6 1b.1.1.7		-	-	-	-	-	-	257	39	296	296	-	-	-	-	-	-	-	-	-	2,000
	Reactor vessel	-	-	-	-	-	-	467	70	537	537	-	-	-	-	-	-	-	-	-	3,630
	Facility closeout	-	-	-	-	-	-	154	23	177	89	-	89	-	-	-	-	-	-	-	1,200
	Sacrificial shield	-	-	-	-	-	-	154 129	23 19	177 148	177 74	-	74	-	-	-	-	-	-	-	1,200 1,000
	1 Reinforced concrete 2 Main Turbine	-	-	-	-	-	-	267	40	307	307	-	- 14	-	-	-	-	-	-	-	2,080
	3 Main Condensers	-	-	-	-	-	-	268	40	309	309	-	-	-	-	-	-	-	-	-	2,088
	4 Moisture separators & reheaters	-	-	-	-	-	-	257	39	296	296	-	-	-	-	-	-	-	-	-	2,000
	5 Radwaste building	-	-	-	-	-	-	351	53	403	363	-	40	-	-	-	-	-	-	-	2,730
1b.1.1	6 Reactor building Total	-	-	-	-	-	-	351 4,336	53 650	403 4,987	$\frac{363}{4,524}$	-	40 463	-	-	-	-	-	-	-	2,730 33,741
1b.1.2	Decon NSSS	296						_	148	444	444									1,067	_
1b.1.2 1b.1	Subtotal Period 1b Activity Costs	296		-	-	-	-	4,336	798	5,431	4,968	-	463	-	-	-	-	-	-	1,067	33,741
	b Additional Costs																				
1b.2.1	Spent Fuel Pool Isolation	-	-	-	-	-	-	12,675		14,576	14,576	-	-	-	-	-	-	-	-	-	-
1b.2.2 1b.2.3	Site Characterization Mixed & RCRA Waste	-	-	28	3 29	14	-	5,930	1,779 9	7,708 80	7,708 80	-	-	43	-	-	-	-	5,253	30,500 161	10,852
1b.2.5 1b.2	Subtotal Period 1b Additional Costs	-	-	28				18,605	3,689	22,365	22,365	-	-	43		-	-	-	5,253	30,661	10,852
	b Collateral Costs																				
1b.3.1	Decon equipment	1,055		-	-	-	-	-	158	1,213	1,213	-	-	-	-	-	-	-	-	-	-
1b.3.2 1b.3.3	DOC staff relocation expenses Process decommissioning water waste	38	-	25	5 45	-	102	1,264	190 53	1,454 263	1,454 263	-	-	-	233	-	-	-	13.991	45	-
1b.3.4	Process decommissioning water waste	1		24			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 1b.3.8	Decon rig Spent Fuel Capital and Transfer	2,104	-	-	-	-	-	391	316 59	2,419 450	2,419	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 11 1b.4.1	b Period-Dependent Costs Decon supplies	39	_						10	48	48										
1b.4.1 1b.4.2	Insurance	- 39	-	-	-	-	-	1,161	116	$\frac{48}{1,277}$	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 1b.4.6	Heavy equipment rental Disposal of DAW generated	-	375			-	29	-	56 9	432 49	432 49	-	-	-	356	-	-	-	- 7.100	- 10	-
1b.4.6 1b.4.7	Plant energy budget	-	_	. "	4	-	29	1,812	9 272	2,083	2,083	-	-	_	396	-	-	-	7,122	12	-
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	-	-	-	-	-	-	1,305 421	196	1,500	1,500	484	-	-	-	-	-	-	-	-	-
1b.4.11 1b.4.12	Spent Fuel Pool O&M ISFSI Operating Costs	-	-	-	-	-	-	421 56	63 8	484 64	-	484 64	-	-	-	-	-	-	-	-	-
1b.4.12	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 1b.4	Utility Staff Cost Subtotal Period 1b Period-Dependent Costs	39	719	7	7 4	-	29	13,682 35,955	2,052 5,323	$15,734 \\ 42,076$	15,734 $39,970$	2,106	-	-	356	-	-	-	7,122	12	211,579 397,229
1b.0	TOTAL PERIOD 1b COST	3,531	1,921	84	1 154	14	1,657	66,886	12,113	86,361	83,343	2,556	463	43	589	231	-	-	50,964	31,828	441,822
	D 1 TOTALS	3,531		96					24,984	188,085	178,125	8,948	1,012			231	_	-	63,155	31,848	1,192,515
		5,551	0,200	50	. 100	14	1,101	104,004	24,004	100,000	110,120	0,040	1,012	40	1,100	201	-	_	00,100	01,040	1,102,010

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Table D

Monticello Nuclear Generating Plant

DECON Decommissioning Cost Estimate with 60 Years of Spent Fuel Storage

(Thousands of 2020 Dollars)

						(Tł	ousands	of 2020 Dollar	rs)											
					Off-Site	LLRW				NRC	Spent Fuel	Site	Processed		Burial '	Volumes		Burial /		Utility and
Activity	Decon	Removal	Packaging		Processing	Disposal	Other	Total	Total	Lic. Term.	Management	Restoration	Volume	Class A	Class B	Class C	GTCC	Processed	Craft	Contractor
Index Activity Description	Cost	Cost	Costs	Costs	Costs	Costs	Costs	Contingency	Costs	Costs	Costs	Costs	Cu. Feet	Cu. Feet	Cu. Feet	Cu. Feet	Cu. Feet	Wt., Lbs.	Manhours	Manhours
PERIOD 2a - Large Component Removal																				
Period 2a Direct Decommissioning Activities																				
Nuclear Steam Supply System Removal																				
2a.1.1.1 Recirculation System Piping & Valves 2a.1.1.2 Recirculation Pumps & Motors	111 40	94 63	27 16			528 539	-	221 186	1,031 938	1,031 938	-	-	96	1,430 945	-	-	-	99,742	2,905 1,563	-
2a.1.1.2 Recirculation Pumps & Motors 2a.1.1.3 CRDMs & NIs Removal	194	1,020	415		42	1,130	-	696	3,591	3,591	-	-	- 96	3,741	-	-	-	112,200 213,700	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		-	5,861	364		30,140	30,140	-	-	-	16,169	1.501	-	-	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										40.400										
2a.1.2 Main Turbine/Generator 2a.1.3 Main Condensers	-	385 1,347	1,356 360		6,139 3,225	439 244	-	1,341 947	10,182 6,317	10,182 6,317	-	-	24,835 17,396		-	-	-	1,577,959 828,955	5,438 18,831	-
Za.1.3 Main Condensers	-	1,047	300	104	5,225	244		541	0,517	0,017	-	•	17,550	121		_	-	020,355	10,031	-
Cascading Costs from Clean Building Demolition		332						70	001	001									0.017	
2a.1.4.1 Reactor Building 2a.1.4.2 Radwaste	-	25	-	-	-	-		50 4	381 28	381 28	-	-	-	-	-	-		-	2,217 127	-
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		70	-	70	410	410	=	-	803		-	-	-	45,852	1,656	-
2a.1.5.2 Chemistry Sampling	-	27	1	2			-	14	83	83	-	-	156	37	-	-	-	8,681	400	-
2a.1.5.3 Chemistry Sampling - Insulated 2a.1.5.4 Circulating Water - RCA	-	2 207	0 14	-		0	-	1 230	3 1,626	3 1,626	-	-	6,656	1	-	-	-	72 270,307	28 2,860	-
2a.1.5.5 Combustible Gas Control - Insul - RCA	-	29	0			-	-	13	80	80	-	-	212		-	-	-	8,617	378	-
2a.1.5.6 Combustible Gas Control - RCA	-	18	1	3			-	12	81	81	-	-	285		-	-	-	11,577	245	-
2a.1.5.7 Condensate & Feedwater 2a.1.5.8 Condensate & Feedwater - Insulated	-	987 492	183 34			2,464 408	-	1,431 343	8,731 2,038	8,731 2,038	-	-	19,947 4,176		-	-	-	1,275,810 246,693	14,196 6,964	-
2a.1.5.8 Condensate & Feedwater - Insulated 2a.1.5.9 Condensate Demin	-	545	30		560	339	-	316	1,840	1,840	-	-	3,346		-	-	-	199,936	7,618	-
2a.1.5.10 Condensate Storage	-	726	33			270	-	444	2,748	2,748	-	-	7,131	795	-	-	-	340,568	10,345	-
2a.1.5.11 Control Rod Drive	-	3	0		0	1	-	2	9	9	-	-	19		-	-	-	1,009	41	-
2a.1.5.12 Control Rod Drive Hydraulic 2a.1.5.13 Core Spray	-	416 79	16 20			190 176	-	199 184	1,124 1,244	1,124 1,244	-	-	1,658 4,384		-	-	-	103,306 211,329	5,898 1,163	-
2a.1.5.14 Core Spray - Insulated	-	145	8	13		90	-	82	474	474	-	-	818		-		-	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 2a.1.5.18 Drywell Atmosphere Cooling - RCA	-	2 38	0	0 5	4 92	-	-	$\frac{1}{24}$	7 159	7 159	-	-	23 548		-	-	-	931 22,244	25 550	-
2a.1.5.19 EDG Emerg Service Water - Insul - RCA	-	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 2a.1.5.22 Emergency Service Water - RCA	-	21 2	0	_	23 2		-	9	55	55 5	-	-	137 13	-	-	-	-	5,544 512	281 22	-
2a.1.5.23 GEZIP - RCA	-	3	0	-	17		-	4	25	5 25	-	-	103		-	-	-	4,184	48	-
2a.1.5.24 Generator Physical Design - RCA	-	5	0	0			-	2	12	12	-	-	31		-	-	-	1,250	67	-
2a.1.5.25 H2-O2 Control Analyzing	-	6	0	-	1	5	-	3	15	15	-	-	6		-	-	-	1,080	81	-
2a.1.5.26 H2-O2 Control Analyzing - Insulated 2a.1.5.27 High Pressure Coolant Injection	-	6 67	0 6	0 13	163	5 70	-	3 61	15 381	15 381	-	-	6 972	10	-	-	-	1,080 52,792	81 966	-
2a.1.5.28 High Pressure Coolant Injection - Insula	-	219	14			163	_	141	830	830	=	-	1,598		-	-	-	95,733	3,079	-
2a.1.5.29 Hydrogen Cooling	-	8	-			-	-	1	10		-	10		-	-	-	-		118	-
2a.1.5.30 Hydrogen Cooling - RCA 2a.1.5.31 Hydrogen Seal Oil - RCA	-	7 17	0	-	7 32		-	3 9	17 60	17 60	-	-	39 189		-	-	-	1,600 7,669	79 212	-
2a.1.5.32 Hydrogen Water Chemistry - RCA	-	24	0	_	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				-	122	712	712	-	-	1,333		-	-	-	80,439	2,746	-
2a.1.5.35 Main Steam 2a.1.5.36 Main Turbine	-	249 1,012	17 205		359 3,306	201 2,921	-	173 1,553	1,029 9,350	1,029 9,350	-	-	2,148 19,760		-	-	-	125,135 1,354,661	3,512 14,733	-
2a.1.5.37 Main Turbine - Insulated	-	214	18				-	1,555	1,097	1,097	-	-	2,530		-	-	-	1,554,661	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				-	163	960	960	-	-	1,795		-	-	-	121,554	2,708	-
2a.1.5.40 Off Gas Recombiner - Insulated 2a.1.5.41 Post Accident Sampling	-	387 25	19	27 1	229 9		-	197 11	1,100 58	1,100 58	-	-	1,366 53		-	-	-	100,933 4,318	5,385 345	-
2a.1.5.42 Post Accident Sampling - Insulated	-	17	1	1	3		-	8	43	43	=	=	17		-	-	-	3,116	212	-
2a.1.5.43 RHR Service Water - Insulated - RCA	-	83	3			-	-	60	409	409	-	-	1,485	-	-	-	-	60,293	1,125	-
2a.1.5.44 RHR Service Water - RCA	-	4 50	0 2	-	6		-	2	12 155	12	-	-	35		-	-	-	1,410	57 779	-
2a.1.5.45 Reactor Feedwater Pump Seal	-	56	2	4	32	33	-	28	199	155	-	-	193	96	-	-	-	14,009	773	-

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Table D

Monticello Nuclear Generating Plant

DECON Decommissioning Cost Estimate with 60 Years of Spent Fuel Storage

(Thousands of 2020 Dollars)

							(Th	ousands	of 2020 Dollar	rs)											
Activit Index		Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Class A Cu. Feet	Class B	Volumes Class C Cu. Feet	GTCC Cu. Feet	Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
2a.1.5.46	of Plant Systems (continued) 3 Residual Heat Removal 7 Residual Heat Removal - Insulated	362 622	252 554	172 61			2,051 880	-	962 772	5,049 3,535	5,049 3,535	-	-	6,406 3,367	6,012 2,607	-	-	-	647,941 303,087	4,135 10,340	-
	Rx Core Isolation Cooling	- 022	49	2		43	26	-	26	150	150	-	-	259	76	-	-	-	15,396	691	-
2a.1.5.49		- 56	107	5	7	48	67	-	52	287 258	287	-	-	288	198	-	-	-	24,419	1,479	-
	Rx Recirculation Snubbers	- -	58 169	6 2	-	7 63	65 30	-	61 60	258 331	258 331	-	-	43 377	190 90	-	-	-	14,095 21,009	1,580 2,548	-
	2 Standby Liquid Control - Insul - RCA	-	4	0		4	-	-	2	9	9	-	-	22	-	-	-	-	904	48	-
2a.1.5.5a 2a.1.5.5a	3 Standby Liquid Control - RCA 4 Stator Cooling - RCA	-	26 7	1 0	2	41 21	-	-	13 5	83 35	83 35	-	-	245 126	-	-	-	-	9,969 5,135	341 98	-
	5 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 2 2a.3.1	a Collateral Costs Process decommissioning water waste	85		57	102		232		122	598	598				532				31,942	104	
2a.3.1	Process decommissioning chemical flush waste	5	-	216			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 2a.3.5	Spent Fuel Capital and Transfer Retention and Severance	-	-		-	-	-	13,661 13,127	2,049 1,969	15,710 15,097	15,097	15,710	-		-	-	-	-	-	-	-
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 2 2a.4.1	a Period-Dependent Costs Decon supplies	112		_		_			28	140	140	_	_	_					_	_	_
2a.4.2	Insurance	-	-	-	-	-	-	1,019	102	1,121	1,121	-	-	-	-	-	-	-	-	-	-
2a.4.3	Property taxes	-	- 0.050	-	-	-	-	4,377	438	4,814 2,945	4,814	-	-	-	-	-	-	-	-	-	-
2a.4.4 2a.4.5	Health physics supplies Heavy equipment rental	-	2,356 3,627	-	-	-	-	-	589 544	4,171	2,945 4,171	-	-	-	-	-	-	-	-	-	-
2a.4.6	Disposal of DAW generated	-	-	110	57	-	457	-	134	758	758	-	-	-	5,551	-	-	-	111,023	181	-
2a.4.7 2a.4.8	Plant energy budget NRC Fees	-	-	-	-	-	-	2,501 856	375 86	2,876 942	2,876 942	-	-	-	-	-	-	-	-	-	-
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 2a.4.12	Spent Fuel Pool O&M ISFSI Operating Costs	-	-		-	-	-	1,224 162	184 24	1,408 187	-	1,408 187	-		-	-	-	-	-	-	-
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 2a.4.16	Security Staff Cost DOC Staff Cost	-		-	-	-		21,881 21,021	3,282 3,153	25,164 $24,174$	25,164 $24,174$	-	-	-	-	-	-	-	-	-	325,574 229,108
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
PERIO	D 2b - Site Decontamination																				
Period 2	b Direct Decommissioning Activities																				
Disposal 2b.1.1.1	of Plant Systems ALARA/Radiological	_	18	0	1	6	3	_	e	35	35	_	_	35	10	_	_	_	2,060	277	_
2b.1.1.2		-	16	ő	1	16		-	7	40	40	-	-	93		-	-	-	3,765	185	-
2b.1.1.3		-	1	0	-			-	0	2	2	-	-	2		-	-	-	129	17	-
2b.1.1.4 2b.1.1.5	Electrical - Contaminated Electrical - Decontaminated	-	445 2,698	6 48				-	183 1,298	1,089 8,167	1,089 8,167	-	-	2,389 23,344	90	-	-	-	102,726 948,013	6,325 37,107	-
2b.1.1.6	Fire - RCA	-	101	1	6	103	-	-	42	253	253	-	-	614	-	-	-	-	24,917	1,324	-
2b.1.1.7 2b.1.1.8	HVAC Ductwork HVAC/Chilled Water - RCA	-	305 324	7 6	27 26		34	-	156 155	975 971	975 971	-	÷	2,665 $2,752$	100	-	-	-	114,598 111,779	4,111 3,985	-
2b.1.1.8 2b.1.1.9		-	483	16		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	-
	Liquid Radwaste Makeup Demin - RCA	588	687 103	48				-	703 65	3,188 431	3,188 431	-	-	3,073 1,471	1,728	-	-	-	235,484 59,747	17,194 1,412	-
	Non-Essential Diesel Generator - RCA	-	27	3				-	45	327	327	-	-	1,471	-	-	-	-	57,832	395	-
2b.1.1.14	4 Off Gas Holdup	-	342	21				-	216	1,291	1,291	-	-	2,755		-	-	-	152,277	4,769	-
2b.1.1.18	5 Primary Containment	-	455	42	87	1,038	507	-	414	2,543	2,543	-	-	6,201	1,506	-	-	-	347,704	6,454	-

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Table D

Monticello Nuclear Generating Plant

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

							`		or 2020 Donar	/											
						Off-Site	LLRW				NRC	Spent Fuel	Site	Processed			Volumes		Burial/		Utility and
Activity Index		Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Processing Costs	Disposal Costs	Other Costs	Total Contingency	Total Costs	Lic. Term. Costs	Management Costs	Restoration Costs	Volume Cu. Feet	Class A Cu. Feet	Class B	Class C Cu. Feet	GTCC Cu. Foot	Processed Wt., Lbs.	Craft Manhours	Contractor Manhours
muex	Activity Description	Cost	Cost	Costs	Costs	Costs	Costs	Costs	Contingency	Costs	Costs	Costs	Costs	Cu. reet	Cu. Feet	Cu. Feet	Cu. Feet	Cu. Feet	Wt., LDS.	Mannours	Walliours
	of Plant Systems (continued)													- 10							
	6 Process Radiation Monitors 7 Rx Bldg Closed Clng Water - Insul - RCA	-	46 114	2 2	2 9	24 163	18	-	20 54	111 343	111 343	-	-	142 977	52	-	-	-	9,115 39,675	649 1,484	-
	8 Rx Bldg Closed Clng Water - RCA	-	184	15	66	1,187		-	235	1,687	1,687	-	-	7,093	-	-	-		288,031	2,489	-
	9 Rx Component Handling Equip	27	142	18	27	194	279	-	154	840	840	-	-	1,158	829	-	-	-	99,730	2,462	-
	Rx Pressure Vessel	28	47	6	5	13	78	-	48	225	225	-	-	75	230	-	-	-	17,816	1,051	-
	1 Rx Water Cleanup 2 Secondary Containment	172	$\frac{265}{124}$	19 7	16 14	22 170	251 86	-	222 81	965 483	965 483	-	-	130 1,017	737 255	-	-	-	52,670 57,567	5,736 1,763	-
	Service & Seal Water - Insulated - RCA	-	120	2	11	197	-	-	62	392	392	-	-	1,180	-	-		-	47,917	1,565	-
	4 Service & Seal Water - RCA	-	159	4	17	303	-	-	88	570	570	-	-	1,809	-	-	-	-	73,453	2,016	-
	5 Service Air Blower - RCA	-	15	0	2	34	-	-	9	62	62	-	-	206		-	-	-	8,364	206	-
	Solid Radwaste Structures & Buildings	338	494 78	36 2	49 5	399 60	467 29	-	480 37	2,264 210	2,264 210	-	-	2,387 357	1,380 85	-	-	-	185,221 19,933	10,820 1,128	-
	8 Wells & Domestic Water	-	10	-	-	-	- 29	-	1	11	210	-	11		- 00	-		-	19,955	1,126	-
	9 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	_
			2,001	20	10	200	00		100	0,000	0,000			1,201	111				00,100	20,200	
	mination of Site Buildings		0.000							00.015					- ~- :				0.01= 0=:	,	
2b.1.3.1 2b.1.3.2		5,202 106	2,903 6	178 0	516 3	8,044	1,181 15	-	4,924 59	22,948 189	22,948 189	-	-	48,077	7,014 145	-	-	-	2,317,670 6,840	112,518 1,600	-
2b.1.3.2 2b.1.3.3		29	28	1	3	20	14	-	29	123	123	-	-	118	125	-		-	10,759	789	-
2b.1.3.4		17	4	0	2	-	11	-	12	46	46	-	-	-	103	-	-	-	4,860	286	-
2b.1.3.5		58	24	2	8	5	45	-	48	191	191	-	-	31	433	-	-	-	21,708	1,127	-
2b.1.3.6		372	269	7	23	225	82	-	312	1,289	1,289	-	-	1,343	669	-	-	-	87,045	8,860	-
2b.1.3.7 2b.1.3.8		41 121	17 61	1 3	6 17	4 29	33 96	-	34 107	136 435	136 435	-	-	25 172	316 910	-	-	-	15,948 49,943	785 2,503	-
2b.1.3.8 2b.1.3.9		64	24	2	9	29	52	-	52	202	202	-	-	172	495	-		-	23,400	1,197	-
	Recombiner	27	25	1	5	33	24	-	32	148	148	_	_	199	216	-	-	-	18,405	695	-
	1 Turbine	705	353	21	104	215	564	-	632	2,594	2,594	-	-	1,283	5,299	-	-	-	303,150	14,443	-
	2 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 2b.1.5	Prepare/submit License Termination Plan Receive NRC approval of termination plan	-	-	-	-	-	-	526	79	605 a	605	-	-	-	-	-	-	-	-	-	4,096
01. 1	Subtotal Period 2b Activity Costs	7.952	14,427	560	1,524	00.401	4,859	526	12,232	62,561	00 540		11	100.000	24.132				0.050.500	296,929	4,096
2b.1	·	7,952	14,421	960	1,524	20,481	4,009	926	12,232	62,361	62,549	-	11	122,269	24,132	-	-	-	6,279,589	296,929	4,096
Period 2l 2b.2.1	b Additional Costs Operational Equipment			20	00	1.011			198	1,524	1 704			11.500					201.000	32	
2b.2.1 2b.2.2	Excavation of Underground Services	-	1,972	23	92	1,211	-	376	198 550	2.898	1,524 2,898	-	-	11,760	-		-	-	294,000	12,493	-
2b.2.2	Security Modifications	-	- 1,372	-	-	-		8,696	1,304	10,000	10,000	-	-	-	-		-	-	-	12,435	-
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	-
Poriod 91	b 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 2b.3.5	Spent Fuel Capital and Transfer Retention and Severance	-	-	-	-	-	-	117,254 6,299	17,588 945	134,843 7,244	7,244	134,843	-	-	-	-	-	-	-	-	-
2b.3.5 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 2l 2b.4.1	b Period-Dependent Costs Decon supplies	1,440	_					_	360	1,799	1,799										
2b.4.1 2b.4.2	Insurance	1,440	-	-	-	-	_	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	1 497	123	694	694	-	-	-	5,084	-	-	-	101,679	166	-
2b.4.7 2b.4.8	Plant energy budget NRC Fees	-	-	-	-	-	-	1,437 623	216 62	1,653 685	1,653 685	-	-	-	-	-	-	-	-	-	-
2b.4.8 2b.4.9	Emergency Planning Fees	-	-	-	-	-	-	2,995	299	3,294	- 689	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 Railroad Track Maintenance	-	-	-	-	-	-	118 458	18 69	136 527	- 527	136	-	-	-	-	-	-	-	-	-
2b.4.14	namoad frack maintenance	-	-	-	-	-	-	408	69	527	927	-	-	-	-	-	-	-	-	-	-

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Table D

Monticello Nuclear Generating Plant

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

							(11	o usurus	or 2020 Donar	,											
Activit		Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Class A	Class B	Volumes Class C Cu. Feet	GTCC Cu. Feet		Craft Manhours	Utility and Contractor Manhours
D : 10																			•		
2b.4.15	b Period-Dependent Costs (continued) 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
PERIO	O 2d - Decontamination Following Wet Fuel Storage																				
Period 2 2d.1.1	d Direct Decommissioning Activities Remove spent fuel racks	654	58	103	149	-	2,572	-	1,017	4,553	4,553	-	-	-	7,653	-	-	-	486,170	906	-
	of Plant Systems																				
2d.1.2.1 2d.1.2.2		-	3 47	0	$\frac{1}{2}$	17 40	3	-	4 19	25 112	25 112	-	-	103 240	- 0	-	-	-	4,184 10,334	48 665	
2d.1.2.2		-	297	5	23	411	3	-	140	876	876	-	-	2,457	9	-	-	-	99,783	4,090	
2d.1.2.4		-	11	0	1	10	-	-	4	26	26	-	-	62	-	-	-		2,499	143	
2d.1.2.5		246	428	34	37	197	455	-	382	1,781	1,781	-	-	1,179	1,341	-	-	-	133,939	8,380	-
2d.1.2.6		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		-	33	0	2	37	-	-	14	87	87	-	-	223	-	-	-	-	9,072	397	-
2d.1.2.9 2d.1.2	Instrument & Service Air-RCA-Fuel Pool Totals	273	29 924	1 45	2 75	45 819	502	-	14 631	91 3,268	91 3,268	-	-	267 4,894	1,479	-	-	-	10,841 293,606	357 15,385	-
Deconta	mination of Site Buildings																				
2d.1.3.1		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		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	-
	d Additional Costs																				
2d.2.1 2d.2	License Termination Survey Planning Subtotal Period 2d Additional Costs	-	-	-	-	-	-	1,458 1,458	437 437	1,896 1,896	1,896 1,896	-	-	-	-	-	-	-	-	-	12,480 12,480
	d Collateral Costs																				
2d.3.1	Process decommissioning water waste	79	-	54		-	220	-	114	563	563	-	-	-	504	-	-	-	30,239	98	-
2d.3.2	Process decommissioning chemical flush waste	1	-	26		-	193	-	64	366	366 105	-	-	-	249	-	-	-	26,553	47	-
2d.3.3 2d.3.4	Small tool allowance Decommissioning Equipment Disposition	-	91	130	82	1,112	178	-	14 237	105 1,739	105 1,739	-	-	6,000	529	-	-	-	303,608	147	-
2d.3.4 2d.3.5	Spent Fuel Capital and Transfer	-	-	150	- 62	1,112	- 170	27	4	32	1,755	32	-	0,000	525	-	-		303,000	147	-
2d.3	Subtotal Period 2d Collateral Costs	80	91	210		1,112	590	27	432	2,805	2,773	32	-	6,000	1,282	-	-	-	360,400	292	-
	d Period-Dependent Costs																				
2d.4.1	Decon supplies	244	-	-	-	-	-	-	61	305	305	-	-	-	-	-	-	-	-	-	-
2d.4.2	Insurance	-	-	-	-	-	-	530	53	583	583	-	-	-	-	-	-	-	-	-	-
2d.4.3 2d.4.4	Property taxes Health physics supplies	-	806	-	-	-	-	1,664	166 202	1,830 1,008	1,830 1,008	=	-	-	-	-	-	-	-	-	-
2d.4.4 2d.4.5	Heavy equipment rental	-	1,936	-	-	-	-	-	202	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 2d.4.12	Liquid Radwaste Processing Equipment/Services ISFSI Operating Costs	-	-	-	-	-	-	320 84	48 13	368 97	368	97	-	-	-	-	-	-	-	-	-
2d.4.12 2d.4.13	Railroad Track Maintenance	-	-	-	-	-	-	84 94	13	108	108	91	-	-	-	-	-	-	-	-	-
2d.4.13	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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Table D

Monticello Nuclear Generating Plant

DECON Decommissioning Cost Estimate with 60 Years of Spent Fuel Storage

(Thousands of 2020 Dollars)

							(Tł	nousands	of 2020 Dollar	rs)											
						Off-Site	LLRW				NRC	Spent Fuel	Site	Processed		Dunial	Volumes		Burial/		Utility and
Activity		Decon	Removal	Packaging	Transport		Disposal	Other	Total	Total	Lic. Term.	Management	Restoration	Volume	Class A	Class B	Class C	GTCC	Processed	Craft	Contractor
Index	Activity Description	Cost	Cost	Costs	Costs	Costs	Costs	Costs	Contingency	Costs	Costs	Costs	Costs	Cu. Feet			Cu. Feet			Manhours	Manhours
PERIOD 2	2f - License Termination																				
Period 2f D	Direct Decommissioning Activities																				
	ORISE confirmatory survey	-	-	-	-	-	-	166	50	216	216	-	-	-	-	-	-	-	-	-	-
	Terminate license Subtotal Period 2f Activity Costs							166	50	a 216	216										
21.1	Subtotal Period 2f Activity Costs	-	-	-	-	-	-	166	90	216	216	-	-	-	-	-	-	-	-	-	-
	dditional Costs							0.000	0.050	0.00*	0.00*									0,5040	0.040
	License Termination Survey Subtotal Period 2f Additional Costs	-	-	-	-	-	-	6,920 6,920			8,995 8,995		-	-	-	-	-	-	-	95,048 95,048	6,240 6,240
								0,020	2,010	0,000	0,000									55,040	0,240
	ollateral Costs							1,264	190	1,454	1 454										
2f.3.1 2f.3.2	DOC staff relocation expenses Spent Fuel Capital and Transfer	-	-	-	-	-	-	1,264		1,454	1,454	54	-	-	-	-	-	-	-	-	-
	Subtotal Period 2f Collateral Costs	-	-	-	-	-	-	1,311		1,508	1,454			-	-	-	-	-	-	-	-
Poriod 9f P	eriod-Dependent Costs																				
	Insurance	-	-	-	-	-	-	530	53	583	583	-	-	-	-	-	-	-	-	-	-
	Property taxes	-	-	-	-	-	-	1,470			1,617		-	-	-	-	-	-	-	-	-
	Health physics supplies	-	708		-	-	-	-	177		884		-	-	-	-	-	-	-	-	-
	Disposal of DAW generated Plant energy budget	•	-	7	4	-	29	274	9 41		48 315		-	-	355	-	-	-	7,097	12	-
	NRC Fees	-	-	-	-	-	-	426			468		-	-	-			-	-	-	-
	Emergency Planning Fees	-	-	-	-	-	-	112			-	123	-	-	-		-	-	-	-	-
	Fixed Overhead	-	-	-	-	-	-	1,597	239	1,836	1,836		-	-	-	-	-	-	-	-	-
	ISFSI Operating Costs	-	-	-	-	-	-	84			108	97	-	-	-	-	-	-	-	-	-
	Railroad Track Maintenance Security Staff Cost	-	-	-	-	-	_	94 10,999			8,918		-	-	-	-		-	-	-	162,981
	DOC Staff Cost	-	-	_	_	-	_	5,393			6,201		-	_	_	-	_	-	-	_	57,200
2f.4.13	Utility Staff Cost	-	-	-	-	-	-	5,762		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	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 3	Bb - Site Restoration																				
Period 3b I	Direct Decommissioning Activities																				
	of Remaining Site Buildings																				
	Reactor Building Condensate Tanks Foundation	-	1,971 10	-	-	-	-	-	296 1	2,267 11	-	-	2,267 11	-	-	-	-	-	-	13,911 50	-
	Discharge Retention Basin	-	4	-	-	-	-		1	5	-	-	5	-	-		-	-	-	25	-
	HPCI Room	-	19	-	-	-	-	-	3	22	-	-	22		-	-	-	-	-	97	-
3b.1.1.5		-	16	-	-	-	-	-	2	19	-	-	19		-	-	-	-	-	177	-
	Hydrogen & Oxygen Storage LLRW Storage & Shipping	-	2 83	-	-	-	-	-	0 12	2 95	-	-	2 95		-	-	-	-	-	19 662	-
	MSIV	-	4	-	-	-	-	-	12	4	-	-	4		-	-	-	-	-	42	-
	Misc Structures 2017	-	1,410	-	-	-	-	-	212	1,622	-	-	1,622	-	-	-	-	-	-	13,042	-
	Offgas Stack	-	108	-	-	-	-	-	16		-	-	124		-	-	-	-	-	544	-
	Offgas Storage & Compressor	-	39	-	-	-	-	-	6	45	-	-	45		-	-	-	-	-	199	-
3b.1.1.12	Radwaste Recombiner	-	228 128	-	-	-	-	•	34 19		-	-	262 147		-	•	-	-	-	1,220 713	-
	Security Barrier	-	186	-		-	_		28		_	-	214		_		_		-	933	-
	Structures Greater than 3' Below Grade	-	2,461	-	-	-	-	-	369	2,830	-	-	2,830	-	-	-	-	-	-	12,649	-
	Tank Farm	-	4	-	-	-	-	-	1	5	-	-	5	-	-	-	-	-	-	21	-
3b.1.1.17	Turbine Turbine Building Addition	=	1,259 55	-	-	-	-	-	189 8	1,448 63	-	-	1,448 63		-	-	-	-	-	13,036 618	-
	Turbine Building Addition Turbine Pedestal	-	99 182	-	-	-	-	-	8 27	209	-	-	209		-	-	-	-	-	926	-
	Totals	-	8,169	-	-	-	-	-	1,225	9,394	-	-	9,394		-	-	-	-	-	58,885	-
Site Closeo	out Activities																				
	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

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Table D

Monticello Nuclear Generating Plant

DECON Decommissioning Cost Estimate with 60 Years of Spent Fuel Storage

(Thousands of 2020 Dollars)

							(T)	housands	of 2020 Dollar	rs)											
						Off-Site	LLRW				NRC	Spent Fuel	Site	Processed		Rurial	Volumes		Burial/		Utility and
Activity		Decon	Removal	Packaging	Transport			Other	Total	Total	Lic. Term.	Management	Restoration	Volume	Class A		Class C	GTCC	Processed	Craft	Contractor
Index	Activity Description	Cost	Cost	Costs	Costs	Costs	Costs	Costs	Contingency	Costs	Costs	Costs	Costs	Cu. Feet	Cu. Feet	Cu. Feet	Cu. Feet	Cu. Feet	Wt., Lbs.	Manhours	Manhours
Period 3b	Additional Costs																				
	Clean Concrete Disposal	-	3,322	-	-	-	-	13	500	3,835	-	-	3,835	_	-	-	-	-	-	12	-
	Intake Structure Cofferdam	-	335	-	-	-	-	-	50	385	-	-	385	-	-	-	-	-	-	2,584	-
	Construction Debris	-		-	-	-	-	1,170	176	1,346	-	-	1,346	-	-	-	-	-	-		-
	Backfill	-	5,583		-	-	-	-	837	6,421	-	-	6,421	-	-	-	-	-	-	5,422	-
	Discharge Structure Cofferdam Subtotal Period 3b Additional Costs	-	442 9,682		-	-	-	1,183	66 1,630	508 12,495	-	-	508 12,495	-	-	-	-	-	-	3,552 11,570	-
30.2	Subtotal I eriod 30 Additional Costs	-	5,002	-	-	-	-	1,100	1,050	12,430	-	-	12,455	-	-	-	-	-	-	11,570	-
	Collateral Costs																				
	Small tool allowance	-	110	-	-	-	-	-	17	127	-	-	127	-	-	-	-	-	-	-	-
	Spent Fuel Capital and Transfer Subtotal Period 3b Collateral Costs	-	110	-	-	-	-	108 108	16 33	125 252	-	125 125	127	-	-	-	-	-	-	-	-
			110					100	33	202		120	121								
	Period-Dependent Costs							1 000	100	1.040	1 0 4 0										
3b.4.1 3b.4.2	Insurance Property taxes	-	-	-	-	-	-	1,220 2,540	122 254	1,342 2,794	1,342	2,794	-	-	-	-	-	-	-	-	-
	Heavy equipment rental	-	5,842	-	-	-	-	2,540	876	6,719	-	2,194	6,719	-	-	-	-	-	-	-	-
	Plant energy budget	-		_	-	_	-	315	47	362	-	362	0,710	_	-	-	_	-	-	-	_
	NRC ISFSI Fees	-	-	-	-	-	-	356	36	391	-	391	-	-	-	-	-	-	-	-	-
3b.4.6	Emergency Planning Fees	-	-	-	-	-	-	257	26	283	-	283	-	-	-	-	-	-	-	-	-
	Fixed Overhead	-	-	-	-	-	-	1,122	168	1,290	429		-	-	-	-	-	-	-	-	-
	ISFSI Operating Costs	-	-	-	-	-	-	194	29	223	-	223	-	-	-	-	-	-	-	-	-
	Railroad Track Maintenance	-	-	-	-	-	-	543	81	624	249		-	-	-	-	-	-	-	-	-
	Security Staff Cost DOC Staff Cost	-	-	-	-	-	-	25,319 11,729	3,798 1,759	29,117 13,489	0	8,589	20,527 13,489	-	-	-	-	-	-	-	375,152 122,646
	Utility Staff Cost	-	-	-	-	-	-	6,873	1,031	7,904	-	2,047	5,857	-	-	-	-	-	-	-	98,297
	Subtotal Period 3b Period-Dependent Costs	-	5,842	-	-	-	-	50,467	8,228	64,537	2,020		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 I	Direct Decommissioning Activities																				
Poriod Sc (Collateral Costs																				
	Spent Fuel Capital and Transfer	_	_	_	_	_	_	85,327	12,799	98,126	_	98,126	_	_	_	_	_	_	_	_	_
	Subtotal Period 3c Collateral Costs	-	-	-	-	-	-	85,327	12,799	98,126	-	98,126	-	-	-	-	-	-	-	-	-
Poriod Sc I	Period-Dependent Costs																				
	Insurance	_	_	_	_	_	_	37,329	3,733	41,062	_	41,062	_	_	_	_	_	_	_	_	_
	Property taxes	-	-	_	-	-	_	48,222	4,822	53,044	-	53,044	-	-	-	-	-	-	-	-	_
	Plant energy budget	-	-	-	-	-	-		· -	-	-	-	-	-	-	-	-	-	-	-	-
	NRC ISFSI Fees	-	-	-	-	-	-	12,360	1,236	13,596	-	13,596	-	-	-	-	-	-	-	-	-
3c.4.5	Emergency Planning Fees	-	-	-	-	-	-	7,869	787	8,656	-	8,656	-	-	-	-	-	-	-	-	-
	Fixed Overhead	-	-	-	-	-	-	11,432	1,715	13,147	-	13,147	-	-	-	-	-	-	-	-	-
	ISFSI Operating Costs Railroad Track Maintenance	-	-	-	-	-	-	5,940 6,636	891 995	6,832 7,632	-	6,832 7,632	-	-	-	-	-	-	-	-	-
	Security Staff Cost	-	-	-	-	-	-	228,259	34,239	262,498	-	262,498	-	-	-	-	-	-	-	-	2,870,241
	Utility Staff Cost	-	-	-	-	-	-	54,527	8,179	62,706	-	62,706	-	-	-	-	-	-	-	-	745,159
	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 St	team Supply System Removal																				
	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	-	-
3 d .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	-	-	-	-	-	-	-	-	-

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Table D

Monticello Nuclear Generating Plant

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

							(11	lousanus	oi 2020 Dollai												
Activit		Decon	Removal		Transport		LLRW Disposal	Other	Total	Total	NRC Lic. Term.	Spent Fuel Management	Site Restoration	Processed Volume	Class A	Class B	Volumes Class C	GTCC	Burial / Processed		Utility and Contractor
Index	Activity Description	Cost	Cost	Costs	Costs	Costs	Costs	Costs	Contingency	Costs	Costs	Costs	Costs	Cu. Feet	Cu. Feet	Cu. Feet	Cu. Feet	Cu. Feet	Wt., Lbs.	Manhours	Manhours
Period 3	d Period-Dependent Costs																				
3d.4.1	Insurance	-	-	-	-	-	-	27	3	30	30	-	-	-	-	-	-	-	-	-	-
3d.4.2 3d.4.4	Property taxes NRC ISFSI Fees	-	-	-	-	-	-	35 8	3	38 9	38	- 0	-	-	-	-	-	-	-	-	-
3d.4.4	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	6 190	-	-	-	-	-	-	-	-	-	2.074
3d.4.8 3d.4.9	Security Staff Cost Utility Staff Cost	-	-	-	-	-	-	165 39	25 6	190 45	190 45		-	-	-	-	-	-	-	-	2,074 539
3d.4	Subtotal Period 3d Period-Dependent Costs	-	-	-	-	-	-	293	40	333	318		-	-	-	-	-	-	-	-	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
PERIO	D 3e - ISFSI Decontamination																				
Period 3	e Direct Decommissioning Activities																				
	e Additional Costs																				
3e.2.1	License Termination ISFSI	-	57				5,925	2,013	2,292	11,462	11,462		-	-	21,949		-	-	2,633,402		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 3	e Period-Dependent Costs																				
3e.4.1	Insurance	-	-	-	-	-	-	118	30	148	148	-	-	-	-	-	-	-	-	-	-
3e.4.2	Property taxes	-	-	-	-	-	-	249	62	312	312		-	-	-	-	-	-	-	-	-
3e.4.3 3e.4.4	Plant energy budget Fixed Overhead	-	-	-	-	-	-	12 71	3 18	15 89	15 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	Ē	57	188	987	-	5,925	3,118	2,569	12,844	12,844	=	-	-	21,949	-	-	-	2,633,402	10,339	10,993
PERIO	D 3f - ISFSI Site Restoration																				
Period 3	f Direct Decommissioning Activities																				
	f Additional Costs																				
3f.2.1 3f.2	Demolition and Site Restoration of ISFSI Subtotal Period 3f Additional Costs	-	1,486 1,486			-	-	233 233	258 258	1,977 1,977	-	-	1,977 1,977		-	-	-	-	-	6,957 6,957	160 160
Period 3 3f.3.1	ff Collateral Costs Small tool allowance		10						2	12			12								
3f.3	Subtotal Period 3f Collateral Costs	-	10		-	-		-	2	12	-	-	12		-	-		-	-	-	-
	ff Period-Dependent Costs							100	10	100			100								
3f.4.2 3f.4.3	Property taxes Heavy equipment rental	-	117	-	-	-	-	126	13 17	138 134	-	-	138 134		-	-	-	-	-	-	-
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 3f.4.8	Security Staff Cost Utility Staff Cost	-		-	-	-	-	177 109	27 16	204 126	-	-	204 126	-	-	-		-		-	2,520 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
PERIO	D 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

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Xcel Energy

Monticello Nuclear Generating Plant Decommissioning Cost Analysis

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

NRC Spent Fuel Site
Total Lic. Term. Management Restoration

Processed Volume Cu. Feet

Class A

 Burial Volumes

 Class A
 Class B
 Class C
 GTCC

 Cu. Feet
 Cu. Feet
 Cu. Feet
 Cu. Feet

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Processing Costs	Dispo Cost	sal	Other Costs	C
TOTAL COST TO DECOM	MMISSION WITH 17.33% CONTINGENCY:				\$1,612,762	thousands of	2020 d	lollars		1
TOTAL NRC LICENSE T	ERMINATION COST IS 48.12% OR:				\$776,139	thousands of	2020 d	lollars		
SPENT FUEL MANAGEN	MENT COST IS 47.32% OR:				\$763,237	thousands of	2020 d	lollars		
NON-NUCLEAR DEMOL	ITION COST IS 4.55% OR:				\$73,386	thousands of	2020 d	lollars		
TOTAL LOW-LEVEL RAI	DIOACTIVE WASTE VOLUME BURIED (E	XCLUDIN	G GTCC):		200,160	Cubic Feet				
TOTAL GREATER THAN	N CLASS C RADWASTE VOLUME GENERA	ATED:			1,160	Cubic Feet				
TOTAL SCRAP METAL I	REMOVED:				23,123	Tons				
TOTAL CRAFT LABOR I	REQUIREMENTS:				848,750	Man-hours				

End Notes:

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

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APPENDIX E

DETAILED COST ANALYSIS

SCENARIO 3: DECON with 100 Year DFS

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Table E

Monticello Nuclear Generating Plant

DECON Decommissioning Cost Estimate with 100 Years of Spent Fuel Storage

(Thousands of 2020 Dollars)

							(Tl	nousands	of 2020 Dollar	rs)											
						Off-Site	LLRW				NRC	Spent Fuel	Site	Processed		Burial	Volumes		Burial/		Utility and
Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs		Disposal Costs	Other Costs	Total Contingency	Total Costs	Lic. Term. Costs	Management Costs	Restoration Costs	Volume Cu. Feet	Class A	Class B	Class C	GTCC Cu. Feet	Processed	Craft Manhours	Contractor Manhours
	Shutdown through Transition	Cost	Cost	Costs	Costs	Costs	Costs	Costs	Contingency	Costs	Costs	Costs	Costs	Cu. Feet	cu. Feet	Cu. Feet	Cu. Feet	Cu. Feet	Wt., LDS.	Mannours	Wannours
	_																				
	ct Decommissioning Activities pare preliminary decommissioning cost	_	_	_	_	-	_	167	25	192	192	_	-	_	_	_	_	_	_	-	1,300
1a.1.2 Noti	ification of Cessation of Operations									a											-,
	nove fuel & source material ification of Permanent Defueling									n/a a											
1a.1.5 Dead	ctivate plant systems & process waste									a											
	pare and submit PSDAR	-	-	÷	-	=	-	257 591	39 89	296 680	296	÷	-	-	-	-	-	-	=	-	2,000 4,600
	iew plant dwgs & specs. form detailed rad survey	-	-	-	-	-	-	991	89	680 a	680	-	-	-	-	-	-	-	-	-	4,600
1a.1.9 Estin	imate by-product inventory	-	-	-	-	-	-	129	19	148	148	-	-	-	-	-	-	-	-	-	1,000
	l product description ailed by-product inventory	-		-	-	-	-	129 167	19 25	148 192	148 192		-	-	-	-	-	-	-		1,000 1,300
	ine major work sequence	-	-	-	-	-	-	964	145	1,108	1,108	-	-	-	-	-	-	-	-	-	7,500
	form SER and EA	-	-	-	-	-	-	398	60	458	458	-	-	-	-	-	-	-	-	-	3,100
	pare/submit Defueled Technical Specifications form Site-Specific Cost Study	-		-	-	-		964 643	145 96	1,108 739	1,108 739	-	-	-	-	-		-	-		7,500 5,000
	pare/submit Irradiated Fuel Management Plan	-	-	-	-	-	-	129	19	148	148	-	-	-	-	-	-	-	-	-	1,000
Activity Specific								200		F0=	ar ·										
1a.1.17.1 Plan 1a.1.17.2 Plan	nt & temporary facilities	-	-	-	-	-	-	632 536	95 80	727 616	654 554	-	73 62	-	-	-	-	-	-		4,920 4,167
1a.1.17.3 NSS	SS Decontamination Flush	-	-	-	-	-	-	64	10	74	74	-		-	-	-	-	-	-	-	500
1a.1.17.4 Read		-	-	-	-	-	-	912 835	137 125	1,049 961	1,049 961	-	-	-	-	-	-	-	-	-	7,100 6,500
1a.1.17.6 Sacr		-		-	-	-	-	64	10	74	74	-	-		-	-	-	-	-		500
	sture separators/reheaters	-	-	-	-	-	-	129	19	148	148	-	-	-	-	-	-	-	-	-	1,000
1a.1.17.8 Rein 1a.1.17.9 Main		-	-	-	-	-	-	206 268	31 40	236 309	118 309	-	118	-	-	-	-	-	-	-	1,600 2,088
1a.1.17.10 Maii		-	-	-	-	-	-	268	40	309	309	-	-	-	-	-	-	-	-	-	2,088
	ssure suppression structure	-	-	-	-	-	-	257	39	296	296	-	-	-	-	-	-	-	-	-	2,000
1a.1.17.12 Dryv 1a.1.17.13 Plan	well nt structures & buildings	-		-	-	-	-	206 401	31 60	236 461	236 231	-	231	-	-	-	-	-	-		1,600 3,120
1a.1.17.14 Was	ste management	-	-	-	-	-	-	591	89	680	680	=	-	-	-	-	-	-	-	-	4,600
1a.1.17.15 Faci 1a.1.17 Tota	ility & site closeout al	-	-	-	-	-	-	116 5,486	17 823	133 6,308	67 5,759	-	67 550	-	-	-	-	-	-	-	900 42,683
Planning & Site	te Preparations																				
	pare dismantling sequence	-	-	-	-	-	-	308	46	355	355	-	-	-	-	-	-	-		-	2,400
	nt prep. & temp. svces ign water clean-up system	-	-	-	-	-	-	3,500 180	525 27	4,025 207	4,025 207	-	-	-	-	-	-	-	-		1,400
1a.1.21 Rigg	ging/Cont. Cntrl Envlps/tooling/etc.	-	-	-	-	-	-	2,400	360	2,760	2,760	-	-	-	-	-	-	-	-	-	´-
	cure casks/liners & containers total Period 1a Activity Costs	-	-	-	-	-	-	158 16,569	24 2,485	182 19,054	182 18,505	-	- 550	-	-	-	-	-	-	-	1,230 83,013
	•	-	-	-	-	-	-	10,505	2,400	15,054	10,000	-	550	-	-	-	-	-	-	-	65,015
Period 1a Colla 1a.3.1 Sper	nteral Costs nt Fuel Capital and Transfer	-	_	-	-	-	_	1,323	198	1,522	_	1,522	_	_	-	_	_	_	_	-	-
1a.3.2 Rete	ention and Severance	-	-	-	-	-	-	9,892	1,484	11,376	11,376	-	-	-	-	-	-	-	-	-	-
	total Period 1a Collateral Costs	-	-	-	-	-	-	11,215	1,682	12,897	11,376	1,522	-	-	-	-	-	-	-	-	-
	od-Dependent Costs arance							2,328	233	2,561	2,561										
	perty taxes	-		-	-	-		3,570	357	3,927	3,927	-	-	-	-	-		-	-		-
	lth physics supplies	-	614		-	-	-	-	153	767	767	-	-	-	-	-	-	-		-	-
	vy equipment rental posal of DAW generated	-	753	3 - 12	- 6	-	50	-	113 15	866 83	866 83	-	-	-	610	-	-	-	12,190	20	-
1a.4.6 Plan	nt energy budget	-	-	-	-	-	-	1,817	272	2,089	2,089	-	-	-	-	-	-	-	-	-	-
	C Fees	-	-	-	-	-	-	1,137	114	1,251	1,251	9.770	=	-	-	-	-	-	-	-	-
	ergency Planning Fees ed Overhead	-	-	-	-	<u>.</u>	-	3,428 2,616	343 392	3,770 3,009	3,009	3,770	-	-	-	-	-	-		-	
1a.4.10 Sper	nt Fuel Pool O&M	-	-	-	-	-	-	845	127	971	-	971	-	-	-	-	-	-	-	-	-
	SI Operating Costs Iroad Track Maintenance	-	-	-	-	-	-	112 125	17 19	129 144	- 144	129	-	-	-	-	-	-	-	-	
1a.4.13 Secu	urity Staff Cost	-	-	-	-	-	-	16,372	2,456	18,827	18,827	-	-	-	-	-	-	-	-	-	245,440
	ity Staff Cost	-	1.005		- 6	-	-	27,285	4,093	31,378	31,378	4.050	-	-	- 010	-	-	-	10 100		422,240
1a.4 Subt	total Period 1a Period-Dependent Costs	=	1,367	7 12	6	-	50	59,634	8,703	69,772	64,902	4,870	-	-	610	-	-	-	12,190	20	667,680

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Table E

Monticello Nuclear Generating Plant

DECON Decommissioning Cost Estimate with 100 Years of Spent Fuel Storage

(Thousands of 2020 Dollars)

							(11	lousanus	oi 2020 Dollai												
						Off-Site	LLRW				NRC	Spent Fuel	Site	Processed			Volumes		Burial /		Utility and
Activi Inde		Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Processing Costs	Disposal Costs	Other Costs	Total Contingency	Total Costs	Lic. Term. Costs	Management Costs	Restoration Costs	Volume Cu. Feet	Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet		Craft Manhours	Contractor Manhours
1a.0	TOTAL PERIOD 1a COST	-	1,367	12	2 6	-	50	87,418	12,871	101,724	94,783	6,392	550	-	610	-	-	-	12,190	20	750,693
PERIO	D 1b - Decommissioning Preparations																				
Period	b Direct Decommissioning Activities																				
Detaile	l Work Procedures																				
	Plant systems	-	-	-	-	-	-	608	91	700	630	-	70	-	-	-	-	-	-	-	4,733
	NSSS Decontamination Flush Reactor internals	-	-	-	-	-	-	129 514	19 77	148 591	148 591	-	-	-	-	-	-	-	-	-	1,000 4,000
	Remaining buildings	-	_	-	-	-	_	174	26	200	50	-	150	-	-		_		-	-	1,350
	CRD housings & NIs	-	-	-	-	-	-	129	19		148	-	-	-	-	-	-	-	-	-	1,000
1b.1.1.6		-	-	-	-	-	-	129	19	148	148	-	-	-	-	-	-	-	-	-	1,000
1b.1.1.7		-	-	-	-	-	-	257	39 70	296 537	296	-	-	-	-	-	-	-	-	-	2,000
1b.1.1.8	Reactor vessel Facility closeout	-	-	-	-	-	-	467 154	70 23	537 177	537 89	-	89	-	-	-	-	-	-	-	3,630 1,200
	0 Sacrificial shield	-	_	-	-	-	_	154	23	177	177	-	-	_	_	-	_	-	-	-	1,200
	1 Reinforced concrete	-	-	-	-	-	-	129	19	148	74	-	74	-	-	-	-	-	-	-	1,000
	2 Main Turbine	-	-	-	-	-	-	267	40	307	307	-	-	-	-	-	-	-	-	-	2,080
	3 Main Condensers	-	-	-	-	-	-	268	40	309	309	-	-	-	-	-	-	-	-	-	2,088
	4 Moisture separators & reheaters 5 Radwaste building	-	-	-	-	-	-	257 351	39 53	296 403	296 363	-	40	-	-	-	-	-	-	-	2,000 2,730
	6 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.1.2	Subtotal Period 1b Activity Costs	296		-	-	-	-	4,336	798	5,431	4,968	-	463	-	-	-	-	-	-	1,067	33,741
	b Additional Costs																				
1b.2.1	Spent Fuel Pool Isolation	-	-	-	-	-	-	12,675	1,901	14,576	14,576	-	-	-	-	-	-	-	-	-	-
1b.2.2	Site Characterization	-	-	-	-	-	-	5,930		7,708	7,708	-	-	-	-	-	-	-	-	30,500	10,852
1b.2.3 1b.2	Mixed & RCRA Waste Subtotal Period 1b Additional Costs	-	-	28 28				18,605	9 3,689	80 22,365	80 22,365	-	-	43 43		-	-	-	5,253 5,253	161 30,661	10,852
Period :	b 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	-	-	-	-	-	-	-	-	-	-
1b.3.3	Process decommissioning water waste	38		25			102	-	53	263	263	-	-	-	233	-	-	-	13,991	45	
1b.3.4 1b.3.5	Process decommissioning chemical flush waste Small tool allowance	- 1	- 9	24	1 77	-	1,526	-	396 0	2,024	2,024	-	-	-	-	231	-	-	24,599	43	-
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	-	-	-	-	-	-	-	-	-
1b.3.9	Retention and Severance	- 0.107	1 000	-	-	-	1.600	6,335	950	7,285	7,285	- 0.145	-	-	-	- 001	-	-	- 20 700	-	-
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 1 1b.4.1	b Period-Dependent Costs	39							10	48	48										
1b.4.1 1b.4.2	Decon supplies Insurance	39		-	-	-		1,161	10 116	$\frac{48}{1,277}$	48 1,277	-	-		-	-	-	-	-	-	-
1b.4.3	Property taxes	=	-	-	-	-	-	1,709	171		1,880	-	-	-	-	-	-	-	-	-	-
1b.4.4	Health physics supplies	-	344		-	-	-	-	86	430	430	-	-	-	-	-	-	-	-	-	-
1b.4.5	Heavy equipment rental	-	375			-		-	56		432	-	-	-		-	-	-			-
1b.4.6	Disposal of DAW generated	-	-	7	7 4	-	29	-	9	49	49	-	-	-	356	-	-	-	7,122	12	-
1b.4.7 1b.4.8	Plant energy budget NRC Fees	-	-	-	-	-	-	1,812 323	272 32	2,083 355	2,083 355	-	-	-	-	-	-	-	-	-	-
1b.4.8 1b.4.9	Emergency Planning Fees	-		-		-		1,416			-	1,557	-		-	-		-	-	-	-
1b.4.10	Fixed Overhead	-	_	-	-	-	-	1,305	196		1,500	-	-	-	-	-	-	-	-	-	-
1b.4.11		-	-	-	-	-	-	421	63	484	-	484	-	-	-	-	-	-	-	-	-
1b.4.12		-	-	-	-	-	-	56	8 9		-	64	-	-	-	-	-	-	-	-	-
1b.4.13 1b.4.14		-	-	-	-	-	-	62 8,163	9 1,225	72 9,388	72 9,388	-	-	-	-	-	-	-	-	-	122,384
1b.4.14 1b.4.15		-	-	-	-	-	-	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	7 4	-	29	35,955	5,323	42,076	39,970	2,106	-	-	356	-	-	-	7,122	12	
1b.0	TOTAL PERIOD 1b COST	3,531	1,921	84	1 154	14	1,657	69,230	12,465	89,056	83,343	5,251	463	43	589	231	-	-	50,964	31,828	441,822
PERIO	D 1 TOTALS	3,531	3,288	96	3 160	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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Table E

Monticello Nuclear Generating Plant

DECON Decommissioning Cost Estimate with 100 Years of Spent Fuel Storage

(Thousands of 2020 Dollars)

Part							(Tł	nousands	of 2020 Dollar	·s)											
Margin M						Off-Site	LLRW				NRC	Spent Fuel	Site	Processed		Rurial	Volumes		Rurial /		Utility and
Proof of Part Processing Maries Proof of Part Proof of	Activity	Decon	Removal	Packaging	Transport			Other	Total	Total						Class B	Class C		Processed	Craft	Contractor
Series Se	Index Activity Description	Cost	Cost	Costs	Costs	Costs	Costs	Costs	Contingency	Costs	Costs	Costs	Costs	Cu. Feet	Cu. Feet	Cu. Feet	Cu. Feet	Cu. Feet	Wt., Lbs.	Manhours	Manhours
Marie Mari	PERIOD 2a - Large Component Removal																				
Sall J. Sear-chaine Shown Finne A Wood 11 1 94 27 0 0 1 0 0 1 0 0 1 0 0 1 0 0 1 0 0 1 0 0 1 0 0 0 1 0 0 0 1 0 0 0 1 0 0 0 0 0 1 0	Period 2a Direct Decommissioning Activities																				
1.1 1.2																					
\$\frac{1}{2} \text{\$\frac{1}{2}						- 49		-				-	-	- 06		-	-	-			
Sal. 1 March Word Internal Series 140 147 1260 2.000						- 42		-				-	-	-		-	-	-			
2-1-1 Park September 1989 1989 1989 1989 1989 1989 1989 198						-						-	-	-	1,252		898	-			
No.						42						-	-	96			898				
\$1.12 Month Turbinant Contenting			.,.	-,	,,,,,,		,			,	, -				-,	, ,			,,		,
Second Content		=	385	1,356	521	6,139	439	-	1,341	10,182	10,182	-	-	24,835	1,383	-	-	_	1,577,959	5,438	-
Section Sect	2a.1.3 Main Condensers	-	1,347	360	194	3,225	244	-	947	6,317	6,317	-	-	17,396	727	-	-	-	828,955	18,831	-
1.1.1 1.1.2 1.1.																					
Depart Principle 1987 1988				-	-	-	-	-				-	-	-	-	-	-	-	-		
Table Park		-		-	-	-	-	-				-	-	_	-	-	-	-	-		
24.1.1.6 Antennatio Poss Bellind 118 7 12 151 70 70 410 4	2a.1.4 Totals	-		-	-	-	-	-	72	556	556	-	-	-	-	-	-	-	-		
Second																					
2.1.5.1 Clements Sampline Insulated		-		7				-				-	-			-	-	-			
2.1.1.6 Closesheing Waters PACA		-		0	_	- 20		-				-	-			-	-	-			
24.1.6.2 Combustible Gas Central, RCA 18 1 3 88		-		14	62	1,114	-	-	230	1,626	1,626	-	-	6,656		-	-	-			
22.1.5.7 Conference & Ferentare - Freedrater 987 383 329 3.87 2.464 1.431 8.731 3.731 1.194 7.7319 1.2754, 100 1.416 1.2754, 100		-		0	_		-	-				-	-			-	-	-			
24.15.8 Condensator & Facedware - Inculated 492 44 68 69 696 88 343 2,038 2,038 4,176 1,207 2,246,698 6,964 2,10.10 10,1		-		1 199	-		9 464	-				-	-			-	-	-			
2a.1.3 December 1997 Service Meters Incl. 1997 Service Meters Incl. 1998 Service Meters Incl. 19		-										-	-			-		-			
24.1.1.1 deared Red Derive 3 0 0 3 1 2 9 9 10 6 10.00 64 1.000 1.000 64 1.0		-		30	51	560	339	-				-	-			-	-	-			
2.1.1.12 Centrel Red Driver Hydraulic 416 16 26 277 190 190 1,124 1,124 1,124 1,688 562 10,33,06 5,888 - 2.1.1.13 Cere Spray Intendiated RCA 16 16 16 17 17 180 184 1,244 1,444 181 221 2,1320 1,163 1		÷						-				=	-			-	-	-			
2a.1.5.1 Ger-Spray 2a.1.5.1 Ger-Spray 2b.1.5.1 Ger-Spray 2a.1.5.1 Ger-Spray 2b.1.5.1 Ger-Spray 2b.1.5		-		Ü	0	-			_	U	v	-	-			-	-	-			
2.1.1.5 Denin Water - Insulated - RCA		-						-				-	-			-	-	-			
2a.1.5.16 Denis Water -RCA		-		8	13			-				-	-			-	-	-			
2a.15.17 Dissel Oil -RCA		-		0	1			-	-			-	-			-	-	-			
2a.15.18 Drywell Atmosphere Cooling - RCA		-		0	0		-		17	7		-	-			-	-				
2a.1.5.2 Electrical · Clean		-		1	5	-	-	-	24	159		-	-			-	-	-			
2a.1.5.2 Emergency Service Water - IRACA 21 0 1 23 - 9 55 55 137 - 5,544 281 - 24.1.5.2 Emergency Service Water - IRACA 2 0 0 0 2 - 1 1 5 5 5 13 - 512 22 - 21.5.2 Emergency Service Water - IRACA 3 0 1 1 17 - 4 25 25 103 - 512 22 - 21.5.2 Emergency Service Water - IRACA 3 0 1 1 17 - 4 25 25 103 - 12.5.2 Emergency Service Water - IRACA 3 0 1 1 17 - 4 25 25 103 - 12.5.2 Emergency Service Water - IRACA 5 0 0 0 5 - 2 2 12 12 12 - 131 - 12.50 67 - 21.5.2 Emergency Service Water - IRACA 5 0 0 0 5 - 2 2 12 12 12 - 131 - 12.50 67 - 21.5.2 Emergency Service Water - IRACA 5 0 0 0 5 - 2 2 12 12 12 - 131 - 12.50 67 - 21.5.2 Emergency Service Water - IRACA 5 0 0 0 1 1 5 0 3 15 15 - 6 6 13 - 10.80 81 - 21.5.2 Emergency Service Water - IRACA 6 13 - 10.80 81 - 21.5.2 Emergency Service Water - IRACA 6 13 - 10.80 81 - 21.5.2 Emergency Service Water - IRACA 6 13 - 10.80 81 - 21.5.2 Emergency Service Water - IRACA 6 13 - 10.80 81 - 21.5.2 Emergency Service Water - IRACA 6 13 - 10.80 81 - 21.5.2 Emergency Service Water - IRACA 6 13 - 10.80 81 - 21.5.2 Emergency Service Water - IRACA 6 13 - 10.80 81 - 21.5.2 Emergency Service Water - IRACA 6 13 - 10.80 81 - 21.5.2 Emergency Service Water - IRACA 6 13 - 10.80 81 - 21.5.2 Emergency Service Water - IRACA 6 13 - 10.80 81 - 21.5.2 Emergency Service Water - IRACA 6 13 - 10.80 81 - 21.5.2 Emergency Service Water - IRACA 6 13 - 10.80 81 - 21.5.2 Emergency Service Water - IRACA 6 13 - 10.80 81 - 21.5.2 Emergency Service Water - IRACA 6 13 - 10.80 81 - 21.5.2 Emergency Service Water - IRACA 6 13 - 10.80 81 - 21.5.2 Emergency Service Water - IRACA 6 14 - 10.80 81		-		0	0	0	-	-		1		-	-		-	-	-	-		-	-
2a.1.5.22 Emergency Service Water - RCA 2 0 0 2 - 1 5 5 - 13 - 512 22 - 1.5.23 GEZIP - RCA 3 0 1 1 7 - 4 4 25 25 103 - 4184 48 - 1.5.24 Generator Physical Design - RCA 5 0 0 0 5 - 2 12 12 12 - 31 - 1.250 67 - 1.5.25 Hzg-C2 Control Analyzing - Insulated 6 0 0 0 1 5 5 3 15 15 6 6 13 1.0.50 81 - 1.5.25 Hzg-C2 Control Analyzing - Insulated - In		-		- 0		- 99	-	-	2			-	15		-	-	-	-			
2a.1.5.23 GEAP - RCA		-		0	0		-	-	1	55 5		-	-		-	-	-	-			
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$		-		0	1	17	-	-	4	25		-	-			-	-	-			
2a.1.5 de H2-O2 Control Analyzing - Insulated 6 0 0 1 5 5 3 15 15 - 6 13 - 1.080 81 - 2.1.5 27 High Pressure Coolant Injection - Insula 219 14 24 267 163 141 830 830 1.58 481 95.733 3.079 - 2.1.5 28 High Pressure Coolant Injection - Insula 219 14 24 267 163 141 830 830 1.58 481 95.733 3.079 - 2.1.5 29 High Pressure Coolant Injection - Insula 30 - 1.5 8 481 95.733 3.079 - 2.1.5 18 High Pressure Coolant Injection - Insula 30 - 1.5 8 481 95.733 3.079 - 2.1.5 18 High Pressure Coolant Injection - Insula 30 - 1.5 8 481 95.733 3.079 - 2.1.5 18 High Pressure Coolant Injection - Insula 30 - 1.5 8 481 95.733 3.079 - 2.1.5 8 High Pressure Coolant Injection - Insula 30 - 1.5 8 481 95.733 3.079 - 2.1.5 8 High Pressure Coolant Injection - Insula 40 - 1.5 8 481 95.733 3.079 95		-	-	0	0	5		-	_			-	-			-	-	-			
2a.1.5.27 High Pressure Colant Injection		-	-	0	0	1	-	-	3 3			-	-	-		-	-	-			-
2a.1.5.29 Hydrogen Cooling - CACA		-	67	6	13	163	70	-	61			-	-	972		-	-	-			-
2a.1.5.30 Hydrogen Cooling - RCA		-		14	24	267	163	-	141			-			481	-	-	-			
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$		-	-	- 0	- 0	- 7	-	-	1			-	10		-	-	-	-			
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$		-		0	2	-	-		-			-	-		-	-		-			
2a.1.5.34 Main Condenser 196 12 20 223 139 122 712<	2a.1.5.32 Hydrogen Water Chemistry - RCA	-	24	0	1	23	-	-		59	59	-	-	140	-	-	-	-	5,672	304	-
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$		-		4			-	-				-	-			-	-	-			
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 - 2,530 667 - - 145,208 3,069 - 2a.1.5.38 Miscellaneous - 43 1 3 51 - 19 115 115 - 3,00 - - 12,283 622 - 2a.1.5.39 Off Gas Recombiner - 189 19 32 300 257 163 960 960 - 1,795 764 - 12,283 622 - 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 - Insulated -								-				-	-			-	-	-			
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.1.5.49 Off Gas Recombiner - 189 19 32 300 257 163 960 960 - 1,766 764 - 12,1283 622 - 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 1 1 58 58 - 53 33 - 4,318 345 - 2a.1.5.42 Post Accident Sampling - Insulated - 17 1 1 <		-			353			-				-	-			-	-	-			
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 - 1,366 709 - - 100,933 5,385 - 2a.1.5.41 Post Accident Sampling - 25 1 1 9 11 1 5 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 - - - 1,410 57 - - - <t< td=""><td></td><td>-</td><td>214</td><td></td><td>37</td><td>423</td><td>225</td><td>-</td><td>180</td><td>1,097</td><td>1,097</td><td>-</td><td>-</td><td>2,530</td><td>667</td><td>-</td><td>-</td><td>-</td><td>145,208</td><td>3,069</td><td>-</td></t<>		-	214		37	423	225	-	180	1,097	1,097	-	-	2,530	667	-	-	-	145,208	3,069	-
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 1 9 11 - 11 58 58 - 58 - 53 33 4,318 345 - 2a.1.5.42 Post Accident Sampling - 110 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		-		1	-			-				-	-			-	-	-			
2a.1.5.41 Post Accident Sampling - 25 1 1 9 11 1 158 58 - 53 33 - 4318 345 - 2a.1.5.42 Post Accident Sampling - 1 1 1 3 13 13 - 8 43 43 - 1 1 4 58 58 - 53 33 - 53 14 212 - 2 2 2 2 12 12 - 35 - 5 1 1 1 58 345 - 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		-						-				-	-			-	-	-			
2a.1.5.43 RHR Service Water - Insulated - RCA - 83 3 14 248	2a.1.5.41 Post Accident Sampling	-	25	1	1		11	-		58	58	-	-	53	33	-	-	-	4,318	345	-
2a.1.5.44 RHR Service Water - RCA - 4 0 0 6 - · 2 12 12 - · 35 · · 1,410 57 -		-		1	1	-		-				-	-			-	-				
		- -		3			-	-				-	-			-	-	-			
2a.1.5).40 neactor reedwater rump beat - 56 Z 4 5Z 55 - 28 155 155 - 193 96 14.009 T/3 -	2a.1.5.45 Reactor Feedwater Pump Seal	-	56	2	4	32	33		28	155	155	-	-	193		-		-	14,009	773	

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Table E

Monticello Nuclear Generating Plant

DECON Decommissioning Cost Estimate with 100 Years of Spent Fuel Storage

(Thousands of 2020 Dollars)

							(11	ousunus	oi 2020 Dollai	,											
						Off-Site	LLRW				NRC	Spent Fuel	Site	Processed		Burial	Volumes		Burial/		Utility and
Activit Index		Decon Cost	Removal Cost	Packaging ' Costs	Transport Costs	Processing Costs	Disposal Costs	Other Costs	Total Contingency	Total Costs	Lic. Term. Costs	Management Costs	Restoration Costs	Volume Cu. Feet	Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet	Processed Wt., Lbs.	Craft Manhours	Contractor Manhours
Disposal	of Plant Systems (continued)																				
2a.1.5.40	Residual Heat Removal	362	252	172	178	1,072	2,051	-	962	5,049	5,049	-	-	6,406	6,012	-	-	-	647,941	4,135	-
	Residual Heat Removal - Insulated	622	554	61	82	563	880	-	772	3,535	3,535	-	-	3,367	2,607	-	-	-	303,087	10,340	-
	Rx Core Isolation Cooling Rx Core Isolation Cooling - Insulated	-	49 107	2	4 7	43 48	26 67	-	26 52	150 287	150 287	-	-	259 288	76 198	-	-	-	15,396 24,419	691 1,479	-
	Rx Recirculation	56	58	6	4	7	65		61	258	258	-	-	43	190	-	-	-	14,095	1,580	-
2a.1.5.5	Snubbers	-	169	2	5	63	30	-	60	331	331	-	-	377	90	-	-	-	21,009	2,548	-
2a.1.5.5	2 Standby Liquid Control - Insul - RCA	-	4	0	0	4	-	-	2	9	9	-	-	22	-	-	-	-	904	48	-
	Standby Liquid Control - RCA	-	26 7	1	2	41	-	-	13 5	83	83 35	-	-	245	-	-	-	-	9,969	341	-
	Stator Cooling - RCA Traversing Incore Probe	- 0	4	0	0	21 0	2	-	9 1	35 7	35 7	-	-	126 1	- 5	-	-		5,135 386	98 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
	a Collateral Costs																				
2a.3.1	Process decommissioning water waste	85 5	-	57	102	-	232	-	122	598	598	-	-	-	532	-	-	-	31,942	104	-
2a.3.2 2a.3.3	Process decommissioning chemical flush waste Small tool allowance	9	324	216	702	-	1,619	-	534 49	3,077 373	3,077 336	-	37	-	2,093	-	-	-	223,008	392	-
2a.3.4	Spent Fuel Capital and Transfer	-	- 524	-	-	-	-	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	-
	a Period-Dependent Costs																				
2a.4.1	Decon supplies	112	-	÷	-	-	-	-	28	140	140	-	-	-	-	-	-	-	-	-	-
2a.4.2 2a.4.3	Insurance Property taxes	-	-	-	-	-	-	1,019 4,377	102 438	1,121 4,814	1,121 4,814	-	-	-	-	-	-	-	-	-	-
2a.4.3 2a.4.4	Health physics supplies	-	2,356	-	-	-	-	4,511	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 2a.4.9	NRC Fees Emergency Planning Fees	-	-	-	-	-	-	856 4,115	86 412	942 4,527	942	4,527	-	-	-	•	-	-	-	-	-
2a.4.10	Fixed Overhead	-		-	-	-	-	3,071	461	3,532	3,532	4,027	-	-		-	-	-	-	-	-
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 2a.4.14	Railroad Track Maintenance Remedial Actions Surveys	-	-	-	-	-	-	181 1,624	27 244	208 1,867	208 1,867	-	-	-	-	-	-	-	-	-	-
2a.4.14 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
PERIO	D 2b - Site Decontamination																				
Period 2	b Direct Decommissioning Activities																				
	of Plant Systems		10	^						0.5	25			0*	10				0.000	0.55	
2b.1.1.1 2b.1.1.2	ALARA/Radiological Alternate N2 - RCA	-	18 16	0	1	6 16	3	-	6	35 40	35 40	=	-	35 93	10	-	-	-	2,060 3,765	277 185	-
2b.1.1.2	Decontamination Projects	-	10	0	0	0	0	-	0	2	2	-	-	2	0	-	-	-	129	17	-
2b.1.1.4		-	445	6	24	400	30	-	183	1,089	1,089	-	-	2,389	90	-	-	-	102,726	6,325	-
2b.1.1.5		=	2,698	48	218	3,906	-	-	1,298	8,167	8,167	-	-	23,344	-	-	-	-	948,013	37,107	-
2b.1.1.6		-	101	1	6	103	-	-	42	253	253	-	-	614	-	-	-	-	24,917	1,324	-
2b.1.1.7 2b.1.1.8	HVAC Ductwork HVAC/Chilled Water - RCA	-	305 324	6	27 26	446 461	34	-	156 155	975 971	975 971	-	-	2,665 2,752	100	•	-	-	114,598 111,779	4,111 3,985	-
2b.1.1.8 2b.1.1.9		-	483	16	61	1,007	76	-	302	1,945	1,945	-	-	6,018	227	-	-	-	258,789	7,101	-
	Heating Boiler - Insulated - RCA	-	3	0	0	4	-	-	1	9	9	-	-	26	-	-	-	-	1,058	35	-
	Liquid Radwaste	588	687	48	63	514	586	-	703	3,188	3,188	-	-	3,073	1,728	-	-	-	235,484	17,194	-
	2 Makeup Demin - RCA	-	103	3	14	246	-	-	65	431	431	-	-	1,471	-	-	-	-	59,747	1,412	-
	3 Non-Essential Diesel Generator - RCA 4 Off Gas Holdup	-	27 342	$\frac{3}{21}$	13 38	238 461	214	-	45 216	327 1,291	327 1,291	-	-	1,424 2,755	630	-	-	-	57,832 152,277	395 4,769	-
	5 Primary Containment	-	455	42	87	1,038	507	-	414	2,543	2,543	-	-	6,201	1,506	-	-	-	347,704	6,454	-
	3 Process Radiation Monitors	-	46	2	2	24	18	-	20	111	111	-	-	142	52	-	-	-	9,115	649	-

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Table E

Monticello Nuclear Generating Plant

DECON Decommissioning Cost Estimate with 100 Years of Spent Fuel Storage

(Thousands of 2020 Dollars)

							(11	iousunus	or 2020 Donai	,											
						Off-Site	LLRW	0.1			NRC	Spent Fuel	Site	Processed			Volumes	amaa.	Burial /		Utility and
Activity Index		Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Processing Costs	Disposal Costs	Other Costs	Total Contingency	Total Costs	Lic. Term. Costs	Management Costs	Restoration Costs	Volume Cu. Feet	Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet	Processed Wt., Lbs.	Craft Manhours	Contractor Manhours
D' 1	of Diagram (and in a D																				
	of Plant Systems (continued) 7 Rx Bldg Closed Clng Water - Insul - RCA		114	2	9	163			54	343	343			977					39,675	1,484	
	Rx Bldg Closed Clng Water - RCA	-	184	15	66	1,187	-		235	1,687	1,687	-	-	7,093		-	-		288,031	2,489	
	Rx Component Handling Equip	27	142	18	27	194	279	-	154	840	840	-	-	1,158		-	-	_	99,730	2,462	
	Rx Pressure Vessel	28	47	6	5	13	78	-	48	225	225	=	-	75		-	-	_	17,816	1,051	-
	Rx Water Cleanup	172	265	19	16	22	251	-	222	965	965	-	-	130	737	-	-	-	52,670	5,736	-
	2 Secondary Containment	-	124	7	14	170	86	-	81	483	483	-	-	1,017	255	-	-	-	57,567	1,763	
	B Service & Seal Water - Insulated - RCA	-	120	2	11	197	-	-	62	392	392	-	-	1,180	-	-	-	-	47,917	1,565	-
	1 Service & Seal Water - RCA	-	159	4	17	303	-	-	88	570	570	-	-	1,809	-	-	-	-	73,453	2,016	-
	Service Air Blower - RCA	-	15	0	2	34	-	-	9	62	62	-	-	206	-	-	-	-	8,364	206	
	Solid Radwaste	338	494	36 2	49 5	399 60	467	-	480 37	2,264	2,264	-	-	2,387	1,380	-	-	-	185,221	10,820	
	7 Structures & Buildings 8 Wells & Domestic Water	-	78 10	2	Э	60	29	-	31 1	210 11	210	-	11	357	85	-	-	-	19,933	1,128 144	
	Wells & Domestic Water - RCA	-	52	1	3	57	-	-	22	136	136	-	11	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		7,859				3,334,244	122,835	
													11								
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	-
Decontar 2b.1.3.1	mination of Site Buildings 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		106	6	0	3	0,044	15	_	59	189	189	_	_	40,011	145	_	_	_	6,840	1,600	
2b.1.3.3		29	28	1	3	20	14	-	29	123	123	=	-	118		-	-	_	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		372	269	7	23	225	82	-	312	1,289	1,289	-	-	1,343		-	-	-	87,045	8,860	
2b.1.3.7		41	17	1	6	4	33	-	34	136	136	-	-	25	316	-	-	-	15,948	785	
2b.1.3.8		121	61	3	17	29	96	-	107	435	435	-	-	172		-	-	-	49,943	2,503	
2b.1.3.9		64	24	2	9	-	52	-	52	202	202	-	-	-	495	-	-	-	23,400	1,197	
	Recombiner	27	25	1	5	33	24	-	32	148	148	-	-	199		-	-	-	18,405	695	
	Turbine 2 Turbine Building Addition	705 58	353 21	21	104	215	564 45	-	632 47	2,594 181	2,594 181	-	-	1,283	5,299 434	-	-	-	303,150 20,478	14,443 1,087	
2b.1.3.12 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 2b.1.5	Prepare/submit License Termination Plan Receive NRC approval of termination plan	-	-	-	-	-	-	526	79	605 a	605	-	-	-	-	-	-	-	-	-	4,096
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	_	<u>-</u>	-	6,279,589	296,929	4,096
		.,	, .		,-	-, -	,		, -	,,,,,,	. ,			,	, -				.,,		,,,,,
	b Additional Costs			9.0	00	1.011			100	1 504	1 504			11.500					204.000	00	
2b.2.1 2b.2.2	Operational Equipment Excavation of Underground Services	-	1,972	23	92	1,211	-	376	198 550	1,524 2,898	1,524 2,898	-	-	11,760	-	-	-	-	294,000	32 12,493	
2b.2.2 2b.2.3	Security Modifications	-	1,972	-	-	-	-	8,696	1,304	10,000	10,000	-	-	-	-	-	-	-	-	12,495	-
2b.2.3	Subtotal Period 2b Additional Costs	- -	1,972	23	92	1,211	-	9,072		14,422	14,422	-	-	11,760	-	-		-	294,000	12,525	
Period 9h	b 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	-
	b Period-Dependent Costs																				
2b.4.1	Decon supplies	1,440	-	-	-	-	-	-	360	1,799	1,799	-	-	-	-	-	-	-	-	-	-
2b.4.2	Insurance	-	-	-	-	-	-	742		816	816	-	-	-	-	-	-	-	-	-	-
2b.4.3	Property taxes Health physics supplies	-	2,376	-	-	-	-	2,703	270 594	2,974 2,970	2,974 2,970	-	-	-	-	-	-	-	-	-	-
2b.4.4 2b.4.5	Heavy equipment rental	-	2,376	-	-	-	-	-	407	3,117	3,117	-	-	-	-	-	-	-	-	-	-
2b.4.6	Disposal of DAW generated	-	-,111	101	52	-	419		123	694	694	-	-	-	5,084	-	-	-	101,679	166	-
2b.4.7	Plant energy budget	-	-	-	-	-		1.437		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 1,182	69 177	527 1,359	527 1,359	-	-	-	-	-	-	-	-	-	-
2b.4.15	Remedial Actions Surveys	-	-	-	-	-	-	1,182	177	1,359	1,359	-	-	-	-	-	-	-	-	-	-

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Table E

Monticello Nuclear Generating Plant

DECON Decommissioning Cost Estimate with 100 Years of Spent Fuel Storage

(Thousands of 2020 Dollars)

							`		or 2020 Bonar												
Activity Index		Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Class A Cu. Feet	Class B	Volumes Class C Cu. Feet	GTCC Cu. Feet		Craft Manhours	Utility and Contractor Manhours
Davied 91	o Period-Dependent Costs (continued)																				
2b.4.16	Security Staff Cost	-	-	-	-	-	-	15,925	2,389	18,314	18,314	-	-	_	-	-	-	-	-	-	236,949
2b.4.17		-	-	-	-	-	-	14,772	2,216	16,988	16,988	-	-	-	-	-	-	-	-	-	160,160
2b.4.18 2b.4	Utility Staff Cost Subtotal Period 2b Period-Dependent Costs	1,440	5,087	101	52	-	419	19,442 63,747	2,916 10,692	22,358 81,536	22,358 77,082	4,455	-	-	5,084	-	-	-	101,679	166	297,283 694,392
2b.0	TOTAL PERIOD 2b COST	9,591	21,850	861	2,046	21,692	6,143		43,954	303,035	163,726	139,297	11	134,029	30,882	-	-	-	6,794,433	309,941	698,488
PERIOI	2d - Decontamination Following Wet Fuel Storage																				
Period 2	d 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	-
	of Plant Systems																				
2d.1.2.1 2d.1.2.2	Cranes/Heavy Loads/Rigging - RCA Electrical - Contaminated Fuel Pool	-	3 47	0	$\frac{1}{2}$	17 40	- 3	-	4 19	25 112	25 112	-	-	103 240	- 9	-	-	-	4,184 10,334	48 665	-
2d.1.2.2		-	297	5	23	411	-	-	140	876	876	-	-	2,457	-	-	-	-	99,783	4,090	-
2d.1.2.4	Fire - RCA - Fuel Pool Area	-	11		1	10	-	-	4	26	26	-	-	62	-	-	-	-	2,499	143	-
2d.1.2.5		246				197	455	-	382	1,781	1,781	-	-	1,179	1,341	-	-	-	133,939	8,380	-
2d.1.2.6 2d.1.2.7	Fuel Pool Cooling & Cleanup - Insulated HVAC Ductwork - Fuel Pool Area	27	41 34		3	11 50	40 4	-	36 17	161 108	161 108	-	-	67 296	117 11	-	-	-	10,220 12,733	848 457	-
2d.1.2.8	HVAC/Chilled Water - RCA Fuel Pool Area	-	33		2	37	-	-	14	87	87	-	-	223	-	-	-	-	9,072	397	-
2d.1.2.9	Instrument & Service Air-RCA-Fuel Pool	-	29		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	-
Decontar	mination of Site Buildings																				
2d.1.3.1	Reactor (Post Fuel)	946				329	10,216	-	3,880	19,056	19,056	-	-	1,969		-	-	-	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	-
	d 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
	d Collateral Costs																				
2d.3.1 2d.3.2	Process decommissioning water waste	79	-	54 26		-	220 193	-	114 64	563 366	563 366	-	-	-	504 249	-	-	-	30,239 26,553	98 47	-
2d.3.2 2d.3.3	Process decommissioning chemical flush waste Small tool allowance	- 1	91		84	-	193	-	14	105	105	-	-	-	249	-	-	-	26,553	47	-
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	-
	d Period-Dependent Costs																				
2d.4.1 2d.4.2	Decon supplies	244		-	-	-	-	530	61 53	305 583	305 583	-	-	-	-	-	-	-	-	-	-
2d.4.2 2d.4.3	Insurance 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	277 630	-	-	-	2,030	-	-	-	40,600	66	-
2d.4.7 2d.4.8	Plant energy budget NRC Fees	-	-	-	-	-	-	547 424	82 42	630 466	630 466	-	-	-	-	-	-	-	-	-	-
2d.4.8 2d.4.9	Emergency Planning Fees	-	-	-	-	-	-	112	11	123	466	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 2d.4.13	ISFSI Operating Costs Railroad Track Maintenance	-	-	=	-	=	-	84 94	13 14	97 108	108	97	-	-	-	-	-	-	-	-	-
2d.4.13 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 2d.4	Utility Staff Cost Subtotal Period 2d Period-Dependent Costs	244	2.743	40	21	-	167	10,052 34,579	1,508 5.652	11,560 43,446	10,670 38,604	890 4.842	-	-	2.030	-	-	-	40,600	- 66	149,660 390,997
	•		,,						-,		,	, ·	-	-	,	-	-	-	.,		,
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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Table E

Monticello Nuclear Generating Plant

DECON Decommissioning Cost Estimate with 100 Years of Spent Fuel Storage

(Thousands of 2020 Dollars)

							(Tl	housands	of 2020 Dollar	rs)											
						Off-Site	LLRW				NRC	Spent Fuel	Site	Processed		D! a13	Volumes		Burial /		Utility and
Activity		Decon	Removal	Packaging	Transport			Other	Total	Total	Lic. Term.	Management	Restoration	Volume	Class A	Class B	Class C	GTCC	Processed	Craft	Contractor
Index	Activity Description	Cost	Cost	Costs	Costs	Costs	Costs	Costs	Contingency	Costs	Costs	Costs	Costs	Cu. Feet			Cu. Feet			Manhours	Manhours
PERIOD 2f -	- License Termination																				
Period 2f Dire	ect Decommissioning Activities																				
	RISE confirmatory survey	-	-	-	-	-	-	166	50	216	216	-	-	-	-	-	-	-	-	-	-
	erminate license abtotal Period 2f Activity Costs							166	50	a 216	216										
		-	_	-	_	-	-	100	50	210	210	_	_		-	-	-	-	-	_	_
Period 2f Addi								0.000	2.050	0.00*	0.005									07.040	0.040
	cense Termination Survey abtotal Period 2f Additional Costs	-	-	-	-	-	-	6,920 6,920	2,076 2,076	8,995 8,995			-	-	-	-	-	-	-	95,048 95,048	6,240 6,240
								-,-	,,,,,	-,	-,									,	-,
Period 2f Colla 2f.3.1 DO	lateral Costs OC staff relocation expenses	_	_	_		_	_	1,264	190	1,454	1,454	_	_	_	_	_	_	_	_		
	pent Fuel Capital and Transfer	-	-	-	-	-	-	47	7	54	-	54	-	-	-	-	-	-	-	-	-
2f.3 Sul	ubtotal Period 2f Collateral Costs	-	-	-	-	-	-	1,311	197	1,508	1,454	54	-	-	-	-	-	-	-	-	-
Period 2f Perio	iod-Dependent Costs																				
2f.4.1 Ins	surance	-	-	-	-	-	-	530	53	583			-	-	-	-	-	-	-	-	-
	operty taxes	-	-	-	-	-	-	1,470		1,617			-	-	-	-	-	-	-	-	-
	ealth physics supplies sposal of DAW generated	-	708	- 7	4	-	29	-	177 9	884 48			-	-	355	-	-	-	7,097	12	-
	ant energy budget	-	-	- '		-	-	274	41				-	-	-	-	-		- 1,001	- 12	-
	RC Fees	-	-	-	-	-	-	426	43				-	-	-	-	-	-	-	-	-
	nergency Planning Fees	-	-	-	-	-	-	112		123		123	-	-	-	-	-	-	-	-	-
	xed Overhead	-	-	-	-	-	-	1,597 84	239 13			97	-	-	-	-	-	-	-	-	-
	FSI Operating Costs ailroad Track Maintenance	-	-	-	-	-	_	84 94	13				-	-	-	-	-	-	-	-	-
	ecurity Staff Cost	-	-	-	_	-	_	10,999	1,650				_	-	_	-	_	-	-	-	162,981
2f.4.12 DO	OC Staff Cost	-	-	-	-	-	-	5,393	809	6,201	6,201		-	-	-	-	-	-	-	-	57,200
	tility Staff Cost	=	-		- ,	-	-	5,762	864	6,626			-	-		-	-	-	-	-	80,707
	abtotal Period 2f Period-Dependent Costs	-	708	7			29		4,070	31,557	26,718		-	-	355	-	-	-	7,097	12	
	OTAL PERIOD 2f COST	-	708	7			29	,	6,392	42,276	37,382		-	-	355		-	-	7,097	95,059	307,128
PERIOD 2 TO		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
	- Site Restoration																				
	rect Decommissioning Activities																				
	f Remaining Site Buildings eactor Building		1.051						296	2,267			2,267							10.011	
	eactor Building ondensate Tanks Foundation	-	1,971 10		-	-	-	-	296	2,267	-	-	2,267	-	-		-	-	-	13,911 50	-
	scharge Retention Basin	-	4	-	-	-	-	-	1	5	-	-	5	-	-	-	-	-	-	25	-
3b.1.1.4 HP		-	19	-	-	-	-	-	3			-	22	-	-	-	-	-	-	97	-
3b.1.1.5 Hot 3b.1.1.6 Hy		-	16 2	-	-	-	-	-	2	19 2	-	-	19 2	-	-	-	-	-	-	177 19	-
	ydrogen & Oxygen Storage LRW Storage & Shipping	-	83	-	-	-	-		12	_	-	-	95	-	-	-	-	-	-	662	-
3b.1.1.8 MS		-	4	-	-	-	-	-	1	4	-	-	4	-	-	-	-	-	-	42	-
	isc Structures 2017	-	1,410	-	-	-	-	-	212			-	1,622	-	-	-	-	-	-	13,042	-
3b.1.1.10 Off		-	108	-	-	-	-	-	16			-	124	-	-	-	-	-	-	544	-
3b.1.1.11 Off 3b.1.1.12 Rad	ffgas Storage & Compressor	-	39 228	-	-	-	-	-	6 34			-	45 262	-	-	-	-	-	-	199 1,220	-
3b.1.1.12 Rat		-	128	-	-	-	-	-	19			-	147	-	-	-	-	-	-	713	-
3b.1.1.14 Sec	ecurity Barrier	-	186	-	-	-	-	-	28	214	-	-	214	-	-	-	-	-	-	933	-
	ructures Greater than 3' Below Grade	-	2,461	-	-	-	-	-	369	,	-	-	2,830	-	-	-	-	-	-	12,649	-
3b.1.1.16 Tar 3b.1.1.17 Tur		-	4 1,259	-	-	-	-	-	1 189	5 1,448	-	-	5 1,448	-	-	-	-	-	-	21 13,036	-
	urbine Building Addition	-	1,259	-	-	-	-	-	8			-	1,446	-	-	-	-	-	-	618	-
3b.1.1.19 Tui	ırbine Pedestal	-	182	-	-	-	-	-	27	209	-	-	209		-	-	-	-	-	926	-
3b.1.1 Tot	otals	-	8,169	•	-	-	-	-	1,225	9,394	-	-	9,394	-	-	-	-	-	-	58,885	-
Site Closeout	Activities																				
3b.1.2 Gra	rade & landscape site	-	896	-	-	-	-	-	134	1,031		-	1,031	-	-	-	-	-	-	1,841	-
	nal report to NRC	-	9,065	-	-	-	-	200 200		231 10,655			10.495	-	-	-	-	-	-		1,560 1,560
50.1 Sul	abtotal Period 3b Activity Costs	=	9,060	-	-	-	-	200	1,390	10,665	231	-	10,425	-	-	-	-	-	-	60,726	1,060

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Table E

Monticello Nuclear Generating Plant

DECON Decommissioning Cost Estimate with 100 Years of Spent Fuel Storage

(Thousands of 2020 Dollars)

							(TI	iousands (of 2020 Dollar	rs)											
						Off-Site	LLRW				NRC	Spent Fuel	Site	Processed		Burial	Volumes		Burial /		Utility and
Activity	7	Decon	Removal	Packaging	Transport	Processing	Disposal	Other	Total	Total	Lic. Term.	Management	Restoration	Volume	Class A	Class B	Class C	GTCC	Processed	Craft	Contractor
Index	Activity Description	Cost	Cost	Costs	Costs	Costs	Costs	Costs	Contingency	Costs	Costs	Costs	Costs	Cu. Feet	Cu. Feet	Cu. Feet	Cu. Feet	Cu. Feet	Wt., Lbs.	Manhours	Manhours
Poriod 9h	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 3b.2.6	Discharge Structure Cofferdam Disposition of Original MPC Canisters	-	442 55		954	-	5,641	-	66 1,709	508 8,544	8,544	-	508	-	21,097	-	-	-	2,505,700	3,552 337	-
3b.2.6 3b.2	Subtotal Period 3b Additional Costs	-	9,737	185			5,641	1,183	3,339	21,039	8,544		12,495	-	21,097	-	-	-	2,505,700	11,907	-
D . 101																					
Period 3b 3b.3.1	o Collateral Costs Small tool allowance		111						17	127	-		127								
3b.3.2	Spent Fuel Capital and Transfer	-	- 111	-	-	-	-	108	16		-	125	- 121	-	-	-	-	-	-	-	-
3b.3	Subtotal Period 3b Collateral Costs	-	111	-	-	-	-	108	33		-	125	127	-	-	-	-	-	-	-	-
Poriod 9h	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 3b.4.6	NRC ISFSI Fees Emergency Planning Fees	-	-	-	-	-	-	356 257	36 26	391 283	-	391 283	-	-	-	-	-	-	-	-	-
3b.4.6 3b.4.7	Fixed Overhead	-		-	-	-		1,122	168	1,290	429		-	_	-	-	-	-	-	-	-
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
PERIOI	3c - Fuel Storage Operations/Shipping																				
Period 3	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 3	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 3c.4.7	Fixed Overhead ISFSI Operating Costs	-	-	-	-	-	-	20,053 10,420	3,008 1,563	23,061 11,983	-	23,061 11,983	-	-	-	-	-	-	-	-	-
3c.4.7	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
PERIOI	3d - GTCC shipping																				
Period 3	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	-	-
	l Collateral Costs									-											
3d.3.1 3d.3	Spent Fuel Capital and Transfer Subtotal Period 3d Collateral Costs	-	-	-	-	-	-	28 28	4	32 32	-	32 32	-	-	-	-	-	-	-	-	-
ou.o	Subtotal I eriod 5d Collateral Costs	-	-	-	-	-	-	28	4	32	-	32	-	-	-	-	-	-	-	-	-

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Table E

Monticello Nuclear Generating Plant

DECON Decommissioning Cost Estimate with 100 Years of Spent Fuel Storage

(Thousands of 2020 Dollars)

							(11)	iousanus	oi 2020 Dollai	(5)											
Activ		Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Class A	Class B	Volumes Class C Cu. Feet	GTCC Cu. Feet	Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
Daniad	3d Period-Dependent Costs																				
3d.4.1		-	-	-	-	-	-	27	3	30	30	-	-	-	-	-	-	-	-	-	-
3d.4.2		-	-	-	-	-	-	35	3	38	38		-	-	-	-	-	-	-	-	-
3d.4.4 3d.4.5		-	-	-	-	-	-	8	1	9	-	9	-	-	-	-	-	-	-	-	-
3d.4.6	Fixed Overhead	-	-	-	-	-	-	8	1	10	10		-	-	-	-	-	-	-	-	-
3d.4.7 3d.4.8		-	-	-	-	-	-	5 165	1 25	6 190	6 190		-	-	-	-	-	-	-	-	2.074
3d.4.9		-	-	-		-		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
PERIO	OD 3e - ISFSI Decontamination																				
Period	3e Direct Decommissioning Activities																				
	3e Additional Costs																				
3e.2.1 3e.2	License Termination ISFSI Subtotal Period 3e Additional Costs	-	0				283 283		602 602	3,008 3,008	3,008 3,008		-	-	848 848		-	-	131,507 131,507		2,225 2,225
Period	3e Period-Dependent Costs																				
3e.4.1	Insurance	-	-	-	-	-	-	118	30	148	148	-	-	-	-	-	-	-	-	-	-
3e.4.2 3e.4.3		-	-	-	-	-	-	249 12		312 15	312 15		-	-	-	-	-	-	-	-	-
3e.4.4		-		-	-	-		71	18	89	89		-	-	-	-		-		-	-
3e.4.5	Railroad Track Maintenance	-	-	-	-	-	-	41	10	52	52		-	-	-	-	-	-	-	-	
3e.4.6 3e.4.7	Security Staff Cost Utility Staff Cost	-	-	-	-	-	-	352 261	88 65	440 326	440 326		-	-	-	-	-	-		-	4,999 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
PERIO	OD 3f - ISFSI Site Restoration																				
Period	3f Direct Decommissioning Activities																				
	3f Additional Costs																				
3f.2.1 3f.2	Demolition and Site Restoration of ISFSI Subtotal Period 3f Additional Costs	-	1,564 1,564		-	-	-	256 256		2,093 2,093	-	-	2,093 2,093		-	-	-	-	-	7,309 7,309	160 160
	3f Collateral Costs																				
3f.3.1 3f.3	Small tool allowance Subtotal Period 3f Collateral Costs	-	11 11		-	-	-	-	2 2	12 12		-	12 12		-	-	-	-	-	-	-
		-	11	•	-	-	-	-	2	12	•	-	12	-	-	-	-	-	-	-	•
Period 3f.4.2	3f Period-Dependent Costs Property taxes	_	_	_	_	_	_	126	13	138	_	_	138	_	_	_	_	_	_	_	_
3f.4.3	Heavy equipment rental	-	117	-	-	-	-	-	17	134	-	-	134		-	-	-	-	-	-	-
3f.4.4	Plant energy budget Fixed Overhead	=	-	-	-	-	-	6 36	1 5	7 41	-	-	7	-	-	-	-	-	-	=	-
3f.4.5 3f.4.6	Railroad Track Maintenance	-	-	-	-	-	-	36 21	3	24	-	-	41 24	-	-	-	-	-	-	-	-
3f.4.7	Security Staff Cost	=	-	-	-	-	-	177	27	204	-	-	204	-	-	-	-	-	-	-	2,520
3f.4.8 3f.4	Utility Staff Cost Subtotal Period 3f Period-Dependent Costs	-	- 117	-		-	-	109 475	16 82	126 674	-	-	126 674	-	-	-	-	-		-	1,564 4,084
3f.0	TOTAL PERIOD 3f COST	-	1,691		-	-	-	731	357	2,779	-	-	2,779		_	_	-	-	-	7,309	4,244
	OD 3 TOTALS	-	26,446		987	-	10,238		213,969	1,695,809	21,816	1,601,341	72,652		21,944	-	-	1,160	2,862,972		8,413,353
		15.000					,		ŕ	, ,	,		ŕ		ŕ		000	,		,	, ,
TOTAL	L 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

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Xcel Energy

Monticello Nuclear Generating Plant Decommissioning Cost Analysis

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

NRC Spent Fuel Site
Total Lic. Term. Management Restoration

Volume Class A
Cu. Feet Cu. Feet

Burial Volumes

Class A Class B Class C GTCC

Cu. Feet Cu. Feet Cu. Feet Cu. Feet

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Processing Costs	Disposal Costs	Other Costs
TOTAL COST TO I	DECOMMISSION WITH 16.23% CONTINGE	ENCY:			\$2,645,871	thousands of	2020 dollars	
TOTAL NRC LICE	NSE TERMINATION COST IS 29.34% OR:				\$776,228	thousands of	2020 dollars	
SPENT FUEL MAN	NAGEMENT COST IS 67.88% OR:				\$1,795,906	thousands of	2020 dollars	
NON-NUCLEAR D	EMOLITION COST IS 2.79% OR:				\$73,737	thousands of	2020 dollars	
TOTAL LOW-LEVE	EL RADIOACTIVE WASTE VOLUME BURI	ED (EXCLUDIN	G GTCC):		200,155	Cubic Feet		
TOTAL GREATER	THAN CLASS C RADWASTE VOLUME GE	ENERATED:			1,160	Cubic Feet		
TOTAL SCRAP ME	ETAL REMOVED:				23,123	Tons		
TOTAL CRAFT LA	BOR 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

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APPENDIX F

DETAILED COST ANALYSIS

SCENARIO 4: DECON with 200 Year DFS

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Table F

Monticello Nuclear Generating Plant

DECON Decommissioning Cost Estimate with 200 Years of Spent Fuel Storage

(Thousands of 2020 Dollars)

							(Tl	nousands	of 2020 Dollar	rs)											
						Off-Site	LLRW				NRC	Spent Fuel	Site	Processed		Burial	Volumes		Burial/		Utility and
Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs		Disposal Costs	Other Costs	Total Contingency	Total Costs	Lic. Term. Costs	Management Costs	Restoration Costs	Volume Cu. Feet	Class A	Class B	Class C	GTCC Cu. Feet	Processed	Craft Manhours	Contractor Manhours
	Shutdown through Transition	Cost	Cost	Costs	Costs	Costs	Costs	Costs	Contingency	Costs	Costs	Costs	Costs	Cu. Feet	cu. Feet	Cu. Feet	Cu. Feet	Cu. Feet	Wt., LDS.	Mannours	Wannours
	_																				
	t Decommissioning Activities are preliminary decommissioning cost	_	_	_	_	-	_	167	25	192	192	_	-	_	_	_	_	_	_	_	1,300
1a.1.2 Notifi	fication of Cessation of Operations									a											-,
	ove fuel & source material fication of Permanent Defueling									n/a a											
1a.1.5 Deact	tivate plant systems & process waste									a											
	are and submit PSDAR ew plant dwgs & specs.	÷	-	÷	-	-	-	257 591	39 89	296 680	296	÷	-	-	-	-	-	-	-	-	2,000 4,600
	ew plant dwgs & specs. orm detailed rad survey	-	-	-	-	-	-	991	89	680 a	680	-	-	-	-	-	-	-	-	-	4,600
1a.1.9 Estim	nate by-product inventory	-	-	-	-	-	-	129	19	148	148	-	-	-	-	-	-	-	-	-	1,000
	product description iled by-product inventory	-	-	-	-	-	-	129 167	19 25	148 192	148 192		-	-	-	-	-	-	-		1,000 1,300
	ne major work sequence	-	-	-	-	-	-	964	145	1,108	1,108	-	-	-	-	-	-	-	-	-	7,500
	orm SER and EA	-	-	-	-	-	-	398	60	458	458	-	-	-	-	-	-	-	-	-	3,100
	are/submit Defueled Technical Specifications orm Site-Specific Cost Study	-	-	-	-	-		964 643	145 96	1,108 739	1,108 739	-	-	-	-	-		-	-		7,500 5,000
	are/submit Irradiated Fuel Management Plan	-	-	-	-	-	-	129	19	148	148	-	-	-	-	-	-	-	-	-	1,000
Activity Specific								632	95	727	654		73								4,920
1a.1.17.1 Plant	t & temporary facilities	-	-	-	-	-	-	536	95 80	616	554 554	-	62	-	-	-	-	-	-	-	4,920 4,167
1a.1.17.3 NSSS	S Decontamination Flush	-	-	-	-	-	-	64	10	74	74	-	-	-	-	-	-	-	-	-	500
1a.1.17.4 React 1a.1.17.5 React		-	-	-	-	-	-	912 835	137 125	1,049 961	1,049 961	-	-	-	-	-	-	-	-	-	7,100 6,500
1a.1.17.6 Sacrit		-		-	-	-		64	10	74	74	-	-	-	-	-		-	-		500
	ture separators/reheaters	-	-	-	-	-	-	129	19	148	148	-	-	-	-	-	-	-	-	-	1,000
1a.1.17.8 Reinf 1a.1.17.9 Main		-	-	-	-	-	-	206 268	31 40	236 309	118 309	-	118	-	-	-	-	-	-	-	1,600 2,088
1a.1.17.10 Main	Condensers	-	-	-	-	-	-	268	40	309	309	-	-	-	-	-	-	-	-	-	2,088
	sure suppression structure	÷	-	÷	-	-	-	257 206	39 31	296 236	296	÷	-	-	-	-	-	-	-	-	2,000
1a.1.17.12 Dryw 1a.1.17.13 Plant	veil t structures & buildings	-		-	-	-	-	401	60	236 461	236 231	-	231		-	-	-	-	-	-	1,600 3,120
1a.1.17.14 Waste		-	-	-	-	-	-	591	89	680	680	-		-	-	-	-	-	-	-	4,600
1a.1.17.15 Facili 1a.1.17 Total	lity & site closeout l	-	-	-	-	-	-	116 5,486	17 823	133 6,308	67 5,759	-	67 550	-	-	-	-	-	-	-	900 42,683
Planning & Site	Preparations																				
	are dismantling sequence	÷	-	÷	-	-	-	308	46	355	355	÷	-	-	-	-	-	-	-	-	2,400
	t prep. & temp. svces gn water clean-up system	-	-	-	-	-		3,500 180	525 27	4,025 207	4,025 207	-	-	-	-	-		-	-		1,400
1a.1.21 Riggi	ing/Cont. Cntrl Envlps/tooling/etc.	-	-	-	-	-	-	2,400	360	2,760	2,760	-	-	-	-	-	-	-	-	-	· -
	ure casks/liners & containers otal Period 1a Activity Costs	-	-	-	-	-	-	158 16,569	24 2,485	182 19,054	182 18,505	-	550	-	-	-	-	-	-	-	1,230 83,013
	·							10,505	2,400	10,004	10,000		000								00,010
Period 1a Collate 1a.3.1 Spent	t Fuel Capital and Transfer	-	-	-	-	-	_	1,323	198	1,522	-	1,522	-	_	_	_	_	-	_	_	_
	ntion and Severance	-	-	-	-	-	-	9,892	1,484	11,376	11,376	-	-	-	-	-	-	-	-	-	-
	otal Period 1a Collateral Costs	-	-	-	-	-	-	11,215	1,682	12,897	11,376	1,522	-	-	-	-	-	-	-	-	-
Period 1a Period 1a.4.1 Insur	d-Dependent Costs	_	_	_	_	_	_	2,328	233	2,561	2,561		_	_	_	_	_	_	_	_	_
1a.4.2 Prope	erty taxes	-	-	-	-	-	-	3,570	357	3,927	3,927	-	-	-	-	-	-	-	-	-	-
	th physics supplies	-	614		-	-	-	-	153	767	767	-	-	-	-	-	-	-	-	-	-
	y equipment rental osal of DAW generated	-	753	3 - 12	- 6	-	50	-	113 15	866 83	866 83	-	-	-	610	-	-	-	12,190	20	-
1a.4.6 Plant	t energy budget	-	-	- 12	-	-	-	1,817	272	2,089	2,089	-	-	-	-	-	-	-	-	-	-
1a.4.7 NRC		-	-	-	-	-	-	1,137	114	1,251 3,770	1,251	3,770	=	-	-	-	-	-	-	-	-
	rgency Planning Fees d Overhead	-	-	-	-	-	-	3,428 2,616	343 392	3,770	3,009	3,770 -	-	-	-	-	-	-	-	-	-
1a.4.10 Spent	t Fuel Pool O&M	-	-	-	-	-	-	845	127	971	-	971	-	-	-	-	-	-	-	-	-
	I Operating Costs road Track Maintenance	-		-	-	-	-	112 125	17 19	129 144	- 144	129	-	-	-	-	-	-	-	-	-
1a.4.13 Secur	rity Staff Cost	-	-	-	-	-	-	16,372	2,456	18,827	18,827	-	-	-	-	-	-	-	-	-	245,440
	ty Staff Cost	-	1 905		- 6	-	-	27,285	4,093	31,378	31,378	4,870	=	-	- 010	-	-	-	10 100	-	422,240
1a.4 Subto	otal Period 1a Period-Dependent Costs	-	1,367	7 12	6	-	50	59,634	8,703	69,772	64,902	4,870	-	-	610	-	-	-	12,190	20	667,680

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

							(io abairab	oi 2020 Dollai	,											
						Off-Site	LLRW				NRC	Spent Fuel	Site	Processed			Volumes		Burial /		Utility and
Activi Inde		Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Processing Costs	Disposal Costs	Other Costs	Total Contingency	Total Costs	Lic. Term. Costs	Management Costs	Restoration Costs	Volume Cu. Feet	Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet		Craft Manhours	Contractor Manhours
1a.0	TOTAL PERIOD 1a COST	-	1,367	12	2 6	-	50	87,418	12,871	101,724	94,783	6,392	550	-	610	-	-	-	12,190	20	750,693
PERIO	D 1b - Decommissioning Preparations																				
Period 1	b Direct Decommissioning Activities																				
Detaile	l Work Procedures																				
	Plant systems	<u>=</u>	-	-	-	-	-	608	91	700	630	=	70	-	-	-	-	-	-	-	4,733
	NSSS Decontamination Flush Reactor internals	=	-	-	-	-	-	129 514	19 77	148 591	148 591	=	-	-	-	-	-	-	-	-	1,000 4,000
	Remaining buildings	-	-	-	-	-	-	174	26	200	50	-	150	-	-		-		-	-	1,350
	CRD housings & NIs	-	-	-	-	-	-	129	19	148	148	-	-	-	-	-	-	-	-	-	1,000
1b.1.1.6		-	-	-	-	-	-	129	19	148	148	-	-	-	-	-	-	-	-	-	1,000
1b.1.1.7		-	-	-	-	-	-	257	39	296	296	-	-	-	-	-	-	-	-	-	2,000
	Reactor vessel Facility closeout	-	-	-	-	-	-	467 154	70 23	537 177	537 89	-	89	-	-	-	-	-	-	-	3,630 1,200
	0 Sacrificial shield	-	-	-	-	-	-	154	23	177	177	-	-	-	-		-		-	-	1,200
	1 Reinforced concrete	<u>-</u>	-	-	-	-	-	129	19	148	74	-	74	-	-	-	-	-	-	-	1,000
	2 Main Turbine	-	-	-	-	-	-	267	40	307	307	-	-	-	-	-	-	-	-	-	2,080
	3 Main Condensers	-	-	-	-	-	-	268	40	309	309	-	-	-	-	-	-	-	-	-	2,088
	4 Moisture separators & reheaters 5 Radwaste building	-	-	-	-	-	-	257 351	39 53	296 403	296 363	-	40	-	-	-	-	•	-	-	2,000 2,730
	6 Reactor building	-	-	-	-	-		351	53	403	363	-	40	-	-	-	-	-	-	-	2,730
1b.1.1	Total	-	-	-	-	-	-	4,336	650	4,987	4,524	-	463	-	-	-	-	-	-	-	33,741
11.10	D. Naga	202							140											1.005	
1b.1.2 1b.1	Decon NSSS Subtotal Period 1b Activity Costs	296 296		-	-	-	-	4,336	148 798	444 5,431	444 4,968	-	463	-	-	-	-	-	-	1,067 1,067	33,741
		200						1,000		0,101	1,000		100							1,001	55,111
	b Additional Costs																				
1b.2.1	Spent Fuel Pool Isolation	-	-	-	-	-	-	12,675	1,901	14,576	14,576	-	-	-	-	-	-	-	-	-	-
1b.2.2	Site Characterization Mixed & RCRA Waste	=	-	28	3 29	14	-	5,930	1,779 9	7,708 80	7,708 80	=	-	43	-	-	-	-	5,253	30,500 161	10,852
1b.2.3 1b.2	Subtotal Period 1b Additional Costs	-	-	28				18,605	3,689	22,365	22,365	-	-	43		-		-	5,253	30,661	10,852
								,	-,	,,	,_,								-,	,	,
	b Collateral Costs																				
1b.3.1	Decon equipment	1,055	-	-	-	-	-	1 004	158	1,213	1,213	-	-	-	-	-	-	-	-	-	-
1b.3.2 1b.3.3	DOC staff relocation expenses Process decommissioning water waste	38	-	25	- 5 45	-	102	1,264	190 53	1,454 263	1,454 263	-	-	-	233	-	-		13,991	45	-
1b.3.4	Process decommissioning water waste	1	_	24			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 1b.3.8	Decon rig Spent Fuel Capital and Transfer	2,104		-	-	-	-	2,735	316 410	2,419	2,419	3,145	-	-	-	-	-	-	-	-	-
1b.3.9	Retention and Severance	-	-	-	-	-		6,335	950	3,145 7,285	7,285	5,145	-	-	-	-	-	-	-	-	-
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	-
D. 4.11	b Period-Dependent Costs																				
1b.4.1	Decon supplies	39	_	_	_	_	_	_	10	48	48	_	_	_	_	_	_		_	_	_
1b.4.1	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 49	432 49	-	-	-	-	-	-	-		-	-
1b.4.6 1b.4.7	Disposal of DAW generated Plant energy budget	-	-	7	7 4	-	29	1,812	9 272	2,083	2.083	-	-	-	356	-	-	-	7,122	12	-
1b.4.7 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		-	-	-	-	-	-	421	63	484	-	484	-	-	-	-	-	-	-	-	=
1b.4.12 1b.4.13		-	-	-	-	-	-	56 62	8 9	64 72	72	64	-	-	-	-	-	-	-	-	-
1b.4.13 1b.4.14		-	-	-	-	-	-	8,163	1,225	9,388	9,388	-	-	-	-	-	-	-	-	-	122,384
1b.4.15		-	_	-	-	=	-	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	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	1 154	14	1,657	69,230	12,465	89,056	83,343	5,251	463	43	589	231	-	-	50,964	31,828	441,822
PERIO	D 1 TOTALS	3,531	3,288	96	3 160	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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Table F

Monticello Nuclear Generating Plant

DECON Decommissioning Cost Estimate with 200 Years of Spent Fuel Storage

(Thousands of 2020 Dollars)

						(Tł	ousands	of 2020 Dollar	rs)											
					Off-Site	LLRW				NRC	Spent Fuel	Site	Processed		Rurial	Volumes		Burial /		Utility and
Activity	Decon	Removal	Packaging	Transport	Processing	Disposal	Other	Total	Total	Lic. Term.	Management	Restoration	Volume	Class A	Class B	Class C	GTCC	Processed	Craft	Contractor
Index Activity Description	Cost	Cost	Costs	Costs	Costs	Costs	Costs	Contingency	Costs	Costs	Costs	Costs	Cu. Feet	Cu. Feet	Cu. Feet	Cu. Feet	Cu. Feet	Wt., Lbs.	Manhours	Manhours
PERIOD 2a - Large Component Removal																				
Period 2a Direct Decommissioning Activities																				
Nuclear Steam Supply System Removal																				
2a.1.1.1 Recirculation System Piping & Valves 2a.1.1.2 Recirculation Pumps & Motors	111 40	94 63	27 16	50 51	42	528 539	-	221 186	1,031 938	1,031 938	-	-	96	1,430 945	-	-	-	99,742 112,200	2,905 1,563	
2a.1.1.2 Recirculation Fumps & Motors 2a.1.1.3 CRDMs & NIs Removal	194	1,020	415		- 42	1,130	-	696	3,591	3,591	-	-	- 96	3,741	-		-	213,700	17,768	
2a.1.1.4 Reactor Vessel Internals	244	6,722	12,852		-	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 2a.1.1 Totals	113 702	9,121 17,020	2,672 15,982		42	5,861 37,903	364 728	10,842 35,973	30,140 112,449	30,140 112,449	-	-	96	16,169 23,536	1,761	898	-	1,105,210 1,874,002	30,515 83,267	1,379 2,758
Removal of Major Equipment	.02	11,020	10,002	1,000		01,000	.20	33,013	112,110	112,110			00	20,000	1,101	000		1,011,002	00,201	2,100
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		000							963	901									0.015	
2a.1.4.1 Reactor Building 2a.1.4.2 Radwaste	-	332 25	-	-	-	-	-	50 4	381 28	381 28	-	-	-	-	-	-	-	-	2,217 127	-
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		-	-	-	45,852	1,656	
2a.1.5.2 Chemistry Sampling 2a.1.5.3 Chemistry Sampling - Insulated	-	27 2	0	0	26	13 0		14 1	83	83 3	-	-	156	37 1	-		-	8,681 72	400 28	
2a.1.5.4 Circulating Water - RCA	-	207	14	-	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 2a.1.5.8 Condensate & Feedwater - Insulated	-	987 492	183 34		3,337 699	2,464 408		1,431 343	8,731 2,038	8,731 2,038	-	-	19,947 4,176		-			1,275,810 246,693	14,196 6,964	-
2a.1.5.9 Condensate Demin	-	545	30	51	560	339	-	316	1,840	1,840	-	-	3,346		-	-	-	199,936	7,618	
2a.1.5.10 Condensate Storage	-	726	33		1,193	270	-	444	2,748	2,748	-	-	7,131	795	-	-	-	340,568	10,345	-
2a.1.5.11 Control Rod Drive	-	3 416	0 16	0 26	3	1 190	-	2 199	1 104	9	-	-	19 1,658		-	-	-	1,009 103,306	41	-
2a.1.5.12 Control Rod Drive Hydraulic 2a.1.5.13 Core Spray	-	79	20		277 734			184	1,124 1,244	1,124 1,244	-	-	4,384	562 521	-	-		211,329	5,898 1,163	
2a.1.5.14 Core Spray - Insulated	-	145	8	13	137	90		82	474	474	-	-	818		-	-		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 2a.1.5.17 Diesel Oil - RCA	-	41 2	1	2	42	-	-	17	104	104 7	-	-	253 23		-	-	-	10,278 931	508 25	
2a.1.5.17 Dieser Oil - RCA 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 2a.1.5.22 Emergency Service Water - RCA	-	21 2	0	1	23 2	-	•	9	55 5	55 5	-	-	137 13	-	-	-	-	5,544 512	281 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 5	-	3	15 15	15 15	-	-	6	13 13	-	-	-	1,080 1,080	81 81	-
2a.1.5.26 H2-O2 Control Analyzing - Insulated 2a.1.5.27 High Pressure Coolant Injection	-	67	6	13	163	-		61	381	381	-	-	972		-	-		52,792	966	
2a.1.5.28 High Pressure Coolant Injection - Insula	-	219	14		267	163	-	141	830	830	-	-	1,598		-	-	-	95,733	3,079	-
2a.1.5.29 Hydrogen Cooling	=	8	-	-		-	-	1	10		-	10		-	-	-	-	-	118	
2a.1.5.30 Hydrogen Cooling - RCA 2a.1.5.31 Hydrogen Seal Oil - RCA	-	7 17	0	0	7 32	-	-	3 9	17 60	17 60	-	-	39 189		-	-	-	1,600 7,669	79 212	
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		223		-	122	712	712	-	-	1,333		-	-	-	80,439	2,746	-
2a.1.5.35 Main Steam 2a.1.5.36 Main Turbine	-	249 1,012	17 205		359 3,306	201 2,921	-	173 1,553	1,029 9,350	1,029 9,350	-	-	2,148 19,760		-	-	-	125,135 1,354,661	3,512 14,733	-
2a.1.5.37 Main Turbine - Insulated	-	214	18		423		-	180	1,097	1,097	-	-	2,530		-	-	-	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 2a.1.5.40 Off Gas Recombiner - Insulated	-	189 387	19 19		300 229	257	-	163 197	960 1,100	960 1,100	-	-	1,795 1,366		-	-	-	121,554 100,933	2,708 5,385	
2a.1.5.40 Off Gas Recombiner - Insulated 2a.1.5.41 Post Accident Sampling	-	387 25	19	27	229	240 11	-	197	1,100	1,100 58	-	-	1,366		-	-	-	4,318	5,385 345	
2a.1.5.41 Post Accident Sampling - Insulated	-	17	1	1	3	13	-	8	43	43	-	-	17		-	-	-	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	57 772	
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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Table F

Monticello Nuclear Generating Plant

DECON Decommissioning Cost Estimate with 200 Years of Spent Fuel Storage

(Thousands of 2020 Dollars)

							(11	ousunus (oi 2020 Dollai												
						Off-Site	LLRW				NRC	Spent Fuel	Site	Processed		Burial '	Volumes		Burial/		Utility and
Activit		Decon	Removal	Packaging		Processing	Disposal	Other	Total	Total	Lic. Term.	Management	Restoration	Volume	Class A	Class B	Class C	GTCC	Processed	Craft	Contractor
Index	Activity Description	Cost	Cost	Costs	Costs	Costs	Costs	Costs	Contingency	Costs	Costs	Costs	Costs	Cu. Feet	Cu. Feet	Cu. Feet	Cu. Feet	Cu. Feet	Wt., Lbs.	Manhours	Manhours
Disposal	of Plant Systems (continued)																				
	3 Residual Heat Removal	362	252	172			2,051	-	962	5,049	5,049	-	-	6,406	6,012	-	-	-	647,941	4,135	-
	7 Residual Heat Removal - Insulated	622	554	61	82 4		880	-	772	3,535	3,535 150	-	-	3,367 259	2,607 76	-	-	-	303,087	10,340	-
	Rx Core Isolation Cooling Rx Core Isolation Cooling - Insulated	-	49 107	5	4 7	43 48	26 67	-	26 52	150 287	287	-	-	288	198	-	-	-	15,396 24,419	691 1,479	-
	Rx Recirculation	56	58	6	4	7	65	-	61	258	258	-	-	43	190	-	-	-	14,095	1,580	-
	1 Snubbers	-	169	2	5	63	30	-	60	331	331	-	-	377	90	-	-	-	21,009	2,548	-
2a.1.5.52		-	4	0	0	4	-	-	2	9	9	-	-	22	-	-	-	-	904	48	-
	3 Standby Liquid Control - RCA 4 Stator Cooling - RCA	-	26 7	0	2	41 21	-	-	13 5	83 35	83 35	-	-	245 126	-	•	-	-	9,969 5,135	341 98	-
2a.1.5.5		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 2	a 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 2a.3.4	Small tool allowance Spent Fuel Capital and Transfer	-	324	-	-	-	-	24,119	49 3,618	373 27,737	336	97.797	37	-	-	-	-	-	-	-	-
2a.3.4 2a.3.5	Retention and Severance	-	-	-	-	-	-	13,127	1,969	15,097	15,097	27,737	-		-	-	-	-	-	-	-
2a.3.6	On-site survey and release of 0.0 tons clean metallic waste	-	_	-	-	-	_	- 10,121	-	-	-	-	-	_	-	-	_	-	_	-	-
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 2	a 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 3,627	-	-	-	-	-	589 544	2,945 4,171	2,945 4,171	-	-	-	-	-	-	-	-	-	-
2a.4.5 2a.4.6	Heavy equipment rental Disposal of DAW generated	-	5,627	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 2a.4.11	Fixed Overhead Spent Fuel Pool O&M	-	-	-	-	-	-	3,071 $1,224$	461 184	3,532 1,408	3,532	1,408	-	-	-	-	-	-	-	-	-
2a.4.11 2a.4.12	ISFSI Operating Costs	-	-	-	-	-	-	162	24	1,408	-	1,408	-	-	-		-	-	-	-	-
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 2a.4.17	DOC Staff Cost Utility Staff Cost	-	-	-	-	-	-	21,021 27,906	3,153 4,186	24,174 $32,092$	24,174 32,092	-	-	-	-	•	-	-	-	-	229,108 426,562
2a.4.17	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
PERIO	D 2b - Site Decontamination																				
Period 2	b Direct Decommissioning Activities																				
Disnosal	of Plant Systems																				
2b.1.1.1		-	18	0	1	6	3	-	6	35	35	-	-	35	10	-	-	-	2,060	277	-
2b.1.1.2		-	16	0	1	16	-	-	7	40	40	-	-	93	-	-	-	-	3,765	185	-
2b.1.1.3		-	1	0	0	0	0	-	0	2	2	-	-	2	0	-	-	-	129	17	-
2b.1.1.4		-	445 2.698	6 48	24 218		30	-	183	1,089	1,089	-	-	2,389 23,344	90	-	-	-	102,726 948,013	6,325	-
2b.1.1.5 2b.1.1.6		-	2,698 101	48	218	3,906		-	1,298 42	8,167 253	8,167 253	-	-	23,344		-	-	-	948,013 24,917	37,107 1,324	-
2b.1.1.7		-	305	7	27		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		-	483	16		1,007	76	-	302	1,945	1,945	-	-	6,018	227	-	-	-	258,789	7,101	-
2b.1.1.10		588	3 687	0 48	0 63	4	-	-	1 703	9 100	9	-	-	26	1 700	-	-	-	1,058	35 17 104	-
	Liquid Radwaste Makeup Demin - RCA	588	103	48	63 14		586	-	703 65	3,188 431	3,188 431	-	-	3,073 1,471	1,728	-	-	-	235,484 59,747	17,194 1,412	-
	Non-Essential Diesel Generator - RCA	-	27	3 3	13			-	45	327	327	-	-	1,471	-	-		-	57,832	395	-
	1 Off Gas Holdup	-	342	21	38	461	214	-	216	1,291	1,291	-	-	2,755	630	-	-	-	152,277	4,769	-
	5 Primary Containment	-	455	42			507	-	414	2,543	2,543	-	-	6,201	1,506	-	-	-	347,704	6,454	-

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Table F

Monticello Nuclear Generating Plant

DECON Decommissioning Cost Estimate with 200 Years of Spent Fuel Storage

(Thousands of 2020 Dollars)

							(11	iousanus	oi 2020 Dollai	15)											
						Off-Site	LLRW				NRC	Spent Fuel	Site	Processed		Burial	Volumes		Burial/		Utility and
Activity Index		Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Processing Costs	Disposal Costs	Other Costs	Total Contingency	Total Costs	Lic. Term. Costs	Management Costs	Restoration Costs	Volume Cu. Feet	Class A Cu. Feet	Class B	Class C Cu. Feet	GTCC Cu. Feet	Processed Wt., Lbs.	Craft Manhours	Contractor Manhours
		Cost	Cost	Costs	Costs	Costs	Costs	Costs	contingency	Costs	Costs	Costs	Costs	cu. rect	cu. r cci	cu. rect	Cu. I cct	cu, rect	11ti, 1155.	mannours	Mamours
	of Plant Systems (continued) Process Radiation Monitors		46	2	2	24	18		20	111	111			142	52				9,115	649	
	Rx Bldg Closed Clng Water - Insul - RCA	-	114	2	9	163	- 10		54	343	343	-	-	977	- 52	-		-	39,675	1,484	-
	Rx Bldg Closed Clng Water - RCA	-	184	15	66	1,187	-	-	235	1,687	1,687	-	-	7,093	-	-	-	-	288,031	2,489	-
	Rx Component Handling Equip	27	142	18	27	194	279		154	840	840	-	-	1,158		-	-	-	99,730	2,462	-
	Rx Pressure Vessel Rx Water Cleanup	28 172	47 265	6 19	5 16	13 22	78 251		48 222	225 965	225 965	-	-	75 130		-	-	-	17,816 52,670	1,051 5,736	-
	Secondary Containment	- 172	124	7	14		86		81	483	483	-	-	1,017		-		-	57,567	1,763	-
	Service & Seal Water - Insulated - RCA	-	120	2	11	197	-		62	392	392	-	-	1,180		-	-	-	47,917	1,565	-
	Service & Seal Water - RCA	-	159	4	17		-	-	88	570	570	-	-	1,809	-	-	-	-	73,453	2,016	-
	Service Air Blower - RCA Solid Radwaste	338	15 494	0 36	2 49		467	-	9 480	62 2,264	62 2,264	-	-	206 2,387	1,380	-	-	-	8,364 185,221	206 10,820	-
	Structures & Buildings	-	78	2	5	60	29		37	2,204	210	-	-	357	85	-		-	19,933	1,128	-
	Wells & Domestic Water	-	10	-	-	-	-	-	1	11	-	-	11	-	-	-	-	-	-	144	-
	Wells & Domestic Water - RCA	1150	52	1	3	57	- 0.055	-	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	-
	nination of Site Buildings	* 000	2.000	150	*10	0.044	1 101		1001	00.040	22.040			40.055	5.014				0.015.050	110 *10	
2b.1.3.1 2b.1.3.2		5,202 106	2,903 6	178 0	516 3	8,044	1,181 15		4,924 59	22,948 189	22,948 189	-	-	48,077	7,014 145	-		-	2,317,670 6,840	112,518 1,600	-
2b.1.3.3		29	28	1	3	20	14		29	123	123	-	-	118		-	-	-	10,759	789	-
2b.1.3.4		17	4	0	2		11		12	46	46	-	-	-	103	-	-	-	4,860	286	-
2b.1.3.5 2b.1.3.6		58 372	24 269	2	8 23	5 225	45 82		48 312	191 1,289	191 1,289	-	-	31 1,343		-	-	-	21,708 87,045	1,127 8,860	-
2b.1.3.6 2b.1.3.7	Offgas Storage & Compressor	41	17	1	23 6	4	33		34	1,289	1,269	-	-	1,545		-	-	-	15,948	0,000 785	-
2b.1.3.8	Radwaste	121	61	3	17	29	96		107	435	435	-	-	172		-	-	-	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	-
	Recombiner Turbine	27 705	25 353	$\frac{1}{21}$	5 104	33 215	24 564		32 632	148 2,594	148 2,594	-	-	199 1,283		-	-	-	18,405 303,150	695 14,443	-
	Turbine Turbine Building Addition	705 58	21	1	104	215	45		47	2,594	2,594	-	-	1,265	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 2b.1.5	Prepare/submit License Termination Plan Receive NRC approval of termination plan	-	-	-	-	÷	-	526	79	605 a	605	-	-	-	-	-	-	-	-	÷	4,096
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 2b.2.3	Excavation of Underground Services Security Modifications	-	1,972	-	-	-	-	376 8,696	550 1,304	2,898 10,000	2,898 10,000	-	-	-	-	-	-	-	-	12,493	-
2b.2.5 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	-
			1,012		02	1,211		0,012	2,002	11,122	1 1, 122			11,100					201,000	12,020	
Period 2b 2b.3.1	o Collateral Costs Process decommissioning water waste	198	_	135	240	_	546	_	285	1,404	1,404				1,253				75,186	244	_
2b.3.2	Process decommissioning water 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 Retention and Severance	-	-	-	-	-	-	117,254	17,588	134,843	7,244	134,843	-	-	-	-	-	-	-	-	-
2b.3.5 2b.3	Subtotal Period 2b Collateral Costs	199	364	178	378	-	865	6,299 $123,554$	945 18,978	7,244 $144,516$	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 2b.4.3	Insurance Property taxes	-	-	-	-	-	-	742 2,703	74 270	816 2,974	816 2,974	-	-	-	-	-	-	-	-	-	-
2b.4.3 2b.4.4	Health physics supplies	-	2,376	-	-	-	-	2,703	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 2b.4.8	Plant energy budget NRC Fees	-	-	-	-	-	-	1,437 623	216 62	1,653 685	1,653 685	=	-	-	-	-	-	-	-	-	-
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	258	1,024	-	-	-	-	-	-	-	-	-
2b.4.12 2b.4.13	Liquid Radwaste Processing Equipment/Services ISFSI Operating Costs	-	-		-	-	-	224 118	34 18	258 136	258	136	-	-	-	-	-	-	-	-	-
2b.4.14	Railroad Track Maintenance	- -	-	-	-	-	-	458	69	527	527	-	-	-	-	-	-	-	-	-	-

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

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Class A Cu. Feet	Class B	Volumes Class C Cu. Feet	GTCC Cu. Feet	Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
D. J. 101	D. C. I. D I. of Costs (cost) and																		·		
	Period-Dependent Costs (continued) 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
	DOC Staff Cost	-	-	-	-	-	-	14,772	2,216	16,988	16,988	-	-	-	-	-	-	-	-	-	160,160
	Utility Staff Cost Subtotal Period 2b Period-Dependent Costs	1,440	5,087	101	52	-	419	19,442 63,540	2,916 10,661	22,358 81,298	22,358 76,844	4,455	-	-	5,084	-	-	-	101,679	166	297,283 694,392
	TOTAL PERIOD 2b COST	9,591	21,850	861	2,046	21 602			43,923		163,488	139,297	11	124 020		-		_		309,941	698,488
		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
	2d - Decontamination Following Wet Fuel Storage																				
	Direct Decommissioning Activities Remove spent fuel racks	654	58	103	149	-	2,572	-	1,017	4,553	4,553	-	-	-	7,653	-	-	-	486,170	906	-
	of Plant Systems				2	- -				05				100					4401		
	Cranes/Heavy Loads/Rigging - RCA Electrical - Contaminated Fuel Pool	-	3 47	0	1 2	17 40	- 3	-	4 19	25 112	25 112	-	-	103 240	- 9	-	-	-	4,184 10,334	48 665	-
	Electrical - Contaminated Fuel Fool 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	-
	Fuel Pool Cooling & Cleanup	246	428	34	37	197	455	-	382	1,781	1,781	-	-	1,179	1,341	-	-	-	133,939	8,380	-
	Fuel Pool Cooling & Cleanup - Insulated HVAC Ductwork - Fuel Pool Area	27	41 34	3	3	11 50	40 4	-	36 17	161 108	161 108	-	-	67 296	117 11	-	-	-	10,220 12,733	848 457	-
	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	ē	-	4,894	1,479	-	-	-	293,606	15,385	-
	ination of Site Buildings	0.10	0.500	150	010	000	10.010		0.000	10.050	10.0*0			1.000	20.200				0.500.400	45 500	
	Reactor (Post Fuel) Totals	946 946	2,599 2,599	172 172	913 913	329 329	10,216 10,216	-	3,880 3,880	19,056 19,056	19,056 19,056	-	-	1,969 1,969	62,698 62,698	-	-	-	2,732,406 2,732,406	45,703 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	-
Pariod 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
	Collateral Costs																				
2d.3.1 2d.3.2	Process decommissioning water waste Process decommissioning chemical flush waste	79	-	54 26	96 84	-	220 193	-	114 64	563 366	563 366	-	-	-	504 249	-	-	-	30,239 26,553	98 47	-
2d.3.2 2d.3.3	Small tool allowance	-	91	- 26	- 04	-	195	-	14	105	105	-	-	-	249	-	-	-	26,888	41	-
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-Dependent Costs	244							27	00*	00=										
2d.4.1 2d.4.2	Decon supplies Insurance	244	-	-	-	-	-	530	61 53	305 583	305 583	-	-	-	-	-	-	-	-	-	-
2d.4.3	Property taxes	-	_	_	-	-	_	1,664	166	1,830	1,830	-	_	-	-	-	_	-	_	-	-
2d.4.4	Health physics supplies	-	806	-	-	-	-	-	202	1,008	1,008	-	-	-	-	-	-	-	-	-	-
	Heavy equipment rental	-	1,936	-	-	-	-	-	290	2,227	2,227	-	-	-	-	-	-	-	-	-	-
2d.4.6 2d.4.7	Disposal of DAW generated Plant energy budget	-	-	40	21	-	167	547	49 82	277 630	277 630	-	-	-	2,030	-	-	-	40,600	66	-
	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 2d.4.12	Liquid Radwaste Processing Equipment/Services ISFSI Operating Costs	-	-	-	-	-	-	320 84	48 13	368 97	368	97	-	-	-	-	-	-	-	-	-
2d.4.12 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
	DOC Staff Cost Utility Staff Cost	-	-	-	-	-	-	7,311 10,052	1,097 1,508	8,408 11,560	8,408 10,670	890	-	-	-	-	-	-	-	-	78,356 149,660
	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
	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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Table F

Monticello Nuclear Generating Plant

DECON Decommissioning Cost Estimate with 200 Years of Spent Fuel Storage

(Thousands of 2020 Dollars)

							(Tl	nousands	of 2020 Dollar	rs)											
_						Off-Site	LLRW				MDC	Count Frank	C:+-	D		Di.al	Volumes		Burial /		Utility and
Activit	v	Decon	Removal	Packaging	Transport	Processing		Other	Total	Total	NRC Lic. Term.	Spent Fuel Management	Site Restoration	Processed Volume	Class A	Class B	Class C	GTCC	Processed	Craft	Contractor
Index		Cost	Cost	Costs	Costs	Costs	Costs	Costs	Contingency	Costs	Costs	Costs	Costs	Cu. Feet			Cu. Feet			Manhours	Manhours
PERIO	2 f - License Termination																				
Period 2	f Direct Decommissioning Activities																				
2f.1.1	ORISE confirmatory survey	-	-	-	-	-	-	166	50	216	216	-	-	-	-	-	-	-	-	-	-
2f.1.2 2f.1	Terminate license Subtotal Period 2f Activity Costs	-	-	-	-	-	-	166	50	a 216	216	-	-		-	-	-			-	-
D. 2. 10	f 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 2	f Collateral Costs																				
2f.3.1	DOC staff relocation expenses	-	-	-	-	-	-	1,264	190	1,454	1,454		-	-	-	-	-	-	-	-	-
2f.3.2 2f.3	Spent Fuel Capital and Transfer Subtotal Period 2f Collateral Costs	-	-	-	-	-	-	47 1,311	7 197	54 1,508		54 54	-	-	-	-	-	-	-	-	-
								,		,	,										
Period 2: 2f.4.1	f Period-Dependent Costs Insurance	-	_	-	_	-	-	530	53	583	583	-	-	_	-	-	_	-	-	-	-
2f.4.2	Property taxes	-	-	-	-	-	-	1,470		1,617	1,617		-	-	-	-	-	-	-	-	-
2f.4.3 2f.4.4	Health physics supplies Disposal of DAW generated	-	708	- 7	4	-	29	-	177 9	884 48	884 48		-	-	- 355	-	-	-	7,097	12	-
2f.4.5	Plant energy budget	- -	-	- '	-	-	-	274	41	315	315		-	-	-	-	-	-	- 1,031	- 12	-
2f.4.6	NRC Fees	-	-	-	-	-	-	426	43	468	468		-	-	-	-	-	-	-	-	-
2f.4.7 2f.4.8	Emergency Planning Fees Fixed Overhead	-	-	-	-	-	-	112 1,597	11 239	123 1,836	1,836	123	-	-	-	-	-	-	-	-	-
2f.4.9	ISFSI Operating Costs	-	-	-	-	-	-	84	13	97	-	97	-	-	-	-	-	-	-	-	-
2f.4.10 2f.4.11	Railroad Track Maintenance Security Staff Cost	=	-	-	-	Ē	-	94 10,999	14 1,650	108 12,649	108 8,918		-	-	-	-	-	-	-	-	162,981
2f.4.11 2f.4.12	DOC Staff Cost	-	-	-	-	-	-	5,393	1,650	6,201	6,201	3,132 -	-	-	-	-	-	-	-	-	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			29	,	4,070	31,557	26,718		-	-	355	-	-	-	7,097	12	300,888
2f.0	TOTAL PERIOD 2f COST	10.701	708	7 20 470	_		29	35,137	6,392	42,276	37,382		-	-	355	1.501	-	-	7,097	95,059	307,128
	O 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
	O 3b - Site Restoration																				
	b Direct Decommissioning Activities																				
3b.1.1.1	on of Remaining Site Buildings Reactor Building	-	1,971	_	-	_	_	-	296	2,267	_	-	2,267	_	-	_	_	_	<u>-</u>	13,911	_
3b.1.1.2	Condensate Tanks Foundation	-	10	-	-	-	-	-	1	11	-	-	11	-	-	-	-	-	-	50	-
3b.1.1.3 3b.1.1.4		-	4 19	-	-	-	-	-	1 3	5 22	-	-	5 22		-	-	-	-	-	25 97	-
3b.1.1.5		-	16		-	-	-	-	2	19	-	-	19	-	-	-	-	-	-	177	-
3b.1.1.6 3b.1.1.7		-	2 83		-	Ē	-	-	0	2 95	-	-	2 95	-	-	-	-	-	-	19 662	-
3b.1.1.8		-	4		-	-	-	-	12 1	4		-	4		-	-	-	-	-	42	-
3b.1.1.9		-	1,410		-	-	-	-	212	1,622	-	-	1,622	-	-	-	-	-	-	13,042	-
	Offgas Stack Offgas Storage & Compressor	-	108 39	-	-	-	-	-	16 6	124 45		-	124 45		-	-		-	-	544 199	-
	Radwaste	-	228	-	-	-	-	-	34	262	-	-	262	-	-	-	-	-	-	1,220	-
	Recombiner	-	128		-	-	-	-	19	147	-	-	147	-	-	-	-	-	-	713	-
	Security Barrier Structures Greater than 3' Below Grade	-	186 2,461	-	-	-	-	-	28 369	214 2,830		-	214 2,830	-	-	-	-	-	-	933 12,649	-
3b.1.1.16	Tank Farm	-	4	-	-	-	-	-	1	5	-	-	5	-	-	-	-	-	-	21	-
	Turbine Turbine Building Addition	-	1,259 55	-	•	-	-	-	189 8	1,448 63	-	-	1,448 63	-	-	-		-	•	13,036 618	-
	Turbine Pedestal	-	182	-	-	-	-	-	27	209	-	-	209	-	-	-	-	-		926	-
3b.1.1	Totals	-	8,169	-	-	-	-	-	1,225	9,394	-	-	9,394	-	-	-	-	-	-	58,885	-
	seout Activities																				
3b.1.2 3b.1.3	Grade & landscape site Final report to NRC	÷	896	-	-	-	-	200	134 30	1,031 231	231	÷	1,031	-	-	-	-	-	-	1,841	1,560
3b.1.3	Subtotal Period 3b Activity Costs	-	9,065	-	-	-	-	200		10,655	231	-	10,425	-	-	-	-	-		60,726	1,560

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Table F

Monticello Nuclear Generating Plant

DECON Decommissioning Cost Estimate with 200 Years of Spent Fuel Storage

(Thousands of 2020 Dollars)

							(TI	nousands	of 2020 Dollar	rs)											
						Off-Site	LLRW				NRC	Spent Fuel	Site	Processed		Burial	Volumes		Burial /		Utility and
Activity	,	Decon	Removal	Packaging	Transport	Processing	Disposal	Other	Total	Total	Lic. Term.	Management	Restoration	Volume	Class A	Class B	Class C	GTCC	Processed	Craft	Contractor
Index	Activity Description	Cost	Cost	Costs	Costs	Costs	Costs	Costs	Contingency	Costs	Costs	Costs	Costs	Cu. Feet	Cu. Feet	Cu. Feet	Cu. Feet	Cu. Feet	Wt., Lbs.	Manhours	Manhours
Poriod 3	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 3b.2.6	Discharge Structure Cofferdam Disposition of Original MPC Canisters	=	442 55		954	=	5,641	-	66 1,709	508 8,544	8,544	=	508	-	21,097		-	-	2,505,700	3,552 337	-
3b.2.6	Subtotal Period 3b Additional Costs	-	9,737				5,641	1,183	3,339	21,039	8,544		12,495	-	21,097	-	-	-	2,505,700	11,907	-
D . 10																					
Period 31 3b.3.1	o Collateral Costs Small tool allowance		111						17	127	_		127								
3b.3.1	Spent Fuel Capital and Transfer	-	- 111	-	-	-	-	108	16	125	-	125	121	-	-	-	-		-	-	-
3b.3	Subtotal Period 3b Collateral Costs	-	111	-	-	-	-	108	33	252	-	125	127	-	-	-	-	-	-	-	-
Poriod 3	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 3b.4.6	NRC ISFSI Fees Emergency Planning Fees	-	-	-	-	-	-	356 257	36 26	391 283	-	391 283	-	-	-	-	-	-	-	-	-
3b.4.6 3b.4.7	Fixed Overhead	-	-	-	-	-	-	1,122	168	1,290	429		-	-	-	-	-		-	-	-
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 3b.4	Utility Staff Cost Subtotal Period 3b Period-Dependent Costs	-	5,842	-	-	-	-	7,148 $50,742$	1,072 8,269	8,220 64,854	2,020	2,129 16,007	6,091 46,826	-	-	-	-	-	-	-	101,904 599,702
	•																				
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
PERIOI	3c - Fuel Storage Operations/Shipping																				
Period 3	Direct Decommissioning Activities																				
Period 3	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 3	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 3c.4.6	Emergency Planning Fees Fixed Overhead	-	-	-	-	-	-	28,639 41,607	2,864 6,241	31,503 47,848	-	31,503 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
PERIOI	3d - GTCC shipping																				
Period 3	Direct Decommissioning Activities																				
	Steam Supply System Removal																				
3d.1.1.1		-	-	1,083		-	4,313		918	6,314	6,314	-	-	-	-	-	-	1,160	225,765	-	-
3d.1.1 3d.1	Totals Subtotal Period 3d Activity Costs	-	-	1,083 1,083		-	4,313 4,313		918 918	6,314 6,314	6,314 6,314		-	-	-	-	-	1,160 1,160	225,765 $225,765$	-	-
		-	-	1,000		-	4,010	-	J10	0,514	0,514	-	•	-	-	-	-	1,100	220,100	-	-
Period 3d 3d.3.1	l Collateral Costs Spent Fuel Capital and Transfer	_	_	_	_		_	28	4	32	_	32	_	_	_	_	_	_	_	_	_
3d.3.1	Subtotal Period 3d Collateral Costs	-		-	-	-	-	28	4	32	-	32	-	-	-			-		-	-
									•			02									

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Table F

Monticello Nuclear Generating Plant

DECON Decommissioning Cost Estimate with 200 Years of Spent Fuel Storage

(Thousands of 2020 Dollars)

							(11	iousunus (oi 2020 Donai												
Activi		Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Class A	Burial Class B	Volumes Class C Cu. Feet	GTCC Cu. Feet	Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
	d Period-Dependent Costs																				
3d.4.1 3d.4.2	Insurance Property taxes	-	-	-	-	-	-	27 35	3	30 38	30 38	-	-	-	-	-	-	-	-	-	-
3d.4.2	Plant energy budget	-	-	-	-	-		- 59	- -	- 30		-	-		-	-		-	-	-	-
3d.4.4	NRC ISFSI Fees	-	-	-	-	-	-	8	1	9	-	9	-	-	-	-	-	-	-	-	-
3d.4.5 3d.4.6	Emergency Planning Fees Fixed Overhead	-	-	-	-	-	-	6 8	1	6 10	10	6	-	-	-	-	-	-	-	-	-
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 3d.4	Utility Staff Cost Subtotal Period 3d Period-Dependent Costs	-	-	-	-	-	-	39 293	6 40	45 333	45 318	15	-	-	-	-	-	-	-	-	539 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
PERIO	D 3e - ISFSI Decontamination																				
Period 3	Be Direct Decommissioning Activities																				
	Be Additional Costs																				
3e.2.1	License Termination ISFSI Subtotal Period 3e Additional Costs	-	0	3		-	283 283		602	3,008 3,008	3,008 3,008	Ē	-	-	848	-	-	-	131,507	10,502	2,225 $2,225$
3e.2	Subtotal Period 3e Additional Costs	-	Ü	3	33	-	283	2,086	602	3,008	3,008	-	-	-	848	-	-	-	131,507	10,502	2,225
	Be Period-Dependent Costs																				
3e.4.1 3e.4.2	Insurance Property taxes	-	-	-	-	-	-	118 249	30 62	148 312	148 312	-	-	-	-	-	-	-	-	-	-
3e.4.2	Plant energy budget	-		-	-	-		12	3	15	15	-	-	-	-	-		-		-	-
3e.4.4	Fixed Overhead	-	-	-	-	-	-	71	18	89	89	=	-	-	-	-	-	-	-	-	-
3e.4.5 3e.4.6	Railroad Track Maintenance Security Staff Cost	-	-	-	-	-	-	41 352	10 88	52 440	52 440	-	-		-	-	-	-	-	-	4.999
3e.4.7	Utility Staff Cost	-		-	-	-		261	65	326	326	-	-	-	-	-		-		-	3,792
3e.4	Subtotal Period 3e Period-Dependent Costs	-	-	-	-	Ē	-	1,105	276	1,381	1,381	-	Ē	-	-	-	-	-	-	-	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
PERIO	D 3f - ISFSI Site Restoration																				
Period 3	of Direct Decommissioning Activities																				
	of Additional Costs		1 504					050	979	0.000			2.000							T 200	100
3f.2.1 3f.2	Demolition and Site Restoration of ISFSI Subtotal Period 3f Additional Costs	-	1,564 1,564	-	-	-	-	$\frac{256}{256}$	273 273	2,093 2,093	-	-	2,093 2,093	-	-	-	-	-	-	7,309 7,309	160 160
Period 3	of Collateral Costs																				
3f.3.1	Small tool allowance	-	11	-	-	-	-	-	2	12	-	-	12	-	-	-	-	-	-	-	-
3f.3	Subtotal Period 3f Collateral Costs	-	11	-	-	-	-	-	2	12	-	-	12	-	-	-	-	-	-	-	-
	of Period-Dependent Costs							100	10	100			100								
3f.4.2 3f.4.3	Property taxes Heavy equipment rental	-	117	-	-	-	-	126	13 17	138 134	-	-	138 134	-	-	-		-	-	-	-
3f.4.4	Plant energy budget	-	-	-	-	-	-	6	1	7	-	-	7	-	-	-	-	-	-	-	-
3f.4.5 3f.4.6	Fixed Overhead Railroad Track Maintenance	-	-	-	-	-	-	36 21	5 3	41 24	-	-	41 24	-	-	-	-	-	-	-	-
3f.4.6 3f.4.7	Security Staff Cost	-	-	-	-	-	-	21 177	3 27	24 204	-	-	24 204	-	-	-	-	-	-	-	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
PERIO	D 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

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Monticello Nuclear Generating Plant Decommissioning Cost Analysis

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

NRC Spent Fuel Site
Total Lic. Term. Management Restoration

Volume Class A
Cu. Feet Cu. Feet

Burial Volumes

Class A Class B Class C GTCC

Cu. Feet Cu. Feet Cu. Feet Cu. Feet

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs
TOTAL COST TO	O DECOMMISSION WITH 15.45% CONTINGE	NCY:			\$4,698,509	thousands of	2020 dollars	
TOTAL NRC LIC	CENSE TERMINATION COST IS 16.52% OR:				\$776,228	thousands of	2020 dollars	
SPENT FUEL M	IANAGEMENT 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-LE	EVEL RADIOACTIVE WASTE VOLUME BURI	ED (EXCLUDING	G GTCC):		200,155	Cubic Feet		
TOTAL GREATI	ER THAN CLASS C RADWASTE VOLUME GE	NERATED:			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

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Monticello Nuclear Generating Plant Decommissioning Cost Analysis Document X01-1775-002, Rev. 0 Appendix G, Page 1 of 12

APPENDIX G

DETAILED COST ANALYSIS

SCENARIO 5: SAFSTOR with 42 Year DFS

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

							(11)	nousanas	of 2020 Dollar	rs)											
						Off-Site	LLRW				NRC	Spent Fuel	Site	Processed			Volumes		Burial /		Utility and
Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Processing Costs	Disposal Costs	Other Costs	Total Contingency	Total Costs	Lic. Term. Costs	Management Costs	Restoration Costs	Volume Cu. Feet	Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet	Processed Wt., Lbs.	Craft Manhours	Contractor Manhours
PERIOD	1a - Shutdown through Transition																				
Period 1a	Direct Decommissioning Activities																				
	SAFSTOR site characterization survey	-	-	-	-	-	-	415	124	539	539	-	-	-	-	-	-	-	-	-	-
	Prepare preliminary decommissioning cost Notification of Cessation of Operations	-	-	-	-	-	-	167	25	192 a	192	-	-	-	-	-	-	-	-	-	1,300
1a.1.4	Remove fuel & source material Notification of Permanent Defueling									n/a											
1a.1.6	Deactivate plant systems & process waste									a a											
	Prepare and submit PSDAR Review plant dwgs & specs.	-	-	-	-	-	-	257 167	39 25	296 192	296 192	-	-	-	-	-	-		-	-	2,000 1,300
1a.1.9	Perform detailed rad survey									a											
	Estimate by-product inventory End product description	-	-	-	-	-	-	129 129	19 19	148 148	148 148		-	-	-	-	-	-	-	-	1,000 1,000
	Detailed by-product inventory Define major work sequence	-	-	-	-	-	-	193 129	29 19	222 148	222 148		-	-	-	-	-	-	-	-	1,500 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
	pecifications 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 1a.1.16.4	Plant structures and buildings Waste management	-	-	-	-	-	-	401 257	60 39	461 296	461 296	-	-	-	-	-	-	-	-	-	3,120 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
	Vork Procedures 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
	Procure vacuum drying system Drain/de-energize non-cont. systems	-	-	-	-	-	-	13	2	15 a	15	-	-	-	-	-	-	-	-	-	100
1a.1.20	Drain & dry NSSS									a											
	Drain/de-energize contaminated systems Decon/secure contaminated systems									a a											
	Subtotal Period 1a Activity Costs	-	-	-	-	-	-	5,027	816	5,844	5,844	-	-	-	-	-	-	-	-	-	35,890
	Collateral Costs																				
	Spent Fuel Capital and Transfer Retention and Severance	-	-	-	-	-	-	1,323 9,892	198 1,484	1,522 11,376	11,376	1,522	-	-	-	-	-	-	-	-	-
	Subtotal Period 1a Collateral Costs	-	-	-	-	-	-	11,215	1,682	12,897	11,376	1,522	-	-	-	-	-	-	-	-	-
	Period-Dependent Costs							0.05													
	Insurance Property taxes	-	-	-	-	-	-	2,328 3,570	233 357	2,561 3,927	2,561 3,927	-	-	-	-	-	-	-	-	-	-
1a.4.3	Health physics supplies	-	614		-	-	-	-	153	767	767	-	-	-	-	-	-	-	-	-	-
	Heavy equipment rental	-	753		-	-	-	-	113	866	866	-	-	-	-	-	-	-	-	-	-
	Disposal of DAW generated Plant energy budget	-	-	12	6	-	50	1,817	15 272	83 2,089	83 2,089	-	-	-	610	-	-	-	12,190	20	-
	NRC Fees	-	-	-	-	-	-	892	89	981	981	-	-	-	-	-	-		-	-	-
	Emergency Planning Fees	-	-	-	-	-	-	3,428	343	3,770	-	3,770	-		-	-	-	-	-	-	-
1a.4.9	Fixed Overhead	-	-	-	-	-	-	2,616	392	3,009	3,009	-	-	-	-	-	-	-	-	-	-
	Spent Fuel Pool O&M	-	-	-	-	-	-	845	127	971	-	971	-	-	-	-	-	-	-	-	-
	ISFSI Operating Costs Railroad Track Maintenance	-	-	-	-	-	-	112 125	17 19	129 144	144	129	-	-	-	-	-	-	-	-	-
	Security Staff Cost	-	-	-	-	-	-	16,372	2,456	18,827	18,827	-	-	-	-	-		-	-	-	245,440
	Utility Staff Cost	-	-	-	-	-	-	27,285	4,093	31,378	31,378	-	-	-	-	-	-	-	-	-	422,240
	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	
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

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Table G

Monticello Nuclear Generating Plant

SAFSTOR Decommissioning Cost Estimate with DOE Pickup of Industry Fuel Starting in 2035

(Thousands of 2020 Dollars)

							(Tl	nousands	of 2020 Dollar	·s)											
						Off-Site	LLRW				NRC	Spent Fuel	Site	Processed		Burial	Volumes		Burial /		Utility and
Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs		Disposal Costs	Other Costs	Total Contingency	Total Costs	Lic. Term. Costs	Management Costs	Restoration Costs	Volume Cu. Feet	Class A Cu. Feet	Class B	Class C Cu. Feet	GTCC Cu. Feet	Processed Wt., Lbs.	Craft Manhours	Contractor Manhours
	SAFSTOR Limited DECON Activities																		,		(
	t Decommissioning Activities																				
	on of Site Buildings																				
1b.1.1.1 React		5,155	_	-	-	_	_	_	2,577	7,732	7,732	-	-	_	-	_	-		-	70,157	_
1b.1.1.2 Admi	in	106	-	-	-	-	-	-	53	159	159	-	-	-	-	-	-	_	-	1,526	
	I Room	28	-	-	-	-	-	-	14	42	42	-	-	-	-	-	-	-	-	391	-
1b.1.1.4 Hot 8	Shop	16	-	-	-	-	-	-	8	24	24	-	-	-	-	-	-	-	-	234	
1b.1.1.5 LLRV 1b.1.1.6 Offga	W Storage & Shipping as Stack	54 362	-	-	-	-	-	-	27 181	82 542	82 542	-	-	-	-	-	-	-	-	788 5,112	
	as Stack as Storage & Compressor	38	-	-	-	-	-	-	19	57	57	-	-	-	-	-	-	-	-	550	
1b.1.1.8 Radw		114	-	-	-	-	-	-	57	171	171	-	-	-	-	-	-	_	-	1,647	
	waste Material Storage Warehouse	60	-	-	-	-	-	-	30	90	90	-	-	-	-	-	-	_	-	864	-
1b.1.1.10 Recor		25	-	-	-	-	-	-	13	38	38	-	-	-	-	-	-	-	-	363	
1b.1.1.11 Turb		664	-	-	-	-	-	-	332	996	996	-	-	-	-	-	-	-	-	9,600	
	oine Building Addition	55	-	-	-	-	-	-	27	82	82	-	-	-	-	-	-	-	-	793	
1b.1.1.13 React 1b.1.1 Total		924 7,601	-	-	-	-	-	-	462 3,800	1,386 11,401	1,386 11,401	-	=	-	-	-	-	-	-	12,653 104,679	
		7,601	-	-	-	-	-	-	3,800	11,401	11,401	-	-	-	-	-	-	-	-		
1b.1 Subto	total Period 1b Activity Costs	7,601	-	-	-	-	-	-	3,800	11,401	11,401	-	-	-	-	-	-	-	-	104,679	-
Period 1b Additi	tional Costs																				
	nt Fuel Pool Isolation	-	-	-	-	-	-	12,675	1,901	14,576	14,576	-	-	-	-	-	-	-	-	-	-
1b.2 Subto	total Period 1b Additional Costs	-	-	-	-	-	-	12,675	1,901	14,576	14,576	-	-	-	-	-	-	-	-	-	-
Period 1b Collat																					
	on equipment	1,055	-	146	3 259	-	589	-	158	1,213 1,523	1,213	-	-	-	1.050	-	-	-	01.107	- 004	-
	ess decommissioning water waste ll tool allowance	220	130		208	, -	989	-	310 20	1,523	1,523 150	-	-	-	1,352	-	-	-	81,127	264	-
	nt Fuel Capital and Transfer	-	-	-	-	-	-	196	29	225	-	225	-	-	-	-	-		-	-	-
	ention and Severance	-	-	-	-	_	-	3,601	540	4,141	4,141	-	_	-	-	-	-	_	-	-	-
	total Period 1b Collateral Costs	1,275	130	146	3 259	-	589		1,058	7,252	7,027	225	-	-	1,352	-	-	-	81,127	264	-
	d-Dependent Costs																				
	on supplies	1,562	-	-	-	-	-	-	391	1,953	1,953	-	-	-	-	-	-	-	-	-	-
	rance	-	-	-	-	-	-	580	58	638	638	-	-	-	-	-	-	-	-	-	-
	perty taxes lth physics supplies	-	750	-	-	-	-	890	89 187	979 937	979 937	-	-	-	-	-	-	-	-	-	-
	vy equipment rental	-	188		-	-	-	-	28	216	216	-	-	-	-	-	-	-	-	-	-
	osal of DAW generated	_	-	12	2 6	-	48	-	14	80	80	_	_	_	588	-	-	_	11,769	19	_
	at energy budget	-	-	-	- '	-	-	453	68	521	521	-	-	-	-	-	-	-	-	- 1	-
	C Fees	-	-	-	-	-	-	161	16	177	177	-	-	-	-	-	-	-	-	-	-
	ergency Planning Fees	-	-	-	-	-	-	708	71	779	-	779	-	-	-	-	-	-	-	-	-
	d Overhead nt Fuel Pool O&M	-	-	-	-	-	-	652 211	98 32	750 242	750	242	-	-	-	-	-	-	-	-	-
	SI Operating Costs	-	-	-	-	-	-	28	32 4	32	-	32		-	-	-	-	-	-	-	-
	road Track Maintenance		-		-	-	-	31	5	36	36	- 52	-	-	-	-	-		-	-	-
	rity Staff Cost	-	-	_	-	-	-	4,082	612	4,694	4,694	-	-	-	-	-	-	_	-	-	61,192
	ity Staff Cost	-	-	-	-	-	-	6,803	1,020	7,823	7,823	-	-	-	-	-	-	-	-	-	105,271
1b.4 Subto	total Period 1b Period-Dependent Costs	1,562	938	12	2 6	-	48	14,599	2,693	19,858	18,805	1,053	-	-	588	-	-	-	11,769	19	166,463
1b.0 TOTA	AL PERIOD 1b COST	10,438	1,068	157	7 265	-	637	31,070	9,453	53,088	51,810	1,278	-	-	1,941	-	-	-	92,896	104,962	166,463
PERIOD 1c - P	Preparations for SAFSTOR Dormancy																				
Period 1c Direct	t Decommissioning Activities																				
1c.1.1 Prepa	pare support equipment for storage	-	527	_	-	-	-	-	79	606	606	-	-	-	-	-	-	-	-	3,000	-
	all containment pressure equal. lines	-	54		-	-	-	-	8	62	62	-	-	-	-	-	-	-	-	700	
1c.1.3 Inter	rim survey prior to dormancy	-	-	-	-	-	-	733	220	953	953	-	-	-	-	-	-	-	-	12,801	-
	re building accesses pare & submit interim report	-	_	_	_	_	-	75	11	a 86	86	-	_	-	_	_	-	-	-	_	583
_	-		F01																		
	total Period 1c Activity Costs	-	581	-	-	-	-	808	318	1,707	1,707	-	-	-	-	-	-	-	-	16,501	583
Period 1c Collate 1c.3.1 Proce	teral Costs less decommissioning water waste	161		107	7 190		433		228	1.120	1.120				994				59,653	194	

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

							(11)	iousanas (of 2020 Dollar	rs)											
						Off-Site	LLRW				NRC	Spent Fuel	Site	Processed		Rurial	Volumes		Burial /		Utility and
Activit	у	Decon	Removal	Packaging	Transport		Disposal	Other	Total	Total	Lic. Term.	Management	Restoration	Volume	Class A	Class B	Class C	GTCC	Processed	Craft	Contractor
Index	Activity Description	Cost	Cost	Costs	Costs	Costs	Costs	Costs	Contingency	Costs	Costs	Costs	Costs	Cu. Feet	Cu. Feet	Cu. Feet	Cu. Feet	Cu. Feet	Wt., Lbs.	Manhours	Manhours
Dowind 1	c 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			-	-	-	-	-	-	-	-	-
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 1	c Period-Dependent Costs																				
1c.4.1	Insurance	-	-	-	-	-	-	580	58	638	638	-	-	-	-	-	-	-	-	-	-
1c.4.2	Property taxes	-		-	-	-	-	888	89	977	977	-	-	-	-	-	-	-	-	-	-
1c.4.3 1c.4.4	Health physics supplies Heavy equipment rental	-	248 188	-	-	-	-	-	62 28	310 216	310 216		-	-	-	-	-	-	-	-	-
1c.4.4	Disposal of DAW generated	-	100	3	- 2	-	13	-	4	210	210		-	-	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 1c.4.10	Fixed Overhead Spent Fuel Pool O&M	-	-	-	-	-	-	652 211	98 32	750 242	750	242	-	-	-	-	-	-	-	-	-
1c.4.10 1c.4.11	ISFSI Operating Costs	-	-	-	-	-	-	211	32 4	32		32	-	-	-	-	-	-	-	-	-
1c.4.11	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
PERIO	O 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
PERIO	O 2a - SAFSTOR Dormancy with Wet Spent Fuel Storage																				
Period 9	a 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 2a.1.5	Bituminous roof replacement Maintenance supplies	-	-	-	-	-	-	155 349	23 87	178 437	178 437		-	-	-	-	-	-	-	-	-
2a.1.5 2a.1	Subtotal Period 2a Activity Costs		-	-	-	-	-	504	111	615			-		-	-		-	-	-	-
	·																				
	a Additional Costs							0.000	1.004	10.000	10.000										
2a.2.1 2a.2	Security Modifications Subtotal Period 2a Additional Costs	-	-	-	-	-	-	8,696 8,696	1,304 1,304	10,000 10,000	10,000 10,000		-	-	-	_			-	-	-
24.2	Subtotal Feriou Za Fluctional Costs							0,000	1,004	10,000	10,000										
	a Collateral Costs							100.01	10.005	120 220		120 220									
2a.3.1	Spent Fuel Capital and Transfer Retention and Severance	-	-	-	-	-	-	130,915 19,427	19,637 2,914	150,553 22,341	22,341	150,553	-	-	-	-	-	-	-	-	-
2a.3.2 2a.3	Subtotal Period 2a Collateral Costs	-	-	-	-	-	-	150,342	22,551	172,893	22,341		-	-	-	-	-		-	-	-
								100,012	22,001	112,000	22,011	100,000									
	a Period-Dependent Costs																				
2a.4.1 2a.4.2	Insurance	-	-	-	-	-	-	1,761 8,932	176 893	1,937 9,825	1,937 9,825	-	-	-	-	-	-	-	-	-	-
2a.4.2 2a.4.3	Property taxes Health physics supplies	-	617	-	-	-	-	6,932	154	771	9,825 771	-	-	-	-	-	-	-	-	-	-
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	- 0.100	7,821	-	-	-	-	-	-	-	-	-
2a.4.8 2a.4.9	Fixed Overhead Spent Fuel Pool O&M	-	-	-	-	-	-	5,306 2,115	796 317	6,102 2,432	6,102	2,432	-	-	-	-	-	-	-	-	-
2a.4.9 2a.4.10	ISFSI Operating Costs	-	-	-	-	-	-	2,115	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		-	-	-	-	-	-	-	-	562,523
2a.4.13	Utility Staff Cost	-	-	-	-	-	-	13,543	2,031	15,574	12,615		-	-	-	-	-	-	-	-	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

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

							(io abarrab	oi 2020 Dollai	/											
						Off-Site	LLRW				NRC	Spent Fuel	Site	Processed			Volumes		Burial /		Utility and
Activit Index		Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Processing Costs	Disposal Costs	Other Costs	Total Contingency	Total Costs	Lic. Term. Costs	Management Costs	Restoration Costs	Volume Cu. Feet	Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet	Processed Wt., Lbs.	Craft Manhours	Contractor Manhours
PERIO	D 2b - SAFSTOR Dormancy with Dry Spent Fuel Storage																				
	b Direct Decommissioning Activities																				
2b.1.1	Quarterly Inspection									a											
2b.1.2 2b.1.3	Semi-annual environmental survey Prepare reports									a a											
2b.1.3	Bituminous roof replacement	_	-	-	-	-	-	2,368	355	2,723	2,723	-	-	-	-	-	-	-	=	-	-
2b.1.5 2b.1	Maintenance supplies Subtotal Period 2b Activity Costs	-	-	-	-	-	-	5,351 7,719	1,338 1,693	6,689 9,412	6,689 9,412	-	-	-	-	-	-	-	-	-	-
	•	-	-	-	-	-	-	1,119	1,695	9,412	9,412	-	-	-	-	-	-	-	-	-	-
Period 2 2b.3.1	b Collateral Costs 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 2	b Period-Dependent Costs																				
2b.4.1	Insurance	-	-	-	-	-	-	26,968	2,697 13,679	29,664 150,471	29,664 150,471	-	-	-	-	-	-	-	-	-	-
2b.4.2 2b.4.3	Property taxes Health physics supplies	-	4,580	-	-	-	-	136,792	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 2b.4.7	NRC Fees Emergency Planning Fees	-	-	-	-	-	-	8,721 5,685	872 568	9,594 6,253	9,594	6,253	-	-	-	-	-	-	-	-	-
2b.4.8	Fixed Overhead	-	-	-	-	-	-	8,259	1,239	9,498	9,498	-	-	-	-	-	-	-	-	-	-
2b.4.9	ISFSI Operating Costs Railroad Track Maintenance	-	-	-	-	-	-	4,292 4,794	644	4,935	5,514	4,935	-	-	-	-	-	-	-	-	-
2b.4.10 2b.4.11	Security Staff Cost	-	-	-	-	-	-	212,676	719 31,901	5,514 244,577	55,030	189,547	-	-	-	-	-	-	-	-	2,871,084
2b.4.12	Utility Staff Cost	-	-			-		86,757	13,014	99,770	54,475	45,296	-	-		-	-	-	<u> </u>	-	1,276,037
2b.4	Subtotal Period 2b Period-Dependent Costs	-	4,580			-	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
PERIO	D 2c - SAFSTOR Dormancy without Spent Fuel Storage																				
	c Direct Decommissioning Activities																				
2c.1.1 2c.1.2	Quarterly Inspection Semi-annual environmental survey									a a											
2c.1.3	Prepare reports									a											
2c.1.4	Bituminous roof replacement	-	-	-	-	-	-	759	114 429	872	872	-	-	-	-	-	-	-	-	-	-
2c.1.5 2c.1	Maintenance supplies Subtotal Period 2c Activity Costs	-	-	-	-	-	-	1,714 2,473	542	$2,143 \\ 3,015$	2,143 3,015	-	-	-	-	-	-	-	-	-	-
Period 2	c Period-Dependent Costs																				
2c.4.1	Insurance	-	-	-	-	-	-	4,931	493	5,424	5,424	-	-	-	-	-	-	-	-	-	-
2c.4.2 2c.4.3	Property taxes Health physics supplies	-	1,380	-	-	-	-	37,270	3,727 345	40,997 1,725	40,997 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 2c.4.7	NRC Fees Fixed Overhead	-	-	-	-	-	-	2,520 2,646	252 397	2,772 3,042	2,772 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 2c.4	Utility Staff Cost Subtotal Period 2c Period-Dependent Costs	-	1,380	25	13	-	103	14,429 95,252	2,164 12,427	16,593 109,199	16,593 109,199	-	-	-	1,250	-	-	-	25,004	41	223,536 606,740
2c.0	TOTAL PERIOD 2c COST	<u>-</u>	1.380	25	13	-	103	97,724	12,969	112,214	112,214	-	-	_	1,250	-	_	_	25.004	41	606,740
	D 2 TOTALS		6,577	120			500	887,899		1,018,809	548,008	470,802			6,064				121,281	198	5,522,123
	D 3a - Reactivate Site Following SAFSTOR Dormancy	-	0,977	120	02	-	500	001,099	120,002	1,010,000	540,006	410,002	-	-	0,004	-	-	-	121,201	156	0,022,120
Period 3 3a.1.1	a Direct Decommissioning Activities 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							129	10	a 149	140										1.000
3a.1.4 3a.1.5	End product description Detailed by-product inventory	-	-	-	-	-	-	129 167	19 25	148 192	148 192	-	-	-	-	-		-	-	-	1,000 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

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

							`		01 2020 Donai	/											
						Off-Site	LLRW				NRC	Spent Fuel	Site	Processed		Burial '	Volumes		Burial /		Utility and
Activity		Decon	Removal				Disposal	Other	Total	Total	Lic. Term.	Management	Restoration	Volume	Class A	Class B		GTCC		Craft	Contractor
Index	Activity Description	Cost	Cost	Costs	Costs	Costs	Costs	Costs	Contingency	Costs	Costs	Costs	Costs	Cu. Feet	Cu. Feet	Cu. Feet	Cu. Feet	Cu. Feet	Wt., Lbs.	Manhours	Manhours
Davied to Divest I	Decommissioning Activities (continued)																				
3a.1.8 Prepar	re/submit Defueled Technical Specifications	_	_	_	_	_	_	964	145	1,108	1,108	_	_	_	_		_	_	_	_	7,500
	rm Site-Specific Cost Study	_	-	-	_	-	-	643		739	739	_	-	_	-	-	-	-	-	_	5,000
	re/submit Irradiated Fuel Management Plan	-	-	-	-	-	-	129		148	148	-	-	-	-	-	-	-	-	-	1,000
Activity Specificat	tions																				
	civate plant & temporary facilities	-	-	-	_	-	_	947	142	1,089	980	-	109	-	_	-	_	-	_	-	7,370
3a.1.11.2 Plant s		-	-	-	-	-	-	536	80	616	554	-	62	-	-	-	-	-	-	-	4,167
3a.1.11.3 Reacto		-	-	-	-	-	-	912		1,049	1,049	-	-	-	-	-	-	-	-	-	7,100
3a.1.11.4 Reacto		-	-	-	-	-	-	835		961	961	-	-	-	-	-	-	-	-	-	6,500
3a.1.11.5 Sacrific		-	-	-	-	-	-	64		74	74	-	-	-	-	-	-	-	-	-	500
3a.1.11.6 Moistu 3a.1.11.7 Reinfor	ure separators/reheaters	-	-	-	-	-	-	129 206		148 236	148 118	-	118	-	-	-	-	-	-	-	1,000 1,600
3a.1.11.8 Main T			-	-	-	-	-	268		309	309	-	110	-	-	-	-	-	-	-	2,088
3a.1.11.9 Main (_	-	-	-	-	-	268		309	309	_	-	-	-	_	_	-	-	_	2,088
	are suppression structure	-	-	-	-	-	-	257		296	296	-	-	-	-	_	-	-	-	-	2,000
3a.1.11.11 Drywel		-	-	-	-	-	-	206		236	236	-	-	-	-	-	-	-	-	-	1,600
	structures & buildings	-	-	-	-	-	-	401	60	461	231	-	231	-	-	-	-	-	-	-	3,120
3a.1.11.13 Waste 3a.1.11.14 Facility		-	-	-	-	-	-	591 116	89 17	680 133	680 67	-	67	-	-	-	-	-	-	-	4,600 900
3a.1.11 Total	ty & site closeout	-	-	-	-	-	-	5,736		6,597	6,011	-	586	-	-	-	-	-	-	-	44,633
Ja.1.11 10tal		-	-	-	-	-	-	0,100	300	0,001	0,011	-	500	-	-	-	-	-	-	-	44,000
Planning & Site F																					
	re dismantling sequence	-	-	-	-	-	-	308	46	355	355	-	-	-	-	-	-	-	-	-	2,400
	prep. & temp. svces	-	-	-	-	-	-	3,500		4,025	4,025	-	-	-	-	-	-	-	-	-	
	n water clean-up system	-	-	-	-	-	-	180		207	207	-	-	-	-	-	-	-	-	-	1,400
	ng/Cont. Cntrl Envlps/tooling/etc. re casks/liners & containers	-	-	-	-	-	-	2,400 158		2,760 182	2,760 182	-	-	-	-	-	-	-	-	-	1,230
	tal Period 3a Activity Costs	-	-	-	-	-	-	16,434		18,899	18,313	-	586	-	-	-	-	-	-	-	81,963
	·							-, -	,	-,	-,-										,,,,,,,
Period 3a Addition																					
	haracterization & RCRA Waste	-		28	29	. 14	-	5,930	1,779	7,708 80	7,708 80	-	-	43	-	-	-	-	5,253	30,500 161	10,852
	tal Period 3a Additional Costs	-	-	28				5,930		7,788	7,788	-	-	43		-	-	-	5,253		10,852
54.2	aar ronoa sa maanashar oosas			20	20			0,000	1,100	1,100	1,100			10					0,200	00,001	10,002
Period 3a Period-l																					
3a.4.1 Insura		-	-	-	-	-	-	401	40	442	442	-	-	-	-	-	-	-	-	-	-
	rty taxes h physics supplies	-	- 537		-	-	-	2,945	295 134	3,240 672	3,240 672	-	=	-	-	-	-	-	-	-	-
	r equipment rental	-	557 753		-	_	-	-	113	866	866	-	-	-	-			-	-	-	-
	sal of DAW generated	-	-	10	5	-	42		12	70	70	_	_	-	514		_		10,287	17	-
3a.4.6 Plant e	energy budget	-	-	- 1	-	-	-	1,817	272	2,089	2,089	-	-	-	-	_	_	-	-	- 1	-
3a.4.7 NRC F		-	-	-	-	-	-	335	33	368	368	-	-	-	-	-	-	-	-	-	-
	Overhead	-	-	-	-	-	-	2,616		3,009	3,009	-	-	-	-	-	-	-	-	-	-
	ad Track Maintenance ity Staff Cost	-	-	-	-	-	-	125 4,441	19 666	144 5,107	144 5,107	-	-	-	-	-	-	-	-	-	65,000
	7 Staff Cost	-	-	-	-	-	-	16,594	2,489	19,084	19,084	-	-	_	-			-	-	-	257,920
	tal Period 3a Period-Dependent Costs	-	1,290	10	5	-	42		4,467	35,089	35,089	-	-	-	514	-	-	-	10,287	17	
	L PERIOD 3a COST		1,290	38	34	1.4	40	51,638	8,720	C1 777	C1 101		586	49	E1.4				15,540	20.070	415,735
		-	1,290	30	- 54	. 14	42	91,000	6,720	61,777	61,191	-	500	43	514	-	-	-	15,540	30,678	419,739
PERIOD 3b - De	ecommissioning Preparations																				
Period 3b Direct I	Decommissioning Activities																				
Detailed Work Pro	rocedures																				
3b.1.1.1 Plant s		-	-	-	-	<u>-</u>	-	608	91	700	630	-	70	-	-	-	-	-	-	-	4,733
3b.1.1.2 Reacto	or internals	-	-	-	-	-	-	514	77	591	591	-	=	-	-	-	-	-	-	-	4,000
3b.1.1.3 Remain		-	-	-	-	-	-	174		200	50	-	150	-	-	-	-	-	-	-	1,350
3b.1.1.4 CRD h		-	-	-	-	-	-	129		148	148	-	-	-	-	-	-	-	-	-	1,000
	instrumentation val primary containment	-	-	-	-	-	-	129 257		148 296	148 296	-	-	-	-	-	-	-	-	-	1,000 2,000
3b.1.1.6 Remov 3b.1.1.7 Reacto		-	-	-	-	-	-	467	70	537	537	-	-	-	-	-	-	-	-	-	3,630
3b.1.1.8 Facility		-	-	-	-	-	-	154		177	89	-	89	_	-	-	-	-	-	-	1,200
3b.1.1.9 Sacrific	icial shield	-	-	-	-	-	-	154	23	177	177	-	-	-	-	-	-	-	-	-	1,200
3b.1.1.10 Reinfor		-	-	-	-	-	-	129		148	74	-	74	-	-	-	-	-	-	-	1,000
3b.1.1.11 Main T		-	-	-	-	-	-	267	40	307	307	-	-	-	-	-	-	-	-	-	2,080
3b.1.1.12 Main (Congensers	-	-	-	-	-	-	268	40	309	309	-	-	-	-	-	-	-	-	-	2,088

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

							(11	lousanus	oi 2020 Dollar	5)											
						Off-Site	LLRW				NRC	Spent Fuel	Site	Processed			Volumes		Burial /		Utility and
Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Processing Costs	Disposal Costs	Other Costs	Total Contingency	Total Costs	Lic. Term. Costs	Management Costs	Restoration Costs	Volume Cu. Feet	Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet	Processed Wt., Lbs.	Craft Manhours	Contractor Manhours
Detailed	Work Procedures (continued)																				
3b.1.1.13	Moisture separators & reheaters	-	-	-	-	-	-	257	39	296	296	-	-	-	-	-	-	-	-	-	2,000
	Radwaste building	-	-	-	-	-	-	351	53	403	363	-	40	-	-	-	-	-	-	-	2,730
	Reactor building Total	-	-	-	-	-	-	351 4,208	53 631	403 4,839	363 4,376	-	40 463	-	-	-	-	-	-	-	2,730 32,741
3b.1.1 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 3b.3	Pipe cutting equipment Subtotal Period 3b Collateral Costs	1,055	1,200 1,200		-	-	-	1,264	180 528	1,380 4,047	1,380 4,047		-	-	-	-	-	-	-	-	-
Dowind 9h	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 3b.4.6	Heavy equipment rental Disposal of DAW generated	-	375		- 3	-	24	-	56 7	432 40	432 40	-	-	-	290	-	-	-	5,802	9	-
3b.4.6 3b.4.7	Plant energy budget	-	-			-	24	906	136	1.042	1.042	-	-	-	290			-	5,602	9	-
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 3b.4.13	DOC Staff Cost Utility Staff Cost	-	-	-	-	-	-	5,344 8,274	802 1,241	6,146 9,516	6,146 9,516	-	-	-	-	-	-	-	-	-	58,080 128,607
3b.4.13	Subtotal Period 3b Period-Dependent Costs	39		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 S	Steam Supply System Removal																				
4a.1.1.1		23	85	27	32	185	264	-	134	750	750	-	-	676	715	-	-	-	94,867	1,594	-
4a.1.1.2	Recirculation Pumps & Motors	8	56		37			-	131	771	771	-	-	568		-	-	-	112,200	1,049	-
4a.1.1.3	CRDMs & NIs Removal	41			98		1,130	-	560	3,045	3,045	-	-	-	3,741			-	213,700	12,506	-
4a.1.1.4 4a.1.1.5	Reactor Vessel Internals Vessel & Internals GTCC Disposal	139	6,098	8,236	1,029	-	25,657 4,313	278	19,830 647	61,268 4,960	61,268 4,960	-	-	-	2,943	1,628	600	1,160	337,343 225,765	22,415	1,055
4a.1.1.6	Reactor Vessel	-	8,498	1,818	837		6,301	278	10,229	27,961	27,961	-	-	-	17,823		-	1,160	1,110,260	22,415	1,055
4a.1.1	Totals	211			2,034		37,935	557	31,530	98,755	98,755	-	-	1,244					2,094,136	59,979	2,110
Removal	of Major Equipment																				
4a.1.2 4a.1.3	Main Turbine/Generator Main Condensers	-	340 1,207		521 194		439 244	-	1,330 912	10,126 6,142	10,126 6,142	-	-	24,835 17,396	1,383 727	-	-	-	1,577,959 828,955	4,796 16,823	-
		-	1,207	900	194	3,228	244	-	912	6,142	6,142	•	-	17,596	121	-	-	-	020,999	10,625	-
	g Costs from Clean Building Demolition										004										
4a.1.4.1 4a.1.4.2	Reactor Building Radwaste	-	332 25		-	-	-	-	50 4	381 28	381 28	-	-	-	-	-	-	-	-	2,217 127	-
4a.1.4.2 4a.1.4.3	Turbine	-	25 127		-	-	_	-	19	28 146	28 146	-	-	-	-		-	_	-	1,254	-
4a.1.4	Totals	-	483		-	-	-	-	72	556	556	-	-	-	-	-	-	-	-	3,598	-
	of Plant Systems																				
	Automatic Press Relief	-	106		10		-	-	56	356	356	-	-	1,088	-	-	-	-	44,184	1,468	-
4a.1.5.2	Chemistry Sampling Insulated	-	24		2	00	-	-	12	73	73 2	-	-	207	-	-	-	-	8,422 61	356 25	-
4a.1.5.3 4a.1.5.4	Chemistry Sampling - Insulated Circulating Water - RCA	-	207		62		-	-	230	1,626	1,626	-	-	6,656	-	-	-		270,307	2,860	-
4a.1.5.5	Combustible Gas Control - Insul - RCA	=	29	0	2		-	-	13	80	80	-	-	212		-	-	-	8,617	378	-
4a.1.5.6	Combustible Gas Control - RCA	-	18		3	10		-	12	81	81	-	=	285	-	-	-	-	11,577	245	-
4a.1.5.7	Condensate & Feedwater	-	888		281		-	-	1,027	7,303	7,303	-	-	30,157		-	-	-	1,224,704	12,501	-
4a.1.5.8	Condensate & Feedwater - Insulated	-	444 494		55 44		-	-	267 250	1,757 1,590	1,757 1,590	-	-	5,855 4,735		-	-	-	237,764 192,293	6,185 6,784	-
4a.1.5.9 4a.1.5.10	Condensate Demin Condensate Storage	-	494 657		44 77			-	384	2,512	2,512	-	-	4,735 8,237	-	-	-	-	334,489	9,265	-
	Control Rod Drive	-	3		0		-	-	1	2,512	2,512	-	-	24	-	-	-	-	976	36	-

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

							(Tł	nousands	of 2020 Dollar	rs)											
						Off-Site	LLRW				NRC	Spent Fuel	Site	Processed		Rurial	Volumes		Burial /		Utility and
Activity		Decon	Removal	Packaging	Transport		Disposal	Other	Total	Total	Lic. Term.	Management	Restoration	Volume	Class A	Class B	Class C	GTCC	Processed	Craft	Contractor
Index	Activity Description	Cost	Cost	Costs	Costs	Costs	Costs	Costs	Contingency	Costs	Costs	Costs	Costs	Cu. Feet	Cu. Feet	Cu. Feet	Cu. Feet	Cu. Feet	Wt., Lbs.	Manhours	Manhours
Disposal of	f Plant Systems (continued)																				
	Control Rod Drive Hydraulic	<u>-</u>	374	5	23	408	-	-	159	968	968	-	-	2,440	-	-	-	-	99,094	5,255	-
4a.1.5.13	Core Spray	-	71	10	48			-	154	1,138	1,138	-	-	5,109		-	-	-	207,487	1,026	-
	Core Spray - Insulated	-	131	2	11			-	64	407	407	-	-	1,184		-	-	-	48,081	1,806	-
	Demin Water - Insulated - RCA	-	15	0	_	14		-	6	36	36	-	-	85		-	-	-	3,445	181	-
	Demin Water - RCA Diesel Oil - RCA	-	41 2	1	2	42	-	-	17	104	104 7	-	=	253 23		-	-	-	10,278 931	508 25	-
	Drywell Atmosphere Cooling - RCA	-	38	1	5	92	_	-	24	159	159	-	-	548		-	-	-	22,244	550	-
	EDG Emerg Service Water - Insul - RCA	_	0	0	0			_	0	1	1	-	-	2		_	-	-	84	4	-
	Electrical - Clean	-	13	- 1	-	-	-	-	2	15	-	-	15	-	-	-	-	-	-	182	-
	Emergency Service Water - Insul - RCA	-	21	0	1	23	-	-	9	55	55	-	-	137		-	-	-	5,544	281	-
	Emergency Service Water - RCA	-	2	0	0	_	=	-	1	5	5	-	-	13		-	-	-	512	22	-
	GEZIP - RCA	-	3	0	1	17	-	-	4	25	25	-	-	103		-	-	-	4,184	48	-
	Generator Physical Design - RCA H2-O2 Control Analyzing	-	5 6	0	0	5 4		-	2	12 12	12 12	-	-	31 23		-	-	-	1,250 948	67 72	-
	H2-O2 Control Analyzing - Insulated		6	0	0	-	-	-	2	12	12	-		23		-	-	-	948	72	-
	High Pressure Coolant Injection	-	60	3	12	211	-	_	49	334	334	-	-	1,262		-	-	-	51,257	850	-
	High Pressure Coolant Injection - Insula	-	198	4	21	379	-	-	110	713	713	-	-	2,266	-	-	-	-	92,018	2,734	-
	Hydrogen Cooling	-	8	-	-	-	-	-	1	10	-	-	10	-	-	-	-	-	-	118	-
	Hydrogen Cooling - RCA	-	7	0	0		-	-	3	17	17	-	-	39		-	-	-	1,600	79	-
	Hydrogen Seal Oil - RCA	-	17	0	2	32		-	9	60	60	-	-	189		-	-	-	7,669	212	-
	Hydrogen Water Chemistry - RCA Instrument & Service Air - RCA	-	24 225	0	17	23 296		-	10 103	59 644	59 644	-	-	140 1,768		-	-	-	5,672 71,810	304 2,733	-
	Main Condenser		177	4	18			-	95	613	613	-	-	1,903		-	-	-	77,301	2,443	-
	Main Steam	-	225	6	28			_	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	-
	Main Turbine - Insulated	-	193	7	32			-	141	952	952	-	-	3,460		-	-	-	140,506	2,725	-
	Miscellaneous	-	38	1	3			-	18	110	110	-	-	302		-	-	-	12,283	556	-
	Off Gas Recombiner	-	169	6	27			-	119	799	799	-	-	2,861		-	-	-	116,194	2,387	-
	Off Gas Recombiner - Insulated Post Accident Sampling	-	351 23	9	22	393 16		_	150	921 48	921 48	-	-	2,350 99		-		-	95,441 4,004	4,785 306	-
	Post Accident Sampling - Insulated	-	15	0	1	11		-	6	33	33	-	-	67		-	-	-	2,737	190	-
	RHR Service Water - Insulated - RCA	_	83	3	14			-	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	-
	Reactor Feedwater Pump Seal	-	50	1	3			-	21	130	130	-	-	327		-	-	-	13,295	687	-
	Residual Heat Removal	-	226	58	147			-	529	3,584	3,584	-	-	12,609		-	-	-	609,174	3,282	-
	Residual Heat Removal - Insulated	-	500	39	74 3		464	-	384	2,312 129	2,312	-	=	5,084	1,374	-	-	-	294,206	7,027 609	-
	Rx Core Isolation Cooling Rx Core Isolation Cooling - Insulated	-	43 97	1	5 5	61 94		-	21 39	237	129 237	-	-	364 563	-	-	-	-	14,781 22,843	1,315	-
	Rx Recirculation	-	53	5	4	16		-	30	161	161	-	-	96		-	-	-	13,794	691	-
4a.1.5.51		-	151	1	5	84		-	51	292	292	-	-	502		-	-	-	20,395	2,272	-
	Standby Liquid Control - Insul - RCA	-	4	0	0	-	-	-	2	9	9	-	-	22		-	-	-	904	48	-
	Standby Liquid Control - RCA	-	26	1	2			-	13	83	83	-	-	245		-	-	-	9,969	341	-
	Stator Cooling - RCA	-	7	0	1	21		-	5	35	35	-	-	126		-	-	-	5,135	98	-
	Traversing Incore Probe Totals	-	3 7,490	0 347	0 1,370		_	-	5,894	39,634	7 39,610	-	24	2 140,459	-	-	-	-	379 5,899,167	46 104,297	-
48.1.0	Totals	-	7,450	347	1,370	23,301	1,032	-	5,654	33,034	35,610	-	24	140,455	3,050	-	-	-	5,655,167	104,257	-
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
	Collateral Costs																				
	Process decommissioning water waste	4		7	12	-	28	-	12	63	63	-	-	-	64	-	-	-	3,856	13	-
	Small tool allowance Subtotal Period 4a Collateral Costs	- 4	267 267	- 7	12	-	28	-	40 52	307 370	276 339	-	31 31	-	64	-	-	-	3,856	13	-
4a.3	Subtotal Feriod 4a Collateral Costs	4	201	1	12	-	20	-	52	510	999	-	91	-	64	-	-	-	5,000	15	-
	Period-Dependent Costs																				
	Decon supplies	87	-	-	-	-	-	790	22 79	109 869	109 869	-	-	-	-	-	-	-	-	-	-
	Insurance Property taxes	-	-	-	-	-	-	2,995	299	3,294	3,294	-	-	-	-	-	-	-	-	-	-
	Health physics supplies	-	1,871	-	-	-	-	2,556	468	2,339	2,339	-	-	-	-	-	-	-	-		-
	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	-
	Plant energy budget	-	-	-	-	-	-	1,938	291	2,229	2,229	-	-	-	-	-	-	-	-	-	-
	NRC Fees	-	-	-	-	-	-	544	54 257	598	598	-	-	-	-	-	-	-	-	-	-
	Fixed Overhead Liquid Radwaste Processing Equipment/Services	-	-	-	-	-	-	2,380 477	357 72	2,737 549	2,737 549	-	-	-	-	-	-	-	-	-	-
	Railroad Track Maintenance	-	-	-	-	-	-	140	21	162	162	-	-	-	-	-	-	-	-	-	-
								1.0	21	102	102										

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

							(11)	iousanas	of 2020 Dollar	s)											
						Off-Site	LLRW				NRC	Spent Fuel	Site	Processed		Rurial	Volumes		Burial /		Utility and
Activity		Decon	Removal	Packaging	Transport	Processing	Disposal	Other	Total	Total	Lic. Term.	Management	Restoration	Volume	Class A	Class B	Class C	GTCC	Processed	Craft	Contractor
Index	Activity Description	Cost	Cost	Costs	Costs	Costs	Costs	Costs	Contingency	Costs	Costs	Costs	Costs	Cu. Feet	Cu. Feet	Cu. Feet	Cu. Feet		Wt., Lbs.	Manhours	Manhours
D. 2. 14. D. 2. 11	December Control (control (control))																				
	Dependent Costs (continued) dial Actions Surveys	_	_	_	_	_	_	1,258	189	1,447	1,447	_	_	_	_	_	_	_	_	_	_
	ty Staff Cost	-	-	-	-	-	-	4,988	748	5,736	5,736	-	-	-	-	-	-	-	-	-	73,014
	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 Subtota	tal 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	L 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 - Sit	te Decontamination																				
Period 4b Direct D	Decommissioning Activities																				
	ve spent fuel racks	591	58	103	149	-	2,572	-	986	4,459	4,459	-	-	-	7,653	-	-	-	486,170	906	-
Disposal of Plant																					
4b.1.2.1 ALARA		-	16		0	_	-	-	5	30	30	-	-	49		-	-	-	1,987	247	-
	ate N2 - RCA	-	16		1	16		-	7	40	40	-	-	93		-	-	-	3,765	185	-
	s/Heavy Loads/Rigging - RCA	-	3	0	0	17 1		-	4	25 2	25	-	-	103		-	-	-	4,184	48	-
	tamination Projects ical - Contaminated	-	400	5	23	-		-	167	1,016	1,016	-	-	2,514		-	-	-	125 102,112	15 5,633	-
	ical - Contaminated ical - Contaminated Fuel Pool		400	1	23				17	105	1,010		-	2,514		-	-	-	10,272	592	-
	ical - Decontam. Fuel Pool Area	_	297	5	23			_	140	876	876	-	-	2,457		_	_	-	99,783	4,090	-
	ical - Decontaminated	-	2,698	48	218			_	1,298	8,167	8,167	-	-	23,344		_	_	-	948,013	37,107	-
4b.1.2.9 Fire - F	RCA	-	101	1	6	103	-	_	42	253	253	-	-	614	-	-	-	-	24,917	1,324	-
4b.1.2.10 Fire - F	RCA - Fuel Pool Area	-	11	0	1	10	-	-	4	26	26	-	-	62	-	-	-	-	2,499	143	-
	Pool Cooling & Cleanup	-	387	20	33			-	216	1,241	1,241	-	-	2,051		-	-	-	128,918	5,363	-
	Pool Cooling & Cleanup - Insulated	-	37	2	3			-	19	107	107	-	-	130		-	-	-	9,830	514	-
4b.1.2.13 HVAC		-	276	6	26			-	144	921	921	-	-	2,805		-	-	-	113,913	3,539	-
	Ductwork - Fuel Pool Area Chilled Water - RCA	-	31	1	3			-	16	102	102	-	-	312		-	-	-	12,657	393	-
	Chilled Water - RCA Fuel Pool Area	-	324 33	6	26 2			-	155 14	971 87	971 87	-	-	2,752 223		-	-		111,779 9,072	3,985 397	-
4b.1.2.17 Heating			433	13	59				277	1,842	1,842		-	6,334		-	-	-	257,243	6,340	-
	ng Boiler - Insulated - RCA	_	3	0	0	,	_	_	1	9	9	_	_	26	_	_	_	_	1,058	35	_
	ment & Service Air-RCA-Fuel Pool	-	29	-	2	-	_	_	14	91	91	-	-	267	-	_	_	-	10,841	357	_
4b.1.2.20 Liquid		-	621	31	57	703	311	_	350	2,072	2,072	-	-	4,203	915	-	-	-	229,422	8,550	-
4b.1.2.21 Makeu		-	103	3	14	246	-	-	65	431	431	-	-	1,471	-	-	-	-	59,747	1,412	-
	ssential Diesel Generator - RCA	-	27	3	13			-	45	327	327	-	-	1,424		-	-	-	57,832	395	-
4b.1.2.23 Off Gas		-	310		34			-	174	1,133	1,133	-	-	3,629		-	-	-	147,355	4,256	-
4b.1.2.24 Primar		-	411	16	77			-	324	2,218	2,218	-	-	8,302		-	-	-	337,148	5,729	-
	ss Radiation Monitors lg Closed Clng Water - Insul - RCA	-	41 114	$0 \\ 2$	2			-	16 54	95 343	95 343	-	-	213 977		-	-	-	8,667 39,675	577 1,484	-
	lg Closed Cing Water - Insui - KCA	-	184	15	66			-	235	1,687	1,687	-	-	7.093		-	-	-	288,031	2,489	-
	mponent Handling Equip	-	127	11	24		139	_	115	708	708	-	-	1,737		-	-	-	96,901	1,839	-
4b.1.2.29 Rx Pres		_	43	5	5			_	30	167	167	-	-	161	169	-	-	-	17,375	578	-
4b.1.2.30 Rx Wat		-	239	16	15	47		-	124	655	655	-	-	278	630	-	-	-	51,819	3,264	-
4b.1.2.31 Second	dary Containment	-	112	3	13	229	-	-	65	421	421	-	-	1,372	-	-	-	-	55,702	1,569	-
	e & Seal Water - Insulated - RCA	-	120	2	11			-	62	392	392	-	-	1,180		-	-	-	47,917	1,565	-
	e & Seal Water - RCA	-	159	4	17			-	88	570	570	-	-	1,809		-	-	-	73,453	2,016	-
	e Air Blower - RCA	-	15		2			-	9	62	62	-	-	206		-	-	-	8,364	206	-
4b.1.2.35 Solid R		-	446		45			-	261	1,563	1,563	-	-	3,390		-	-	-	179,772	6,270	-
4b.1.2.36 Structu	ures & Buildings & Domestic Water	-	70 10	1	4	80	-	-	30	185 11	185	-	- 11	477	-	-	-	-	19,351	1,005 144	-
	& Domestic Water - RCA	•	52		- 3	57		-	22	136	136	-	- 11	342	-	-	-	-	13,874	633	-
4b.1.2 Totals		-	8,342	249	841			-	4,613	29,085	29,073	_	11			-	-	-	3,585,374	114,290	-
4b.1.3 Scaffold	lding in support of decommissioning	-	3,159	33	19	286	46	-	850	4,394	4,394	-	-	1,545	136	-	-	-	78,166	29,953	-
Decontamination																					
4b.1.4.1 Reactor		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		1,101		53	172	172	_	-	-	145	-	-	_	6,840	1,421	-
4b.1.4.3 HPCI I		26			3			-	26	115	115	-	-	118		-	-	-	10,759	703	-
4b.1.4.4 Hot Sh		15	4	0	2		11	-	11	43	43	-	-	-	103	-	-	-	4,860	254	-
	Storage & Shipping	52		2	8	5	45	-	45	179	179	-	-	31		-	-	-	21,708	1,003	-
4b.1.4.6 Offgas		336		7	23			-	286	1,199	1,199	-	-	1,343		-	-	-	87,045	7,924	-
	s Storage & Compressor	36			6		33	-	32	128	128	-	-	25		-	-	-	15,948	696	-
4b.1.4.8 Radwa		109		3 2	17 9			-	100	410	410	-	-	172		-	-	-	49,943	2,229	-
4b.1.4.9 Radwas 4b.1.4.10 Recomb	aste Material Storage Warehouse	57 24		1	9 5	- 33	52 24	-	48 30	189 140	189 140	-	-	199	495 216	-	-	-	23,400 18,405	1,062 616	-
10.1.1.10 10COIII		24	22	1	9	33	24	-	30	140	140	-	-	199	210	-	-	-	10,400	010	-

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

							(11	iousanus (oi 2020 Dollai												
		_			_	Off-Site	LLRW				NRC	Spent Fuel	Site	Processed			Volumes		Burial /		Utility and
Activity Index		Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Processing Costs	Disposal Costs	Other Costs	Total Contingency	Total Costs	Lic. Term. Costs	Management Costs	Restoration Costs	Volume Cu. Feet	Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet		Craft Manhours	Contractor Manhours
	mination of Site Buildings (continued)																				
	Turbine 2 Turbine Building Addition	638 53			104 8	215	564 45	-	588 44	2,444 169	2,444 169	-	-	1,283	5,299 434	-	-	-	303,150 20,478	12,856 968	-
	Reactor (Post Fuel)	849			-		5,301	-	2,535	12,425	12,425	-	-	1,969	50,605	-	-	-	2,471,778	40,860	-
4b.1.4	Totals	6,960				8,904	7,465	-	8,379	39,378	39,378	-	-	53,216	66,764	<u>-</u>	÷	-	5,351,984	171,309	-
4b.1.5 4b.1.6	Prepare/submit License Termination Plan Receive NRC approval of termination plan	-	-	-	-	-	-	526	79	605 a	605	-	-	-	-	-	-	-	-	-	4,096
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
	b Additional Costs																				
4b.2.1 4b.2.2	License Termination Survey Planning Excavation of Underground Services	-	1,972	-	-	-	-	1,458 376	437 550	1,896 2,898	1,896 2,898	-	-	-	-	-	-	-	-	12,493	12,480
4b.2.3	Operational Equipment	-	- 1,012	23		1,211	-	-	198	1,524	1,524	-	-	11,760	-	-	-	-	294,000	32	
4b.2.4	License Termination ISFSI	-	57			-	5,925	3,118	2,569	12,844	12,844	-	-	-	21,949	-	-	-	2,633,402	10,339	
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 4l 4b.3.1	b Collateral Costs Process decommissioning water waste	12	-	22	39	-	88		36	196	196				202			_	12,097	39	
4b.3.1	Small tool allowance	- 12	397		-	_	-	-	60	457	457	-	-	-	-			-	12,007	-	-
4b.3.4	Decommissioning Equipment Disposition	-	-	130			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 4l 4b.4.1	b Period-Dependent Costs Decon supplies	1,701	-						425	2,126	2,126										
4b.4.1 4b.4.2	Insurance	1,701	-	-	-	-	-	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 4b.4.6	Heavy equipment rental Disposal of DAW generated	-	5,239	117	60	-	486	-	786 142	6,024 805	6,024 805	-	-	-	5,892	-	-	-	117,848	192	-
4b.4.6 4b.4.7	Plant energy budget	-	-	117	-	-	400	2,777	417	3,194	3,194	-	-	-	5,692	-	-	-	111,040	192	-
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 4b.4.11	Liquid Radwaste Processing Equipment/Services Railroad Track Maintenance	-	-	-	-	-	-	866 255	130 38	996 293	996 293	-	-	-	-	-	-	-	-	-	-
4b.4.11 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 4b.4	Utility Staff Cost Subtotal Period 4b Period-Dependent Costs	1,701	8,346	117	60	-	486	32,416 85,506	4,862 14,575	37,278 110,790	37,278 110,790	-	-	-	5,892	-	-	-	117,848	192	500,294 916,853
	-	,				-						-	· ·			-	-	-			
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
PERIOI	O 4f - License Termination																				
Period 4f 4f.1.1	f Direct Decommissioning Activities ORISE confirmatory survey	_	_	_	_	_	_	166	50	216	216	_	_	_	_	_	_	_	_	_	_
4f.1.2	Terminate license							100	-	a	210										
4f.1	Subtotal Period 4f Activity Costs	-	-	-	-	-	-	166	50	216	216	-	-	-	-	-	-	-	-	-	-
	f Additional Costs							2.000	0.050	0.00=	0.00*									0, 0, 10	2010
4f.2.1 4f.2	License Termination Survey Subtotal Period 4f Additional Costs	-	-	-	-	-	-	6,920 6,920	2,076 2,076	8,995 8,995	8,995 8,995	-	-	-	-	-	-	-	-	95,048 95,048	6,240 6,240
	f 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	-	-	-	-	-	-	-	=	-	-
	f Period-Dependent Costs																				
4f.4.2	Property taxes	-	-	-	-	-	-	1,796	180	1,975	1,975	-	-	-	-	-	-	-	-	-	-
4f.4.3 4f.4.4	Health physics supplies Disposal of DAW generated	-	705	- 7	- 4	-	29	-	176 8	881 48	881 48	-	-	-	351	-	-	-	7,025	- 11	-
4f.4.5	Plant energy budget	-	-	- '	-	-	- 29	274	41	315	315	-	-	-	- 551		-	-	- 1,025	-	-
4f.4.6	NRC Fees	-	-	-	-	-	-	426	43	468	468	-	-	-	-	-	-	-	-	-	-
4f.4.7	Fixed Overhead	-	-	-	-	-	-	1,597	239	1,836	1,836	-	-	-	-	-	-	-	-	-	-
4f.4.8 4f.4.9	Railroad Track Maintenance Security Staff Cost	-	-	-	-	-	-	94 1,360	14 204	108 1,564	108 1,564	-	-	-	-	-	-	-	-	-	18,805
41.4.5	occurry otan cost	-	-	-	-	-	-	1,500	∠04	1,004	1,004	-	-	-	-	-	-	-	-	-	10,000

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

							`		or 2020 Donar												
Activit Index		Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Class A Cu. Feet	Burial Class B	Volumes Class C Cu. Feet	GTCC Cu. Feet	Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
D. d. 14	CD in LD Los Costo (costi and l)																				
4f.4.10	f Period-Dependent Costs (continued) 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
PERIO	D 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
PERIO	D 5b - Site Restoration																				
Period 5	b Direct Decommissioning Activities																				
D 10	· · · · · · · · · · · · · · · · · · ·																				
5b.1.1.1	ion of Remaining Site Buildings Reactor Building		1,971						296	2,267			2,267							13,911	
5b.1.1.2		-	10	-	-	-	-	-	1	11	-	-	11	-	-	-	-	-	-	50	-
5b.1.1.3		-	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		-	2	-	-	-	-	-	0	2	-	-	2	-	-	-	-	-	-	19	
5b.1.1.7		-	83	-	-	-	-	-	12	95	-	-	95	-	-	-	-	-	-	662	
5b.1.1.8		-	4	-	-	-	-	-	1	1 000	-	-	1 000	-	-	-	-	-	-	42	
	Misc Structures 2017 O Offgas Stack	-	1,410 108	-	-	-	-	-	212 16	1,622 124	-	-	1,622 124	-	-	-	-	-	-	13,042 544	
	1 Offgas Storage & Compressor	-	39	-	-	-		-	6	45	-	-	45	-		-		-	-	199	
	2 Radwaste	-	228	_	-	_	-	_	34	262	_	_	262	_	_	_	_	_	_	1,220	
	Recombiner	-	128	_	-	-	-	-	19	147	-	_	147	_	-	-	-	-	-	713	
	4 Security Barrier	-	186	-	-	-	-	-	28	214	-	-	214	-	-	-	-	-	-	933	-
5b.1.1.1	5 Structures Greater than 3' Below Grade	-	2,461	-	-	-	-	-	369	2,830	-	-	2,830	-	-	-	-	-	-	12,649	-
	3 Tank Farm	-	4	-	-	-	-	-	1	5	-	-	5	-	-	-	-	-	-	21	-
	7 Turbine	-	1,259	-	-	-	-	-	189	1,448	-	-	1,448	-	-	-	-	-	-	13,036	-
	8 Turbine Building Addition	-	55	-	-	-	-	-	8	63	-	-	63	-	-	-	-	-	-	618	-
5b.1.1.19 5b.1.1	9 Turbine Pedestal Totals	-	182 8,169	-	-	-	-	-	27 1,225	209 9,394	-	-	209 9,394	-	-	-	-	-	-	926 58,885	-
50.1.1	Totals	-	0,103	•	-	-	-	-	1,220	5,554	•	-	5,554	-	-	-	-	-	-	50,005	-
	seout 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	-	10.40	-	-	-	-	-	-		1,560
5b.1	Subtotal Period 5b Activity Costs	-	9,065	-	-	-	-	200	1,390	10,655	231	-	10,425	-	-	-	-	-	-	60,726	1,560
	b Additional Costs																				
5b.2.1	Clean Concrete Disposal	-	3,322	-	-	-	-	13		3,835	-	-	3,835	-	-	-	-	-	-	12	
5b.2.2 5b.2.3	Intake Structure Cofferdam Construction Debris	-	335	-	-	-	-	1.170	50 176	385	-	-	385 1,346	-	-	-	-	-	-	2,584	
5b.2.4	Backfill	-	5,583	-	-	-	-	1,170	837	1,346 6,421	-	-	6,421	-	-	-	-	-	-	5,422	-
5b.2.4 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 5	b Collateral Costs																				
5b.3.1	Small tool allowance	_	121	_	_	-	_	-	18	139	-	-	139	-	_	-	_	-	-	_	_
5b.3	Subtotal Period 5b Collateral Costs	-	121	-	-	-	-	-	18	139	-	-	139	-	-	-	-	-	-	-	-
Do 1 =	b Period-Dependent Costs																				
5b.4.2	Property taxes		_	_	_	_	_	4,602	460	5,062	_	_	5,062	_	_	_	_	_	_	_	_
5b.4.2	Heavy equipment rental	-	5,842	-	-	-	-	4,002	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

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Monticello Nuclear Generating Plant Decommissioning Cost Analysis

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

					Off-Site	LLRW				NRC	Spent Fuel	Site	Processed		Burial V	olumes		Burial/		Utility and
Activity	Decon	Removal	Packaging	Transport	Processing	Disposal	Other	Total	Total	Lic. Term.	Management	Restoration	Volume	Class A	Class B		GTCC	Processed	Craft	Contractor
Index Activity Description	Cost	Cost	Costs	Costs	Costs	Costs	Costs	Contingency	Costs	Costs	Costs	Costs	Cu. Feet	Cu. Feet	Cu. Feet	Cu. Feet	Cu. Feet	Wt., Lbs.	Manhours	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

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APPENDIX H

DETAILED COST ANALYSIS

SCENARIO 6: SAFSTOR with 60 Year DFS

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

		(Thousands of 2020 Dollars) Off-Site LLRW NRC Spent Fuel Site Processed Burial Volumes Burial / Utility and																			
												Spent Fuel							Burial /		
Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Processing Costs	Disposal Costs	Other Costs	Total Contingency	Total Costs	Lic. Term. Costs	Management Costs	Restoration Costs	Volume Cu. Feet	Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet	Processed Wt., Lbs.	Craft Manhours	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
	Notification of Cessation of Operations Remove fuel & source material									a n/a											
	Notification of Permanent Defueling									а											
	Deactivate plant systems & process waste							0.55	00	a	200										2.000
	Prepare and submit PSDAR Review plant dwgs & specs.	-		-	-	-	-	257 167	39 25	296 192	296 192	-	-	-	-	-	-	-	-		2,000 1,300
1a.1.9	Perform detailed rad survey									a											
	Estimate by-product inventory	-	-	-	-	-	-	129	19	148 148	148	-	-	-	-	-	-	-	-	-	1,000
	End product description Detailed by-product inventory	-	-	-	-	-	-	129 193	19 29	222	148 222		-	-	-	-	-	-	-	-	1,000 1,500
1a.1.13	Define major work sequence	-	-	-	-	-	-	129	19	148	148	-	-	-	-	-	-	-	-	-	1,000
	Perform SER and EA	-	-	-	-	-	-	398 643	60 96	458 739	458 739		-	-	-	-	-	-	-	-	3,100 5,000
1a.1.15	Perform Site-Specific Cost Study	-	-	-	-	-	-	643	96	739	739	-	-	-	-	-	-	-	-	-	5,000
	pecifications Prepare plant and facilities for SAFSTOR							632	95	727	727										4,920
	Plant systems	-	-	-	-	-	-	536	80	616	616	-	-	-	-	-	-	-	-	-	4,920
1a.1.16.3	Plant structures and buildings	-	-	-	-	-	-	401	60	461	461	-	-	-	-	-	-	-	-	-	3,120
	Waste management Facility and site dormancy	-	-	-	-	-	-	257 257	39 39	296 296	296 296	-	-	-	-	-	-	-	-	-	2,000 2,000
1a.1.16.5 1a.1.16		-	-	-	-	-	-	2,083	312	2,395	2,395	-	-	-	-	-	-	-	-	-	16,207
								,		,	,										-,
	Work Procedures Plant systems							152	23	175	175										1,183
	Facility closeout & dormancy	-	-	-	-	-	-	154	23	177	177		-	-	-	-	-		-	-	1,200
1a.1.17		-	-	-	-	-	-	306	46	352	352	-	-	-	-	-	-	-	-	-	2,383
1a.1.18	Procure vacuum drying system	-	-	-	-	-	-	13	2	15	15	-	-	-	-	-	-	-	-	-	100
	Drain/de-energize non-cont. systems									a											
	Drain & dry NSSS Drain/de-energize contaminated systems									a a											
	Decon/secure contaminated systems									a											
1a.1	Subtotal Period 1a Activity Costs	-	-	-	-	-	-	5,027	816	5,844	5,844	-	-	-	-	-	-	-	-	-	35,890
	Collateral Costs																				
	Spent Fuel Capital and Transfer Retention and Severance	-	-	-	-	-	-	1,323 9,892	198 1,484	1,522 11,376	11,376	1,522	-	-	-	-	-	-	-	-	-
	Subtotal Period 1a Collateral Costs	-	-	-	-	-	-	11,215	1,484	12,897	11,376	1,522	-		-	-		-	-		-
	Period-Dependent Costs																				
	Insurance	-	-	_	_	-	_	2,328	233	2,561	2,561	_	-	_	_	_	-	_	-	-	-
1a.4.2	Property taxes	-	-	-	-	-	-	3,570	357	3,927	3,927	-	-	-	-	-	-	-	-	-	-
	Health physics supplies	-	614 753		-	-	-	-	153 113	767 866	767 866	-	-	-	-	-	-	-	-	-	-
	Heavy equipment rental Disposal of DAW generated	-	799 -	12	- 6	-	50	-	115	83	83	-	-	-	610	-	-	-	12,190	20	-
1a.4.6	Plant energy budget	-	-	-	-	-	-	1,817	272	2,089	2,089	-	-	-	-	-	-	-	,	-	-
	NRC Fees	-	-	-	-	-	-	892	89	981 3,770	981	- 0.550	-	-	-	-	-	-	-	-	-
	Emergency Planning Fees Fixed Overhead	- -	-	-	-	-	-	3,428 2,616	343 392	3,770	3,009	3,770	-	-	-	-	-	-	-	-	-
1a.4.10	Spent Fuel Pool O&M	-	-	-	-	-	-	845	127	971	-	971	-	-	-	-	-	-	-	-	-
	ISFSI Operating Costs	-	-	-	-	-	-	112	17	129	- 144	129	-	-	-	-	-	-	-	-	-
	Railroad Track Maintenance Security Staff Cost	-	-	-	-	-	-	125 16,372	19 2,456	144 18,827	144 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

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

							(11	iousanus (oi 2020 Dollai	15)											
						Off-Site	LLRW				NRC	Spent Fuel	Site	Processed		Burial	Volumes		Burial /		Utility and
Activit		Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Processing Costs	Disposal Costs	Other Costs	Total	Total Costs	Lic. Term. Costs	Management Costs	Restoration Costs	Volume Cu. Feet	Class A	Class B	Class C Cu. Feet	GTCC	Processed Wt., Lbs.	Craft Manhours	Contractor Manhours
Index		Cost	Cost	Costs	Costs	Costs	Costs	Costs	Contingency	Costs	Costs	Costs	Costs	Cu. reet	Cu. reet	Cu. Feet	Cu. Feet	Cu. reet	Wt., Lbs.	Mannours	Mannours
PERIO	D 1b - SAFSTOR Limited DECON Activities																				
Period 1	b Direct Decommissioning Activities																				
	mination of Site Buildings																				
	Reactor Building	5,155	-	-	-	-	-	-	2,577	7,732	7,732	-	-	-	-	-	-	-	-	70,157	-
1b.1.1.2 1b.1.1.3		106 28	-	-	-	-	-	-	53 14	159 42	159 42	-	-	-	-	-	-	-	-	1,526 391	-
1b.1.1.4		16	-	-	-	-	-	-	8	24	24	-	-	-	-	-	-		-	234	-
	LLRW Storage & Shipping	54	-	-	-	-	-	-	27	82	82	-	-	-	-	-	-	-	-	788	-
	Offgas Stack	362	-	-	-	-	-	-	181	542	542	-	-	-	-	-	-	-	-	5,112	-
1b.1.1.7		38	-	-	-	-	-	-	19	57	57	-	-	-	-	-	-	-	-	550	-
1b.1.1.8		114 60	-	-	-	-	-	-	57 30	171 90	171	-	-	-	-	-	-	-	-	1,647	-
1b.1.1.9 1b.1.1.1		25	-	-	-	-	-		13	38	90 38	-	-	-	-	-	-	-	-	864 363	-
	1 Turbine	664	_	_	-	_	-	_	332	996	996	_	_	-	_	_	_	_	_	9,600	-
	2 Turbine Building Addition	55	-	-	-	-	-	_	27	82	82	-	-	-	-	-	-	-	-	793	-
	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	-
	b Additional Costs																				
1b.2.1 1b.2	Spent Fuel Pool Isolation Subtotal Period 1b Additional Costs	-	-	-	-	-	-	12,675 $12,675$	1,901 1,901	14,576 14,576	14,576 14,576	-	-	-	-	-	-	-	-	-	-
								,	-,	,	,										
	b Collateral Costs	10**							1.50	1.010	1 010										
1b.3.1 1b.3.2	Decon equipment	1,055 220	-	146	259	-	589	-	158 310	1,213 1,523	1,213 1,523	=	-	-	1,352	-	-	-	81,127	264	-
1b.3.4	Process decommissioning water waste Small tool allowance	220	130		259	-	969	-	20	1,525	1,525	-	-	-	1,352	-	-	-	01,127	264	-
1b.3.4 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 1	b 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	-	750	-	-	-	-	890	89 187	979 937	979 937	=	-	-	-	-	-	-	-	-	-
1b.4.4 1b.4.5	Health physics supplies 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 1b.4.13	ISFSI Operating Costs Railroad Track Maintenance	-	-	-	-	-	-	28 31	4 5	32 36	36	32	-	-	-	-	-	-	-	-	-
1b.4.13	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
PERIO	D 1c - Preparations for SAFSTOR Dormancy																				
Period 1	c 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 1c.1.5	Secure building accesses Prepare & submit interim report	-	-	-	-	-	-	75	11	a 86	86	-	-	-	-	-	-	-	=	-	583
1c.1	Subtotal Period 1c Activity Costs	<u>-</u>	581	_	-	_	-	808	318	1,707	1,707	_	_	-	-	-	_	_	<u>-</u>	16,501	583
10.1			301					230	310	1,.01	2,101									10,001	556

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

	(Thousands of 2020 Dollars) Off-Site LLRW NRC Spent Fuel Site Processed Burial Volumes Burial / Utility and																				
_						Off-Site	LLRW				NRC	Spent Fuel	Site	Processed		Rurial	Volumes		Burial /		Utility and
Activit	y	Decon	Removal	Packaging	Transport			Other	Total	Total	Lic. Term.	Management	Restoration	Volume	Class A	Class B		GTCC	Processed	Craft	Contractor
Index		Cost	Cost	Costs	Costs	Costs	Costs	Costs	Contingency	Costs	Costs	Costs	Costs	Cu. Feet	Cu. Feet	Cu. Feet	Cu. Feet	Cu. Feet	Wt., Lbs.	Manhours	Manhours
Period 1	c 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 1	c 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	-	-	5	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 71	177 779	177	779	-	-	-	-	-	-	-	-	-
1c.4.8 1c.4.9	Emergency Planning Fees Fixed Overhead	-	-	-	-	-	-	708 652	98	779 750	750	- 119	-	-	-	-	-	-	-	-	-
	Spent Fuel Pool O&M	-	-	-	-	-	-	211	32	242	750	242	-	-	-	-	-	-	-	-	-
1c.4.10 1c.4.11	ISFSI Operating Costs	-	-	-	-	-	-	28	52 4	32	-	32	-	-	-	-	-	-	-	-	-
1c.4.11	Railroad Track Maintenance	-	-	-	-	-	-	31	5	36	36	32	•	-	-	-	-	-	-	-	-
1c.4.12	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.4.14	Subtotal Period 1c Period-Dependent Costs	_	436	9	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
PERIO	D 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
PERIO	D 2a - SAFSTOR Dormancy with Wet Spent Fuel Storag	ge																			
Dowind 9	a Direct Decommissioning Activities																				
2a.1.1	Quarterly Inspection									а											
2a.1.1	Semi-annual environmental survey									а											
2a.1.2	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 2	a 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	-	-	-	-	-	-	-	-	-	-
D. 1.10	a Collateral Costs																				
2a.3.1	Spent Fuel Capital and Transfer							130,915	19,637	150,553	_	150,553									
2a.3.1 2a.3.2	Retention and Severance	-	-	-	-	-	-	19,427	2,914	22,341	22,341	150,555	-	-	-	-	-	-	-	-	-
2a.3.2 2a.3	Subtotal Period 2a Collateral Costs	-	-	-	-	-	-	150,342	22,551	172,893	22,341	150,553	-	-	-		-	-	-	-	-
								100,012	==,001	172,000	22,011	100,000									
	a 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	7.001	=	-	-	-	-	-	-	-	-
2a.4.7	Emergency Planning Fees	-	-	-	-	-	-	7,110 5,306	711 796	7,821 6,102	c 109	7,821	-	-	-	-	-	-	-	-	-
2a.4.8 2a.4.9	Fixed Overhead Spent Fuel Pool O&M	-	-	-	-	-	-	5,306 2,115	796 317	6,102 2,432	6,102	2,432	-	-	-	-	-	-	-	-	-
2a.4.9 2a.4.10	Spent Fuel Pool O&M ISFSI Operating Costs	-	-	-	-	-	-	2,115	317 42	322	-	2,432 322	-	-	-	-	-	-	-	-	-
2a.4.10 2a.4.11	Railroad Track Maintenance	-	-	-	-	-	-	639	96	735	735	322	-	-	-	-	-	-	-	-	-
2a.4.11 2a.4.12	Security Staff Cost	-	-	-	-	-	-	37,806	5,671	43,477	31,086	12,391	-	-	-	-	-	-	-	-	562,523
2a.4.12 2a.4.13	Utility Staff Cost	-	-	-	-	-	-	13,543	2,031	15,574	12,615	2,959	-	-	-	-	-	-	-	-	205,738
2a.4.13	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

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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	Class A Cu. Feet	Class B	Volumes 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																				
	Direct Decommissioning Activities Quarterly Inspection Semi-annual environmental survey Prepare reports Bituminous roof replacement Maintenance supplies Subtotal Period 2b Activity Costs		:	:	:			3,127 7,065 10,192	469 1,766 2,235	a a 3,596 8,831 12,427	3,596 8,831 12,427	- - -	- - -	:		- - -		:		:	- - -
Period 2b 2b.3.1 2b.3	Collateral Costs Spent Fuel Capital and Transfer Subtotal Period 2b Collateral Costs	- -		-	- -	- -	- -	73,422 73,422	11,013 11,013	84,435 84,435	- -	84,435 84,435	-	- -	- -	- -		-	- -	-	-
Period 2b 2b.4.1 2b.4.2 2b.4.3 2b.4.4 2b.4.5 2b.4.7 2b.4.8 2b.4.9 2b.4.10 2b.4.11 2b.4.12	Period-Dependent Costs Insurance Property taxes Health physics supplies Disposal of DAW generated Plant energy budget NRC Fees Emergency Planning Fees Fixed Overhead ISFSI Operating Costs Railroad Track Maintenance Security Staff Cost Utility Staff Cost Subtotal Period 2b Period-Dependent Costs		6,047 6,047				461	35,606 180,613 - 9,196 11,515 7,506 10,904 5,666 6,330 280,802 114,547 662,686	3,561 18,061 1,512 135 1,379 1,152 751 1,636 850 950 42,120 17,182 89,288	39,167 198,674 7,559 764 10,576 12,667 8,256 12,540 6,516 7,280 322,922 131,729 758,650	39,167 198,674 7,559 764 10,576 12,667 - 7,280 72,658 71,924 433,808	8,256 6,516 250,265 59,805 324,843	-	- - - - - - - - - - - - - - - - - - -	5,595 - - 5,595 - - - - - - - - - - - - - - -				111,903 	182	3,790,775 1,684,789
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																				
3a.1.1 3a.1.2 3a.1.3 3a.1.4 3a.1.5 3a.1.6 3a.1.7 3a.1.8 3a.1.9	Direct Decommissioning Activities Prepare preliminary decommissioning cost Review plant dwgs & specs. Perform detailed rad survey End product description Detailed by-product inventory Define major work sequence Perform SER and EA Prepare/submit Defueled Technical Specifications Perform Site-Specific Cost Study Prepare/submit Irradiated Fuel Management Plan	- - - - - - - -	- - - - - - - - -	- - - - - - - - -	- - - - - - - - -			167 591 129 167 964 398 964 643 129	25 89 19 25 145 60 145 96	192 680 a 148 192 1,108 458 1,108 739 148	192 680 148 192 1,108 458 1,108 739 148	: : : : : :		- - - - - - - -				- - - - - - - - -			1,300 4,600 1,000 1,300 7,500 3,100 7,500 5,000 1,000
3a.1.11.1 3a.1.11.2 3a.1.11.3 3a.1.11.4 3a.1.11.5 3a.1.11.6 3a.1.11.7 3a.1.11.8 3a.1.11.1 3a.1.11.1 3a.1.11.1	2 Plant structures & buildings 3 Waste management 4 Facility & site closeout		- - - - - - - - - - - - - - - - - - -	- - - - - - - - - - - - - - - - - - -	- - - - - - - - - - - - - - - - - - -			947 536 912 835 64 129 206 268 257 206 401 591 116 5,736	142 80 137 125 10 19 31 40 40 39 31 60 89	1,089 616 1,049 961 74 148 236 309 309 296 236 461 680 133 6,597	980 554 1,049 961 74 148 118 309 296 236 231 680 67 6,011		109 62 - - - 118 - - - 231 - 67 586	- - -							7,370 4,167 7,100 6,500 500 1,000 1,600 2,088 2,088 2,000 1,600 3,120 4,600 900 44,633
3a.1.12 3a.1.13	& Site Preparations Prepare dismantling sequence Plant prep. & temp. svces Design water clean-up system		-	-	-	- - -	- - -	308 3,500 180	46 525 27	355 4,025 207	355 4,025 207	- - -	- - -	- - -	- - -	-	-	- - -	- - -		2,400 - 1,400

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Table H

Monticello Nuclear Generating Plant

SAFSTOR Decommissioning Cost Estimate with 60 Years of Spent Fuel Storage

(Thousands of 2020 Dollars)

							(Tl	nousands	of 2020 Dollar	rs)											
						Off-Site	LLRW				NRC	Spent Fuel	Site	Processed		Rurial	Volumes		Burial /		Utility and
Activity		Decon	Removal	Packaging	g Transport		Disposal	Other	Total	Total	Lic. Term.	Management	Restoration	Volume	Class A	Class B		GTCC	Processed	Craft	Contractor
Index	Activity Description	Cost	Cost	Costs	Costs	Costs	Costs	Costs	Contingency	Costs	Costs	Costs	Costs	Cu. Feet	Cu. Feet	Cu. Feet	Cu. Feet	Cu. Feet	Wt., Lbs.	Manhours	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	-	-	-	-	-	-	-	-	-	1,230
3a.1	Subtotal Period 3a Activity Costs	-	-	-	-	-	-	16,434	2,465	18,899	18,313	-	586	-	-	-	-	-	-	-	81,963
	a Additional Costs																				
3a.2.1 3a.2.2	Site Characterization Mixed & RCRA Waste		-	28	8 29	14		5,930	1,779 9	7,708 80	7,708 80	-	-	43	-	-	-	-	5,253	30,500 161	10,852
3a.2	Subtotal Period 3a Additional Costs	-	-	28				5,930	1,788	7,788	7,788	-	-	43		-	-	-	5,253	30,661	10,852
Period 3a	a 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	-	-	-	-	-	-	-	-	-
	a Period-Dependent Costs																				
3a.4.1	Insurance	-	-	-	-	-	-	703	70	774	442	332	-	-	-	-	-	-	-	-	-
3a.4.2	Property taxes	-	-	-	-	-	-	3,479	348	3,827 673	3,241 673	586	-	-	-	-	-	-	-	-	-
3a.4.3 3a.4.4	Health physics supplies Heavy equipment rental	-	538 758		-	-	-	-	135 113	866	866	-	-	-	-	_	_	_	-	-	-
3a.4.5	Disposal of DAW generated	-	-	10	0 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 3a.4.10	Fixed Overhead ISFSI Operating Costs	=	-	-	-	-	-	2,616 112	392 17	3,009 129	3,009	129	=	-	-	-	-	-	-	-	-
3a.4.11	Railroad Track Maintenance		-	-	-	-	-	125	19	144	144	125	-	-	-	-	-	-	-	-	-
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	-	1,29	1 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	-	1,29	1 38	8 34	14	42	55,010	9,177	65,607	60,271	4,751	586	43	516	-	-	-	15,565	30,678	421,975
PERIOI	3b - Decommissioning Preparations																				
Period 3l	Direct Decommissioning Activities																				
	Work Procedures							000	0.1	700	C20		70								4 722
	Plant systems Reactor internals	-	-	-	-	-	-	608 514	91 77	700 591	630 591	-	70	-	-	-	-	-	-	-	4,733 4,000
3b.1.1.3		-	-	-	-	-	-	174	26	200	50	-	150	-	-	-	-	-	-	-	1,350
	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 3b.1.1.8	Reactor vessel Facility closeout	=	-	-	-	-	-	467 154	70 23	537 177	537 89	-	89	-	-	-	-	-	-	-	3,630 1,200
3b.1.1.9			-	-	-	-	-	154	23	177	177	-	-	-	-	-	-	-	-	-	1,200
	Reinforced concrete	=	-	-	-	-	-	129	19	148	74	-	74	-	-	-	-	-	-	-	1,000
	Main Turbine	-	-	-	-	-	-	267	40	307	307	-	-	-	-	-	-	-	-	-	2,080
	Main Condensers	-	-	-	-	-	-	268	40	309	309	-	-	-	-	-	-	-	-	-	2,088
	Moisture separators & reheaters	-	-	-	-	-	-	257	39 53	296 403	296 363	-	- 40	-	-	-	-	-	-	-	2,000 2,730
	Radwaste building Reactor building	-	-	-	-	-	_	351 351	53	403	363	-	40 40		-	_	_	_	-	-	2,730 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 3l	o Collateral Costs																				
3b.3.1	Decon equipment	1,05	5 -	-	-	-	-	-	158	1,213	1,213	-	-	-	-	-	-	-	-	-	-
3b.3.2	DOC staff relocation expenses	-	-	-	-	-	-	1,264	190	1,454	1,454	-	-	-	-	-	-	-	-	-	-
3b.3.3 3b.3.4	Pipe cutting equipment Spent Fuel Capital and Transfer	-	1,200		-	-	-	900	180 135	1,380 1,035	1,380	1,035	-	-	-	-	-	-	-	-	-
3b.3.4 3b.3	Subtotal Period 3b Collateral Costs	1,05	5 1,200		-	-	-	2,164	663	5,082	4,047	1,035	-	-	-	-	-	-	-	-	-
Period 3	o Period-Dependent Costs																				
3b.4.1	Decon supplies	39	9 -	_	-	_	-	-	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	-	295 375		-	-	-	-	74 56		369	-	-	-	-	-	-	-	-	-	-
3b.4.5	Heavy equipment rental	-	378	-	-	-	-	-	56	432	432	-	-	-	-	-	-	-	-	-	-

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

Part								`		or 2020 Donar	/											
Part			_		·				0.1										amaa			Utility and
March Marc		Activity Description																				Contractor Manhours
18.4 2 Mars amy winds 1.00																						
Section Sect			-	-	6	3	-	24	-	•			-	-	-	291	-	-	-	5,814	9	-
March Marc			-	-	-	-	-	-					-	-	-	-	-	-	-	-	-	-
Section Sect			-	-	-	-	-	-					- 81	-	-	-	-	-	-	-	-	-
Second Floor Sec			-	-	-	-	-	-		196		1,500	-	-	-	-	-	-	-	-	-	-
Section Sect			-	-	-	-	-	-					64	-	-	-	-	-	-	-	-	-
10.0 10.0			-	-	-	-	-	-		-			140	-	-	-	-	-	-	-	-	24.40
Substitution Subs			-	-	-	-	-	-					143	-	-		-	-		-	-	
1.00 1.00			-		-	-	-	-					588	-	-	-	-	-	-	-	-	129,644
Part	3b.4 Subt	total 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
Page	3b.0 TOT	CAL 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
Part	PERIOD 3 TO	TALS	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
National Section Sec	PERIOD 4a - l	Large Component Removal																				
Second stand Paper Pringing & Valves 23 55 27 32 185 284 313 790 700 670 715	Period 4a Direc	et Decommissioning Activities																				
Second			99	o#	97	99	105	964		194	750	750			272	715				04 967	1 504	
													-	-					-			-
Second Aller Seco			41										-	-				-				-
Secret S			139	6,098	8,236	1,029	-		278				-	-	-	2,943					22,415	1,055
Second of Marie Seguence 1			-	9 409			-						-	-							99.415	
Section Sect			211				438						-	-								2,110
1. 1. 1. 1. 1. 1. 1. 1.																						
Case diving Costs from Cleam Building Demolition			-						-				-	-			-	-	-			
Au La Recote Building Say	4a.1.3 Maii	n Condensers	-	1,207	360	194	3,225	244	-	912	6,142	6,142	-	-	17,396	727	-	-	-	828,955	16,823	-
Mail				222																		
Hand 14 Turbine			-			-	-	-	-				-	-	-	-	-	-	-	-		
Part			-					-					-	-		-			-	-		
4.1.1.5 Automatic Press Relief 106 2 10 182 56 356			-		-	-	-	-	-				-	-	-	-	-	-	-	-		-
4.1.5.2 Chemistry Sampling - Insulated																						
4.1.5.1 Chemistry Sampling - Insulated 2 0 0 0 0 0 2 2 2 5 5 5 5 5 5 5			-		_			-	-				-	-			-	-	-			-
4a.1.5. Circulating Water RCA Circul			-			_		-	-				-	-			-	-				
Au.1.5. Combustible Gas Control - IRCA			-		0	-	-	-	-		_		-	-	-	-	-	-	-			
4a.1.5.7 Condensate & Feedwater S88 60 281 5.046 1.027 7.303	4a.1.5.5 Com	bustible Gas Control - Insul - RCA	-		0	_	36	-	-		80	80	-	-			-	-	-	8,617	378	-
4a.1.5.8 Condensate Feedwater - Insulated 44			-		1			-	-				-	-		-	-	-	-			
Aal. Log Condensate Demin As 48 9 44 792 250 1.590 1.590 4.735 1.92,293 6.784 1.510 Condensate Storage 657 16 77 1.378 384 2.512 2.512 2			-					-	-				-	-		-	-	-	-			
4a.1.5.10 Condensate Storage			-					-	-				_	-		_	-	-	_			
Aa.1.5.12 Control Rod Drive Hydraulie			-			77	1,378	-	-	384	2,512	2,512	-	-		-	-	-	-		9,265	-
4a.1.5.13 Core Spray Spr			-		9		-	-	-		0	-	-	-		-	-	-	-			-
4a.1.5.14 Core Spray - Insulated 4 Core Spray - Insulated - RCA 131			-				100	-	-				-	-		-	-	-	-			-
4a.1.5.15 Demin Water - Insulated - RCA			-					-	-				-	-		-	-	-	-			-
4a.1.5.17 Diesel Oil - RCA 4a.1.5.18 Drywell Atmosphere Cooling - RCA 4a.1.5.18 Drywell Atmosphere Cooling - RCA 4a.1.5.19 EDG Emerg Service Water - Insul - RCA 4a.1.5.20 Electrical - Clean 4a.1.5.21 Emergency Service Water - Insul - RCA 4a.1.5.22 Emergency Service Water - Insul - RCA 4a.1.5.23 Emergency Service Water - RCA 4a.1.5.24 Emergency Service Water - RCA 4a.1.5.25 Emergency Service Water - RCA 4a.1.5.26 Emergency Service Water - Insul - RCA 4a.1.5.26 Emergency Serv	4a.1.5.15 Dem	nin Water - Insulated - RCA	-	15	0	1		-	-	6	36	36	-	-	85	-	-	-	-	3,445	181	-
4a.1.5.18 Drywell Atmosphere Cooling - RCA			-		1	_		-	-				-	-		-	-	-	-			-
4a.1.5.19 EDG Emerg Service Water - Insul - RCA			-		0	0	_	-	-	-		•	-	-	-0	-	-	-	-			-
4a.1.5.20 Electrical · Clean			-		0	0		-	-				-	-		-	-	-				-
4a.1.5.22 Emergency Service Water - RCA	4a.1.5.20 Elec	trical - Clean	-		-	- "	-	-	-	_			-	15	-	-	-	-	-	-		-
4a.1.5.23 GZIP - 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 H2-02 Control Analyzing - 6 0 0 4 - 2 2 12 12 23 948 72 - 4a.1.5.26 H2-02 Control Analyzing - 6 0 0 0 4 - 2 2 12 12 23 948 72			-		· ·	1		-	-	9			-	-		-	-	-	-			-
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 0 4 2 12 12 12 23 948 72 - 4a.1.5.26 H2-O2 Control Analyzing - Insulated - 6 0 0 0 4 2 12 12 12 23 948 72 -			-	_	0	0	_	-	-	1	0	9	-	-		-	-	-	-			-
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 -			-	0	0	0		-	-	4 9			-	-		-	-	-	-			-
4a.1.5.26 H2-O2 Control Analyzing - Insulated - 6 0 0 4 2 12 12 23 948 72			-	-	· ·	0		-	-	_			-	-		-	-	-	-		72	-
4a.1.5.27 High Pressure Coolant Injection 60 3 12 211 - 49 334 334 - 1,262 - 51,257 850 -	4a.1.5.26 H2-0	O2 Control Analyzing - Insulated	-		O .	-	_	-	-	_	12	12	-	-			-	-	-	948	72	-
	4a.1.5.27 High	n Pressure Coolant Injection	-	60	3	12	211	-	-	49	334	334	-	-	1,262	-	-	-	-	51,257	850	-

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

							(11	iousunus (oi 2020 Dollai	,											
						Off-Site	LLRW				NRC	Spent Fuel	Site	Processed		Burial	Volumes		Burial /		Utility and
Activity		Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Processing Costs	Disposal Costs	Other Costs	Total	Total Costs	Lic. Term. Costs	Management Costs	Restoration Costs	Volume Cu. Feet	Class A Cu. Feet	Class B	Class C Cu. Feet	GTCC Cu. Feet	Processed Wt., Lbs.	Craft	Contractor Manhours
Index	Activity Description	Cost	Cost	Costs	Costs	Costs	Costs	Costs	Contingency	Costs	Costs	Costs	Costs	Cu. reet	Cu. reet	Cu. reet	Cu. reet	Cu. Feet	Wt., Lbs.	Manhours	Mannours
	of Plant Systems (continued)																				
	High Pressure Coolant Injection - Insula	-	198 8	4	21	379	-	-	110	713	713	-	-	2,266	-	-	-	-	92,018	2,734	-
	Hydrogen Cooling Hydrogen Cooling - RCA	-	8	- 0	- 0	7		-	3	10 17	17	-	10	39	-		-	-	1,600	118 79	-
	Hydrogen Seal Oil - RCA	-	17	Ö		32	-	-	9	60	60	-	-	189	-	-	-	-	7,669	212	-
	Hydrogen Water Chemistry - RCA	-	24	0	-	23	-	-	10	59	59	-	-	140	-	-	-	-	5,672	304	-
4a.1.5.33	Instrument & Service Air - RCA Main Condenser	-	$\frac{225}{177}$	4	17 18	296 318	-	-	103 95	644 613	644 613	-	-	1,768 1,903	-	-	-	-	71,810 77,301	2,733 2,443	-
	Main Steam	-	225	4 6		498	-	-	136	892	892	-	-	2,975	-	-	-	-	120,806	3,122	-
	Main Turbine	-	909	63		5,335	-	-	1,079	7,684	7,684	-	-	31,885	-	-	-	-	1,294,866	12,952	-
	Main Turbine - Insulated	-	193	7	32	579	-	-	141	952	952	-	-	3,460	-	-	-	-	140,506	2,725	-
	Miscellaneous	-	38	1	3	51	-	-	18	110	110	-	-	302	-	-	-	-	12,283	556	-
	Off Gas Recombiner Off Gas Recombiner - Insulated	-	169 351	6 5		479 393	-	-	119 150	799 921	799 921	-	-	2,861 2,350	-	-	-	-	116,194 95,441	2,387 4,785	-
	Post Accident Sampling	-	23	0		16	-	-	8	48	48	-	-	99	-	-	-	-	4,004	306	-
	Post Accident Sampling - Insulated	-	15	0		11	-	-	6	33	33	-	-	67	-	-	-	-	2,737	190	-
	RHR Service Water - Insulated - RCA	-	83	3			-	-	60	409	409 12	-	-	1,485	-	-	-	-	60,293	1,125	-
	RHR Service Water - RCA Reactor Feedwater Pump Seal	-	50	1	0	55	-	-	21	12 130	130	-	-	35 327	-	-	-	-	1,410 13,295	57 687	-
	Residual Heat Removal	-	226	58	147	2,110	514	-	529	3,584	3,584	-	-	12,609	1,519		-	-	609,174	3,282	-
	Residual Heat Removal - Insulated	-	500	39		851	464	-	384	2,312	2,312	-	-	5,084	1,374	-	-	-	294,206	7,027	-
	Rx Core Isolation Cooling	-	43	1	3	61	-	-	21	129	129	-	-	364	-	-	-	-	14,781	609	-
	Rx Core Isolation Cooling - Insulated Rx Recirculation	-	97 53	5	5 4	94 16	52	-	39 30	237 161	237 161	-	-	563 96	152	-	-	-	22,843 13,794	1,315 691	-
4a.1.5.51		-	151	1	5	84	- 52	_	51	292	292	-	-	502	- 102	_	-		20,395	2,272	-
	Standby Liquid Control - Insul - RCA	-	4	0	0	4	-	-	2	9	9	-	-	22	-	-	-	-	904	48	-
	Standby Liquid Control - RCA	-	26	1	2	41	-	-	13	83	83	-	-	245	-	-	-	-	9,969	341	-
	Stator Cooling - RCA Traversing Incore Probe	-	7	0		21	2	-	5 1	35 7	35 7	-	-	126 2	- 5	-	-	-	5,135 379	98 46	-
4a.1.5.5c	Totals	-	7,490	347		23,501	1,032		5,894	39,634	39,610		24	140,459	-		-	-	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
	a Collateral Costs			_																	
4a.3.1 4a.3.3	Process decommissioning water waste Small tool allowance	4	267	7	12	-	28	-	12 40	63 307	63 276	-	31	-	64	-	-	-	3,856	13	-
4a.3.3	Spent Fuel Capital and Transfer	-	207	-	-	-	-	2,351	353	2,704	210	2,704	- 31	-		-	-	-	-	-	-
4a.3	Subtotal Period 4a Collateral Costs	4	267	7	12	-	28		404	3,073	339	2,704	31	-	64	-	-	-	3,856	13	-
Period 4a	a Period-Dependent Costs																				
4a.4.1	Decon supplies	87	-	-	-	-	-	-	22	109	109	-	-	-	-	-	-	-	-	-	-
4a.4.2 4a.4.3	Insurance Property taxes	-	-	-	-	-	-	790 3,594	79 359	869 3,953	869 3,293	660	-	-	-	-	-	-	-	-	-
4a.4.3 4a.4.4	Health physics supplies	-	1,872	-	-	-		3,334	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	1.000	108	612	612	-	-	-	4,485	-	-	-	89,703	146	-
4a.4.7 4a.4.8	Plant energy budget NRC Fees	-	-	-	-	-	-	1,938 544	291 54	2,229 598	2,229 598	-	-	-	-	-	-	-	-	-	-
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 4a.4.13	ISFSI Operating Costs Railroad Track Maintenance	-	-	-	-	-	-	126 140	19 21	145 162	162	145	-	-	-	-	-	-	-	-	-
4a.4.15 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 4a.4	Utility Staff Cost Subtotal Period 4a Period-Dependent Costs	87	4,683	- 89	46	-	370	19,141 51,826	2,871 8,539	22,012 65,639	20,691 61,399	1,321 4,241	-	-	4,485	-	-	-	89,703	146	294,391 556,657
						22.404								104.000			600	1 100			
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
	0 4b - Site Decontamination																				
	Direct Decommissioning Activities Remove spent fuel racks	591	58	103	149	-	2,572	-	986	4,459	4,459	-	-	-	7,653	-	-	_	486,170	906	-
											-										

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Table H

Monticello Nuclear Generating Plant

SAFSTOR Decommissioning Cost Estimate with 60 Years of Spent Fuel Storage

(Thousands of 2020 Dollars)

							(Tł	ousands	of 2020 Dollaı	rs)											
						Off-Site	LLRW				NRC	Spent Fuel	Site	Processed		Rurial	Volumes		Burial /		Utility and
Activity		Decon	Removal	Packaging			Disposal	Other	Total	Total	Lic. Term.	Management	Restoration	Volume	Class A	Class B	Class C	GTCC	Processed	Craft	Contractor
Index	Activity Description	Cost	Cost	Costs	Costs	Costs	Costs	Costs	Contingency	Costs	Costs	Costs	Costs	Cu. Feet	Cu. Feet	Cu. Feet	Cu. Feet	Cu. Feet	Wt., Lbs.	Manhours	Manhours
Disposal of Plant	t Systems																				
4b.1.2.1 ALAR		-	16	0	0	8	-	-	5	30	30	-	-	49	-	-	-	-	1,987	247	-
	nate N2 - RCA es/Heavy Loads/Rigging - RCA	-	16 3	0	_	16 17	-	-	7 4	40 25	40 25	-	-	93 103	-	-	-	-	3,765 4,184	185 48	-
	es/Heavy Loads/Rigging - RCA ntamination Projects	-	ა 1	0	_		-	-	0	25	25	-	-	103	-		-	-	4,184 125	48 15	-
	rical - Contaminated	-	400	5	-	_	-	-	167	1,016		-	-	2,514	-	-	-	-	102,112	5,633	-
	rical - Contaminated Fuel Pool	-	42	1	2	42	-	-	17	105	105	-	-	253	-	-	-	-	10,272	592	-
	rical - Decontam. Fuel Pool Area	÷	297	5			-	-	140	876	876	-	-	2,457	-	-	-	-	99,783	4,090	-
4b.1.2.8 Electr 4b.1.2.9 Fire -	rical - Decontaminated	÷	2,698 101	48	218	,	-	-	1,298 42	8,167 253	8,167 253	-	-	23,344 614	-	-	-	-	948,013 24,917	37,107 1,324	-
	RCA - Fuel Pool Area	-	11	0		103	-	-	42	26	26	-	-	62	-		-	-	2,499	143	-
4b.1.2.11 Fuel I	Pool Cooling & Cleanup	-	387	20	33		241	-	216	1,241	1,241	-	-	2,051	712	-	-	-	128,918	5,363	-
	Pool Cooling & Cleanup - Insulated	-	37	2	-		24	-	19	107	107	-	-	130	71	-	-	-	9,830	514	-
4b.1.2.13 HVAC	C Ductwork C Ductwork - Fuel Pool Area	÷	276 31	6	26		-	-	144 16	921 102	921 102	-	-	2,805 312		-	-	-	113,913 12,657	3,539 393	-
	C/Chilled Water - RCA	-	324	6			-	-	155	971	971	-	-	2,752	-		-		111,779	3,985	-
	C/Chilled Water - RCA Fuel Pool Area	-	33	0			-	-	14	87	87	-	-	223	-	-	-	-	9,072	397	-
4b.1.2.17 Heati		-	433	13			-	-	277	1,842		-	-	6,334	-	-	-	-	257,243	6,340	-
	ing Boiler - Insulated - RCA	-	3	0	-	_	-	-	1	9	9	-	-	26	-	-	-	-	1,058	35	-
4b.1.2.19 Instru 4b.1.2.20 Liquid	ument & Service Air-RCA-Fuel Pool	-	29 621	31	2 57		311	_	14 350	91 2,072	91 2,072	-	-	267 4,203	915	-	-	-	10,841 229,422	357 8,550	-
4b.1.2.21 Make		-	103	3			-	-	65	431	431	-	-	1,471	-		-	-	59,747	1,412	-
4b.1.2.22 Non-F	Essential Diesel Generator - RCA	-	27	3			-	-	45	327	327	-	-	1,424	-	-	-	-	57,832	395	-
4b.1.2.23 Off Ga		-	310	7	34		-	-	174	1,133	1,133	-	-	3,629	-	-	-	-	147,355	4,256	-
4b.1.2.24 Prima	ary Containment ess Radiation Monitors	÷	411 41	16			-	-	324 16	2,218 95	2,218 95	-	-	8,302 213	-	-	-	-	337,148 8,667	5,729 577	-
	ldg Closed Clng Water - Insul - RCA		114	2	_			-	54	343	343	-	-	977	-		-		39,675	1,484	-
	ldg Closed Clng Water - RCA	-	184	15	66		-	-	235	1,687	1,687	-	-	7,093	-	-	-	-	288,031	2,489	-
	omponent Handling Equip	-	127	11			139	-	115		708	-	-	1,737	415	-	-	-	96,901	1,839	-
4b.1.2.29 Rx Pr		-	43	5			57	-	30	167	167	-	-	161	169 630	-	-	-	17,375	578	-
4b.1.2.30 Rx Wa	ater Cleanup ndary Containment	-	239 112	16 3	15 13		214	_	124 65	655 421	655 421	-	-	278 1,372		-	-	-	51,819 55,702	3,264 1,569	-
	ce & Seal Water - Insulated - RCA	-	120	2			-	_	62	392	392	_	-	1,180	-	-	_	-	47,917	1,565	-
	ce & Seal Water - RCA	•	159	4	17		-	-	88	570	570	-	-	1,809	-	-	-	-	73,453	2,016	-
	ce Air Blower - RCA	-	15	0	_		-	-	9	62	62	-	-	206	-	-	-	-	8,364	206	-
4b.1.2.35 Solid	tures & Buildings	-	446 70	21	45 4	567 80	223	-	261 30	1,563 185	1,563 185	-	-	3,390 477	659	-	-	-	179,772 19,351	6,270 1,005	-
	& Domestic Water	-	10		-	-	-	_	1	11	-	_	11		-	-	_	-	- 10,001	144	-
	& Domestic Water - RCA	•	52	1	3		-	-	22	136	136	-	-	342	-	-	-	-	13,874	633	-
4b.1.2 Totals	s	-	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 Scaffo	olding in support of decommissioning	-	3,159	33	19	286	46	-	850	4,394	4,394	-	-	1,545	136	-	-	-	78,166	29,953	-
	n of Site Buildings	4.000	0.500	150	710	0.044	1 101		4.500	01 504	01 504			40.055	5.014				0.015.050	100 510	
4b.1.4.1 React 4b.1.4.2 Admin	or Building n	4,668 96	2,596 5	178			1,181 15	-	4,580 53	21,764 172	21,764 172	-	-	48,077	7,014 145	-	-		2,317,670 6,840	100,718 1,421	-
4b.1.4.3 HPCI		26	25	1	3	20	14		26	115	115	-	-	118		-	-	-	10,759	703	-
4b.1.4.4 Hot S		15		0	_		11	-	11	43	43	-	-		103	-	-	-	4,860	254	-
	V Storage & Shipping	52 336	22 241	2	0	5	45	-	45	179 1,199	179	-	-	31 1,343	433 669	-	-	-	21,708 87,045	1,003	-
4b.1.4.6 Offgas 4b.1.4.7 Offgas	s Stack s Storage & Compressor	36		1	23		82 33	-	286 32	1,199	1,199 128	-	-	1,545		-	-		15,948	7,924 696	-
4b.1.4.8 Radw		109	54	3	-	-	96	-	100	410	410	-	-	172	910	-	-	-	49,943	2,229	-
	raste Material Storage Warehouse	57	21	2	-		52	-	48	189	189	-	-	-	495	-	-	-	23,400	1,062	-
4b.1.4.10 Recon		24	22	1	5	33	24 564	-	30	140	140	-	-	199		-	-	-	18,405	616	-
4b.1.4.11 Turbi	ine ine Building Addition	638 53	314 19	21	104	215	564 45	_	588 44	2,444 169	2,444 169	-	-	1,283	5,299 434	-	-	-	303,150 20,478	12,856 968	-
4b.1.4.13 React		849		172		329	5,301	-	2,535	12,425	12,425	-	-	1,969	50,605		-	-	2,471,778	40,860	-
4b.1.4 Totals	s	6,960		390			7,465	-	8,379	39,378	39,378	-	-	53,216		-	-	-	5,351,984	171,309	-
	are/submit License Termination Plan ve NRC approval of termination plan	-	-	-	-	-	-	526	79	605 a	605	-	-	-	-	-	-	-	-	-	4,096
4b.1 Subto	otal 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 Additio								1 180		1.000	1.000										10.400
	se Termination Survey Planning vation of Underground Services	- -	1,972	-	-	-	-	1,458 376	437 550	1,896 2,898	1,896 2,898	-	-	-	-	-	-	-	-	12,493	12,480
	ational Equipment	-	1,312	23			-	-	198				-	11,760	-	-	-	-	294,000	32	-
- Poro	4 F :			20	02	-,			-30	-,1	-,1			,.50					,		

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

							(11	iousanus (oi 2020 Dollai	13)											
						Off-Site	LLRW				NRC	Spent Fuel	Site	Processed			Volumes		Burial /		Utility and
Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Processing Costs	Disposal Costs	Other Costs	Total Contingency	Total Costs	Lic. Term. Costs	Management Costs	Restoration Costs	Volume Cu. Feet	Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet	Processed Wt., Lbs.	Craft Manhours	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 4	o Collateral Costs																				
4b.3.1	Process decommissioning water waste	12	-	22	39		88	-	36	196	196	-	-	-	202	-	-	-	12,097	39	-
4b.3.3 4b.3.4	Small tool allowance Decommissioning Equipment Disposition	-	397	130	82	1,112	178	-	60 237	456 1,739	456 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-Dependent Costs	1.501							407	0.100	0.100										
4b.4.1 4b.4.2	Decon supplies Insurance	1,701	-	-	-	-	-	1,434	425 143	2,126 1,577	2,126 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 4b.4.6	Heavy equipment rental Disposal of DAW generated	-	5,239	117	- 60	-	486	-	786 142	6,024 805	6,024 805	-	-	-	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 4b.4.10	Emergency Planning Fees Fixed Overhead	-	-	-	-	-	-	302 4,319	30 648	332 4,967	4.967	332	-	-	-	-	-	-	-	-	-
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 4b.4.14	Railroad Track Maintenance Remedial Actions Surveys	-	•	-	-	-	-	255 $2,283$	38 343	293 2,626	293 2,626	-	-	-	-	-	•	-	-	-	-
4b.4.14 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 4b.4	Utility Staff Cost Subtotal Period 4b Period-Dependent Costs	1,701	8,289	117	60	-	486	32,869 90,622	4,930 15,259	37,799 116,533	35,380 108,817	2,419 7,716	-	-	5,895	-	-	-	117,897	192	504,534 971,970
4b.0	TOTAL PERIOD 4b COST	9,264	27,881	1,067			12,044		32,614	210,310	195,435	14,863	11	155,174	84,750	-	-	_	10,229,300	329,361	
PERIOI	4f - License Termination																				
	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	-	-	-	-	-	-	-	-	-	-
	Additional Costs																				
4f.2.1 4f.2.2	License Termination Survey	-	- 57	188	987	-	5,925	6,920 3,118	2,076 2,569	8,995 12,844	8,995 12,844	-	-	-	21,949	-	-	-	2,633,402	95,048 10,339	
4f.2.2 4f.2	License Termination ISFSI Subtotal Period 4f Additional Costs	-	57 57	188			5,925 5,925		2,569 4,645	21,839	21,839	-	-	-	21,949	-	-	-	2,633,402	10,339	
Period 4	Collateral Costs																				
4f.3.1	DOC staff relocation expenses	-	-	-	-	-	-	1,264	190	1,454	1,454	-	-	-	-	-	-	-	-	_	-
4f.3.2	Small tool allowance	-	0	-	-	-	-	846	0	1	1	-	-	-	-	-	-	-	-	-	-
4f.3.3 4f.3	Spent Fuel Capital and Transfer Subtotal Period 4f Collateral Costs	-	0	-	-		-	2,110	127 317	972 2,427	1,454	972 972	-	-	-	-	-	-	-	-	-
Period 4	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 4f.4.4	Health physics supplies Disposal of DAW generated	-	766	- 7	- 4	-	29	-	192 9	958 48	958 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 4f.4.8	Emergency Planning Fees Fixed Overhead	-	-		-	-	-	112 1,597	11 239	123 1,836	1,836	123	-	-	-		-	-	-		-
4f.4.9	ISFSI Operating Costs	-	-	-	-	-	-	84	13	97	-	97	-	-	-	-	-	-	-	-	-
4f.4.10	Railroad Track Maintenance	-	-	-	-	-	-	94	14	108	108	-	-	-	-	-	-	-	-	-	-
4f.4.11 4f.4.12	Security Staff Cost DOC Staff Cost	-	-	-	-	-	-	3,463 5,393	519 809	3,982 6,201	1,565 6,201	2,417	-	-	-	-	-	-	-	-	50,932 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
PERIOI	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

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

							(T)	housands	of 2020 Dollar	rs)											
						Off-Site	LLRW				NRC	Spent Fuel	Site	Processed		Burial	Volumes		Burial /		Utility and
Activit		Decon			Transport	Processing	Disposal	Other	Total	Total	Lic. Term.	Management	Restoration	Volume	Class A	Class B	Class C	GTCC	Processed		Contractor
Index	•	Cost	Cost	Costs	Costs	Costs	Costs	Costs	Contingency	Costs	Costs	Costs	Costs	Cu. Feet	Cu. Feet	Cu. Feet	Cu. Feet	Cu. Feet	Wt., Lbs.	Manhours	Manhours
	D 5b - Site Restoration																				
Period 5	b Direct Decommissioning Activities																				
	ion of Remaining Site Buildings Reactor Building		1,971						296	2,267			2,267							13,911	
5b.1.1.2		-	1,571	-	-	-	-		1	11	-	-	2,207	_			-	-	-	50	-
5b.1.1.3	Discharge Retention Basin	-	4		-	-	-	-	1	5	-	-	5	-	-	-	-	-	-	25	-
5b.1.1.4		-	19		-	-	-	-	3	22	-	-	22	-	-	-	-	-	-	97	-
5b.1.1.5 5b.1.1.6		-	16 2		-	-	-	-	2	19 2	-	-	19	-	-	-	-	-	-	177 19	-
5b.1.1.7		-	83		-	-	-	-	12	95	-	-	95	_	-	-	-		-	662	-
5b.1.1.8		-	4		-	-	-	-	1	4	-	-	4	-	-	-	-	-	-	42	-
5b.1.1.9		-	1,410		-	-	-	-	212	1,622	-	-	1,622	-	-	-	-	-	-	13,042	-
	0 Offgas Stack	-	108		-	-	-	-	16	124	-	-	124	-	-	-	-	-	-	544	-
	1 Offgas Storage & Compressor 2 Radwaste	-	39 228		-	-	-	-	6 34	45 262	-	-	$\frac{45}{262}$	-	•	-	-	-	-	199 1,220	-
	3 Recombiner	-	128		-	-	-	-	19	147	-	-	147	_	-	-	-		-	713	-
	4 Security Barrier	-	186		-	-	-	-	28	214	-	-	214	_	-	-	-	-	-	933	-
	5 Structures Greater than 3' Below Grade	-	2,461	-	-	-	-	-	369	2,830	-	-	2,830	-	-	-	-	-	-	12,649	-
	6 Tank Farm	-	4	-	-	-	-	-	1	5	-	-	5	-	-	-	-	-	-	21	-
	7 Turbine 8 Turbine Building Addition	-	1,259 55		-	-	-	-	189 8	1,448 63	-	-	1,448 63	-	-	-	-	-	-	13,036 618	-
	9 Turbine Pedestal	-	182		-	-	-	-	27	209	_	-	209	-	-	-	-	-	-	926	-
	Totals	-	8,169	-	-	-	-	-	1,225	9,394	-	-	9,394	-	-	-	-	-	-	58,885	-
an an																					
5b.1.2	seout Activities Grade & landscape site		896						134	1,031	_	_	1,031							1,841	_
5b.1.2	Final report to NRC	-	-	-	-	-	-	200	30	231	231		1,001	-	-	-	-	-	-	1,041	1,560
5b.1	Subtotal Period 5b Activity Costs	-	9,065	-	-	-	-	200	1,390	10,655	231		10,425	-	-	-	-	-	-	60,726	1,560
Period 5	b 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 5b.2.5	Backfill Discharge Structure Cofferdam	-	5,583 442		-	-	-	-	837 66	6,421 508	-	-	6,421 508	-	-	-	-	-	-	5,422 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 5	b Collateral Costs																				
5b.3.1	Small tool allowance	-	121	-	-	-	-	-	18	139	-	-	139	-	-	-	-	-	-	-	-
5b.3	Subtotal Period 5b Collateral Costs	-	121	-	-	-	-	-	18	139	-	-	139	-	-	-	-	-	-	-	-
Period 5	b Period-Dependent Costs																				
5b.4.1	Insurance	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5b.4.2	Property taxes	-	-	-	-	-	-	4,770	477	5,247	-	-	5,247	-	-	-	-	-	-	-	-
5b.4.3 5b.4.4	Heavy equipment rental Plant energy budget	-	5,842	-	-	-	-	315	876 47	6,719 362		-	6,719 362	_	-	_	-	-	-	-	-
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 13,489	-	-	-	-	-	-	-	43,287
5b.4.9 5b.4.10	DOC Staff Cost Utility Staff Cost	-	-	-	-	-	-	11,729 4,931	1,759 740	13,489 5,671	-	-	5,671	-			-	-	-	-	122,646 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
PERIO	D 5 TOTALS	-	26,196	-	-	-	-	27,879	7,870	61,945	231	51	61,663	-	-	-	-	-	-	79,253	237,994
		01.050			0.010	¥0.0=0	¥0.50=							040 100	180.000	1 000	000	1 100	00 500 000		
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

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 $\begin{array}{c|cccc} Processed & & Burial \, Volumes \\ \hline Volume & Class \, A & Class \, B & Class \, C & GTCC \\ \hline Cu. \, Feet & Cu. \, Feet & Cu. \, Feet & Cu. \, Feet \\ \end{array}$

Monticello Nuclear Generating Plant Decommissioning Cost Analysis

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

NRC Spent Fuel Site
Total Lic. Term. Management Restoration

Activity		Decon	Removal	Packaging	Transport	Off-Site Processing	LLRW Disposal	Other	
Index	Activity Description	Cost	Cost	Costs	Costs	Costs	Costs	Costs	
TOTAL COST TO	DECOMMISSION WITH 16.34% CONTINGEN	CY:			\$1,941,915	thousands of	2020 dollars		
TOTAL NRC LIC	ENSE TERMINATION COST IS 64.37% OR:				\$1,250,098	thousands of	2020 dollars		
SPENT FUEL MA	NAGEMENT 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-LEV	VEL RADIOACTIVE WASTE VOLUME BURIEF	O (EXCLUDING	G GTCC):		155,449	Cubic Feet			
TOTAL GREATE	R THAN CLASS C RADWASTE VOLUME GEN	ERATED:			1,160	Cubic Feet			
TOTAL SCRAP M	IETAL REMOVED:				23,123	Tons			
TOTAL CRAFT L	ABOR 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

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Monticello Nuclear Generating Plant Decommissioning Cost Analysis Document X01-1775-002, Rev. 0 Appendix I, Page 1 of 13

APPENDIX I

DETAILED COST ANALYSIS

SCENARIO 7: SAFSTOR with 100 Year DFS

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Table I

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

							,		or 2020 Donar	•											
Activit	y	Decon	Removal	Packaging	Transport	Off-Site Processing	LLRW Disposal	Other	Total	Total	NRC Lic. Term.	Spent Fuel Management	Site Restoration	Processed Volume	Class A	Burial Class B	Volumes Class C	GTCC	Burial / Processed	Craft	Utility and Contractor
Index	Activity Description	Cost	Cost	Costs	Costs	Costs	Costs	Costs	Contingency	Costs	Costs	Costs	Costs	Cu. Feet	Cu. Feet	Cu. Feet	Cu. Feet		Wt., Lbs.	Manhours	Manhours
PERIO	D 1a - Shutdown through Transition																				
Period 1	a Direct Decommissioning Activities																				
1a.1.1	SAFSTOR site characterization survey	-	-	-	-	-	-	415	124	539	539	-	-	-	-	-	-	-	-	-	-
1a.1.2 1a.1.3	Prepare preliminary decommissioning cost Notification of Cessation of Operations	-	-	-	-	-	-	167	25	192 a	192	-	-	-	-	-	-	-	-	-	1,300
1a.1.4	Remove fuel & source material									n/a											
1a.1.5 1a.1.6	Notification of Permanent Defueling Deactivate plant systems & process waste									a a											
1a.1.7	Prepare and submit PSDAR	-	-		-	-	-	257	39	296	296	-	-	-	-	-	-	-	-	-	2,000
1a.1.8 1a.1.9	Review plant dwgs & specs. Perform detailed rad survey	-	-	-	-	-	-	167	25	192 a	192	-	-	-	-	-	-	-	-	-	1,300
1a.1.10	Estimate by-product inventory	-	-	-	-	-	-	129	19	148	148	-	-	-	-	-	-	-	-	-	1,000
1a.1.11	End product description	-	-	-	-	-	-	129	19 29	148 222	148 222	-	-	-	-	-	-	-	-	-	1,000 1,500
1a.1.12 1a.1.13	Detailed by-product inventory Define major work sequence	-	-	-	-	-	-	193 129	19	148	148	-	-	-	-	-	-	-	-	-	1,000
1a.1.14	Perform SER and EA	-	-	-	-	-	-	398	60	458	458	-	-	-	-	-	-	-	-	-	3,100
1a.1.15 1a.1.16		-	-	-	-	-	-	964 643	145 96	1,108 739	1,108 739	-	-	-	-	-	-	-	-	-	7,500 5,000
1a.1.17		-	-	-	-	-	-	129	19	148	148	-	-	-	-	-	-	-	-	-	1,000
Activity	Specifications																				
	1 Prepare plant and facilities for SAFSTOR	-	-		-	-	-	632	95	727	727	-	-	-	-	-	-	-	-	-	4,920
	2 Plant systems 3 Plant structures and buildings	-		-	-	-	-	536 401	80 60	616 461	616 461	-	-	-	-	-	-	-	-	-	4,167 3,120
1a.1.18.	4 Waste management	-	-	-	-	-	-	257	39	296	296	-	-	-	-	-	-	-	-	-	2,000
1a.1.18. 1a.1.18	5 Facility and site dormancy	-	-	-	-	-	-	257 2,083	39 312	296 2,395	296 2,395	-	-	-	-	-	-	-	-	-	2,000 16,207
		_		-	-	•	-	2,000	312	2,555	2,555	_	_	_	-	-	•	-	-	-	10,207
	l Work Procedures 1 Plant systems							152	23	175	175										1,183
	2 Facility closeout & dormancy	-		-	-	-		154	23	175	175	-	-		-		-	-	-	-	1,200
1a.1.19		-	-	-	-	-	-	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 1a.1.23	Drain & dry NSSS Drain/de-energize contaminated systems									a 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
	a Collateral Costs																				
1a.3.1 1a.3.2	Spent Fuel Capital and Transfer Retention and Severance	-	-	-	-	-	-	1,323 9,892	198 1,484	1,522 11,376	11,376	1,522	-	-	-	-	-	-	-	-	-
1a.3	Subtotal Period 1a Collateral Costs	-	-	-	-	-	-	11,215	1,682	12,897	11,376	1,522	-	-	-	-	-	-	-	-	-
Period 1	a Period-Dependent Costs																				
1a.4.1	Insurance	-	-	-	-	-	-	2,328	233	2,561	2,561	-	-	-	-	-	-	-	-	-	-
1a.4.2 1a.4.3	Property taxes Health physics supplies	-	614	-	-	-	-	3,570	357 153	3,927 767	3,927 767	-	-	-	-	-	-	-	-	-	-
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 1a.4.7	Plant energy budget NRC Fees	-	-	-	-	-	-	1,817 892	272 89	2,089 981	2,089 981	-	- -	-	-	-	-	-	-	-	-
1a.4.8	Emergency Planning Fees	-	-	-	-	-	-	3,428	343	3,770	-	3,770	-	-	-	-	-	-	-	-	-
1a.4.9 1a.4.10	Fixed Overhead Spent Fuel Pool O&M	-	-	-	-	-	-	2,616 845	392 127	3,009 971	3,009	971	-	-	-	-	-	-	-	-	-
1a.4.11	ISFSI Operating Costs	-	-	-	-	-	-	112	17	129	-	129	-	-	-	-	-	-	-	-	-
1a.4.12		-	-	-	-	-	-	125	19	144	144	-	-	-	-	-	-	-	-	-	0.45 4.40
1a.4.13 1a.4.14		-	-	-	-	-	-	16,372 27,285	2,456 4,093	18,827 31,378	18,827 31,378	-	-	-	-	-	-	-	-	-	245,440 422,240
1a.4	Subtotal Period 1a Period-Dependent Costs	-	1,367	12	6	-	50		8,679	69,502	64,632	4,870	-	-	610	-	-	-	12,190	20	
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

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Table I

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

							(11	lousanus	oi 2020 Dollai	3)											
						Off-Site	LLRW				NRC	Spent Fuel	Site	Processed			Volumes		Burial /		Utility and
Activi Inde		Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Processing Costs	Disposal Costs	Other Costs	Total Contingency	Total Costs	Lic. Term. Costs	Management Costs	Restoration Costs	Volume Cu. Feet	Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet	Processed Wt., Lbs.	Craft Manhours	Contractor Manhours
PERIO	D 1b - SAFSTOR Limited DECON Activities																				
Period 1	b Direct Decommissioning Activities																				
Deconta	mination of Site Buildings																				
	Reactor Building	5,155	-	-	-	-	-	-	2,577	7,732	7,732	-	-	-	-	-	-	-	-	70,157	
	Admin HPCI Room	95 25	-	-	-	-	-	-	48 13	143 38	143 38	-	-	-	-	-	-	-	-	1,357 350	
	Hot Shop	15	-	-	-	-	-	-	7	22	22	-	-	-	-	-	-	-	-	208	
1b.1.1.5		49	-	-	-	-	-	-	25	74	74	-	-	-	-	-	-	-	-	705	
1b.1.1.6 1b.1.1.7		326 34	-	-	-	-	-	-	163 17	489 51	489 51	-	-	-	-	-	-	-	-	4,575 488	
1b.1.1.8	Radwaste	103	-	-	-	-	-	-	51	154	154	-	-	-	-	-	-	-	-	1,473	
1b.1.1.9		54	-	-	-	-	-	-	27	81	81	-	-	-	-	-	-	-	-	768	
	Recombiner Turbine	23 600	-	-	-	-	-	-	11 300	34 900	34 900	-	-	-	-	-	-	-	-	323 8,583	
	2 Turbine Building Addition	50	-	-	-	-	-	-	25	74	74	-	-	-	-	-	-	-	-	709	
	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	-
	b 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	-	-	-	-	-	-	-	-	-	-
	b Collateral Costs																				
1b.3.1	Decon equipment	1,055	-	- 145	- 050	-	-	-	158	1,213	1,213	-	-	-	1.051	-	-	-	- 01.040	-	-
1b.3.2 1b.3.4	Process decommissioning water waste Small tool allowance	220	126	145	258	-	588	-	310 19	1,522 145	1,522 145	-	-	-	1,351	-	-	-	81,042	263	-
1b.3.5	Spent Fuel Capital and Transfer	-	-	-	-	-	-	196	29	225	-	225	-	-	-	-	-	-	-	-	-
1b.3.6	Retention and Severance	1.054	-	145	- 050	-	-	3,601	540	4,141	4,141	-	-	-	1.051	-	-	-	- 01.040	-	-
1b.3	Subtotal Period 1b Collateral Costs	1,274	126	145	5 258	-	588	3,796	1,057	7,246	7,021	225	-	-	1,351	-	-	-	81,042	263	-
	b Period-Dependent Costs																				
1b.4.1 1b.4.2	Decon supplies Insurance	1,562	-	-	-	-	•	580	391 58	1,953 638	1,953 638	-	-	-	•	-	-	-	-	-	-
1b.4.2	Property taxes	-	-	-	-	-	-	890	89	979	979	-	-	-	-	-	-	-	-	-	-
1b.4.4	Health physics supplies	-	729		-	-	-	-	182	911	911	-	-	-	-	-	-	-	-	-	-
1b.4.5 1b.4.6	Heavy equipment rental Disposal of DAW generated	-	188	11	- 6	-	46	-	28 13	216 76	216 76	-	-	-	- 555	-	-	-	11,092	18	-
1b.4.7	Plant energy budget	-		- 11		-	- 40	453	68	521	521	-	-	-	-	-		-	- 11,032	- 10	-
1b.4.8	NRC Fees	-	-	-	-	-	-	161	16	177	177	-	-	-	-	-	-	-	-	-	-
1b.4.9 1b.4.10	Emergency Planning Fees Fixed Overhead	-	-	-	-	-	•	708 652	71 98	779 750	750	779	-	-	•	-	-	-	-	-	-
1b.4.10 1b.4.11	Spent Fuel Pool O&M	-	-	-	-	-	-	211	32	242	750	242	-	-	-	-	-	-	-	-	-
1b.4.12	ISFSI Operating Costs	-	-	-	-	-	-	28	4	32	-	32		-	-	-	-	-	-	-	-
1b.4.13 1b.4.14	Railroad Track Maintenance Security Staff Cost	-	-	-	-	-	-	31 4,082	5 612	36 4,694	36 4,694	-	-	-	-	-	-	-	-	-	61,192
1b.4.14 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	
1b.0	TOTAL PERIOD 1b COST	10,195	1,043	156	3 264	-	634	31,070	9,325	52,688	51,410	1,278	-	-	1,905	-	-	-	92,135	101,314	166,463
PERIO	D 1c - Preparations for SAFSTOR Dormancy																				
Period 1	c 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 1c.1.4	Interim survey prior to dormancy Secure building accesses	-	-	-	-	-	-	733	220	953 a	953	-	-	-	-	-	-	-	-	12,801	-
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 1	c Collateral Costs																				
1c.3.1	Process decommissioning water waste	161	-	107	190	-	433	-	228	1,120	1,120	-	-	-	994	-	-	-	59,653	194	-

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Table I

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

						O 00 ~··															******
Activit	t7	Decon	Removal	Packaging	Transport	Off-Site Processing	LLRW Disposal	Other	Total	Total	NRC Lic. Term.	Spent Fuel Management	Site Restoration	Processed Volume	Class A		Volumes Class C	GTCC	Burial / Processed	Craft	Utility and Contractor
Index		Cost	Cost	Costs	Costs	Costs	Costs	Costs	Contingency	Costs	Costs	Costs	Costs	Cu. Feet			Cu. Feet		Wt., Lbs.	Manhours	Manhours
D. C. 11																					
1c.3.3	c Collateral Costs (continued) Small tool allowance		5						1	6	6	-									
1c.3.4	Spent Fuel Capital and Transfer	-			-	-	-	2,539	381	2,920	-	2,920	-	-	-	-	-	-	-	-	-
1c.3.4	Retention and Severance	-	-	-	-	-	-	2,734	410	3,145	3,145	2,320	-	-	-	-	-	-	-	-	-
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	-
D 1 14	D. LID. L. G.																				
Period 1 1c.4.1	c Period-Dependent Costs							580	58	638	638										
1c.4.1 1c.4.2	Insurance 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 28	32	242 32	-	242 32	-	-	-	-	-	-	-	-	-
1c.4.11 1c.4.12	ISFSI Operating Costs Railroad Track Maintenance	-	-	-	-	-	-	28 31	4 5	32 36	36	32	-	-	-	-	-	-	-	-	-
1c.4.12 1c.4.13	Security Staff Cost	-	-	-	-	-	-	4,082	612	4,694	4,694	-	-	-	-	-	-	-	-	-	61,192
1c.4.13	Utility Staff Cost	-	-	-	-	-	-	6,803	1,020	7,823	7,823	-	-	-	-	-	-	-	-	-	105,271
1c.4.14	Subtotal Period 1c Period-Dependent Costs	-	436	3	2	-	13		2,166	17,216	16,163	1,053	-	-	152	-	-	-	3,039	5	166,463
								,	ŕ	,	,	,							ŕ		
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
PERIO	O 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
PERIO	O 2a - SAFSTOR Dormancy with Wet Spent Fuel Storage																				
Period 2	a 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 2a.1	Maintenance supplies Subtotal Period 2a Activity Costs	-	-	-	-	-	-	349 504	87 111	437 615	437 615	-	-	-	-	-	-	-	-	-	-
2a.1	Subtotal Period 2a Activity Costs	-	-	-	-	-	-	504	111	619	619	-	-	-	-	-	-	-	-	-	-
	a 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 2	a 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 2	a 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	- E 001	-	-	-	-	-	-	-	-	-
2a.4.7 2a.4.8	Emergency Planning Fees Fixed Overhead	-	-	-	-	-	-	7,110 5,306	711 796	7,821 6,102	6,102	7,821	-	-	-	-	-	-	-	-	-
2a.4.6 2a.4.9	Spent Fuel Pool O&M	-	-	-	-	-	-	2,115	317	2,432	6,102	2,432	-	-	-	-	-	-	-	-	-
2a.4.3 2a.4.10	ISFSI Operating Costs	-	-	-	-	-	-	2,113	42	322	-	322	-	-	-	-	-		-	-	-
2a.4.10	Railroad Track Maintenance	-	-		-	-	-	639	96	735	735	- 322	-	-	-		-	-	-	-	-
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		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

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Table I

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

							`		or 2020 Domai	/											
Activity Index		Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Class A	Class B	Volumes Class C Cu. Feet	GTCC Cu. Feet	Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
PERIOI	O 2b - SAFSTOR Dormancy with Dry Spent Fuel Storage																				•
Period 2l	b Direct Decommissioning Activities																				
2b.1.1	Quarterly Inspection									a											
2b.1.2 2b.1.3	Semi-annual environmental survey Prepare reports									a a											
2b.1.4	Bituminous roof replacement	-	-	-	-	<u>-</u>	-	3,127	469	3,596	3,596	<u>-</u>	-	-	-	-	-	-	-	-	<u>-</u>
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	-	-	-	-	-	-	-	-	-	-
	b Collateral Costs							000 555	** 010	101 501		101 501									
2b.3.1 2b.3	Spent Fuel Capital and Transfer Subtotal Period 2b Collateral Costs	-	-	-	-	-	-	366,775 366,775	55,016 55,016	421,791 421,791	-	421,791 421,791	-	-	-	-	-	-	-	-	-
								000,110	00,010	121,101		121,101									
Period 28 2b.4.1	b Period-Dependent Costs Insurance	_	_	-	-	<u>-</u>	_	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 2b.4.5	Disposal of DAW generated Plant energy budget	-	-	111	57	-	461	9,196	135 1,379	764 10,576	764 10,576	-	-	-	5,595	-	-	-	111,903	182	-
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 2b.4.10	ISFSI Operating Costs Railroad Track Maintenance	-	-	-	-	-	-	5,666 6,330	850 950	6,516 7,280	7,280	6,516	-	-	-	-	-	-	-	-	-
2b.4.10 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
PERIOI	O 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
PERIOI	O 3a - Reactivate Site Following SAFSTOR Dormancy																				
Period 3a	a Direct Decommissioning Activities																				
3a.1.1	Prepare preliminary decommissioning cost	-	-	-	-	-	-	167	25	192	192	-	-	-	-	-	-	-	-	-	1,300
3a.1.2 3a.1.3	Review plant dwgs & specs. Perform detailed rad survey	-	-	-	-	-	-	591	89	680 a	680	-	-	-	-	-	-	-	-	-	4,600
3a.1.3	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 3a.1.7	Define major work sequence Perform SER and EA	-	-	-	-	-	-	964 398	145 60	1,108 458	1,108 458	-	-	-	-	-	-	-	-	-	7,500 3,100
3a.1.7 3a.1.8	Perform Site-Specific Cost Study	-	-	-	-	-	-	643	96	458 739	498 739	-	-	-	-	-	-	-	-	-	5,000
Activity	Specifications																				
3a.1.9.1		-	-	-	-	-	-	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 3a.1.9.4		-	-	-	-	-	-	912 835	137 125	1,049 961	1,049 961	-	-	-	-	-	-	-	-	-	7,100 6,500
3a.1.9.4 3a.1.9.5			-	-	-	-	-	835 64	10	74	74	-	-	-	-	-		-	-	-	500
3a.1.9.6		-	-	-	-	-	-	129	19	148	148	-	-	-	-	-	-	-	-	-	1,000
3a.1.9.7		-	-	-	-	-	-	206	31	236	118	-	118	-	-	-	-	-	-	-	1,600
3a.1.9.8 3a.1.9.9		-	-	-	-	-	-	268 268	40 40	309 309	309 309	-	-	-	-	-	-	-	-	-	2,088 2,088
	Main Condensers Pressure suppression structure	-	-	-	-	-	-	257	39	296	296	-	-	-		-	-	-	-	-	2,000
3a.1.9.11	Drywell	-	-	-	-	-	-	206	31	236	236	-	-		-	-	-	-	-		1,600
	2 Plant structures & buildings	-	-	-	-	-	-	401	60	461	231	-	231	-	-	-	-	-	-	-	3,120
	Waste management Facility & site closeout	-	-	-	-	-	-	591 116	89 17	680 133	680 67	-	67	-	-	-	-	-	-	-	4,600 900
3a.1.9.14 3a.1.9	Total	-	-	-	-	-	-	5,736	860	6,597	6,011	-	586	-	-	-	-	-	-	-	44,633
	g & Site Preparations																				
3a.1.10		-	-	-	-	-	-	308	46	355	355	-	-	-	-	-	-	-	-	-	2,400
3a.1.11	Plant prep. & temp. svces	-	-	-	-	-	-	3,500 180	525 27	4,025 207	4,025 207	-	-	-	-	-	-	-	-	-	1,400
3a.1.12 3a.1.13	Design water clean-up system Rigging/Cont. Cntrl Envlps/tooling/etc.	-	-	-	-	-	-	2,400	360	2,760	2,760	-	-	-	-	-	-	-	-	-	1,400
3a.1.14	Procure casks/liners & containers	-	-	-	-	-	-	158	24	182	182	-	-	-	-	-	-	-	-	-	1,230

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Table I

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

							`														
Activity Index		Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Class A Cu. Feet	Class B	Volumes Class C Cu. Feet	GTCC Cu. Feet	Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
3a.1	Subtotal Period 3a Activity Costs	-	-	-	-	-	-	15,341	2,301	17,643	17,057	-	586	-	-	-	-	-	-	-	73,463
	a Additional Costs																				
3a.2.1	Site Characterization Mixed & RCRA Waste	-	-	28	29	- 14	-	5,930	1,779	7,708 80	7,708 80	-	-	- 40	-	-	-	-	5,253	30,500 161	10,852
3a.2.2 3a.2	Subtotal Period 3a Additional Costs	-	-	28				5,930	9 1,788	7,788	7,788	-	-	43 43		-	-	-	5,253	30,661	10,852
				20	23	14		5,550	1,700	1,100	1,100			40					0,200	50,001	10,002
3a.3.1	a Collateral Costs 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	-	-	-	-	-	-	-	-	-
	a Period-Dependent Costs																				
3a.4.1	Insurance	-	-	-	-	-	-	703	70	774 3,827	442	332	-	-	-	-	-	-	-	-	-
3a.4.2 3a.4.3	Property taxes Health physics supplies	-	538	-	-	-	-	3,479	348 135	3,827 673	3,241 673	586	-	-	-	-	-	-	-	-	-
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 3a.4.9	NRC Fees Emergency Planning Fees	-	-	-	-	-	-	335 148	33 15	368 163	368	163	=	-	-	-	-	-	-	-	-
3a.4.9 3a.4.10	Fixed Overhead	-	-	-	-	-	-	2,616	392	3,009	3,009	163	-	-	-	-	-	-	-	-	-
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			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																				
	Plant systems	-	-	-	-	-	-	608	91	700	630	-	70	-	-	-	-	-	-	-	4,733
3b.1.1.2		-	-	-	-	-	-	514	77	591	591	-	-	-	-	-	-	-	-	-	4,000
3b.1.1.3	Remaining buildings CRD housings & NIs	-	-	-	-	-	-	174 129	26 19	200 148	50 148	-	150	-	-	-	-	-	-	-	1,350 1,000
3b.1.1.4 3b.1.1.5		-	-	-	-	-	-	129	19	148	148	-	-	-	-	-	-	-	-	-	1,000
3b.1.1.6		-	-	-	-	-	-	257	39	296	296	_	-	-	-	-	-	-	-	-	2,000
	Reactor vessel	-	-	-	-	-	-	467	70	537	537	-	-	-	-	-	-	-	-	-	3,630
	Facility closeout	-	-	-	-	-	-	154	23	177	89	-	89	-	-	-	-	-	-	-	1,200
3b.1.1.9		-	-	-	-	-	-	154	23 19	177	177	-		-	-	-	-	-	-	-	1,200 1,000
	Reinforced concrete Main Turbine	-		-	-	-	-	129 267	40	148 307	74 307	-	74	-		_	_	-	-	-	2,080
	Main Condensers	-	-	-	_	_	-	268	40	309	309	_	-	-	-		_	-	-	_	2,088
3b.1.1.13	Moisture separators & reheaters	-	-	-	-	-	-	257	39	296	296	-	-	-	-	-	-	-	-	-	2,000
	Radwaste building	-	-	-	-	-	-	351	53	403	363	-	40		-	-	-	-	-	-	2,730
	Reactor building	-	-	-	-	-	-	351	53	403	363	-	40		-	-	-	-	-	-	2,730
3b.1.1 3b.1	Total Subtotal Period 3b Activity Costs	-	-	-	-	-	-	4,208 4,208	631 631	4,839 4,839	4,376 4,376	-	463 463		-	-	-	-	-	-	32,741 32,741
Period 91	o Collateral Costs																				
3b.3.1	Decon equipment	1,055	-	-	-	-	-	_	158	1,213	1,213	-	_	_	_	_	-	-	-	_	_
3b.3.2	DOC staff relocation expenses	-,000	-	-	-	-	-	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 3b.4.1	o Period-Dependent Costs Decon supplies	39							10	48	48										
3b.4.1 3b.4.2	Insurance	- 39	-	-	-	-	-	351	35	48 386	48 386	-	-	-	-	-	-	-	-	-	-
3b.4.2	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	-	=	-	-	-	-	-	-	-	-

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Table I

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

3b.4.15 DOC Staff Cost								`			,											
Part																						
Sect		Activity Description																				
Sect	Period 3h Period-I	Denendent Costs (continued)																				
Mart			-	-	-	-	-	-	25	3	28	-	28	-	-	-	-	-	-	-	-	-
March Marc			-	-	-	-	-	-				183		-	-	-	-	-	-	-	-	-
Section Sect			-	-	-	-	-	-					81	-	-	-	-	-	-	-	-	-
Section Sect				-	-	-	-	-					64	-	-	-			-	-	-	-
1. 1. 1. 1. 1. 1. 1. 1.			-	-	-	-	-	-				72	-	-	-	-	-	-	-	-	-	-
1. 1. 1. 1. 1. 1. 1. 1.			-	-	-	-	-	-					143	-	-	-	-	-	-	-	-	34,485
36. 1 Soliminal Personal Regentance of 130 167 1 6 3 - 14 108 108 109 109 109 109 109 109 109 109 109 109			-	-	-	-	-	-						-	-	-	-	-	-	-	-	58,080
PARMO PUPLINE 1,000 1,00			39	671	6	3	-	24						-	-	291	-	-	-	5,814	9	222,210
Part	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
Principal Content Prin	PERIOD 3 TOTA	ALS	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
Note Name (Section Section S	PERIOD 4a - Lai	rge Component Removal																				
Lail 18 Decrementation System Programs Valves (2) 85 27 32 185 284 1134 700 970 970 970 116 - 94,687 1284 1285 1140 1140 1140 1140 1140 1140 1140 114	Period 4a Direct D	Decommissioning Activities																				
Lail 18 Decrementation System Programs Valves (2) 85 27 32 185 284 1134 700 970 970 970 116 - 94,687 1284 1285 1140 1140 1140 1140 1140 1140 1140 114																						
Charles 1 1 1 1 1 1 1 1 1			23	85	27	32	185	264	-	134		750	-	-	676	715	-	-	-	94,867	1,594	-
Section Sect			-				252		-				-	-	568		-	-	-			-
Section Sect													-	-								-
Lal I feads 21 35,08 30,08 20,4 48 30,02 57 21,05 59,002 97,002			139										-	-								
Main Turkinsofloeware Main		vesser	211										-	-								2,110
As Ass Confessiones 1,00 2,00 1,00 2,																						
A A			-						-				-	-			-	-	-			
A A	Cascading Costs fo	rom Clean Building Demolition																				
April Apri			-	332	-	-	-	-	-	50	381	381	-	-	-	-	-	-	-	-	2,217	-
Dispos Plant State Pla			-		-	-	-	-	-	-			-	-	-	-	-	-	-	-	127	-
Disposal of Plant Systems		e	-		-	-	-	-	-				-	-	-	-	-	-	-	-		
Aa.1.5.1 Automatic Press Relief 106 2 10 182 56 356 356 356 1.088 4.1.84 1.468 4.1.52 4.1.	4a.1.4 Totals		-	483	-	-	-	-	-	72	996	556	-	-	-	-	-	-	-	-	3,598	-
An 1.5.2 Chemistry Sampling 1.5.2 Chemistry Sampling 1.5.2 Chemistry Sampling 1.5.3 Chemistry Sampling 1.5.4 Crealating Water - RCA																						
4a.1.5.1 Control fixed C			<u>-</u>		_			-	-				-	-			-	-	-			-
An.I.A. Circulating Water - RCA					0	-		-	-				-	-		-			-			
4a.1.5.1 Combustible Gas Control - RCA			-		14	62	1,114	-	-	230	1,626		-	-	6,656	-	-		-			-
4a.1.5.1 Condensate & Feedwater - Insulated 44 41 42 55 980 267 1,767 1,757 5,855 237,764 12,501 4a.1.5.9 Condensate & Feedwater - Insulated 44 41 42 55 980 267 1,767 1,757 5,855 237,764 12,501 4a.1.5.10 Condensate & Feedwater - Insulated & 44 41 472 250 250 1,590 1,590 4,735 192,293 3484 9,265 4a.1.5.10 Control Rod Drive 47,790 47,790 47,790 48,790 48,790 48,790 48,790 48,790 48,790 49,994 49			-		0			-	-				-	-			-	-	-			-
44.1.5.1 Condensate & Feedwater Insulated			-		1			-	-				-	-			-	-	-			
4a.1.5.10 Condensate Demin 494 9 44 792 250 1,590 1,590 - 4,735 132,438 9,286 - 4a.1.5.10 Condensate Storage 657 16 77 1,378 384 2,512 - 8,237 382 9,286 - 4a.1.5.12 Control Rod Drive 4a.1.5.12 Control Rod Drive Hydraulic 37 5 23 408 15 968 968 2,440 99,906 525 - 4a.1.5.12 Control Rod Drive Hydraulic 37 10 48 855 154 1,138 1,138 2,140 99,906 525 - 4a.1.5.12 Core Spray 11 10 48 855 154 1,138 1,138 - 1,184 24,00 96,948 41,026 - 44,01 26 36 44,01 41,026 44,01 41,026 41,026 42 41,026 48 41,026 48 44,026 44 40 40 40 40 40 40 40 40 40 40 40 40 40 40 40 40			-					-	-				-	-		-	-		_			
4a.1.5.10 Condensate Storage 4a.1.5.11 Curter Rod Drive 3			-					-	-				-	-		-	-		-			
4a.1.5.12 Control Rod Drive Hydraulic			-	657	16	77	1,378	-	-	384	2,512	2,512	-	-	8,237	-	-	-	-	334,489	9,265	-
4a.1.5.14 Core Spray — 71 10 48 855 — 154 1,138 1,138 — 5,109 — 207,487 1,026 — 41.5.14 Core Spray — Insulated RCA — 118			-	9	0		-	-	-		-	0	-	-		-	-	-	-			-
4a.1.5.14 Core Spray - Insulated 4 (131) 2 11 198 - 66 4 407 407 - 1,184 - 48,081 1,806 - 44.1.5.15 Demin Water - Insulated - RCA - 15 0 1 1 14 - 6 36 36 36 - 85 - 3,445 181 - 44.1.5.16 Demin Water - RCA - 11 1 1 2 42 42 - 17 104 104 - 253 - 10,278 508 - 44.1.5.17 Diesel Oil - RCA - 2 2 0 0 0 4 - 1 7 104 104 - 233 - 233 - 931 25 - 44.1.5.18 Dipwell Atmosphere Cooling - RCA - 38 1 5 9 92 - 24 159 159 - 548 - 22,244 550 - 24.1.5.19 EDG Energ Service Water - Insul - RCA - 0 0 0 0 0 0 0 0 1 1 1 0 0 2 - 548 - 182 -			-				100	-	-				-	-		-	-	-	-			-
4a.1.5.15 Demin Water - Insulated - RCA			-					-	-				-	-		-	-	-	-			-
4a.1.5.16 Demin Water - RCA 4a.1.5.17 Diesel Oil - RCA 4a.1.5.18 Drywell Atmosphere Cooling - RCA 4a.1.5.19 Diesel Oil - RCA 4a.1.5.20 Diesel Rery Service Water - Insul - RCA 4a.1.5.21 Diesel Oil - RCA 4a.1.5.22 Dieser gery Service Water - Insul - RCA 4a.1.5.22 Dieser gery Service Water - Insul - RCA 4a.1.5.22 Dieser gery Service Water - Insul - RCA 4a.1.5.23 Diesel Cital - RCA 4a.1.5.24 Diesel Oil - RCA 4a.1.5.25 Dieser gery Service Water - RCA 4a.1.5.26 Dieser gery Service Water - RCA 4a.1.5.27 Diesel Oil - RCA 4a.1.5.28 Dieser gery Service Water - RCA 4a.1.5.29			-		_	1		-	-		36	36	-	-	85		-	-	-	3,445	181	-
4a.1.5.18 Drywell Atmosphere Cooling - RCA	4a.1.5.16 Demin	Water - RCA	-	41	1	_	42	-	-		104	104	-	=	253		-	-	-	10,278	508	-
4a.1.5.19 EDG Emerg Service Water - Insul - RCA			-	_	0		-	-	-		•	•	-	-		-	-	-	-			-
4a.1.5.21 Emergency Service Water - Insul - RCA 4a.1.5.21 Emergency Service Water - Insul - RCA 4a.1.5.22 Emergency Service Water - RCA 4a.1.5.23 GEZIP - RCA 4a.1.5.24 Generator Physical Design - RCA 4a.1.5.25 H2-O2 Control Analyzing 4a.1.5.26 H2-O2 Control Analyzing - 66 4a.1.5.26 H2-O2 Control Analyzing - 66 4a.1.5.26 H2-O2 Control Analyzing - 66 4a.1.5.27 High Pressure Coolant Injection - Insula 4a.1.5.28 High Pressure Coolant Injection - Insula 4a.1.5.29 High Pressure Coolant Injection - Insula 4a.1.5.20 - 135 4a.1.5.21 - 155 4a.1.5.22 - 155 4a.1.5.23 - 155 4a.1.5.24 - 155 4a.1.5.25 H2-O2 Control Analyzing - 66 4a.1.5.26 H2-O2 Control Analyzing - 66 4a.1.5.27 High Pressure Coolant Injection - Insula 4a.1.5.28 High Pressure Coolant Injection - Insula 4a.1.5.28 High Pressure Coolant Injection - Insula 4a.1.5.29 High Pressure Coolant Injection - Insula 4a.1.5.29 High Pressure Coolant Injection - Insula 4a.1.5.29 H2-O2 Control Analyzing - 198 4a.1.5.20 H2			-		1	0		-	-				-	-		-	-	-	-			-
4a.1.5.21 Emergency Service Water - Insul - RCA 4a.1.5.22 Emergency Service Water - RCA 4a.1.5.23 GEZIP - RCA 4a.1.5.23 GEZIP - RCA 4a.1.5.24 Generator Physical Design - RCA 4a.1.5.25 H2-O2 Control Analyzing 4a.1.5.26 H2-O2 Control Analyzing 4a.1.5.27 High Pressure Coolant Injection - Insula 4a.1.5.27 High Pressure Coolant Injection - Insula 4a.1.5.28 High Pressure Coolant Injection - Insula 4a.1.5.28 High Pressure Coolant Injection - Insula 4a.1.5.29 Insulated 4a.1.5.20 Insulated 4a.1.5.27 High Pressure Coolant Injection - Insula 4a.1.5.28 High Pressure Coolant Injection - Insula 4a.1.5.29 Insulated 4a.1.5.20 Insulate			-		- 0		0		-	0	-	_	-	15	2		-		-	84	-	-
4a.1.5.22 Emergency Service Water - RCA			-		0	1	23	-	-	_			-	-	137	-	-	-	-	5,544		-
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	4a.1.5.22 Emerge	ency Service Water - RCA	-		0	0	2	-	-	1	5	5	-	-	13	-	-	-	-	512	22	-
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 - 1 6 0 0 4 - 2 12 12 - 23 948 72 - 4a.1.5.26 H2-O2 Control Analyzing - 1 6 0 0 4 - 2 12 12 - 23 948 72 - 4a.1.5.27 High Pressure Coolant Injection - 6 0 3 12 211 - 49 334 334 - 1,262 51,257 850 - 4a.1.5.28 High Pressure Coolant Injection - 1 1 10 713 713 - 2,266 92,018 2,734 -			-	0	0	1		-	-	4			-	-		-	-	-	-			-
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			-	9	0	0		-	-	_			-	-		-	-	-	-			-
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 -			- -	Ü	0	0		-	-	_			-	-		-	-	-	-			-
4a.1.5.28 High Pressure Coolant Injection - Insula - 198 4 21 379 - 110 713 713 - 2,266 92,018 2,734 -			-		Ü	12		-	-				-	-		-	-	-	-			-
			-		4			-	-				-	-			-	-	-			-
			-		-	-	-	-	-			-	-	10		-	-	-	-	-		-

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Table I

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

							·			•											
						Off-Site	LLRW				NRC	Spent Fuel	Site	Processed			Volumes		Burial /		Utility and
Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Processing Costs	Disposal Costs	Other Costs	Total Contingency	Total Costs	Lic. Term. Costs	Management Costs	Restoration Costs	Volume Cu. Feet	Class A Cu. Feet	Class B	Class C Cu. Feet	GTCC		Craft Manhours	Contractor Manhours
index	Activity Description	Cost	Cost	Costs	Costs	Costs	Costs	Costs	Contingency	Costs	Costs	Costs	Costs	Cu. Feet	Cu. Feet	Cu. Feet	Cu. reet	Cu. reet	Wt., LDS.	Mannours	Mannours
	of Plant Systems (continued)																				
	Hydrogen Cooling - RCA	-	7	0	0	7	-	-	3	17	17	-	-	39	-	-	-	-	1,600	79	-
	Hydrogen Seal Oil - RCA	-	$\frac{17}{24}$	0	2	32 23	-	-	9 10	60 59	60 59	-	-	189 140	-	-	-	-	7,669	212 304	-
	Hydrogen Water Chemistry - RCA Instrument & Service Air - RCA	-	225	4	17	296	-	-	103	644	644	-	-	1,768		-		-	5,672 71,810	2,733	-
	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	-
	Main Turbine	-	909	63	298	5,335	-	-	1,079	7,684	7,684	-	-	31,885	-	-	-	-	1,294,866	12,952	-
	Main Turbine - Insulated	-	193	7	32	579	-	-	141	952	952	-	-	3,460	-	-	-	-	140,506	2,725	-
	Miscellaneous Off Gas Recombiner	-	38 169	6	3 27	51 479	-	-	18 119	110 799	110 799	-	-	302 2,861	-	-	-	-	12,283 116,194	556 2,387	-
	Off Gas Recombiner - Insulated	-	351	5	22	393	-	-	150	921	921	-	-	2,350	-	-	-	-	95,441	4,785	-
	Post Accident Sampling	-	23	0	1	16	-	-	8	48	48	-	-	99	-	-	-	_	4,004	306	-
	Post Accident Sampling - Insulated	-	15	0	1	11	-	-	6	33	33	-	-	67	-	-	-	-	2,737	190	-
	RHR Service Water - Insulated - RCA	-	83	3	14	248	-	-	60	409	409	-	-	1,485	-	-	-	-	60,293	1,125	-
	RHR Service Water - RCA	-	4 50	0	0 3	6 55	-	-	2 21	12 130	12 130	-	-	35 327	-	-	-	-	1,410	57 687	-
	Reactor Feedwater Pump Seal Residual Heat Removal	-	226	58	147	2,110	514	-	529	3,584	3,584	-	-	12,609	1,519	-	-	-	13,295 609,174	3,282	-
	Residual Heat Removal - Insulated	-	500	39	74	851	464	-	384	2,312	2,312	-	-	5,084	1,374	-	-	-	294,206	7,027	-
	Rx Core Isolation Cooling	-	43	1	3	61	-	-	21	129	129	-	-	364	-	-	-	_	14,781	609	-
	Rx Core Isolation Cooling - Insulated	-	97	1	5	94	-	-	39	237	237	-	-	563	-	-	-	-	22,843	1,315	-
	Rx Recirculation	-	53	5	4	16	52	-	30	161	161	-	-	96	152	-	-	-	13,794	691	-
	Snubbers	-	151	1	5	84	-	-	51	292	292	-	-	502	-	-	-	-	20,395	2,272	-
	Standby Liquid Control - Insul - RCA Standby Liquid Control - RCA	-	$\frac{4}{26}$	0	0 2	41	-	-	2 13	83	9 83	-	-	22 245	-	-	-	-	904 9,969	48 341	-
	Stator Cooling - RCA	-	7	0	1	21	-	-	5	35	35	-	-	126	-	-	-	-	5.135	98	-
	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	
								-				-	-			1.000	-	-			0.110
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
	Collateral Costs																				
4a.3.1	Process decommissioning water waste	4	-	7	12	-	28	-	12	63	63	-	-	-	64	-	-	-	3,856	13	-
4a.3.3 4a.3.4	Small tool allowance Spent Fuel Capital and Transfer	-	267	-	-	-	-	6,395	40 959	307 7,355	276	7,355	31	-	-	-	-	-	-	-	-
4a.3.4 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-Dependent Costs	25							22	100	100										
4a.4.1 4a.4.2	Decon supplies Insurance	87	-	-	-	-	-	790	22 79	109 869	109 869	-	-	-	-	-	-	-	-	-	-
4a.4.2 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 NRC ISFSI Fees	-	-	-	-	-	-	1,938	291	2,229 63	2,229	- 63	-	-	-	-	•	-	-	-	-
4a.4.8 4a.4.9	NRC ISFSI Fees NRC Fees	-	-	-	-	-	-	57 544	6 54	63 598	598	- 63	-	-	-	-	-	-	-	-	-
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 4a.4.15	Railroad Track Maintenance Remedial Actions Surveys	-	-	-	-	-	-	140 1,258	21 189	162 1,447	162 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	1,502	=	-	-	-	-	-	-	-	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																				
	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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Table I

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

							(11	iousanus	oi 2020 Dollai	.5)											
						Off-Site	LLRW				NRC	Spent Fuel	Site	Processed		Burial	Volumes		Burial/		Utility and
Activity		Decon	Removal		Transport	Processing	Disposal	Other	Total	Total	Lic. Term.	Management	Restoration	Volume	Class A	Class B	Class C	GTCC	Processed	Craft	Contractor
Index	Activity Description	Cost	Cost	Costs	Costs	Costs	Costs	Costs	Contingency	Costs	Costs	Costs	Costs	Cu. Feet	Cu. Feet	Cu. Feet	Cu. Feet	Cu. Feet	Wt., Lbs.	Manhours	Manhours
	of Plant Systems																				
	ALARA/Radiological	-	16			8	-	-	5	30	30	-	-	49	-	-	-	-	1,987	247	-
4b.1.2.2	Alternate N2 - RCA	-	16 3		-	16 17	-	-	7	40 25	40 25	-	-	93 103	-	-	-	-	3,765	185 48	-
4b.1.2.3 4b.1.2.4	Cranes/Heavy Loads/Rigging - RCA Decontamination Projects	-	ა 1	0		17	-	-	0	25	25	-	-	103	-	-	-		4,184 125	48 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 4b.1.2.9	Electrical - Decontaminated Fire - RCA	-	2,698 101	48	218 6	3,906 103	-	-	1,298 42	8,167 253	8,167 253	-	-	23,344 614	-	-	-	-	948,013 24,917	37,107 1,324	-
	Fire - RCA Fire - RCA - Fuel Pool Area	-	101	0		103	-	-	42	26	26	-	-	62	-		-	-	2,499	1,324	-
	Fuel Pool Cooling & Cleanup	-	387	20	33	343	241	-	216	1,241	1,241	-	-	2,051	712	-	-	-	128,918	5,363	-
	Fuel Pool Cooling & Cleanup - Insulated	-	37	2	3	22	24	-	19	107	107	-	-	130	71	-	-	-	9,830	514	-
	HVAC Ductwork	-	276	6	26	469	-	-	144	921	921	-	-	2,805	-	-	-	-	113,913	3,539	-
	HVAC Ductwork - Fuel Pool Area HVAC/Chilled Water - RCA	-	31 324	1	3 26	52 461	-	-	16 155	102 971	102 971	-	-	312 2,752	-	-	-	-	12,657 111,779	393 3,985	-
	HVAC/Chilled Water - RCA Fuel Pool Area	-	33			37	-	-	14	87	87	-	-	2,752	-	-	-		9,072	397	
	Heating & Ventilation	-	433		_	1,060	_	-	277	1,842	1,842	_	_	6,334	-	_	_		257,243	6,340	-
	Heating Boiler - Insulated - RCA	-	3	0	-	4	-	-	1	9	9	-	-	26	-	-	-	-	1,058	35	-
	Instrument & Service Air-RCA-Fuel Pool	-	29	1	2	45	-	-	14	91	91	-	-	267	-	-	-	-	10,841	357	-
	Liquid Radwaste	-	621	31		703	311	-	350	2,072	2,072	-	-	4,203	915	-	-	-	229,422	8,550	-
	Makeup Demin - RCA Non-Essential Diesel Generator - RCA	-	103 27	3 3		246 238	-	-	65 45	431 327	431 327	-	-	1,471 1,424	-	-	-		59,747 57,832	1,412 395	-
	Off Gas Holdup	-	310		34	607	-	-	174	1,133	1.133	-	-	3,629	-	_	_		147.355	4,256	-
	Primary Containment	-	411	16		1,389	-	-	324	2,218	2,218	-	-	8,302	-	_	_	-	337,148	5,729	-
	Process Radiation Monitors	-	41	0	_	36	-	-	16	95	95	-	-	213	-	-	-	-	8,667	577	-
	Rx Bldg Closed Clng Water - Insul - RCA	-	114			163	-	-	54	343	343	-	-	977	-	-	-	-	39,675	1,484	-
	Rx Bldg Closed Clng Water - RCA Rx Component Handling Equip	-	184 127	15 11		1,187 291	139	-	235 115	1,687 708	1,687 708	-	-	7,093 1,737	415	-	-	-	288,031 96,901	2,489 1,839	-
	Rx Pressure Vessel	-	43			291	139 57	-	30	167	167	-	-	1,757	169			-	17,375	578	-
	Rx Water Cleanup	-	239	16		47	214	_	124	655	655	-	-	278	630	_	_		51,819	3,264	-
4b.1.2.31	Secondary Containment	-	112		13	229	-	-	65	421	421	-	-	1,372	-	-	-	-	55,702	1,569	-
	Service & Seal Water - Insulated - RCA	-	120			197	-	-	62	392	392	-	-	1,180	-	-	-	-	47,917	1,565	-
	Service & Seal Water - RCA	-	159		17	303	-	-	88	570	570	-	-	1,809	-	-	-	-	73,453	2,016	-
	Service Air Blower - RCA Solid Radwaste	-	15 446		-	34 567	223	-	9 261	62 1,563	62 1,563	-	-	206 3,390	659	•	-	-	8,364 179,772	206 6,270	-
	Structures & Buildings	-	70		45	80	-	-	30	1,565	185	-	-	477	-				19,351	1,005	-
	Wells & Domestic Water	-	10		-	-	-	-	1	11	-	-	11	-	-	_	_	-	-	144	-
	Wells & Domestic Water - RCA	-	52		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	-
	nination of Site Buildings																				
		4,668				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		0	-	-	15		53	172	172	-	-	-	145	-	-	-	6,840	1,421	-
4b.1.4.3 4b.1.4.4	HPCI Room Hot Shop	26 15		0	3 2	20	14 11	-	26 11	115 43	115 43	-	-	118	125 103	-	-	-	10,759 4,860	703 254	-
4b.1.4.4	LLRW Storage & Shipping	52			8	- 5	45	-	45	179	179	-	-	31	433	-	-		21,708	1,003	-
4b.1.4.6	Offgas Stack	336		7	23	225	82		286	1,199	1,199	-	-	1,343	669	-	-	-	87,045	7,924	-
4b.1.4.7	Offgas Storage & Compressor	36			6	4	33		32	128	128	-	-	25	316	-	-	-	15,948	696	-
4b.1.4.8	Radwaste	109			17	29	96		100	410	410	-	-	172	910	-	-	-	49,943	2,229	-
4b.1.4.9	Radwaste Material Storage Warehouse Recombiner	57 24		2	9 5	- 33	52 24		48 30	189 140	189 140	-	-	199	495 216	-	-	-	23,400 18,405	1,062 616	-
	Turbine	638		-	-	215	564		588	2.444	2.444	-	-	1.283	5.299	-	-		303,150	12.856	-
	Turbine Building Addition	53			8	-	45		44	169	169	-	-	-	434		-	-	20,478	968	-
	Reactor (Post Fuel)	849		172		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 4b.1.6	Prepare/submit License Termination Plan Receive NRC approval of termination plan	-	-	-	-	-	-	526	79	605 a	605	-	-	-	-	-	-	-	-	-	4,096
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
	Additional Costs																				40
4b.2.1	License Termination Survey Planning Excavation of Underground Services	-	1,972	-	-	-	-	1,458 376	437 550	1,896 2,898	1,896 2,898	-	-	-	-	-	-	-	-	12,493	12,480
4b.2.2 4b.2.3	Excavation of Underground Services Operational Equipment	-	1,972	23	92	1,211	-	376	550 198	2,898 1,524	2,898 1,524	-	-	11,760	-	-	-	-	294,000	12,493	-
40.2.0	Operational Equipment	-	-	20	32	1,411	-	-	130	1,024	1,024	-	-	11,700	-	-	-	-	204,000	32	-

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Table I

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

Activity Index		Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Class A Cu. Feet	Burial V Class B Cu. Feet	Class C	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
	Collateral Costs																				
4b.3.1 4b.3.3	Process decommissioning water waste Small tool allowance	12	397	22	39	-	88	-	36 60	196 456	196 456	-	-	-	202	-	-	-	12,097	39	-
4b.3.4	Decommissioning Equipment Disposition	-	397	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 4l 4b.4.1	Period-Dependent Costs 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 4b.4.5	Health physics supplies Heavy equipment rental	-	3,050 5,239	-	-	-	-	-	763 786	3,813 6,024	3,813 6,024	-	-	-	-	-	-	-	-	-	-
4b.4.6	Disposal of DAW generated		5,235	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	-	-	-	-	-	-	986 302	99 30	1,085	1,085	-	-	-	-	-	-	-	-	-	-
4b.4.10 4b.4.11	Emergency Planning Fees Fixed Overhead	-		-	_	-	_	4,319	648	332 4,967	4,967	332	-	-	-	_	-	-	-	-	-
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 4b.4.16	Remedial Actions Surveys Security Staff Cost	-	-	-	-	-	-	2,283 12,097	343 1,815	2,626 13,912	2,626 3,826	10,086	-	-	-	-	-	-	-	-	183,371
4b.4.17	DOC Staff Cost	-	-	-	-	-	-	25,916	3,887	29,803	29.803	10,000	-	-	-	-	-	-	-	-	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
PERIOI	9 4f - License Termination																				
	Direct Decommissioning Activities									24.0	24.0										
4f.1.1 4f.1.2	ORISE confirmatory survey Terminate license	-	-	-	-	-	-	166	50	216 a	216	-	-	-	-	-	-	-	-	-	-
4f.1	Subtotal Period 4f Activity Costs	-	-	-	-	-	-	166	50	216	216	-	-	-	-	-	-	-	-	-	-
	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 4f.3.1	Collateral Costs 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 4f.4.1	Period-Dependent Costs Insurance							530	53	583	_	583									
4f.4.1 4f.4.2	Property taxes	-	-	-	-	-	-	2,198	220	2,417	1,975	583 442	-	-	-	-	-	-	-	-	-
4f.4.3	Health physics supplies	-	708	-	-	-	-	-,100	177	884	884	- 114	-	-	-	-	-	-	-	-	-
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	- 40	-	-	-	-	-	-	-	-	-
4f.4.6 4f.4.7	NRC ISFSI Fees NRC Fees	-	-	-	-	-	-	38 426	4 43	42 468	468	42	-	-	-	-	-	-	-	-	-
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 4f.4.12	Railroad Track Maintenance Security Staff Cost	-	-	-	-	-	-	94 3,463	14 519	108 3.982	108 1.565	2,417	-	-	-	-	-	-	-	-	50.932
4f.4.12 4f.4.13	DOC Staff Cost	-			-	-		5,393	809	6,201	6,201	2,417	-	-	-	-	-	-	-		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
PERIOI	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

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Table I

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

Activity Activity Description Decomagn Decomagn		C GTC			Utility and Contractor Manhours
Index Activity Description Cost Cost Costs Cu. Feet					
Demolition of Remaining Site Buildings	- -				
Demolition of Remaining Site Buildings Site Buildings					
5b.1.1.1 Reactor Building 1,971 956 2,267 2,267 2,267 5b.1.2.2 Condensate Tanks Foundation 10 1 11 1 11 1 11 1 5b.1.3.4 Discharge Retention Basin 4 1 5	-				
5b.1.12 Condensate Tanks Foundation 10 - - 1 11 - - 15 - - 55 - - 22 - - 22 - 22 - 22 - - 29 - - 20 - - 11 - - 11 - - 11 - - 11 - - 12 - - 22 - -	-				
5b.1.1.3 Discharge Retention Basin 4 - - - 1 5 - - 5 - - 5 - - 5 -	-			13,91	
5b.1.1.4 HPCI Room 19 - - 3 22 - 22 - 5b.1.1.5 Hot Shop 16 - - 2 19 - 19 - - 5b.1.1.6 Hydrogen & Oxygen Storage 2 - - 0 2 - 2 - - 5b.1.1.7 LLRW Storage & Shipping 83 - - 12 95 - 95 - 95 -				5	
5b.1.1.5 Hot Shop - 16 - - - 2 19 - - 19 - - - 5b.1.1.6 Hydrogen & Oxygen Storage - 2 - - - 0 2 - - 2 - - 5b.1.1.7 LLRW Storage & Shipping 83 - - - 12 95 - - 95 - 95	-		-	2 9	
5b.1.1.6 Hydrogen & Oxygen Storage 5b.1.1.7 LLRW Storage & Shipping 2 - - - <t< td=""><td></td><td></td><td></td><td>17</td><td></td></t<>				17	
5b.1.1.7 LLRW Storage & Shipping - 83 12 95 95 95	-			1	
5b.1.1.8 MSIV - 4 1 4 4 1	-			66	2 -
	-			4	
5b.1.1.9 Misc Structures 2017 - 1,410 212 1,622 - 1,622 - 1,622	-			13,04	
5b.1.1.10 Offgas Stack - 108 16 124 124 124 108	-			54	
5b.1.1.11 Offgas Storage & Compressor - 39 6 45 45 5b.1.1.12 Radwaste - 228 34 262 262 262	-		-	19	
55.1.1.12 Recombiner - 128 54 262 262 55.1.1.13 Recombiner - 128 19 147 147 147	-			1,22 71	
55.1.1.15 Recurity Barrier - 186 28 214 214 214				93	
5b.1.1.15 Structures Greater than 3' Below Grade - 2,461 369 2,830 2,830 2,830 2,830	_			12,64	
5b.1.1.16 Tank Farm - 4 1 5 5 5	-			2	
5b.1.1.17 Turbine - 1,259 189 1,448 1,448 1,448 1,448 1,448	-			13,03	-
5b.1.1.18 Turbine Building Addition - 55 8 63 63 63	-			61	
5b.1.1.19 Turbine Pedestal 182 27 209 209 209	-			92	
5b.1.1 Totals - 8,169 1,225 9,394 9,394 9,394	-		-	58,88	-
Site Closeout Activities					
5b.1.2 Grade & Indicape site				1,84	1 -
5b.1.3 Final report to NRC 200 30 231 231	-			-,	1,56
5b.1 Subtotal Period 5b Activity Costs - 9,065 200 1,390 10,655 231 - 10,425	-			60,72	
Period 5b Additional Costs					
5b.2.1 Clean Concrete Disposal - 3,322 13 500 3,835 3,835 5b.2.2 Intake Structure Cofferdam - 335 50 385 385 385 385 385	-			1	
5b.2.2 Intake Structure Cofferdam 335 - - - 50 385 - - 385 - - 5b.2.3 Construction Debris - - - - 1,170 176 1,346 - - 1,346 - - 1,346 - -	-			2,58	-
50.2.5 Constitution bears				5,42	2 -
55.2.5 Discharge Structure Cofferdam 442 66 508 - 508 508	_		_	3,55	
5b.2.6 Disposition of Original MPC Canisters - 55 185 954 - 5,641 - 1,709 8,544 8,544 21,097	-		- 2,505,70		
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	-		- 2,505,70	0 11,90	-
Period 5b Collateral Costs 5b.3.1 Small tool allowance - 111 17 127 127 127 127 127 127 127 127 127 127 127 127					
55.3.1 Small tool allowance - 111 17 127 127 127 55.3.2 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	-			-	-
5b.4.2 Property taxes - 4,534 453 4,988 - 4,588 - 5,549	-		-	-	-
5b.4.3 Heavy equipment rental - 5,842 876 6,719 6,719 5b.4.4 Plant energy budget 315 47 362 - 362	-		-	-	-
50-4.4 Interest blugge				-	-
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	-			-	117,23
5b.4.11 DOC Staff Cost 11,729 1,759 13,489 13,489 5b.4.12 Utility Staff Cost 7,148 1,072 8,220 - 2,129 6,091	-		-	-	122,64 101,90
50.4.12 Utility Stant Cost	-			-	341,78
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	-		- 2,505,70	0 72,63	343,34
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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Table I

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

Activity		Decon	Removal	Packaging	Transport	Off-Site Processing	LLRW Disposal	Other	Total	Total	NRC Lic. Term.	Spent Fuel Management	Site Restoration	Processed Volume	Class A		Volumes Class C	GTCC	Burial / Processed	Craft	Utility and Contractor
Index	Activity Description	Cost	Cost	Costs	Costs	Costs	Costs	Costs	Contingency	Costs	Costs	Costs	Costs	Cu. Feet	Cu. Feet		Cu. Feet		Wt., Lbs.	Manhours	Manhours
5c.3	Subtotal Period 5c Collateral Costs	-	-	-	-	-	-	142,259	21,339	163,598	-	163,598	-	-	-	-	-	-	-	-	-
Period 5	Period-Dependent Costs																				
5c.4.1	Insurance	-	-	-	-	-	-	27,126	2,713	29,838	-	29,838	-	-	-	-	-	-	-	-	-
5c.4.2	Property taxes NRC ISFSI Fees	-	-	-	-	-	-	35,797 9,215	3,580 922	39,376 10,137	-	39,376 10,137	-	-	-	-	-	-	-	-	-
5c.4.4 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 5c.4.11	DOC Staff Cost Utility Staff Cost	-	-	-	-	-	-	11,823 73,686	1,773 11,053	13,597 84,739	-	13,597 84,739	-	-	-	-	-		-	-	80,220 1,062,910
5c.4.11	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
PERIOR	5d - GTCC shipping																				
Period 5	Direct Decommissioning Activities																				
	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	-	-
	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 5	Period-Dependent Costs																				
5d.4.1	Insurance	-	-	-	-	-	-	27	3	30	30	-	=	-	-	-	-	-	-	-	-
5d.4.2	Property taxes	-	-	-	-	-	-	35	3	38	38	-	-	-	-	-	-	-	-	-	-
5d.4.4 5d.4.5	NRC ISFSI Fees Emergency Planning Fees	-	-	-	-	-	-	8	1	9 6	-	9	=	-	-	-	-	-	-	-	-
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
PERIOR	5e - ISFSI Decontamination																				
Period 5	Direct Decommissioning Activities																				
Period 5e	Additional Costs																				
5e.2.1	License Termination ISFSI	-	0	3	33	-	283		602	3,008	3,008	-	-	-	848	-	-	-	131,507	10,502	
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-Dependent Costs																				
5e.4.1	Insurance	-	-	-	-	-	-	118	30	148	148	-	-	-	-	-	-	-	-	-	-
5e.4.2 5e.4.3	Property taxes Plant energy budget	-	-	-	-	-	-	248 12	62 3	310 15	310 15	-	-	-	-	-	-	-	-	-	-
5e.4.5	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

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Monticello Nuclear Generating Plant Decommissioning Cost Analysis

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

						Off-Site	LLRW				NRC	Spent Fuel	Site	Processed		Burial	Volumes		Burial /		Utility and
Activit		Decon	Removal	Packaging	Transport	Processing	Disposal	Other	Total	Total	Lic. Term.	Management	Restoration	Volume	Class A	Class B	Class C	GTCC	Processed	Craft	Contractor
Index	Activity Description	Cost	Cost	Costs	Costs	Costs	Costs	Costs	Contingency	Costs	Costs	Costs	Costs	Cu. Feet	Cu. Feet	Cu. Feet	Cu. Feet	Cu. Feet	Wt., Lbs.	Manhours	Manhours
PERIO	O 5f - ISFSI Site Restoration																				
Period 5	f Direct Decommissioning Activities																				
Period 5	f 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 5	f Collateral Costs																				
5f.3.1	Small tool allowance	-	11	-	-	-	-	-	2	12	-	-	12		-	-	-	-	-	-	-
5f.3	Subtotal Period 5f Collateral Costs	-	11	-	-	-	-	-	2	12	-	-	12	-	-	-	-	-	-	-	-
Period 5	f 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
PERIO	0 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

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Xcel Energy

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APPENDIX J

DETAILED COST ANALYSIS

SCENARIO 8: SAFSTOR with 200 Year DFS

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Table J

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

							(11	iousunus c	oi 2020 Dollar												
Activity	v	Decon	Removal	Packaging	Transport	Off-Site Processing	LLRW Disposal	Other	Total	Total	NRC Lic. Term.	Spent Fuel Management	Site Restoration	Processed Volume	Class A	Burial Class B	Volumes Class C	GTCC	Burial / Processed	Craft	Utility and Contractor
Index		Cost	Cost	Costs	Costs	Costs	Costs		Contingency	Costs	Costs	Costs	Costs	Cu. Feet			Cu. Feet			Manhours	
PERIOI) 1a - Shutdown through Transition																				
Period 1a	a 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 1a.1.4	Notification of Cessation of Operations Remove fuel & source material									a n/a											
1a.1.5	Notification of Permanent Defueling									a											
1a.1.6	Deactivate plant systems & process waste									a											
1a.1.7 1a.1.8	Prepare and submit PSDAR Review plant dwgs & specs.	-	-	-	-	-	-	257 167	39 25	296 192	296 192	-	-	-	-	-	-	-	-	-	2,000 1,300
1a.1.9	Perform detailed rad survey							101		a	102										
1a.1.10	Estimate by-product inventory	-	-	-	-	-	-	129	19	148	148	-	-	-	-	-	-	-	-	-	1,000
1a.1.11 1a.1.12	End product description Detailed by-product inventory	-	-	-	-	-	•	129 193	19 29	148 222	148 222	-	-	-	-	-	-	-	-	-	1,000 1,500
1a.1.12	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 1a.1.17	Perform Site-Specific Cost Study Prepare/submit Irradiated Fuel Management Plan	-	-	-	-	-	-	643 129	96 19	739 148	739 148	-	-	-	-	-		-	-	-	5,000 1,000
								120	10	140	140										1,000
Activity	Specifications																				
	Prepare plant and facilities for SAFSTOR Plant systems	-	-	-	-	-	-	632 536	95 80	727 616	727 616	-	-	-	-	-	-	-	-	-	4,920 4,167
	Plant structures and buildings	-		-	-			401	60	461	461	-	-	-		-			-	-	3,120
1a.1.18.4	Waste management	-	-	-	-	-	-	257	39	296	296	-	-	-	-	-	-	-	-	-	2,000
	Facility and site dormancy	-	-	-	-	-	-	257	39	296	296	-	-	-	-	-	-	-	-	-	2,000
1a.1.18	Total	-	-	-	-	-	-	2,083	312	2,395	2,395	-	-	-	-	-	-	-	-	-	16,207
	Work Procedures																				
	Plant systems	-	-	-	-	-	-	152	23	175	175	-	-	-	-	-	-	-	-	-	1,183
1a.1.19.2 1a.1.19	Pacility closeout & dormancy Total	-		-	-	-	-	154 306	23 46	177 352	177 352	-	-	-	-	-		-	-	-	1,200 2,383
14.1.10								000	10		552										,
1a.1.20	Procure vacuum drying system	-	-	-	-	-	-	13	2	15	15	-	-	-	-	-	-	-	-	-	100
1a.1.21 1a.1.22	Drain/de-energize non-cont. systems Drain & dry NSSS									a 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	a Collateral Costs																				
1a.3.1	Spent Fuel Capital and Transfer	-	-	-	-	-	-	1,323	198	1,522	-	1,522	-	-	-	-	-	-	-	-	-
1a.3.2 1a.3	Retention and Severance Subtotal Period 1a Collateral Costs	-	-	-	-	-	-	9,892 11,215	1,484 1,682	11,376 12,897	11,376 11,376	1,522	-	-	-	-	-	-	-	-	-
18.0	Subtotal I eriou la Conateral Costs	-	-	-	-	-	-	11,210	1,002	12,001	11,576	1,022	-	-	-	-	-	-	-	-	-
	a Period-Dependent Costs																				
1a.4.1 1a.4.2	Insurance	-	-	-	-	-	-	2,328 3,570	233 357	2,561 3,927	2,561 3,927	-	-	-	-	-	-	-	-	-	-
1a.4.2 1a.4.3	Property taxes Health physics supplies	-	614	1 -	-	-	-	5,570	153	767	3,927 767	-	-	-	-		-	-	-	-	-
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 1a.4.7	Plant energy budget NRC Fees	-	-	-	-	-	-	1,817 892	272 89	2,089 981	2,089 981	-	-	-	-	-	-	-	-	-	-
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 ISFSI Operating Costs	-	-	-	-	-	-	845 112	127 17	971 129	-	971 129	-	-	-	-	-	-	-	-	-
1a.4.11 1a.4.12	Railroad Track Maintenance	-	-	-	-	-	-	112	17	144	144	129	-	-	-	-	-	-	-	-	-
1a.4.13	Security Staff Cost	-	-	-	-	-	-	16,372	2,456	18,827	18,827	-	-	-	-	-	-	-	-	-	245,440
1a.4.14	Utility Staff Cost	-	1.005			-	-	27,285	4,093	31,378	31,378	4 970	-	-	- 010	-	-	-	10.100	-	422,240
1a.4	Subtotal Period 1a Period-Dependent Costs	-	1,367	7 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	7 12	6	-	50	76,724	11,341	89,500	83,108	6,392	-	-	610	-	-	-	12,190	20	712,070

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Table J

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

							(11	lousanus	oi 2020 Dollai	13)											
						Off-Site	LLRW				NRC	Spent Fuel	Site	Processed			Volumes		Burial /		Utility and
Activit Index		Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Processing Costs	Disposal Costs	Other Costs	Total Contingency	Total Costs	Lic. Term. Costs	Management Costs	Restoration Costs	Volume Cu. Feet	Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet	Processed Wt., Lbs.	Craft Manhours	Contractor Manhours
PERIO	D 1b - SAFSTOR Limited DECON Activities																				
Period 1	b Direct Decommissioning Activities																				
Deconta	mination of Site Buildings																				
1b.1.1.1	Reactor Building	5,155	-	-	-	-	-	-	2,577	7,732	7,732	-	-	-	-	-	-	-	-	70,157	
	Admin HPCI Room	95 25	-	-	-	-	-	-	48 13	143 38	143 38	-	-	-	-	-	-	-	-	1,357 350	
	Hot Shop	15	-	-	-	-	-		7	22	22	-	-	-					-	208	
1b.1.1.5	LLRW Storage & Shipping	49		-	-	-	-	-	25	74	74	-	-	-	-	-	-	-	-	705	-
1b.1.1.6		326	-	-	-	-	-	-	163		489	-	-	-	-	-	-	-	-	4,575	
1b.1.1.7 1b.1.1.8		34 103	-	-	-	-	-	-	17 51	51 154	51 154	-	-	-	-	-	-	-	-	488 1,473	
1b.1.1.9		54		-	-	-	-		27	81	81	-	-	-	-		-		-	768	
	Recombiner	23	-	-	-	-	-	-	11	34	34	-	-	-	-	-	-	-	-	323	
	1 Turbine	600	-	-	-	-	-	-	300		900	-	-	-	-	-	-	-	-	8,583	
	2 Turbine Building Addition 3 Reactor (Post Fuel)	50 830	-	-	-	-	-	-	25 415		74 1,245	-	-	-	-	-	-	-	-	709 11,337	
1b.1.1.1 1b.1.1	Totals	7,359	-	-	-	-	-		3,679		1,245	-	-	-	-		-		-	101,033	
		,									,										
1b.1	Subtotal Period 1b Activity Costs	7,359	-	-	-	-	-	-	3,679	11,038	11,038	-	-	-	-	-	-	-	-	101,033	-
	b Additional Costs																				
1b.2.1	Spent Fuel Pool Isolation	-	-	-	-	-	-	12,675	1,901		14,576	-	-	-	-	-	-	-	-	-	-
1b.2	Subtotal Period 1b Additional Costs	-	-	-	-	-	-	12,675	1,901	14,576	14,576	-	-	-	-	-	-	-	-	-	-
Period 1	b Collateral Costs																				
1b.3.1	Decon equipment	1,055	-	-	-	-	-		158	1,213	1,213	-	-	-	-	-	-	-	-	-	-
1b.3.2	Process decommissioning water waste	220	-	145		-	588	-	310		1,522	-	-	-	1,351	-	-	-	81,042		
1b.3.4 1b.3.5	Small tool allowance Spent Fuel Capital and Transfer	-	126	-	-	-	-	196	19 29		145	225	-	-	-	-	-	-	-		-
1b.3.6	Retention and Severance	-	-	-	-	-	-	3,601	540		4,141	-	-	-	-	-	-	-	-	-	-
1b.3	Subtotal Period 1b Collateral Costs	1,274	126	145	258	-	588	3,796	1,057		7,021	225	-	-	1,351	-	-	-	81,042	263	
Period 1	b Period-Dependent Costs																				
1b.4.1	Decon supplies	1,562	-	-	-	-	-	-	391	1,953	1,953	-	-	-	-	-	-	-	-	-	-
1b.4.2	Insurance	-	-	-	-	-	-	580 890	58 89		638 979	-	-	-	-	-	-	-	-	-	-
1b.4.3 1b.4.4	Property taxes Health physics supplies	-	729		-	-	-	- 090	182		911	-	-	-	-	-	-	-	-	-	-
1b.4.5	Heavy equipment rental	-	188		-	-	-	-	28		216	-	-	-	-	-	-	-	-	-	-
1b.4.6	Disposal of DAW generated	-	-	11	. 6	-	46		13		76	-	-	-	555	-	-	-	11,092	18	-
1b.4.7	Plant energy budget	-	-	-	-	-	-	453	68		521	-	-	-	-	-	-	-	-	-	-
1b.4.8 1b.4.9	NRC Fees Emergency Planning Fees	-	-	-	-	-	-	161 708	16 71		177	779	-	-	-	-	-	-	-	-	-
1b.4.10	Fixed Overhead	-	-	-	-	-	-	652	98		750	-	-	-	-	-	-	-	-	-	-
1b.4.11	Spent Fuel Pool O&M	-	-	-	-	-	-	211	32		-	242	-	-	-	-	-	-	-	-	-
1b.4.12	ISFSI Operating Costs	-	-	-	-	-	-	28	4	32	-	32	-	-	-	-	-	-	-	-	-
1b.4.13 1b.4.14	Railroad Track Maintenance Security Staff Cost	-	-	-	-	-	-	31 4,082	5 612		36 4,694	-	-	-	-	-	-	-	-	-	61,192
1b.4.14 1b.4.15	Utility Staff Cost	-	-	-	-	-	-	6,803	1,020		7,823	-	-	-	-	-	-	-	-	-	105,271
1b.4.16	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		
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
PERIO	D 1c - Preparations for SAFSTOR Dormancy																				
Period 1	c 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							75	11	a 86	86									-	583
1c.1.5	Prepare & submit interim report	-	-	-	-	-	-		11	06		-	-	-	-	-	-	-	-		
1c.1	Subtotal Period 1c Activity Costs	-	581	-	-	-	-	808	318	1,707	1,707	-	-	-	-	-	-	-	-	16,501	583
	c Collateral Costs																				
1c.3.1	Process decommissioning water waste	161	-	107	190	-	433	-	228	1,120	1,120	-	-	-	994	-	-	-	59,653	194	-

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Monticello Nuclear Generating Plant Decommissioning Cost Analysis

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

						Off-Site	LLRW				NRC	Spent Fuel	Site	Processed		Dunial	Volumes		Burial /		Utility and
Activity	v.	Decon	Removal	Packaging	Transport	Processing	Disposal	Other	Total	Total	Lic. Term.	Management	Restoration	Volume	Class A	Class B		GTCC	Processed	Craft	Contractor
Index		Cost	Cost	Costs	Costs	Costs	Costs	Costs	Contingency	Costs	Costs	Costs	Costs		Cu. Feet					Manhours	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	-
	D 1 1 D 1 1 0 0 1																				
1c.4.1	c Period-Dependent Costs Insurance							580	58	638	638										
1c.4.1	Property taxes	•	-	-	-	-	-	888	89	977	977	-	-	-	-	-	-	-	-	-	-
1c.4.2	Health physics supplies	-	248	-	-	-	-	-	62	310	310	-	-	-	-	-	-	-	-	-	-
1c.4.3	Heavy equipment rental	-	188	-	-	-	-	-	28	216	216	-	-	-	-	-	-	-	-	-	-
1c.4.5	Disposal of DAW generated		100	3	9		13	-	4	210	210			_	152				3.039	5	
1c.4.6	Plant energy budget		-		- 4		10	453	68	521	521		-	-	102		-	-	5,055		-
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.4.11	Railroad Track Maintenance		_		_	_		31	5	36	36	- 02			_	_	_	_	_	_	
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.4.14	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
10.4	Subtotal Feriou 1c Feriou-Dependent Costs		400	0	2		10	14,007	2,100	17,210	10,105	1,000			102				5,055	9	100,405
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
PERIOI	O 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
PERIOI	2a - SAFSTOR Dormancy with Wet Spent Fuel Store	age																			
	·																				
	a Direct Decommissioning Activities																				
2a.1.1	Quarterly Inspection									a											
2a.1.2	Semi-annual environmental survey									a											
2a.1.3	Prepare reports							122	20	a	150										
2a.1.4 2a.1.5	Bituminous roof replacement	-	-	-	-	-	-	155 349	23 87	178 437	178 437	-	-	-	-	-	-	-	-	-	-
	Maintenance supplies	-	-	-	-	-	-			437 615	437 615	-	-	-	-	-	-	-	-	-	-
2a.1	Subtotal Period 2a Activity Costs	-	-	-	-	-	-	504	111	619	619	-	-	-	-	-	-	-	-	-	-
Period 2	a 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	-	-	-	-	-	-	-	-	-	-
Dowind 9	a Collateral Costs																				
2a.3.1	Spent Fuel Capital and Transfer							141,374	21,206	162,580	-	162,580									
2a.3.1 2a.3.2	Retention and Severance	-	-	-	-	-	-	19,427	2,914	22,341	22,341	162,560	-	-	-	-	-	-	-	-	-
2a.3.2 2a.3	Subtotal Period 2a Collateral Costs	-	-	-	-	-	-	160,801	24,120	184,921	22,341	162,580	-	-	-	-	-	-	-	-	-
2a.o	Subtotal I erioù za Conateral Costs	-	-	•	-	-	-	100,001	24,120	104,521	22,341	102,500	-	-	-	-	-	-	-	•	-
	a 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

 $\begin{array}{ll} \mbox{Period 2b Direct Decommissioning Activities} \\ 2b.1.1 & \mbox{Quarterly Inspection} \\ 2b.1.2 & \mbox{Semi-annual environmental survey} \end{array}$

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Table J

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

							`		or 2020 Domai	/											
Activit		Decon	Pomoval	Packaging	Transport	Off-Site Processing	LLRW Disposal	Other	Total	Total	NRC Lic. Term.	Spent Fuel Management	Site Restoration	Processed Volume	Class A	Burial Class B	Volumes Class C	GTCC	Burial / Processed	Craft	Utility and Contractor
Index		Cost	Cost	Costs	Costs	Costs	Costs	Costs	Contingency	Costs	Costs	Costs	Costs	Cu. Feet	Cu. Feet		Cu. Feet		Wt., Lbs.	Manhours	Manhours
	b Direct Decommissioning Activities (continued)																				
2b.1.3 2b.1.4	Prepare reports Bituminous roof replacement	_	_	_	_	_	_	3,127	469	a 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	-	-	-	-	-	-	-	-	-	-
	b Collateral Costs							000 555	FF 010	401 501		401.501									
2b.3.1 2b.3	Spent Fuel Capital and Transfer Subtotal Period 2b Collateral Costs	-	-	-	-	-	-	366,775 366,775	55,016 55,016	$421,791 \\ 421,791$	-	421,791 421,791	-	-	-	-	-	-	-	-	-
Period 2	b Period-Dependent Costs																				
2b.4.1	Insurance	-	-	-	-	-	-	35,606	3,561	39,167	39,167	-	-	-	-	-	-	-	-	-	-
2b.4.2 2b.4.3	Property taxes Health physics supplies	-	6,047		-	-	-	180,613	18,061 1,512	198,674 7,559	198,674 7,559	-	-	-		-	-	-	-	-	-
2b.4.4	Disposal of DAW generated	-	- 0,047	111	. 51	7 -	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	0.050	-	-	-	-	-	-	-	-	-
2b.4.7 2b.4.8	Emergency Planning Fees Fixed Overhead	-	-	-	-	-	-	7,506 10,904	751 1,636	8,256 12,540	12,540	8,256	-	-	-	-	-	-	-	-	-
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 71,924	250,265	-	-	-	-	-	-	-	-	3,790,775 1,684,789
2b.4.12 2b.4	Utility Staff Cost Subtotal Period 2b Period-Dependent Costs	-	6,047	111	. 57	7 -	461	114,547 662,686	17,182 89,288	131,729 758,650	433,808	59,805 324,843	-	-	5,595	-	-	-	111,903	182	5,475,563
2b.0	TOTAL PERIOD 2b COST	-	6,047	111	. 57	7 -	461	1,039,652	146,539	1,192,868	446,234	746,634	-	-	5,595	-	-	-	111,903	182	5,475,563
PERIO	D 2 TOTALS	-	6,664	122	. 65	3 -	509	1,288,665	183,173	1,479,196	544,057	935,139	-	-	6,171	-	-	-	123,426	201	6,243,824
PERIO	D 3a - Reactivate Site Following SAFSTOR Dormancy																				
Period 3	a 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 3a.1.4	Perform detailed rad survey End product description	_	_	_	_	_	_	129	19	a 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 3a.1.8	Perform SER and EA Perform Site-Specific Cost Study	-	-	-	-	-	-	398 643	60 96	458 739	458 739	-	-	-	-	-	-	-	-	-	3,100 5,000
Activity	Specifications																				
3a.1.9.1	Re-activate plant & temporary facilities	-	-	-	-	-	-	947		1,089	980	-	109		-	-	-	-	-	-	7,370
3a.1.9.2		-	-	-	-	-	-	536	80	616	554	-	62	-	-	-	-	-	-	-	4,167
3a.1.9.3 3a.1.9.4		-	-	-	-	-	-	912 835	137 125	1,049 961	1,049 961	-	-	-	-	-	-	-	-	-	7,100 6,500
3a.1.9.5		-	-	-	-	_	-	64	10	74	74	-	-	-	-	-	-	-	-	-	500
3a.1.9.6		-	-	-	-	-	-	129	19	148	148	-	-	-	-	-	-	-	-	-	1,000
3a.1.9.7		-	-	-	-	-	-	206 268	31 40	236 309	118 309	-	118	-	-	-	-	-	-	-	1,600 2,088
3a.1.9.8 3a.1.9.9		-	-	-	-	-	-	268	40	309	309	-	-	-	-		-	-	-	-	2,088
	Pressure suppression structure	-	-	-	-	-	-	257	39	296	296	-	-	-	-	-	-	-	-	-	2,000
3a.1.9.1	1 Drywell	-	-	-	-	-	-	206	31	236	236	-	-	-	-	-	-	-	-	-	1,600
	2 Plant structures & buildings	-	-	-	-	-	-	401 591	60 89	461 680	231 680	-	231	-	-	-	-	-	-	-	3,120 4,600
	Waste management Facility & site closeout	-	-	-	-	-	-	116	17	133	67	-	67	-	-		-	-	-	-	900
3a.1.9	Total	-	-	-	-	-	-	5,736	860	6,597	6,011	-	586		-	-	-	-	-	-	44,633
	g & Site Preparations										~~-										
3a.1.10 3a.1.11	Prepare dismantling sequence Plant prep. & temp. svces	-	•	-	-	-	-	308 3,500	46 525	355 4,025	355 4,025	-	-	-	-	-	-	-	-	-	2,400
3a.1.11 3a.1.12	Design water clean-up system	-	-	-	-	-	-	180	525 27	207	4,025	-	-	-	-	-	-	-	-	-	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 3 3a.2.1	a Additional Costs Site Characterization	_	-	_	-	-	-	5,930	1,779	7,708	7,708	-	-	_	_	-	_	_	_	30,500	10,852
Ju. 2. 1								0,000	2,110	.,.50	.,.00									55,500	10,002

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Table J

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

							(oi 2020 Dollar	/											
Activit	fu.	Decon	Romoval	Packaging	Transport	Off-Site Processing	LLRW Disposal	Other	Total	Total	NRC Lic. Term.	Spent Fuel Management	Site Restoration	Processed Volume	Class A		Volumes Class C	GTCC	Burial / Processed	Craft	Utility and Contractor
Index		Cost	Cost	Costs	Costs	Costs	Costs	Costs	Contingency	Costs	Costs	Costs	Costs	Cu. Feet	Cu. Feet		Cu. Feet		Wt., Lbs.	Manhours	Manhours
	Ba Additional Costs (continued) Mixed & RCRA Waste			90	90	1.4			9	00	80			40					F 0F0	161	
3a.2.2 3a.2	Subtotal Period 3a Additional Costs	-	-	28 28	29 29	14 14		5,930	1,788	80 7,788	7,788	-	-	43 43		-	-	-	5,253 5,253	30,661	10,852
	Ba Collateral Costs																				
3a.3.1 3a.3	Spent Fuel Capital and Transfer Subtotal Period 3a Collateral Costs	-	-	-	-	-	-	5,693 5,693	854 854	6,547 $6,547$	-	6,547 6,547	-	-	-	-	-	-	-	-	-
	Ba Period-Dependent Costs																				
3a.4.1 3a.4.2	Insurance Property taxes	-	-	-	-	-	-	703 3,479	70 348	774 3,827	442 3,241	332 586	-	-	-	-	-	-	-	-	-
3a.4.3	Health physics supplies	-	538	-	-	-	-	-	135	673	673	-	-	-	-	-	-	-	-	-	-
3a.4.4	Heavy equipment rental	-	753			-	-	-	113	866	866	-	-	-	-	-	-	-	-	-	-
3a.4.5 3a.4.6	Disposal of DAW generated Plant energy budget	-	-	10	5	-	42	1,817	12 272	70 2.089	70 2,089	-	-	-	516	-	-	-	10,311	17	-
3a.4.7	NRC ISFSI Fees	-	-	-	-	-	-	28	3	31	2,000	31	-	-	-	-	-	-	-	-	-
3a.4.8	NRC Fees	-	-	-	-	-	-	335	33	368	368	-	-	-	-	-	-	-	-	-	-
3a.4.9 3a.4.10	Emergency Planning Fees Fixed Overhead	-	-	-	-	-	-	148 2,616	15 392	163 3,009	3,009	163	-	-	-	-	-	-	-	-	-
3a.4.11		-	-	_	-	-	-	112	17	129	-	129	-	-	-	-		-	-	_	-
3a.4.12	Railroad Track Maintenance	-	-	-	-	-	-	125	19	144	144	-	-	-	-	-	-	-	-	-	-
3a.4.13		-	-	-	-	-	-	4,690	703	5,393	5,107	286	-	-	-	-	-	-	-	-	69,160
3a.4.14 3a.4	Utility Staff Cost Subtotal Period 3a Period-Dependent Costs	-	1,291	10	5	-	42	16,817 30,870	2,523 4,656	19,339 36,875	18,160 34,169	1,180 2,706	-	-	516	-	-	-	10,311	17	260,000 329,160
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
PERIO	D 3b - Decommissioning Preparations																				
Period 3	Bb Direct Decommissioning Activities																				
	d Work Procedures																				
3b.1.1.1 3b.1.1.2	Plant systems Reactor internals	-	-	-	-	-	-	608 514	91 77	700 591	630 591	-	70	-	-	-	-	-	-	-	4,733 4,000
3b.1.1.3		-	-	-	-	-	-	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		-	-	-	-	-	-	257	39 70	296	296	-	-	-	-	-	-	-	-	-	2,000
3b.1.1.7 3b.1.1.8		-	-	-	-	-	-	467 154	23	537 177	537 89	-	89	-	-	-		-	-	-	3,630 1,200
3b.1.1.9		-	-	-	-	-	-	154	23	177	177	-	-	-	-	-	-	-	-	-	1,200
	0 Reinforced concrete	-	-	-	-	-	-	129	19	148	74	-	74	-	-	-	-	-	-	-	1,000
	1 Main Turbine	-	-	-	-	-	-	267 268	40 40	307 309	307 309	-	-	-	-	-	-	-	-	-	2,080 2,088
	2 Main Condensers 3 Moisture separators & reheaters	-	-	-	-	-	-	268 257	40 39	296	296	-	-	-	-	-	-	_	-	-	2,088
	4 Radwaste building	-	-	-	-	-	-	351	53	403	363	-	40	-	-	-	-	-	-	-	2,730
	5 Reactor building	-	-	-	-	-	-	351	53	403	363	-	40	-	-	-	-	-	-	-	2,730
3b.1.1 3b.1	Total Subtotal Period 3b Activity Costs	-	-	-	-	-	-	4,208 4,208	631 631	4,839 4,839	4,376 4,376	-	463 463	-	-	-	-	-	-	-	32,741 32,741
Period 3	Bb Collateral Costs																				
3b.3.1	Decon equipment	1,055		-	-	-	-	-	158	1,213	1,213	-	-	-	-	-	-	-	-	-	-
3b.3.2 3b.3.3	DOC staff relocation expenses Pipe cutting equipment	-	1,200	-	-	-	-	1,264	190 180	1,454 1,380	1,454 1,380	-	-	-	-	-	-	-	-	-	-
3b.3.4	Spent Fuel Capital and Transfer	-	1,200	-	-	-	-	2,839	426	3,265	1,560	3,265	-	-	-	-	-	-	-	-	-
3b.3	Subtotal Period 3b Collateral Costs	1,055	1,200	-	-	-	-	4,103	954	7,311	4,047	3,265	-	-	-	-	-	-	=	-	-
Period 3 3b.4.1	Bb Period-Dependent Costs Decon supplies	39							10	48	48										
3b.4.1 3b.4.2	Insurance	- 39	-	-	-	-	-	351	35	48 386	48 386	-	-	-	-	-	-	-	-	-	-
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	- 0	- 3	-	- 0.4	-	56 7	432 40	432 40	-	-	-	291	-	-	-	- E 014	- 9	-
3b.4.6 3b.4.7	Disposal of DAW generated Plant energy budget	-	-	- b	- -	-	24	906	136	1,042	1,042	-	-	-	291 -	-	-	-	5,814	- 9	-
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	-	-	-	-	-	-	-	-	-

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Table J

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

							`		or 2020 Domar	/											
Activity		Decon		Packaging		Off-Site Processing	LLRW Disposal	Other	Total	Total	NRC Lic. Term.	Spent Fuel Management	Site Restoration	Processed Volume	Class A	Class B	Volumes Class C	GTCC	Burial / Processed	Craft	Utility and Contractor
Index	Activity Description	Cost	Cost	Costs	Costs	Costs	Costs	Costs	Contingency	Costs	Costs	Costs	Costs	Cu. Feet	Cu. Feet	Cu. Feet	Cu. Feet	Cu. Feet	Wt., Lbs.	Manhours	Manhours
Period 3b Period-De	ependent Costs (continued)																				
3b.4.11 Fixed Ove 3b.4.12 ISFSI Op	erhead perating Costs	-	-	-	-	-	-	1,305 56	196 8	1,500 64	1,500	64	-	-	-	-	-	-	-	-	-
	Track Maintenance	-		-	-	-		62	9	72	72	- 04	-	-	-		-	-	-	-	-
3b.4.14 Security S	Staff Cost	-	-	-	-	-	-	2,338	351	2,689	2,547	143	-	-	-	-	-	-	-	-	34,485
3b.4.15 DOC Staf 3b.4.16 Utility St		-	-	-	-	-	-	5,344 8,385	802 1,258	6,146 9,643	6,146 9,055	- 588	-	-	-	-	-	-	-	-	58,080 129,644
	Period 3b Period-Dependent Costs	39	671	6	3	-	24	20,616	3,128	24,487	23,302	1,185	-	-	291	-	-	-	5,814	9	
3b.0 TOTAL P	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 TOTAL	S	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 - Largo	e Component Removal																				
Period 4a Direct Dec	commissioning Activities																				
Nuclear Steam Supp		99	85	0.7	90	185	004		104	750	750			676	715				04.005	1,594	
	ation System Piping & Valves ation Pumps & Motors	23 8	85 56	27 16	32 37	252	264 270	-	134 131	750 771	750 771	-	-	568	473	-	-	-	94,867 112,200	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	-
	Vessel Internals	139	6,098	11,330	1,029	-	25,657	278	20,603	65,135	65,135	-	=	-	2,943	1,628		-	337,343	22,415	
4a.1.1.5 Reactor V 4a.1.1 Totals	vessei	211	8,498 15,538	1,818 13,605	837 2,034	438	6,301 33,622	278 557	10,229 31,657	27,961 97,662	27,961 97,662	-	-	1,244	17,823 25,695	1,628	600	-	1,110,260 1,868,371	22,415 59,979	
Removal of Major Ed	quipment																				
4a.1.2 Main Tur	rbine/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 Cor	ndensers	-	1,207	360	194	3,225	244	-	912	6,142	6,142	-	-	17,396	727	-	-	-	828,955	16,823	-
	m Clean Building Demolition		000							001	001									0.015	
4a.1.4.1 Reactor F 4a.1.4.2 Radwaste		-	332 25		-	-	-		50 4	381 28	381 28	-	-	-	-	-	-	-	-	2,217 127	
4a.1.4.3 Turbine		-	127	-	=	-	-	-	19	146	146	=	=	-	-	_	-	-	-	1,254	
4a.1.4 Totals		-	483	-	-	-	-	-	72	556	556	-	-	-	-	-	-	-	-	3,598	-
Disposal of Plant Sy																					
4a.1.5.1 Automati 4a.1.5.2 Chemistr	ic Press Relief ry Sampling	-	106 24	2	10	182 35	-	-	56 12	356 73	356 73	-	-	1,088 207	-	-	-	-	44,184 8,422	1,468 356	
	ry Sampling ry Sampling - Insulated	-	24	0	0	0		-	0	2	2	-	-	1	-	-		-	61	25	
4a.1.5.4 Circulatin	ng Water - RCA	-	207	14	62	1,114	-	-	230	1,626	1,626	-	-	6,656	-	-	-	-	270,307	2,860	
	ible Gas Control - Insul - RCA ible Gas Control - RCA	-	29 18	0	2 3	36 48	-	-	13 12	80 81	80 81	-	-	212 285	-	-	-	-	8,617 11,577	378 245	
	ate & Feedwater	-	888	60	281	5,046	-	-	1,027	7,303	7,303	-	-	30,157	-	-	-	-	1,224,704	12,501	
4a.1.5.8 Condensa	ate & Feedwater - Insulated	-	444	12	55	980	-	-	267	1,757	1,757	-	-	5,855	-	-	-	-	237,764	6,185	-
4a.1.5.9 Condensa 4a.1.5.10 Condensa	ate Demin	-	494 657	9 16	44 77	792 1,378	-	-	250 384	1,590 2,512	1,590 2,512	-	-	4,735 8,237	-	-	-	-	192,293 334,489	6,784 9,265	
4a.1.5.10 Condensa 4a.1.5.11 Control R		-	3	0	0	1,576	-	-	304	2,512	2,512	-	-	0,237	-		-	-	976	9,265 36	
4a.1.5.12 Control R	Rod Drive Hydraulic	-	374	5	23	408	-	-	159	968	968	-	-	2,440	-	-	-	-	99,094	5,255	
4a.1.5.13 Core Spra		-	71	10	48 11	855 198	-	-	154	1,138 407	1,138 407	-	-	5,109 1.184	-	-	-	-	207,487 48,081	1,026	
4a.1.5.14 Core Spra 4a.1.5.15 Demin W	ay - Insulated Vater - Insulated - RCA	-	131 15	0	11	198	-	-	64 6	407 36	407 36	-	-	1,184	-	-	-	-	3,445	1,806 181	
4a.1.5.16 Demin W	Vater - RCA	-	41	1	2	42	-	-	17	104	104	-	-	253	-	-	-	-	10,278	508	-
4a.1.5.17 Diesel Oi		-	2 38	0	0	4 92	-	-	1	7 159	7 159	-	-	23	-	-	-	-	931	25 550	
	Atmosphere Cooling - RCA erg Service Water - Insul - RCA	-	38 0	0	0	92	-	-	24 0	159	159	-	-	548 2	-	-	-	-	22,244 84	550 4	-
4a.1.5.20 Electrical		-	13	-	-		-	-	2	15	-	-	15		-	-	-	-	-	182	
	cy Service Water - Insul - RCA	-	21 2	0	1	23 2	-	-	9	55	55	-	-	137 13	-	-	-	-	5,544	281 22	
4a.1.5.22 Emergene 4a.1.5.23 GEZIP - I	cy Service Water - RCA RCA	-	2	0	0	2 17	-	-	1 4	5 25	5 25	-	-	103	-	-	-	-	512 4,184	22 48	
4a.1.5.24 Generato	or Physical Design - RCA	-	5	0	0	5	-	-	2	12	12	-	-	31	-	-	-	-	1,250	67	-
4a.1.5.25 H2-O2 Co	ontrol Analyzing	-	6	0	0	4	-	-	2	12	12	-	-	23	-	-	-	-	948	72	
	ontrol Analyzing - Insulated essure Coolant Injection	-	6 60	0 3	0 12	4 211	-	-	2 49	12 334	12 334	-	-	23 1,262	-	-	-	-	948 51,257	72 850	
	ssure Coolant Injection - Insula	-	198	4	21	379	-	-	110	713	713	-	-	2,266	-	-	-	-	92,018	2,734	
4a.1.5.29 Hydrogen	n Cooling	-	8		-		-	-	1	10	-	-	10	-	-	-	-	-	-	118	-
4a.1.5.30 Hydrogen 4a.1.5.31 Hydrogen		=	7 17	0	0 2	7 32	-	-	3	17 60	17 60	-	-	39 189	-	-	-	-	1,600 7,669	79 212	
	n Water Chemistry - RCA	-	24	0	1	23	-	-	10	59	59	-	-	140	-	-	-	-	5,672	304	
, 7501				0		20			10		30			-10					-,		

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Table J

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

							(11	iousunus .	oi 2020 Dollai	,											
						Off-Site	LLRW				NRC	Spent Fuel	Site	Processed		Burial '	Volumes		Burial /		Utility and
Activity Index		Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Processing Costs	Disposal Costs	Other Costs	Total Contingency	Total Costs	Lic. Term. Costs	Management Costs	Restoration Costs	Volume Cu. Feet	Class A Cu. Feet	Class B	Class C Cu. Feet	GTCC Cu. Feet		Craft Manhours	Contractor Manhours
muex	Activity Description	Cost	Cost	Costs	Costs	Costs	Costs	Costs	Contingency	Costs	Costs	Costs	Costs	Cu. Feet	Cu. Feet	Cu. Feet	Cu. Feet	Cu. Feet	Wt., LDS.	Mannours	Mannours
	of Plant Systems (continued)																				
	Instrument & Service Air - RCA Main Condenser	-	225 177			296 318	-	-	103 95	644 613	644 613	-	-	1,768 1,903	-	-	-	-	71,810 77,301	2,733 2,443	-
	Main Steam	-	225			498	-	-	136	892	892	-	-	2,975	-	-	-	-	120,806	3,122	-
	Main Turbine	-	909			5,335	-	-	1,079	7,684	7,684	-	-	31,885	-	-	-	-	1,294,866	12,952	-
	Main Turbine - Insulated	-	193		32	579	-	-	141	952	952	-	-	3,460	-	-	-	-	140,506	2,725	-
	Miscellaneous	-	38 169		3 27	51	-	-	18	110 799	110 799	-	-	302	-	-	-	-	12,283	556 2,387	-
	Off Gas Recombiner Off Gas Recombiner - Insulated	-	351			479 393	-	-	119 150	921	921	-	-	2,861 2,350	-	-	-	-	116,194 95,441	4,785	-
	Post Accident Sampling	_	23			16	-	-	8	48	48	-	-	99	-	-	-	-	4,004	306	-
	Post Accident Sampling - Insulated	-	15		-	11	-	-	6	33	33	-	-	67	-	-	-	-	2,737	190	-
	RHR Service Water - Insulated - RCA	-	83			248	-	-	60	409	409	-	-	1,485	-	-	-	-	60,293	1,125	-
	RHR Service Water - RCA Reactor Feedwater Pump Seal	-	4 50	0	0	6 55	-	-	$\frac{2}{21}$	12 130	12 130	-	-	35 327	-	-	-	-	1,410 13,295	57 687	-
	Residual Heat Removal	-	226			2,110	514	-	529	3,584	3,584	-	-	12,609	1,519	-	-	-	609,174	3,282	
	Residual Heat Removal - Insulated	-	500			851	464	-	384	2,312	2,312	-	-	5,084	1,374		-	-	294,206	7,027	-
	Rx Core Isolation Cooling	-	43		3	61	-	-	21	129	129	-	-	364	-	-	-	-	14,781	609	-
	Rx Core Isolation Cooling - Insulated	-	97		5	94	-	-	39	237	237	-	-	563	150	-	-	-	22,843	1,315	-
	Rx Recirculation Snubbers	-	53 151		4 5	16 84	52	-	30 51	161 292	161 292	-	-	96 502	152	-	-	-	13,794 20,395	691 2,272	-
	Standby Liquid Control - Insul - RCA	-	151	0		4	-	-	2	292	292	-	-	22	-	-	-	-	20,393	48	-
	Standby Liquid Control - RCA	-	26	1	2	41	-	-	13	83	83	-	-	245	-	-	-	-	9,969	341	-
	Stator Cooling - RCA	-	7	0	_	21	-	-	5	35	35	-	-	126	-	-	-	-	5,135	98	-
	Traversing Incore Probe	-	3	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 4	a Collateral Costs																				
4a.3.1	Process decommissioning water waste	4		7		-	28	-	12	63	63	-		-	64		-	-	3,856	13	-
4a.3.3	Small tool allowance	-	267	-	-	-	-	6,395	40 959	307 7,355	276	7,355	31	-	-	-	-	-	-	-	-
4a.3.4 4a.3	Spent Fuel Capital and Transfer Subtotal Period 4a Collateral Costs	4	267	7	12	-	28	6,395	1,011	7,724	339	7,355 7,355	31	-	64	-	-	-	3,856	13	
D. 2.14	De de I De contra Contr																				
4a.4.1	a Period-Dependent Costs Decon supplies	87	-	_	_	_		_	22	109	109	_	_	_	_	_	_	_	_	_	_
4a.4.1	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 4a.4.6	Heavy equipment rental	-	2,811	89	46	-	370	-	422 108	3,232 612	3,232 612	-	-	-	4 405	-	-	-	90.702	140	-
4a.4.6 4a.4.7	Disposal of DAW generated Plant energy budget	-	-	89	46	-	370	1,938	291	2,229	2,229	-	-	_	4,485	_	_	-	89,703	146	-
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	-	-	-	-	-	-	2,380 477	357 72	2,737 549	2,737 549	-	-	-	-	-	-	-	-	-	-
4a.4.12 4a.4.13	Liquid Radwaste Processing Equipment/Services ISFSI Operating Costs	-	-	-	-	-	-	126	19	145	549	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 20,691	1 201	-	-	-	-	-	-	-	-	161,214
4a.4.18 4a.4	Utility Staff Cost Subtotal Period 4a Period-Dependent Costs	87	4,683	89	46	-	370	19,141 51,858	2,871 8,542	22,012 65,674	61,399	1,321 4,275	-	-	4,485	-	-	-	89,703	146	294,391 556,657
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
PERIO	0 4b - Site Decontamination		•				•	-			•	•								•	•
	Direct Decommissioning Activities																				
4b.1.1		591	58	103	149	-	2,572	-	986	4,459	4,459	-	-	-	7,653	-	-	-	486,170	906	-
	of Plant Systems																				
4b.1.2.1		-	16		-	8	-	-	5	30	30	-	-	49	-	-	-	-	1,987	247	-
4b.1.2.2		-	16 3			16 17		-	7 4	40 25	40 25	-	-	93 103	-	-	-	-	3,765 4,184	185 48	-
40.1.2.3	Cranes/Heavy Loads/Rigging - RCA	-	3	0	1	17	-	-	4	40	∠0	-	-	103	-	-	-	-	4,164	48	-

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Table J

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

							`			•											
						Off-Site	LLRW				NRC	Spent Fuel	Site	Processed		Burial '	Volumes		Burial /		Utility and
Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Processing Costs	Disposal Costs	Other Costs	Total Contingency	Total Costs	Lic. Term. Costs	Management Costs	Restoration Costs	Volume Cu. Feet	Class A Cu. Feet	Class B	Class C Cu. Feet	GTCC		Craft Manhours	Contractor Manhours
Index	Activity Description	Cost	Cost	Costs	Costs	Costs	Costs	Costs	Contingency	Costs	Costs	Costs	Costs	Cu. reet	Cu. reet	Cu. Feet	Cu. Feet	Cu. Feet	Wt., Lbs.	Mannours	Mannours
	of Plant Systems (continued)																				
	Decontamination Projects	-	1	0	0	1	-	-	0	2	2	-	-	3	-	-	-	-	125	15	-
4b.1.2.5	Electrical - Contaminated	-	400	5	23 2	421	-	-	167	1,016	1,016	-	-	2,514	-	-	-	-	102,112	5,633	-
4b.1.2.6 4b.1.2.7	Electrical - Contaminated Fuel Pool Electrical - Decontam. Fuel Pool Area	-	42 297	5	23	42 411		-	17 140	105 876	105 876	-	-	253 $2,457$	-	-	-	-	10,272 99,783	592 4,090	-
4b.1.2.7 4b.1.2.8	Electrical - Decontaminated	-	2.698	48		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	-
	Fuel Pool Cooling & Cleanup	-	387	20		343		-	216	1,241	1,241	-	-	2,051	712	-	-	-	128,918	5,363	-
	Fuel Pool Cooling & Cleanup - Insulated	-	37	2	3	22		-	19	107	107	-	-	130	71	-	-	-	9,830	514	-
	HVAC Ductwork HVAC Ductwork - Fuel Pool Area	-	276 31	6	26 3	469 52		-	144 16	921 102	921 102	-	-	2,805 312	-	-	-	-	113,913 12,657	3,539 393	-
	HVAC/Chilled Water - RCA	-	324	6	26	461	-	-	155	971	971	-	-	2,752	-	-	-		111,779	3.985	-
	HVAC/Chilled Water - RCA Fuel Pool Area	-	33	0	2	37	-	-	14	87	87	-	-	223	-	-	-	-	9,072	397	_
	Heating & Ventilation	-	433	13		1,060	-	-	277	1,842	1,842	-	-	6,334	-	-	-	-	257,243	6,340	-
	Heating Boiler - Insulated - RCA	-	3	0	0	4	-	-	1	9	9	-	-	26	-	-	-	-	1,058	35	-
	Instrument & Service Air-RCA-Fuel Pool	-	29	1	2	45		-	14	91	91	-	-	267	-	-	-	-	10,841	357	-
	Liquid Radwaste Makeup Demin - RCA	-	621 103	31 3	57 14	703 246		-	350 65	2,072 431	2,072 431	-	=	4,203 1,471	915	-	-	-	229,422 59,747	8,550 1,412	-
	Non-Essential Diesel Generator - RCA	-	27	3 3	13	238	-	-	45	327	327	_	-	1,471	-	-	-		57.832	395	-
	Off Gas Holdup	-	310	7	34	607	_	-	174	1,133	1,133	-	_	3,629	-	-	-	_	147,355	4,256	_
	Primary Containment	-	411	16		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	-
	Rx Bldg Closed Clng Water - Insul - RCA	-	114	2	9	163		-	54	343	343	-	-	977	-	-	-	-	39,675	1,484	-
	Rx Bldg Closed Clng Water - RCA	-	184	15		1,187	-	-	235	1,687	1,687	-	-	7,093	-	-	-	-	288,031	2,489	-
	Rx Component Handling Equip Rx Pressure Vessel	-	127 43	11 5	24 5	291 27	139 57	-	115 30	708 167	708 167	-	-	1,737 161	415 169	-	-	-	96,901 17,375	1,839 578	-
	Rx Water Cleanup	-	239	16		47		-	124	655	655	-	-	278	630	-	-		51,819	3,264	-
	Secondary Containment	-	112	3	13	229		-	65	421	421	_	_	1,372	-	-	-	-	55,702	1,569	_
	Service & Seal Water - Insulated - RCA	-	120	2	11	197	-	-	62	392	392	-	-	1,180	-	-	-	-	47,917	1,565	-
	Service & Seal Water - RCA	-	159	4	17	303		-	88	570	570	-	-	1,809	-	-	-	-	73,453	2,016	-
	Service Air Blower - RCA	-	15	0	2	34		-	9	62	62	-	-	206	-	-	-	-	8,364	206	-
	Solid Radwaste	-	446 70	21	45 4	567 80		-	261 30	1,563 185	1,563 185	-	-	3,390 477	659	-	-	-	179,772 19,351	6,270 1,005	-
	Structures & Buildings Wells & Domestic Water	-	10		- 4	- 00	-	-	50 1	11	169	_	11	411	-	-	-		19,551	1,005	-
	Wells & Domestic Water - RCA	-	52	1	3	57		-	22	136	136	-		342	-	-	-	_	13,874	633	_
4b.1.2	Totals	-	8,342	249		13,829		-	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	-
Decontan	nination of Site Buildings																				
4b.1.4.1	Reactor Building	4,668		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		0	3	-	15		53	172	172	-	-	-	145	-	-	-	6,840	1,421	-
4b.1.4.3	HPCI Room	26		1	3	20			26	115	115	-	-	118	125	-	-	-	10,759	703	-
4b.1.4.4 4b.1.4.5	Hot Shop LLRW Storage & Shipping	15 52		0	2 8	- 5	11 45	-	11 45	43 179	43 179	-	-	31	103 433	-	-	-	4,860 21,708	254 1,003	-
4b.1.4.6	Offgas Stack	336		7	23	225		-	286	1,199	1,199	-	-	1,343	669	-	-		87,045	7,924	-
4b.1.4.7	Offgas Storage & Compressor	36		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		2	9	-	52		48	189	189	-	-	-	495		-	-	23,400	1,062	-
	Recombiner	24		1	5	33			30	140	140	-	-	199	216	-	-	-	18,405	616	-
	Turbine Turbine Puilding Addition	638 53		21	104	215	564 45		588 44	2,444 169	2,444 169	-	=	1,283	5,299 434	-	-	-	303,150 20,478	12,856 968	-
	Turbine Building Addition Reactor (Post Fuel)	849		172	0	329		-	2,535	12,425	12,425	_	-	1,969	50,605	-	-		2,471,778	40,860	-
4b.1.4	Totals	6,960		390		8,904		-	8,379	39,378	39,378	-	-	53,216	66,764	-	-	-	5,351,984	171,309	-
4b.1.5 4b.1.6	Prepare/submit License Termination Plan Receive NRC approval of termination plan	-	-	-	-	-	-	526	79	605 a	605	-	-	-	-	-	-	-	-	-	4,096
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 4h	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		1,211	-	- 1.00#	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

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Table J

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

						Off-Site	LLRW				NRC	Spent Fuel	Site	Processed		Burial V	Volumes		Burial /		Utility and
Activit Index		Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Processing Costs	Disposal Costs	Other Costs	Total Contingency	Total Costs	Lic. Term. Costs	Management Costs	Restoration Costs	Volume Cu. Feet	Class A	Class B	Class C Cu. Feet	GTCC		Craft Manhours	Contractor Manhours
index	Activity Description	Cost	Cost	Costs	Costs	Costs	Costs	Costs	Contingency	Costs	Costs	Costs	Costs	Cu. Feet	Cu. reet	Cu. reet	Cu. reet	Cu. reet	Wt., LDS.	Mannours	Mannours
	Collateral Costs																				
4b.3.1	Process decommissioning water waste	12	-	22	39	-	88	-	36	196	196	-	-	-	202	-	-	-	12,097	39	-
4b.3.3 4b.3.4	Small tool allowance Decommissioning Equipment Disposition	-	397	130	82	- 1,112	178	-	60 237	456 1,739	456 1,739	-	-	6,000	529	-	-	-	303,608	147	-
4b.3.4 4b.3.5	Spent Fuel Capital and Transfer	-	-	150	- 64	1,112	170	14,092	2,114	16,206	1,759	16,206	-	6,000	529		-	-	303,606	147	-
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	-
Dania J 4	o 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 6,024	3,813	-	-	-	-	-	-	-	-	-	-
4b.4.5 4b.4.6	Heavy equipment rental Disposal of DAW generated	-	5,239	117	60	-	486	-	786 142	805	6,024 805	-	-	-	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 4b.4.11	Emergency Planning Fees Fixed Overhead	-	-	-	-	-	-	302 4,319	30 648	332 4,967	4.967	332	-	-	-	-	-	-	-	-	-
4b.4.11 4b.4.12	Liquid Radwaste Processing Equipment/Services	-	-	-	-	-	-	4,519 866	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 4b.4.18	DOC Staff Cost Utility Staff Cost	-	-	-	-	-	-	25,916 32,869	3,887 4,930	29,803 37,799	29,803 35,380	2,419	-	-	-	-	-	-	-	-	284,065 504,534
4b.4.16 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
	0 4f - License Termination	-, -	.,	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	,	-,-	,-	, .		-, -	,	,			,,,,,,				-, -,	,	,
	Direct Decommissioning Activities																				
4f.1.1	ORISE confirmatory survey	-	-	-	-	-	-	166	50	216	216	-	-	-	-	-	-	-	-	-	-
4f.1.2 4f.1	Terminate license Subtotal Period 4f Activity Costs		_	_		_	_	166	50	a 216	216	_	_	_	_	_	_	_	_	_	_
	•							100	90	210	210										
	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
	Collateral Costs																				
4f.3.1	DOC staff relocation expenses	-	-	-	-	-	-	1,264	190	1,454	1,454	-	-	-	-	-	-	-	-	-	-
4f.3.2 4f.3	Spent Fuel Capital and Transfer Subtotal Period 4f Collateral Costs	-	-	-	-	-	-	4,289 5,553	643 833	4,933 6,386	1,454	4,933 4,933	-	-	-	-	-	-	-	-	-
41.5	Subtotal I eriou 41 Conateral Costs	-	-	•	-	-	-	5,555	633	0,500	1,454	4,555	-	-	-	-	-	-	-	-	-
	Period-Dependent Costs																				
4f.4.1	Insurance	-	-	-	-	-	-	530	53	583	1.055	583	-	-	-	-	-	-	-	-	-
4f.4.2 4f.4.3	Property taxes Health physics supplies	-	708	-	-	-	-	2,198	220 177	2,417 884	1,975 884	442	-	-	-	-	-	-	-	-	-
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	-	-	-	-	_	_	-	- 1,001	- 12	-
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	1 000	123	-	-	-	-	-	-	-	-	-
4f.4.9 4f.4.10	Fixed Overhead ISFSI Operating Costs	-	-	-	-	-	-	1,597 84	239 13	1,836 97	1,836	97	-	-	-	-	-	-	-	-	-
4f.4.10 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
PERIO	0 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

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Table J

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

							(-ousumes c	oi 2020 Dollai	,											
						Off-Site	LLRW	0.1			NRC	Spent Fuel	Site	Processed			Volumes	amaa	Burial /	G 0	Utility and
Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Processing Costs	Disposal Costs	Other Costs	Total Contingency	Total Costs	Lic. Term. Costs	Management Costs	Restoration Costs	Volume Cu. Feet	Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet	Processed Wt., Lbs.	Craft Manhours	Contractor Manhours
PERIOD	5b - Site Restoration																				
Period 5b	Direct Decommissioning Activities																				
	of Remaining Site Buildings																				
	Reactor Building	-	1,971 10	-	-	-	-	-	296	2,267	-	-	2,267 11	-	-	-	-	-	-	13,911 50	-
	Condensate Tanks Foundation Discharge Retention Basin	-	4		-	-	-	-	1	11 5	-	-	5	-	-	-	-	-	-	50 25	
5b.1.1.4	HPCI Room	-	19	-	-	-	-	-	3	22	-	-	22	-	-	-	-	-	-	97	-
	Hot Shop	-	16 2	-	-	-	-	-	2 0	19 2	-	-	19	-	-	-	-	-	-	177	
	Hydrogen & Oxygen Storage LLRW Storage & Shipping	-	83	-	-	-	-		12	95	-	-	95	-	-	-	-	-	-	19 662	
5b.1.1.8	MSIV	-	4	-	-	-	-	-	1	4	-	-	4	-	-	-	-	-	-	42	-
	Misc Structures 2017	-	1,410	-	-	-	-	-	212	1,622	-	-	1,622	-	-	-	-	-	-	13,042	
	Offgas Stack Offgas Storage & Compressor	-	108 39	-	-	-	-	-	16 6	124 45	-	-	124 45	-	-	-	-	-	-	544 199	
5b.1.1.12		-	228	_	-	-	-	-	34	262	-	-	262	-	-	-	-	-	-	1,220	
	Recombiner	-	128	-	-	-	-	-	19	147	-	-	147	-	-	-	-	-	-	713	
	Security Barrier Structures Greater than 3' Below Grade	-	186 2,461	-	-	-	-	-	28 369	214 2,830	-	-	214 2,830	-	-	-	-	-	-	933 12,649	
	Tank Farm	-	2,401	_	-	-	-	-	1	5	-	-	5	-	-	-	-	-	-	21	
5b.1.1.17		-	1,259	-	-	-	-	-	189	1,448	-	-	1,448	-	-	-	-	-	-	13,036	
	Turbine Building Addition Turbine Pedestal	-	55 182	-	-	-	-	-	8 27	63 209	-	-	63 209	•	-	-	-	-	-	618 926	
	Totals	-	8,169	-	-	-	-	-	1,225	9,394	-	-	9,394	-	-	-	-	-	-	58,885	
Site Closed	out Activities																				
5b.1.2	Grade & landscape site	-	896	-	-	-	-	-	134	1,031	-	-	1,031	-	-	-	-	-	-	1,841	-
5b.1.3	Final report to NRC Subtotal Period 5b Activity Costs	-	9,065	-	-	-	-	200 200	30 1,390	231 10,655	231 231	-	10,425	-	-	-	-	-	-	60,726	1,560
		-	9,069	-	-	-	-	200	1,590	10,655	231	-	10,425	-	-	-	-	-	-	60,726	1,560
	Additional Costs Clean Concrete Disposal	_	3,322					13	500	3,835	_		3,835							12	
	Intake Structure Cofferdam	-	335	-	-	-	-	-	50	385	-	-	385	-	-	-	-	-	-	2,584	
5b.2.3	Construction Debris	-	-	-	-	-	-	1,170	176	1,346	-	-	1,346	-	-	-	-	-	-	-	-
	Backfill Discharge Structure Cofferdam	-	5,583 442	-	-	-	-	-	837 66	6,421 508	-	-	6,421 508	•	-	-	-	-	-	5,422 3,552	
	Disposition of Original MPC Canisters		55	185		-	5,641		1,709	8,544	8,544	-	-		21,097		-		2,505,700	337	
	Subtotal Period 5b Additional Costs	-	9,737	185			5,641	1,183	3,339	21,039	8,544	-	12,495	-	21,097		-	-	2,505,700	11,907	
	Collateral Costs																				
	Small tool allowance	-	111	-	-	-	-	- 0.007	17	127	-	- 11.045	127	-	-	-	-	-	-	-	-
	Spent Fuel Capital and Transfer Subtotal Period 5b Collateral Costs	-	111	-	-	-		9,867 9,867	1,480 1,497	11,347 11,475	-	11,347 11,347	127		-		-		-	-	-
								-,	-,	,		,									
	Period-Dependent Costs Insurance	_	-	_	-	-	_	1,220	122	1,342	-	1,342	-	_	_	_	_	-	_	_	_
5b.4.2	Property taxes	-	-	-	-	-	-	4,534	453	4,988	-	´-	4,988	-	-	-	-	-	-	-	-
	Heavy equipment rental	-	5,842	-	-	-	-	- 01 #	876	6,719	-	-	6,719	-	-	-	-	-	-	-	-
	Plant energy budget NRC ISFSI Fees	-	-	-	-	-	-	315 375	47 37	362 412	-	362 412	-	-	-		-	-	-	-	-
	Emergency Planning Fees	-	-	-	-	-	-	257	26	283	-	283	-	-	-	-	-	-	-	-	-
	Fixed Overhead	-	-	-	-	-	-	1,122	168	1,290	0	860	429	-	-	-	-	-	-	-	-
	ISFSI Operating Costs Railroad Track Maintenance	-	-	-	-	-	-	194 217	29 33	223 249	- 0	223 150	100	-	-	-	-	-	-	-	-
	Security Staff Cost	-	-	-	-	-	-	7,971	1,196	9,167	0	8,580	587	-	-	-	-	-	-	-	117,235
	DOC Staff Cost	-	-	-	-	-	-	11,729	1,759	13,489	-	-	13,489	-	-	-	-	-	-	-	122,646
	Utility Staff Cost Subtotal Period 5b Period-Dependent Costs	-	5,842	-	-	-	-	7,148 35,082	1,072 5,819	8,220 46,744	82 82	2,047 14,259	6,091 32,402	-	-	-	-	-	-	-	101,904 341,785
	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	
PERIOD	5c - Fuel Storage Operations/Shipping																				
	Direct Decommissioning Activities																				
	Collateral Costs																				
	Spent Fuel Capital and Transfer	_	-	-	-	_	-	1,042,659	156,399	1,199,058	_	1,199,058	_	-	-	_	_	_	_	-	_

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Table J

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

Antivit		Door	Pomov-1	Doolrogi	Transport	Off-Site	LLRW Disposal	Other	Total	Total	NRC Lic. Term.	Spent Fuel	Site	Processed	Class A		Volumes Class C	СТСС	Burial /	Croft	Utility and
Activit Index		Decon Cost	Removal Cost	Costs	Costs	Processing Costs	Costs	Costs	Contingency	Costs	Costs	Management Costs	Restoration Costs	Volume Cu. Feet	Class A Cu. Feet		Cu. Feet	GTCC Cu. Feet	Processed Wt., Lbs.	Craft Manhours	Contractor Manhours
5c.3	Subtotal Period 5c Collateral Costs	-	-	-	-	-	-	1,042,659	156,399	1,199,058	-	1,199,058	-	-	-	-	-	-	-	-	-
Period 5	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 5c.4.5	NRC ISFSI Fees Emergency Planning Fees	-	-	-	-	-	-	29,939 20,554	2,994 2,055	32,933 22,610	-	32,933 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
PERIO	of GTCC shipping																				
Period 5	Direct Decommissioning Activities																				
Nuclear	Steam Supply System Removal																				
5d.1.1.1		-	-	1,083		-	4,313		918	6,314	6,314	-	-	-	-	-	-	1,160	225,765	-	-
5d.1.1 5d.1	Totals Subtotal Period 5d Activity Costs	-	-	1,083 1,083		-	4,313 4,313		918 918		6,314 6,314	-	-	-	-	-	-	1,160 1,160	$\begin{array}{c} 225,765 \\ 225,765 \end{array}$	-	-
Dania J E	l Collateral Costs																				
5d.3.1	Spent Fuel Capital and Transfer							28	4	32	_	32									
5d.3.1	Subtotal Period 5d Collateral Costs	-	-	-	-	-	-	28	4	32	-	32	-	-	-	-	-	-	-	-	-
D. 4.15	10. 10. 10. 10. 10. 10. 10. 10. 10. 10.																				
5d.4.1	l Period-Dependent Costs Insurance							27	3	30	30										
5d.4.1 5d.4.2	Property taxes	-	-	-	-	-	-	35	3 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	-	-	-	-	-	-	-	-	-	2,154
5d.4.9	Utility Staff Cost	-	-	-	-	-	-	39 278	6		45 301	15	-	-	-	-	-	-	-	-	539 2,693
5d.4	Subtotal Period 5d Period-Dependent Costs	-	-	-	-	-	-	218	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
PERIO	5e - ISFSI Decontamination																				
Period 5	Direct Decommissioning Activities																				
	Additional Costs																				
5e.2.1	License Termination ISFSI	-	0	3			283		602		3,008	-	-	-	848	-	-	-	131,507	10,502	
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 5	Period-Dependent Costs																				
5e.4.1	Insurance	-	-	-	-	-	-	118	30	148	148	-	-	-	-	-	-	-	-	-	-
5e.4.2	Property taxes	-	-	-	-	-	-	248	62		310	-	-	-	-	-	-	-	-	-	-
5e.4.3	Plant energy budget	-	-	-	-	-	-	12	3		15	-	-	-	-	-	-	-	-	-	-
5e.4.4	Fixed Overhead	-	-	-	-	-	-	71	18		89	-	-	-	-	-	-	-	-	-	-
5e.4.5	Railroad Track Maintenance	-	-	-	-	-	-	41 352	10 88		52 440	-	-	-	-	-	-	-	-	-	4 000
5e.4.6 5e.4.7	Security Staff Cost Utility Staff Cost	-	-	-	-	-	-	352 261	88 65		326	-	-	-	-	-	-	-	-	-	4,999 3,792
5e.4.7	Subtotal Period 5e Period-Dependent Costs	-	-	-	-	-	-	1,104	276	1,380	1,380	-	-	-	-	-	-	-	-	-	3,792 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

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Monticello Nuclear Generating Plant Decommissioning Cost Analysis

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

						Off-Site	LLRW				NRC	Spent Fuel	Site	Processed		Burial	Volumes		Burial /		Utility and
Activit		Decon	Removal	Packaging	Transport	Processing	Disposal	Other	Total	Total	Lic. Term.	Management	Restoration	Volume	Class A	Class B	Class C	GTCC	Processed	Craft	Contractor
Index	Activity Description	Cost	Cost	Costs	Costs	Costs	Costs	Costs	Contingency	Costs	Costs	Costs	Costs	Cu. Feet	Cu. Feet	Cu. Feet	Cu. Feet	Cu. Feet	Wt., Lbs.	Manhours	Manhours
PERIOD 5f - ISFSI Site Restoration																					
Period 5	of Direct Decommissioning Activities																				
	of Additional Costs									2.000											
5f.2.1 5f.2	Demolition and Site Restoration of ISFSI Subtotal Period 5f Additional Costs	-	1,564 1,564	-	-	-	-	256 256	273 273	2,093 2,093	-	-	2,093 2,093	-	-	-	-	-	-	7,309 7,309	160 160
	of Collateral Costs																				
5f.3.1 5f.3	Small tool allowance Subtotal Period 5f Collateral Costs	-	11 11	-	-	-	-	-	$\frac{2}{2}$	12 12	-	-	12 12		-	-	-	-	-	-	-
Period 5	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 5f.4.7	Railroad Track Maintenance	-	-	-	-	-	-	180	3 27	24 207	-	-	24 207	-	-	-	-	-	-	-	2,562
5f.4.8	Security Staff Cost Utility Staff Cost	-	-	-	-	-	-	111	17	128	-	-	128	-	-	-	-	-	-	-	1,590
5f.4.6	Subtotal Period 5f Period-Dependent Costs	-	118	-	-	-	-	482	84	685	-	-	685		-	-	-	-	-	-	4,151
***	-		1 000					=00	070	0.500			0.700							= 000	, 011
5f.0	TOTAL PERIOD 5f COST	-	1,693	-	-	-	-	738	358	2,790	-	-	2,790	-	-	-	-	-	-	7,309	4,311
PERIO	D 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

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APPENDIX K

ISFSI DECOMMISSIONING

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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)

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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)

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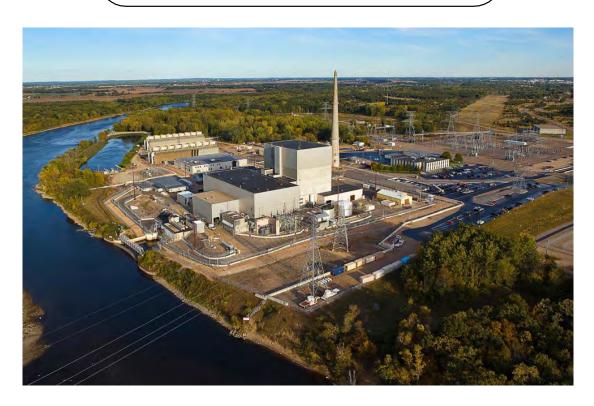
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DECOMMISSIONING COST ANALYSIS FOR A 70 YEAR OPERATING LIFE

for the

MONTICELLO NUCLEAR GENERATING PLANT



 $prepared \ for$

Xcel Energy

prepared by

TLG Services, LLC Bridgewater, Connecticut

October 2020

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Xcel Energy

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APPROVALS

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Date

Technical Manager

Roderick W. Knight
Date

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REVISION LOG

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

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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

TLG Services, LLC

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

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

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

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.

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

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

<u>SAFSTOR</u> 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." 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 <u>Ibid</u>. Page FR24022, Column 3

⁵ Ibid

⁶ <u>Ibid</u>. Page FR24023, Column 2

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In 1996, the NRC published revisions to its general requirements for decommissioning nuclear power plants to clarify ambiguities and codify procedures and terminology as a means of enhancing efficiency and uniformity in the decommissioning process.^[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).

TLG Services, LLC

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

[&]quot;Standard Format and Content of Decommissioning Cost Estimates for Nuclear Power Reactors," Regulatory Guide 1.202, Nuclear Regulatory Commission, February 2005

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 seg.), June 17, 2011

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	1st Spent	1st Spent Fuel	Last Spent	
Scenario	Fuel	Assembly	Fuel Assembly	Scenario
	Canister	Removed from	Removed from	Identification
	Replacement	Monticello*	Monticello	
1	n/a	2052	2082	DECON with 42 Year
1				$\mathrm{DFS^{+}}$
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.

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

⁺ Dry Fuel Storage

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

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

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

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

Contingency

Consistent with cost estimating practice, contingencies are applied to the decontamination and dismantling costs developed as "specific provision for unforeseeable elements of cost within the defined project scope, particularly important where previous experience relating estimates and actual costs has shown that unforeseeable events which will increase costs are likely to occur."[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.

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

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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

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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

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

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

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

The DOE issued its final Environmental Impact Statement for the disposal of GTCC on January 2016.^[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.

High-Level Radioactive Waste Management

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 &}quot;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 &}quot;Nuclear Waste Policy Act of 1982 and Amendments," DOE's Office of Civilian Radioactive Management, 1982

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of the nuclear fuel cycle ... and make recommendations for a new plan."[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 "[0]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;

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

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

²³ Ibid., p.2

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

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

Completion of the decommissioning process is dependent upon the DOE's ability to remove spent fuel from the site in a timely manner. DOE's repository program had originally assumed that spent fuel allocations would be accepted for disposal from the nation's commercial nuclear plants, with limited exceptions, in the order (the "queue") in which it was discharged from the reactor. [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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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 ..."

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

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nuclear fuel will be stored in the state for 60 years, 100 years, and 200 years following the cessation of operation of the nuclear plant." [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.

²⁷ Ibid.

[&]quot;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

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

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

An ISFSI, operated under a Part 50 General License (in accordance with 10 CFR 72, Subpart K [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 alreadycanistered 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"

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

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

Consequently, non-essential site structures addressed by this analysis are completely removed (including foundations) as required by Minnesota statute [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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Minnesota Administrative Rule part 7035.0400 "General Requirements"

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

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

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

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

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

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SCENARIO 1: DECON WITH 42 YEARS DFS **DECOMMISSIONING COST ELEMENTS**

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

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

Columns may not add due to rounding

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SCENARIO 2: DECON WITH 60 YEAR DFS DECOMMISSIONING COST ELEMENTS

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

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SCENARIO 3: DECON WITH 100 YEAR DFS DECOMMISSIONING COST ELEMENTS

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

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SCENARIO 4: DECON WITH 200 YEAR DFS DECOMMISSIONING COST ELEMENTS

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

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1. INTRODUCTION

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

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

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

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

1.1 OBJECTIVES OF STUDY

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

The operating license was originally issued for the plant on September 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

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a renewed license (i.e., 20 year extension). The application was approved by the NRC in November 2006. For the purposes of this study, a subsequent license renewal is assumed to be requested and approved, with a final shutdown date (license expiration) for Monticello changing to September 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

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

1.3 REGULATORY GUIDANCE

The Nuclear Regulatory Commission (NRC or Commission) provided initial decommissioning requirements in its rule "General Requirements for Decommissioning Nuclear Facilities," issued in June 1988. [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

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

The NRC had considered rulemaking to alter the 60-year time for completing decommissioning and to clarify the use of engineered barriers for reactor entombments. 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

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

In 2011, the NRC published amended regulations to improve decommissioning planning and thereby reduce the likelihood that any current operating facility will become a legacy site. [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

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

In January 2013, the DOE issued the "Strategy for the Management and Disposal of Used Nuclear Fuel and High-Level Radioactive Waste," in response to the recommendations made by the Blue Ribbon Commission and as "a framework for moving toward a sustainable program to deploy an integrated system capable of transporting, storing, and disposing of used nuclear fuel..." [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.

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

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

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

Completion of the decommissioning process is dependent upon the DOE's ability to remove spent fuel from the site in a timely manner. DOE's repository program had originally assumed that spent fuel allocations would be accepted for disposal from the nation's commercial nuclear plants, with limited exceptions, in the order (the "queue") in which it was discharged from the reactor.[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."

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

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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.

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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 EnergySolutions' facility in Clive, Utah. Therefore, disposal costs for Class A waste were based upon current contract rates. This facility is not licensed to receive the higher activity portion (Classes B and C) of the decommissioning waste stream.

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

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

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The DOE issued its final Environmental Impact Statement for the disposal of GTCC on January 2016. [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 Docket No. E002/RP-24-67 Appendix BB: 2022-2024 Triennial Nuclear Plant Decommissioning Study and Assumptions - Page 1449 of 1964

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

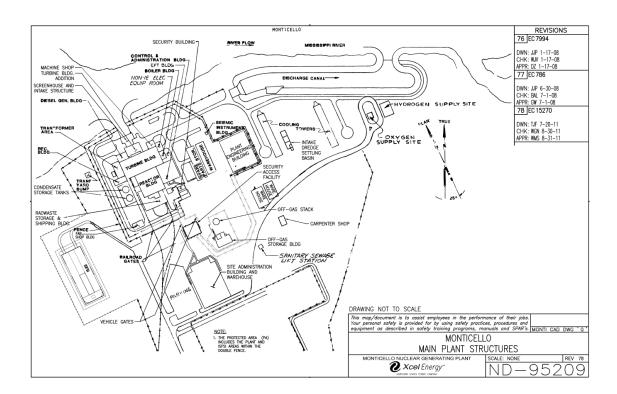
On October 9, 2002, the NRC signed an agreement with the EPA on the radiological decommissioning and decontamination of NRC-licensed sites. The Memorandum of Understanding (MOU) [25] provides that EPA will defer exercise of authority under CERCLA for the majority of facilities decommissioned under NRC 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.

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FIGURE 1.1 MONTICELLO NUCLEAR GENERATING PLANT GENERAL PLAN



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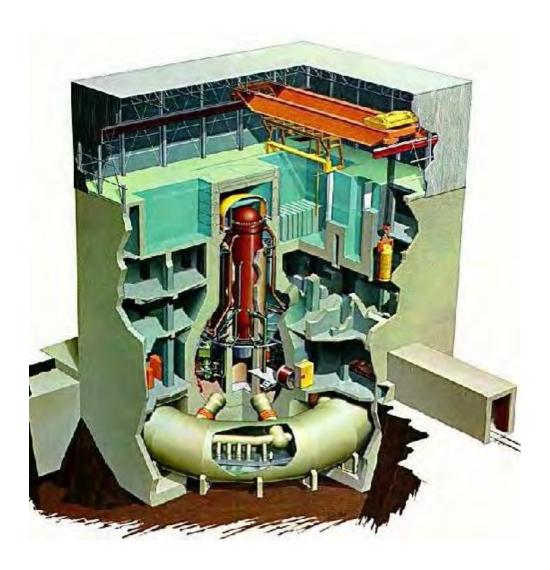
FIGURE 1.2 MONTICELLO NUCLEAR GENERATING PLANT AERIAL VIEW



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FIGURE 1.3 MONTICELLO NUCLEAR GENERATING PLANT REACTOR BUILDING SECTION



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2. DECON DECOMMISSIONING ALTERNATIVE

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

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

	1st Spent	1st Spent Fuel	Last Spent	
Scenario	Fuel	Assembly	Fuel Assembly	Scenario
	Canister	Removed from	Removed from	Identification
	Replacement	Monticello	Monticello	
1	n/a	2052	2082	DECON with 42 Year
				DFS ⁺
2	70/0	2079	9100	DECON with 60 Year
2	n/a	2078	2100	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.

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.

⁺ Dry Fuel Storage

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

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

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

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

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

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

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2.1 PERIOD 1 - PREPARATIONS

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

Engineering and Planning

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

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

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

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

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

Site Preparations

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

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

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

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

2.2 PERIOD 2 -DECOMMISSIONING OPERATIONS

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

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

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

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

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

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

Incorporated into the LTP is the Final Survey Plan. This plan identifies the radiological surveys to be performed once the decontamination activities are completed and is developed using the guidance provided in the "Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM)."^[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

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

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

2.3 PERIOD 3 –SITE RESTORATION

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

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

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

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

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

2.4 ISFSI OPERATIONS AND DECOMMISSIONING

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

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

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

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

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

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3. COST ESTIMATES

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

3.1 BASIS OF ESTIMATES

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

3.2 METHODOLOGY

The methodology used to develop the estimates follows the basic approach originally presented in the AIF/NESP-036 study report, "Guidelines for Producing Commercial Nuclear Power Plant Decommissioning Cost Estimates," [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

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

Regulatory Guide 1.184 [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%

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

Scheduling Program Durations

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

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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

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

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

Decontamination	50%
Contaminated Component Removal	25%
Contaminated Component Packaging	10%
Contaminated Component Transport	15%
Low-Level Radioactive Waste Disposal	25%
Low-Level Radioactive Waste Processing	15%
Reactor Segmentation	75%
NSSS Component Removal	25%
Reactor Waste Packaging	25%
Reactor Waste Transport	25%
Decetes Vessel Comment Dissessel	F 00/
Reactor Vessel Component Disposal	50%
GTCC Disposal	15%
Staffing	15%
Spent Fuel Management	15%
Non-Radioactive Component Removal	15%
11 15 : 4 170 1:	1 20/
Heavy Equipment and Tooling	15%
Supplies	25%
Engineering	15%
Energy	15%
Insurance and Fees	10%
Characterization and Termination Surveys	30%
Operations and Maintenance Expense	15%

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Construction	15%
Property Taxes	10%
ISFSI Decommissioning	25%

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

3.3.2 Financial Risk

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

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

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

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

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

3.4 SITE-SPECIFIC CONSIDERATIONS

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

3.4.1 Spent Fuel Management

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

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

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

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- 1) Fuel transferred from the pool to the ISFSI within 4 years of shutdown;
- 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

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

Storage Canister Design

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

Canister Loading and Transfer

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

Operations and Maintenance

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

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

Replacement of DSCs during ISFSI fuel storage period

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

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

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

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

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

ISFSI Decommissioning

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

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

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

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

GTCC

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

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

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

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

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

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

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

3.4.3 Primary System Components

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

3.4.4 Main Turbine and Condenser

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

3.4.5 Transportation Methods

Contaminated piping, components, and structural material other than the highly activated reactor vessel and internal components will qualify as LSA-I, II or III or Surface Contaminated Object, SCO-I or II, as described in Title 49. [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

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

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

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

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

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

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

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

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

3.4.7 Site Conditions Following Decommissioning

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

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

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

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

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

3.5 ASSUMPTIONS

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

3.5.1 Estimating Basis

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

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

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

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3.5.2 Labor Costs

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

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

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

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

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

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

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

3.5.3 Design Conditions

Any fuel cladding failure that occurred during the lifetime of the plant is assumed to have released fission products at sufficiently low levels that the buildup of quantities of long-lived isotopes (e.g., ¹³⁷Cs, ⁹⁰Sr, 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.

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

Scrap and Salvage

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

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

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

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

Energy

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

Emergency Planning

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

Insurance

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

Site Non-Labor Overhead

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

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

Severance Program

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

Taxes

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

NRC Fees

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

Disposal of Processed Water

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

Site Modifications

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

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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 Docket No. E002/RP-24-67 Appendix BB: 2022-2024 Triennial Nuclear Plant Decommissioning Study and Assumptions - Page 1485 of 1964

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

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

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

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TABLE 3.1 SCENARIO 1: DECON WITH 42 YEAR DFS TOTAL ANNUAL EXPENDITURES

(thousands, 2020 dollars)

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

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TABLE 3.1 (continued) SCENARIO 1: DECON WITH 42 YEAR DFS TOTAL ANNUAL EXPENDITURES

(thousands, 2020 dollars)

	\mathbf{E}					
Year	Labor	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

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TABLE 3.2 SCENARIO 2: DECON WITH 60 YEAR DFS TOTAL ANNUAL EXPENDITURES

(thousands, 2020 dollars)

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

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TABLE 3.2 (continued) SCENARIO 2: DECON WITH 60 YEAR DFS TOTAL ANNUAL EXPENDITURES

(thousands, 2020 dollars)

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

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TABLE 3.2 (continued) SCENARIO 2: DECON WITH 60 YEAR DFS TOTAL ANNUAL EXPENDITURES

(thousands, 2020 dollars)

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

Note: Columns may not add due to rounding

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TABLE 3.3 SCENARIO 3: DECON WITH 100 YEAR DFS TOTAL ANNUAL EXPENDITURES

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

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TABLE 3.3 (continued) SCENARIO 3: DECON WITH 100 YEAR DFS TOTAL ANNUAL EXPENDITURES

		quipment &				
Year	Labor	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	$\frac{2,451}{2,458}$	16,770
2073	9,380	4,911	0	0	2,450 $2,451$	16,742
2074	9,380	4,911	0	0	2,451	16,742
2075	9,380	4,911	0	0	$\frac{2,451}{2,451}$	16,742
2076	9,401	4,911	0	0	,	16,770
$\frac{2076}{2077}$	9,401	4,911	0	0	2,458	$\frac{16,770}{16,742}$
2077	9,380	4,911	0	0	2,451	16,742
			0	0	2,451	
2079	9,380	4,911	0		2,451	16,742
2080	12,990	15,678		0	2,458	31,126
2081	9,380	4,911	0	0	2,451	16,742
2082	9,380	4,911	0	0	2,451	16,742
2083	9,380	4,911	0	0	2,451	16,742
2084	9,401	4,911	0	0	2,458	16,770
2085	12,969	15,678	0	0	2,451	31,098
2086	9,380	4,911	0	0	2,451	16,742
2087	11,534	11,371	0	0	2,451	25,356
2088	10,121	7,069	0	0	2,458	19,648
2089	9,380	4,911	0	0	2,451	16,742
2090	9,380	4,911	0	0	2,451	16,742
2091	9,380	4,911	0	0	2,451	16,742
2092	10,121	7,070	0	0	2,458	19,650
2093	10,640	8,690	0	0	2,451	21,781
2094	34,684	80,821	0	0	2,451	117,956
2095	10,460	8,150	0	0	2,451	21,062
2096	10,841	9,230	0	0	2,458	22,529
2097	7,743	0	0	0	2,451	10,195
2098	7,743	0	0	0	2,451	10,195
2099	7,743	0	0	0	2,451	10,195

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TABLE 3.3 (continued) SCENARIO 3: DECON WITH 100 YEAR DFS TOTAL ANNUAL EXPENDITURES

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

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

(thousands, 2020 dollars)

Year	E Labor	quipment & Materials	Energy	Burial	Other	Total
	12001	Waterials	Linergy	Duriai	Other	Total
2130	11,436	11,079	0	0	2,451	24,966
2131	7,847	311	0	0	2,451	10,610
2132	7,868	311	0	0	2,458	10,638
2133	7,951	623	0	0	2,451	11,025
2134	7,847	311	0	0	2,451	10,610
2135	11,436	11,079	0	0	2,451	24,966
2136	7,972	623	0	0	2,458	11,053
2137	10,001	6,772	0	0	2,451	19,224
2138	7,847	311	0	0	2,451	10,610
2139	7,951	623	0	0	2,451	11,025
2140	7,920	1,977	0	0	7,412	17,309
2141	2,074	1,449	22	354	3,830	7,729
Total	1,406,512	765,842	10,030	166,633	376,375	2,725,391

Note: Columns may not add due to rounding

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

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

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

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

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

Year	E Labor	quipment & Materials	Energy	Burial	Other	Total
	20001					
2100	9,380	4,911	0	0	2,442	16,733
2101	9,380	4,911	0	0	2,442	16,733
2102	9,380	4,911	0	0	2,442	16,733
2103	9,380	4,911	0	0	2,442	16,733
2104	9,401	4,911	0	0	2,449	16,761
2105	9,380	4,911	0	0	2,442	16,733
2106	9,380	4,911	0	0	2,442	16,733
2107	9,380	4,911	0	0	2,442	16,733
2108	16,579	26,445	0	0	2,449	45,473
2109	9,380	4,911	0	0	2,442	16,733
2110	9,380	4,911	0	0	2,442	16,733
2111	9,380	4,911	0	0	2,442	16,733
2112	9,401	4,911	0	0	2,449	16,761
2113	12,969	15,678	0	0	2,442	31,089
2114	9,380	4,911	0	0	2,442	16,733
2115	9,380	4,911	0	0	2,442	16,733
2116	10,119	7,064	0	0	2,449	19,632
2117	9,380	4,911	0	0	2,442	16,733
2118	19,430	35,059	0	0	2,442	56,930
2119	9,380	4,911	0	0	2,442	16,733
2120	9,401	4,911	0	0	2,449	16,761
2121	9,380	4,911	0	0	2,442	16,733
2122	9,380	4,911	0	0	2,442	16,733
2123	9,380	4,911	0	0	2,442	16,733
2124	9,401	4,911	0	0	2,449	16,761
2125	9,380	4,911	0	0	2,442	16,733
2126	9,380	4,911	0	0	2,442	16,733
2127	9,380	4,911	0	0	2,442	16,733
2128	10,121	7,069	0	0	2,449	19,639
2129	9,380	4,911	0	0	2,442	16,733

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

X 7		quipment &	T2	D 1	0.1	m , 1
Year	Labor	Materials	Energy	Burial	Other	Total
2130	12,969	15,678	0	0	2,442	31,089
2131	9,380	4,911	0	0	2,442	16,733
2132	9,401	4,911	0	0	2,449	16,761
2133	9,380	4,911	0	0	2,442	16,733
2134	9,380	4,911	0	0	2,442	16,733
2135	12,969	15,678	0	0	2,442	31,089
2136	9,401	4,911	0	0	2,449	16,761
2137	11,534	11,371	0	0	2,442	25,347
2138	9,380	4,911	0	0	2,442	16,733
2139	9,380	4,911	0	0	2,442	16,733
2140	9,401	4,911	0	0	2,449	16,761
2141	9,380	4,911	0	0	2,442	16,733
2142	9,380	4,911	0	0	2,442	16,733
2143	9,380	4,911	0	0	2,442	16,733
2144	34,525	80,281	0	0	2,449	117,254
2145	9,380	4,911	0	0	2,442	16,733
2146	9,380	4,911	0	0	2,442	16,733
2147	9,380	4,911	0	0	2,442	16,733
2148	9,401	4,911	0	0	2,449	16,761
2149	9,380	4,911	0	0	2,442	16,733
2150	9,380	4,911	0	0	2,442	16,733
2151	9,380	4,911	0	0	2,442	16,733
2152	9,401	4,911	0	0	2,449	16,761
2153	9,380	4,911	0	0	2,442	16,733
2154	9,380	4,911	0	0	2,442	16,733
2155	9,380	4,911	0	0	2,442	16,733
2156	9,401	4,911	0	0	2,449	16,761
2157	9,380	4,911	0	0	2,442	16,733
2158	16,558	26,445	0	0	2,442	45,445
2159	9,380	4,911	0	0	2,442	16,733

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

		quipment &				
Year	Labor	Materials	Energy	Burial	Other	Total
2160	9,401	4,911	0	0	2,449	16,761
2161	9,380	4,911	0	0	2,443	16,733
2162	9,380	4,911	0	0	2,442	16,733
2163	12,969	15,678	0	0	2,442	
$\frac{2163}{2164}$,		0	0		31,089
	9,401	4,911	0	0	2,449	16,761
2165	9,380	4,911		-	2,442	16,733
2166	10,098	7,064	0	0	2,442	19,604
2167	9,380	4,911	0	0	2,442	16,733
2168	20,170	37,217	0	0	2,449	59,836
2169	9,380	4,911	0	0	2,442	16,733
2170	9,380	4,911	0	0	2,442	16,733
2171	9,380	4,911	0	0	2,442	16,733
2172	9,401	4,911	0	0	2,449	16,761
2173	9,380	4,911	0	0	2,442	16,733
2174	9,380	4,911	0	0	2,442	16,733
2175	9,380	4,911	0	0	2,442	16,733
2176	9,401	4,911	0	0	2,449	16,761
2177	9,380	4,911	0	0	2,442	16,733
2178	9,380	4,911	0	0	2,442	16,733
2179	9,380	4,911	0	0	2,442	16,733
2180	12,990	15,678	0	0	2,449	31,117
2181	9,380	4,911	0	0	2,442	16,733
2182	9,380	4,911	0	0	2,442	16,733
2183	9,380	4,911	0	0	2,442	16,733
2184	9,401	4,911	0	0	2,449	16,761
2185	12,969	15,678	0	0	2,442	31,089
2186	9,380	4,911	0	0	2,442	16,733
2187	11,534	11,371	0	0	2,442	25,347
2188	9,401	4,911	0	0	2,449	16,761
2189	9,380	4,911	0	0	2,442	16,733

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

		quipment &				
Year	Labor	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
$\frac{2191}{2192}$	10,121	7,070	0	0	2,442	19,641
$\frac{2192}{2193}$	10,121		0	0	,	
		8,690			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

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

(thousands, 2020 dollars)

	\mathbf{E}	quipment &				
Year	Labor	Materials	Energy	Burial	Other	Total
				. 1		
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

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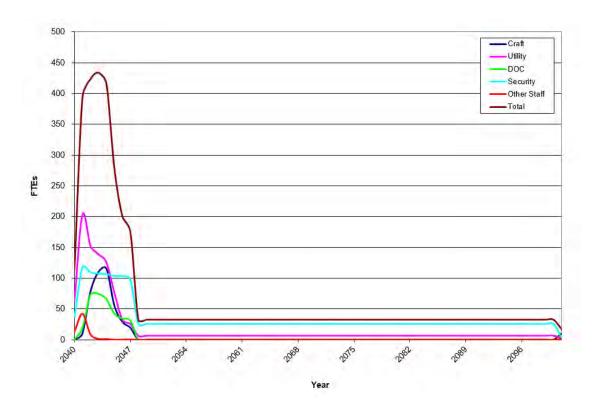
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> FIGURE 3.1 SCENARIO 2: DECON WITH 60 YEAR DFS MONTICELLO NUCLEAR GENERATING PLANT MANPOWER LEVELS



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

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4. SCHEDULE ESTIMATE

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

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

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

4.2 PROJECT SCHEDULE

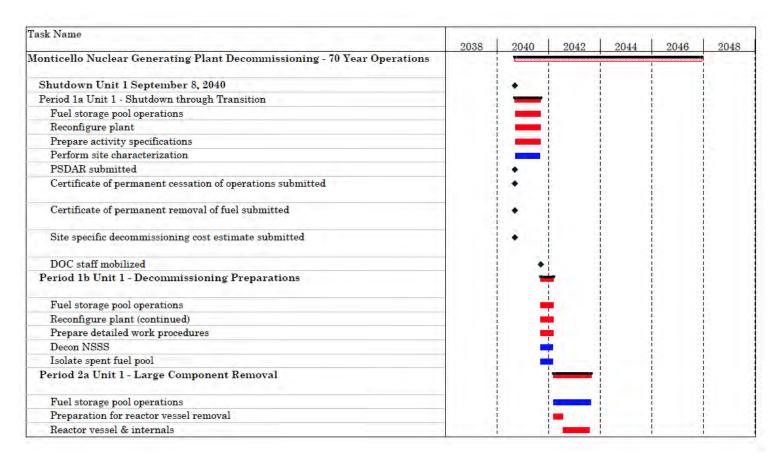
The period-dependent costs presented in the detailed cost tables are based upon the durations developed in the schedules for decommissioning Monticello. Durations are established between several milestones in each project period; these durations are used to establish a critical path for the entire project.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

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

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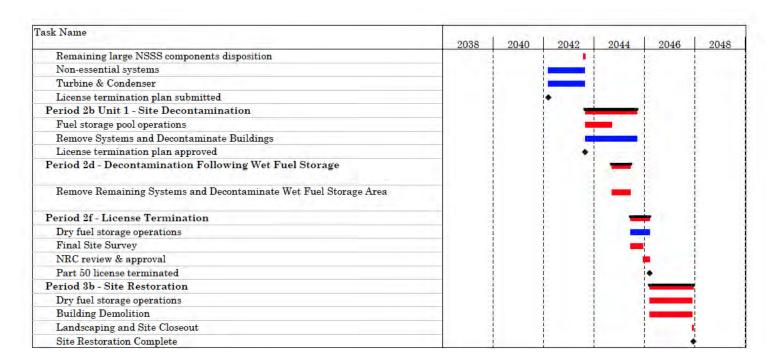
FIGURE 4.1 DECON ACTIVITY SCHEDULE



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FIGURE 4.1 (continued) DECON ACTIVITY SCHEDULE



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

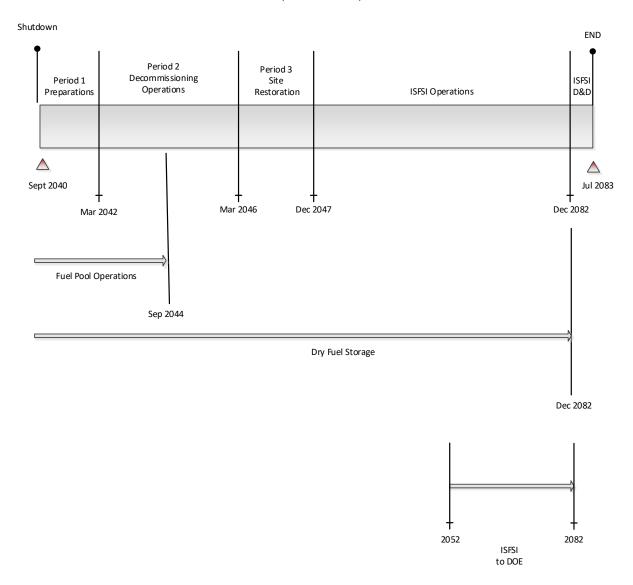
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FIGURE 4.2 SCENARIO 1: DECON WITH 42 YEAR DFS DECOMMISSIONING TIMELINE



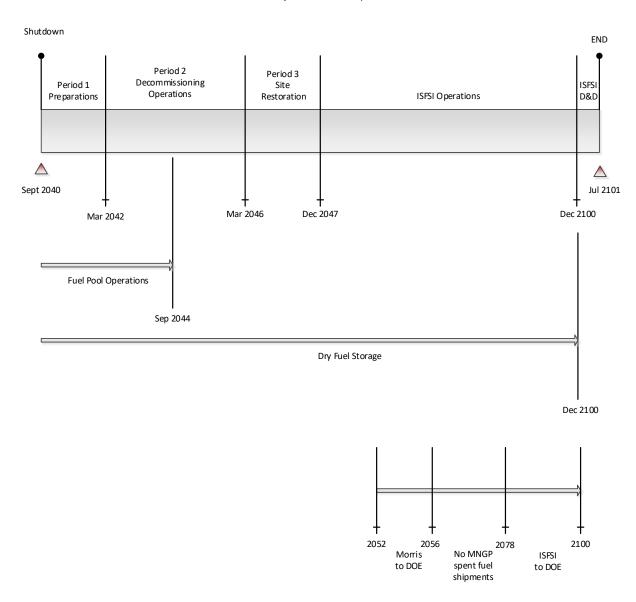
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FIGURE 4.3 **SCENARIO 2: DECON WITH 60 YEAR DFS DECOMMISSIONING TIMELINE**



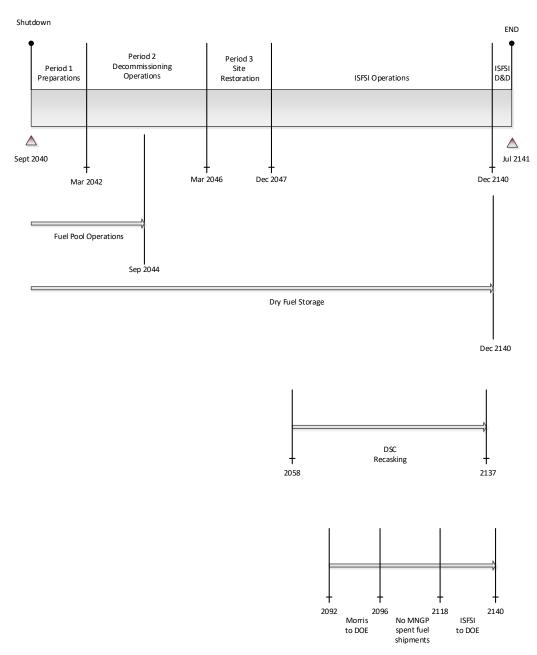
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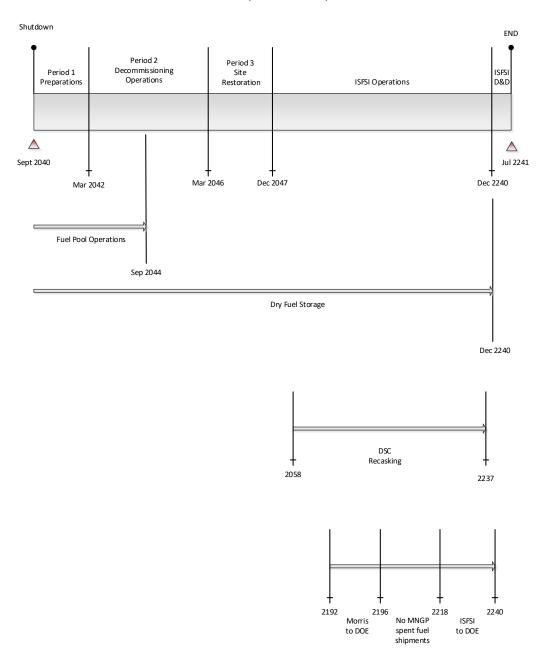
FIGURE 4.4 SCENARIO 3: DECON WITH 100 YEAR DFS DECOMMISSIONING TIMELINE



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FIGURE 4.5 SCENARIO 4: DECON WITH 200 YEAR DFS DECOMMISSIONING TIMELINE



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5. RADIOACTIVE WASTES

The objectives of the decommissioning process are the removal of all radioactive material from the site that would restrict its future use and the termination of the NRC license. This currently requires the remediation of all radioactive material at the site in excess of applicable legal limits. Under the Atomic Energy Act, [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.

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

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

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

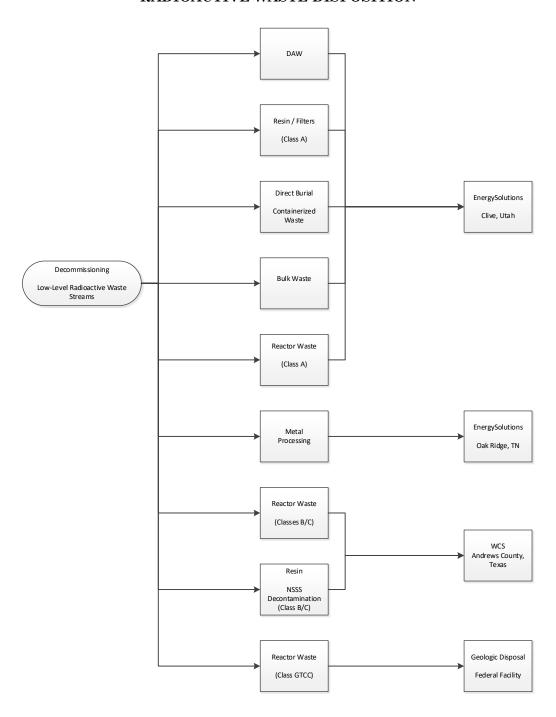
EnergySolutions is not able to accept the higher activity waste (Class B and C) generated in the decontamination of the NSSS and segmentation of the components closest to the core. Waste disposal costs for the higher activity waste (Class B and C) are based upon preliminary and indicative information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

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

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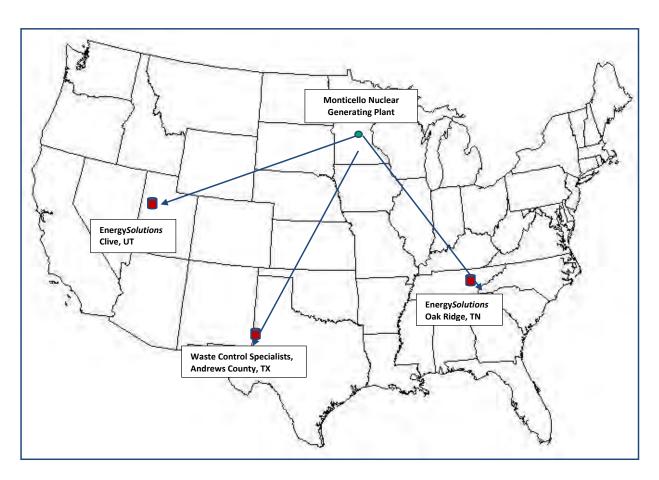
FIGURE 5.1 RADIOACTIVE WASTE DISPOSITION



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FIGURE 5.2 DECOMMISSIONING WASTE DESTINATIONS RADIOLOGICAL



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

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

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

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

Waste	Cost Basis	Class [1]	Waste Volume (cubic feet)	Mass (pounds)
				,
Low-Level Radioactive Waste (near-surface	EnergySolutions Containerized	A	122,218	7,165,609
disposal)	EnergySolutions Bulk	A	75,053	4,661,497
	Future LLRW Disposal Facility (Proxy)	В	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

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

Waste	Cost Basis	Class [1]	Waste Volume (cubic feet)	Mass (pounds)
1,55000		0.2000.0	(0 110 20 20 0)	(1000000)
Low-Level Radioactive	EnergySolutions			
Waste (near-surface disposal)	Containerized	A	122,218	7,165,609
(disposal)	EnergySolutions			
	Bulk	A	75,053	4,661,497
	Future LLRW Disposal Facility			
	(Proxy)	В	1,711	185,173
	Future LLRW Disposal Facility			
	(Proxy)	С	1,178	110,575
Greater than Class C	Spent Fuel			
(geologic repository)	Equivalent	GTCC	1,160	225,765
Total [2]			201,320	12,348,620
10001			201,020	12,010,020
Processed/Conditioned (off-site recycling	Recycling			
center)	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

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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	Energy Solutions Containerized	A	122,218	7,169,509
disposal)		71	122,210	7,100,000
	Energy <i>Solutions</i> Bulk	A	75,048	4,661,403
	Future LLRW Disposal Facility			
	(Proxy)	В	1,711	185,173
	Future LLRW Disposal Facility			
	(Proxy)	С	1,178	110,575
Greater than Class C	Spent Fuel			
(geologic repository)	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

 $^{^{\}mbox{\scriptsize [1]}}$ Waste is classified according to the requirements as delineated in Title 10 CFR, Part 61.55

^[2] Columns may not add due to rounding

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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	EnergySolutions Containerized	A	122,218	7,169,509
disposal)	EnergySolutions Bulk	A	75,048	4,661,403
	Future LLRW Disposal Facility (Proxy)	В	1,711	185,173
	Future LLRW Disposal Facility	C		
	(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

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6. RESULTS

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

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

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

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

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

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

The cost for waste disposal includes only those costs associated with the controlled disposition of the low-level radioactive waste generated from decontamination and dismantling activities, including plant equipment and components, structural material, filters, resins and dry-active waste. As described in Section 5, disposition of the majority of the low-level radioactive material requiring controlled disposal is at the 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.

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

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

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

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TABLE 6.1 SCENARIO 1: DECON WITH 42 YEAR DFS DECOMMISSIONING COST ELEMENTS

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

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

Columns may not add due to rounding

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TABLE 6.2 SCENARIO 2: DECON WITH 60 YEAR DFS DECOMMISSIONING COST ELEMENTS

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

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

Columns may not add due to rounding

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TABLE 6.3 SCENARIO 3: DECON WITH 100 YEAR DFS DECOMMISSIONING COST ELEMENTS

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

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

Columns may not add due to rounding

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TABLE 6.4 SCENARIO 4: DECON WITH 200 YEAR DFS DECOMMISSIONING COST ELEMENTS

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

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

Columns may not add due to rounding

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7. REFERENCES

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

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- 12. United States Court of Appeals for the District of Columbia Circuit, In Re: Aiken County, Et Al., August 2013 [Open]
- U.S. Code of Federal Regulations, Title 10, Part 961.11, Article IV -13. 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 ..."
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- U.S. Code of Federal Regulations, Title 10, Part 50, "Domestic Licensing of 16. Production and Utilization Facilities," Subpart 54 (bb), "Conditions of Licenses" [Open]
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- 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]

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7. REFERENCES

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7. REFERENCES

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APPENDIX A

UNIT COST FACTOR DEVELOPMENT

A

a ... 1

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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
\mathbf{c}	Install contamination controls	20	(b)
d	Disconnect inlet and outlet lines	60	60
e	Cap openings	20	(d)
f	Rig for removal	30	30
g	Unbolt from mounts	30	30
h	Remove contamination controls	15	15
i	Remove, wrap, send to waste processing area	<u>60</u>	<u>60</u>
	Totals (Activity/Critical)	355	255
	tion adjustment(s):		100
	spiratory protection adjustment (50 of critical durat		128
	diation/ALARA adjustment (37.1 of critical duration	1)	<u>95</u>
Aaju	sted work duration		478
	otective clothing adjustment (30 of adjusted duration uctive work duration	n)	$\frac{143}{621}$
+ Wo	ork break adjustment (8.33 of productive duration)		<u>52</u>
Total	work duration (minutes)		673

*** Total duration = 11.217 hr ***

^{*} alpha designators indicate activities that can be performed in parallel

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APPENDIX A

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3. LABOR REQUIRED

Crew	Number	Duration (hours)	Rate (\$/hr)	Cost
Laborers	3.00	11.217	\$61.19	\$2,059.10
Craftsmen	2.00	11.217	\$76.95	\$1,726.30
Foreman	1.00	11.217	\$80.53	\$903.30
General Foreman	0.25	11.217	\$82.80	\$232.19
Fire Watch	0.05	11.217	\$61.19	\$34.32
Health Physics Technician	1.00	11.217	\$53.89	<u>\$604.48</u>
Total Labor Cost				\$5,559.69
4. EQUIPMENT & CO	NSUMABLES	COSTS		
Equipment Costs				none
Consumables/Materials Cost	ss			
• Universal Sorbent 50	\$31.50			
Tarpaulins (oil resista	-		sa ft {2}	\$23.50
Gas torch consumable		,	1	\$20.79
Subtotal cost of equipment a	nd materials			\$75.79
Overhead & profit on equipment		rials @ 16.88%		\$12.79
Total costs, equipment & ma	terial			\$88.58
TOTAL COST:				
Removal of contamina	ted heat exch	anger <3000 j	pounds:	\$5,648.27
Total labor cost:				\$5,559.69
Total equipment/material cos	sts:			\$88.58
Total craft labor man-hours		nit:		81.88

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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. <u>www.mcmaster.com</u> 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.

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APPENDIX B

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APPENDIX B

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

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APPENDIX B

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

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Monticello Nuclear Generating Plant Decommissioning Cost Analysis – 70 Year Lifetime Document X01-1775-003, Rev. 0 Appendix B, Page 4 of 7

APPENDIX B

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

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Monticello Nuclear Generating Plant Decommissioning Cost Analysis – 70 Year Lifetime Document X01-1775-003, Rev. 0 Appendix B, Page 5 of 7

APPENDIX B

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	d 568.99
Removal of below-grade suspended floors, \$/cubic yard	218.59
Removal of clean monolithic concrete structures, \$/cubic yard	1,160.31
Removal of contaminated monolithic concrete structures, \$/cubic yard	2,697.57
Removal of clean foundation concrete, \$/cubic yard	910.72
Removal of contaminated foundation concrete, \$/cubic yard	2,512.94
Explosive demolition of bulk concrete, \$/cubic yard	61.21
Removal of clean hollow masonry block wall, \$/cubic yard	27.85
Removal of contaminated hollow masonry block wall, \$/cubic yard	72.42
Removal of clean solid masonry block wall, \$/cubic yard	27.85
Removal of contaminated solid masonry block wall, \$/cubic yard	72.42
Backfill of below-grade voids, \$/cubic yard	36.73
Removal of subterranean tunnels/voids, \$/linear foot	143.27

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APPENDIX B

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

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APPENDIX B

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

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Xcel Energy

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APPENDIX C

DETAILED COST ANALYSIS

SCENARIO 1: DECON with 42 Year DFS

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

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Class A Cu. Feet	Class B	Volumes Class C Cu. Feet	GTCC Cu. Feet	Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
PERIOD 1a -	Shutdown through Transition																				
	ect Decommissioning Activities																				
	epare preliminary decommissioning cost	-	-	-	-	-	-	167	25	192	192	-	-	-	-	-	-	-	-	-	1,300
	tification of Cessation of Operations move fuel & source material									a n/a											
	tification of Permanent Defueling									a											
1a.1.5 Dea	activate plant systems & process waste									a											
	epare and submit PSDAR	-	-	-	-	-	-	257	39	296	296	-	-	-	-	-	-	-	-	-	2,000
	view plant dwgs & specs. rform detailed rad survey	-	-	-	-	-	-	591	89	680 a	680	-	-	-	-	-	-	-	-	-	4,600
	timate by-product inventory	_	_	_	_	_	_	129	19	148	148	_	_	_	_	_	_	_	_	_	1,000
	d product description	-	-	-	-	-	-	129	19	148	148	-	-	-	-	-	-	-	-	-	1,000
	tailed by-product inventory	-	-	-	-	-	-	167	25	192	192	-	-	-	-	-	-	-	-	-	1,300
	fine major work sequence	-	-	-	-	-	-	964	145	1,108	1,108	-	-	-	-	-	-	-	-	-	7,500
	rform SER and EA epare/submit Defueled Technical Specifications	-	-	-	-	-	-	398 964	60 145	458 1,108	458 1,108	-	-	-	-	-	-	-	-	-	3,100 7,500
	rform Site-Specific Cost Study	-	-	-	-	-	-	643		739	739	- -	-	-	-	-	-	-	-	-	5,000
	epare/submit Irradiated Fuel Management Plan	-	-	-	-	-	-	129	19	148	148	-	-	-	-	-	-	-	-	-	1,000
Activity Specif								000	05	707	051		70								4.000
1a.1.17.1 Pla 1a.1.17.2 Pla	ant & temporary facilities	-	-	-	-	-	-	632 536	95 80	727 616	654 554	-	73 62	-	-	-	-	-	-	-	4,920 4,167
	SSS Decontamination Flush	-	-	-	-	-	-	64	10	74	74	-	- 02	-	-	-	-	-	-	-	500
	actor internals	-	-	-	-	-	-	912	137	1,049	1,049	-	-	-	-	-	-	-	-	-	7,100
1a.1.17.5 Rea		-	-	-	-	-	-	835	125	961	961	-	-	-	-	-	-	-	-	-	6,500
1a.1.17.6 Sac		-	-	-	-	-	-	64	10	74	74	-	-	-	-	-	-	-	-	-	500
	sisture separators/reheaters	-	-	-	-	-	-	129	19	148	148	-	-	-	-	-	-	-	-	-	1,000
1a.1.17.8 Rei 1a.1.17.9 Ma	inforced concrete	-	-	-	-	-	-	206 268	31 40	236 309	118 309	-	118	-	-	-	-	-	-	-	1,600 2,088
	in Condensers	-	-	-	-	-	-	268	40	309	309	-	-	-	-	-	-	-	-	-	2,088
	essure suppression structure	-	-	-	-	-	-	257	39	296	296	-	-	-	-	-	-	-	-	-	2,000
1a.1.17.12 Dry		-	-	-	-	-	-	206	31	236	236	-	-	-	-	-	-	-	-	-	1,600
	ant structures & buildings	-	-	-	-	-	-	401	60	461	231	-	231	-	-	-	-	-	-	-	3,120
	aste management cility & site closeout	-	-	-	-	-	-	591 116	89 17	680 133	680 67	-	67	-	-	-	-	-	-	-	4,600 900
1a.1.17 Tot			-	-	-	-	-	5,486	823	6,308	5,759	-	550	-	-	-	-	-	-	-	42,683
	te Preparations																				
	epare dismantling sequence	-	-	-	-	-	-	308	46	355	355	-	-	-	-	-	-	-	-	-	2,400
	ant prep. & temp. svces sign water clean-up system	-	-	-	-	-	-	3,500 180	525 27	4,025 207	4,025 207	-	-	-	-	-	-	-	-	-	1,400
	gging/Cont. Cntrl Envlps/tooling/etc.	-	_	_	_	_	-	2,400	360	2,760	2,760	-	_	_	_	_	_	-	_	_	-
1a.1.22 Pro	ocure casks/liners & containers	-	-	-	-	-	-	158	24	182	182	-	-	-	-	-	-	-	-	-	1,230
1a.1 Sul	btotal Period 1a Activity Costs	-	-	-	÷	-	-	16,569	2,485	19,054	18,505	-	550	-	-	-	-	-	-	-	83,013
Period 1a Colla								6,288	943	7,232	-	7,232									
	ent Fuel Capital and Transfer tention and Severance	-	-	-	-	-	-	6,288 9,892	1,484	11,376	11,376	1,232	-	-	-		-	-	-	-	-
	btotal Period 1a Collateral Costs	-	-	-	-	-	-	16,180	2,427	18,607	11,376	7,232	-	-	-	-	-	-	-	-	-
	od-Dependent Costs							0.00-	0.00	a = a	0 2 0:										
	surance	-	-	-	-	-	-	2,328 3,570	233 357	2,561 3,927	2,561 3,927	-	-	-	-	-	-	-	-	-	-
	operty taxes alth physics supplies	-	614	-	-	-	-	5,570 -	153	3,927 767	3,927 767	-	-	-	-	-	-	-	-	-	-
	avy equipment rental	=	753		-	=	-	-	113	866	866	=	-	-	-	-	-	-	-	-	-
1a.4.5 Dis	sposal of DAW generated	-	-	12	6	-	50		15	83	83	-	-	-	610	-	-	-	12,190	20	-
	ant energy budget	-	-	-	-	-	-	1,817	272	2,089	2,089	-	-	-	-	-	-	-	-	-	-
	C Fees	-	-	-	-	-	-	1,137 3,428	114 343	1,251 3,770	1,251	3,770	-	-	-	-	-	-	-	-	-
	nergency Planning Fees and Overhead	-	-	-	-	-	-	3,428 2,616		3,770	3,009	3,770 -	-	-	-	-	-	-	-	-	-
	ent Fuel Pool O&M	-	-	-	-	-	-	845	127	971	3,009	971	-	-				-	-	-	-
1a.4.11 ISF	FSI Operating Costs	-	-	-	-	-	-	112	17	129	-	129	-	-	-	-	-	-	-	-	-
1a.4.12 Rai	ilroad Track Maintenance	-	-	-	-	-	-	125	19	144	144	-	-	-	-	-	-	-	-	-	-
	curity Staff Cost	-	-	-	-	-	-	16,372	2,456	18,827	18,827	-	-	-	-	-	-	-	-	-	245,440
	ility Staff Cost btotal Period 1a Period-Dependent Costs	-	1,367	12	- 6		50	27,285	4,093	31,378	31,378	4,870	-	-	610	-	-	-	12,190	20	422,240
1a.4 Sub	ototai i eriou 1a Feriou-Dependent Costs	-	1,367	12	б	-	00	59,634	8,703	69,772	64,902	4,870	-	-	610	-	-	-	14,190	20	667,680

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

Part	_																					
The property The	Activit	Ÿ	Decon	Removal	Packaging	Transport	Off-Site Processing	LLRW Disposal	Other	Total	Total	NRC Lic. Term.	Spent Fuel Management	Site Restoration	Processed Volume	Class A			GTCC	Burial / Processed	Craft	Utility and Contractor
Part																						
Section Sect	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
Section Sect	PERIO	1b - Decommissioning Preparations																				
1. 1. 1. 1. 1. 1. 1. 1.	Period 1	Direct Decommissioning Activities																				
1									608	01	700	620		70								4 799
No. Section			-	-	-	-	-	-					-	-	-	-	-	-	-	-	-	
Martin	1b.1.1.3	Reactor internals	-	-	-	-	-	-					-	-	-	-	-	-	-	-	-	
Mary			-	-	-	-	-	-					-	150	-	-	-	-	-	-	-	
Martin M			-	-	-	-	-	-						-	-	-	-	-	-	-	-	
Mary			-	-	-	-	-	-					-	-	-	-	-	-	-	-	-	
Saling discoorder			- -	-	-	-	-	-					-	-	-	-	-	-	-	-	-	
Sulfied Sulfied Summer			-	-	-	-	=	-					=	89	-	-	-	-	-	-	-	
Min Marke	1b.1.1.10	Sacrificial shield	-	-	-	-	-	-	154		177		-	-	-	-	-	-	-	-	-	
1.11 Materians			-	-	-	-	-	-					-	74	-	-	-	-	-	-	-	
Minister Sequence of Anthone Sequence 1			-	-	-	-	-	-						-	-	-	-	-	-	-	-	
1.11 1.11			=	-	-	-	=	-						-	=	-	-	-	-	-	-	
10.1 11.1			-	-	-	-	-	-						40	-	-		-	-	-	-	
Proper			-	-	-	-	=	-					=		-	-	-	-	-	-	-	
1-1 Short Physich Lower State White Lower State	1b.1.1	Total	-	-	-	-	-	-	4,336	650	4,987	4,524	-	463	-	-	-	-	-	-	-	33,741
Profit Additional Constant					-	-	-	-						-	-	-	-	-	-	-		
1	1b.1	Subtotal Period 1b Activity Costs	296	-	-	-	-	-	4,336	798	5,431	4,968	-	463	-	-	-	-	-	-	1,067	33,741
1																						
1-22			-	-	-	-	-	-					-	-	-	-	-	-	-			-
1			-	-				-	5,930				-	-	- 49	-	-	-	-			
1			-	-					18,605				-	-			-	-	-			
1.0.1 1.0.2 1.0.	Period 1	o Collateral Costs																				
18.5 18.6			1,055	-	-	-	-	-					-	-	-	-	-	-	-	-	-	-
1.5 1.5				-		-	-						-	-	-	-	-	-	-			-
1.0 1.0													-	-	-		- 001	-	-			-
1.5.6 Pice cutting equipment 1.500 1.5			_		24	77	-	1,526	-				-	-	-	-	231	-	-	24,599	43	-
1.5.8 1.5.					-	-	-	-	-			_	-	-	-	-		-	-	-	-	-
1-1			2,104		-	-	-	-	-				-	-	-	-	-	-	-	-	-	-
Period P			-	-	-	-	-	-					414	-	-	-	-	-	-	-	-	-
Period Dependent Cost			- 0.105		-	-		-						-	-	-	- 001	-	-	-		-
10.4 10.2			3,197	1,202	49	122	-	1,628	7,964	2,298	16,460	16,046	414	-	-	233	231	-	-	38,589	89	-
1. 1. 1. 1. 1. 1. 1. 1.			39	-	_	-	-	-	_	10	48	48	-	-	_	-	-	_	_	-	_	-
10.4.4 10.4 11.4			-		-	-	-	-		116	1,277	1,277	-	-	-	-	-	-	-	-	-	-
Heavy equipment rental 1.5			-		-	-	-	-	1,710		1,881		-	-	-	-	-	-	-	-	-	-
Disposal of DAW generated			-		-	-	-	-					-	-	-	-	-	-	-	-	-	-
1.			=	375	- 7	- 4	=	- 20					=	-	=	- 250	-	-	-	7 100	10	-
1b.4.8 NRC Fees			-	-	, ,	4		29					-	-	-	556	-	-		1,122	12	-
1b.4.10 Fixed Overhead			-	-	-	-	=	-					=	-	-	-	-	-	-	-	-	-
1b.4.11 Spent Fuel Pool O&M	1b.4.9	Emergency Planning Fees	-	-	-	-	-	-	1,416	142		-	1,557	-	-	-	-	-	-	-	-	-
1b.4.12 ISFSI Operating Costs			-	-	-	-	-	-				1,500		-	-	-	-	-	-	-	-	-
1b.4.13 Railroad Track Maintenance			-	-	-	-	-	-						-	-	-	-	-	-	-	-	-
1b.4.14 Security Staff Cost			-	<u>-</u>	-	-	-	<u>-</u>		-			64	-	-	-	-	-	-	-	-	-
1b.4.15 DOC Staff Cost			-	-	-	-	-	-		U			-	-	-	-	-	-	-	-	-	122.384
1b.4.16 Utility Staff Cost 1b.4 Subtotal Period 1b Period-Dependent Costs 19 719 10 7 4 - 29 35,956 10 707AL PERIOD 1b COST 10			-	-	-	-	-	-					-	-	-	-	-	-	-	-	-	
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	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	
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	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
	PERIO	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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Monticello Nuclear Generating Plant

Decommissioning Cost Analysis

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

						Off-Site	LLRW				NRC	Spent Fuel	Site	Processed		Burial V	Volumes		Burial /		Utility and
Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Processing Costs	Disposal Costs	Other Costs	Total Contingency	Total Costs	Lic. Term. Costs	Management Costs	Restoration Costs	Volume Cu. Feet	Class A Cu. Feet	Class B Cu. Feet	Class C	GTCC Cu. Feet	Processed Wt., Lbs.	Craft Manhours	Contractor Manhours
		Cost	Cost	Costs	Costs	Costs	Costs	Costs	contingency	Costs	Costs	Costs	Costs	cu. rect	cu. r cct	cu. r cct	cu. r cct	cu. r cct	W., 195.	Mamours	Mannours
	rge Component Removal																				
Period 2a Direct D	Decommissioning Activities																				
	apply System Removal alation System Piping & Valves	111	94	27	50		528	_	221	1,031	1,031				1,430				99,742	2,905	_
2a.1.1.2 Recircu	ulation Pumps & Motors	40	63	16	51	42	539	-	186	938	938	-	-	96	945	-	-	-	112,200	1,563	-
	s & NIs Removal r Vessel Internals	194 244	1,020 6,722	415 $12,852$	135 2,696	•	1,130 29,845	364	696 24,027	3,591 76,749	3,591 76,749	-	-	-	3,741 1,252	1,481	1,178	-	213,700 343,150	17,768 30,515	1,379
	r 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			00*	1050	*01	2100	400		1.041	10.100	10.100			24.00	1 000				1 555 050	* 400	
	Curbine/Generator Condensers	-	385 1,347	1,356 360	521 194	6,139 3,225	439 244	-	1,341 947	10,182 6,317	10,182 6,317	-	-	24,835 17,396	1,383 727	-	-	-	$\substack{1,577,959\\828,955}$	5,438 18,831	-
Cascading Costs fi	rom Clean Building Demolition																				
	r Building	-	332	-	-	-	-	-	50	381	381	-	-	-	-	-	-	-	-	2,217	-
2a.1.4.2 Radwa		Ē	$\frac{25}{127}$	-	-	-	-	-	4	28	28	-	-	-	-	-	-	-	-	127	-
2a.1.4.3 Turbin 2a.1.4 Totals	e	-	483	-	-	-	-	-	19 72	146 556	146 556	-	-	-	-	-	-	-	-	1,254 3,598	-
Disposal of Plant S	Systems																				
2a.1.5.1 Autom	atic Press Relief	-	118	7	12	134	70	-	70	410	410	-	-	803	206	-	-	-	45,852	1,656	-
	stry Sampling stry Sampling - Insulated	-	27 2	1 0	2	26	13 0	-	14	83 3	83 3	-	-	156	37 1	-	-	-	8,681 72	400 28	-
	ating Water - RCA	-	207	14	62	1,114	-	-	230	1,626	1,626	-	-	6,656	-	-	-		270,307	2,860	-
	stible Gas Control - Insul - RCA	-	29	0	2	36	-	-	13	80	80	-	-	212	-	-	-	-	8,617	378	-
	stible Gas Control - RCA nsate & Feedwater	-	18 987	183	3 329	48 3,337	2,464	-	12 1,431	81 8,731	81 8,731	-	-	285 19,947	7,319	-	-	-	11,577 1,275,810	245 14,196	-
2a.1.5.8 Conder	nsate & Feedwater - Insulated	-	492	34	63	699	408	-	343	2,038	2,038	-	-	4,176	1,207	-	-	-	246,693	6,964	-
2a.1.5.9 Conder 2a.1.5.10 Conder	nsate Demin	-	545 726	30 33	51 82	560 1,193	339 270	-	316 444	1,840 2,748	1,840 2,748	-	-	3,346 7,131	1,000 795	-	-	-	199,936 340,568	7,618 10,345	-
	l Rod Drive	-	3	0	0	3	1	-	2	9	9	-	-	19	4	-	-	-	1,009	41	-
2a.1.5.12 Contro 2a.1.5.13 Core S	l Rod Drive Hydraulic	-	416 79	16 20	26 51	277 734	190 176	-	199 184	1,124 1,244	1,124 1,244	-	-	1,658 4,384	562 521	-	-	-	103,306 211,329	5,898 1,163	-
2a.1.5.14 Core S		=	145	8	13	137	90	-	82	474	474	-	-	818	264	-	-	-	50,149	2,033	-
	Water - Insulated - RCA	-	15	0	1	14	-	-	6	36	36	-	-	85	-	-	-	-	3,445	181	-
2a.1.5.16 Demin 2a.1.5.17 Diesel		-	41 2	0	2 0	42 4	-	-	17 1	104 7	104 7	-	-	253 23	-	-	-	-	10,278 931	508 25	-
	ll Atmosphere Cooling - RCA	-	38	1	5	92	-	-	24	159	159	-	-	548	-	-	-	-	22,244	550	-
	lmerg Service Water - Insul - RCA cal - Clean	-	0 13	- 0	0	0	-	-	0 2	1 15	1	-	15	2	-	-	-	-	84	4 182	-
2a.1.5.21 Emerge	ency Service Water - Insul - RCA	-	21	0	1	23	-	-	9	55	55	-	-	137	-	-	-	-	5,544	281	-
2a.1.5.22 Emerge 2a.1.5.23 GEZIP	ency Service Water - RCA	-	2	0	0	2 17	-	-	1 4	$\frac{5}{25}$	5 25	-	-	13 103	-	-	-	-	512 4,184	22 48	-
2a.1.5.24 Genera	ntor Physical Design - RCA	-	5	0	0	5	-	-	2	12	12	-	-	31	-	-	-	-	1,250	67	-
2a.1.5.25 H2-O2	Control Analyzing Control Analyzing - Insulated	-	6	0	0	1	5 5	-	3	15 15	15 15	-	-	6	13 13	-	-	-	1,080 1,080	81 81	-
	ressure Coolant Injection	-	67	6	13	163	70	-	61	381	381	-	-	972	209	-	-		52,792	966	-
	ressure Coolant Injection - Insula	-	219	14	24	267	163	-	141	830 10	830	-	10	1,598	481	-	-	-	95,733	3,079	-
	gen Cooling gen Cooling - RCA	-	8 7	0	0	7	-	-	3	10	17	-	- 10	39	-	-	-	-	1,600	118 79	-
	gen Seal Oil - RCA	-	17	0	2	32	-	-	9	60	60	-	-	189	-	-	-	-	7,669	212	-
	gen Water Chemistry - RCA ment & Service Air - RCA	-	24 225	4	1 17	23 296	-	-	10 103	59 644	59 644	-	-	140 1,768	-	-	-	-	5,672 71,810	304 2,733	-
2a.1.5.34 Main C	Condenser	-	196	12	20	223	139	-	122	712	712	-	-	1,333	411	-	-	-	80,439	2,746	-
2a.1.5.35 Main S 2a.1.5.36 Main T		-	249 1,012	17 205	32 353	359 3,306	201 2,921	-	173 1,553	1,029 9,350	1,029 9,350	-	-	2,148 19,760	594 8,687	-	-	-	125,135 1,354,661	3,512 14,733	-
2a.1.5.37 Main T	'urbine - Insulated	- -	214	18	37	423	2,921	-	180	1,097	1,097	-	-	2,530	667	-		-	145,208	3,069	
2a.1.5.38 Miscell 2a.1.5.39 Off Gas		-	43	1	3	51	- 957	-	19	115	115	-	-	302	764	-	-	-	12,283	622	-
2a.1.5.40 Off Gas	s Recombiner - Insulated	-	189 387	19 19	32 27	300 229	257 240	-	163 197	960 1,100	960 1,100	-	-	1,795 1,366	764 709	-	-	-	121,554 100,933	2,708 5,385	-
2a.1.5.41 Post A	ccident Sampling	-	25	1	1	9	11	-	11	58	58	-	-	53	33	-	-	-	4,318	345	-
	ccident Sampling - Insulated ervice Water - Insulated - RCA	-	17 83	1 3	1 14	3 248	13	-	8 60	43 409	43 409	-	-	17 1,485	37	-	-	-	3,116 60,293	212 1,125	-
2a.1.5.44 RHR S	ervice Water - RCA	-	4	0	0	6	-	-	2	12	12	-	-	35	-	-	-	-	1,410	57	-
2a.1.5.45 Reactor	r Feedwater Pump Seal	-	56	2	4	32	33	-	28	155	155	-	-	193	96	-	-	-	14,009	773	-

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

							(01 2020 Dona.	-~/											
						Off-Site	LLRW				NRC	Spent Fuel	Site	Processed		Burial '	Volumes		Burial /		Utility and
Activity Index		Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Processing Costs	Disposal Costs	Other Costs	Total Contingency	Total Costs	Lic. Term. Costs	Management Costs	Restoration Costs	Volume Cu. Feet	Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet		Processed Wt., Lbs.	Craft Manhours	Contractor Manhours
Dianocal	of Plant Systems (continued)																		•		
	3 Residual Heat Removal	362	252	172	178	1,072	2,051	_	962	5.049	5.049	_	_	6.406	6.012	_	_	_	647,941	4.135	_
	7 Residual Heat Removal - Insulated	622	554	61	82	563	880	-	772	3,535	3,535	=	-	3,367	2,607	-	-	-	303,087	10,340	-
	8 Rx Core Isolation Cooling	-	49	2	4	43	26	-	26	150	150	-	-	259	76	-	-	-	15,396	691	-
	9 Rx Core Isolation Cooling - Insulated	-	107	5	7	48	67	-	52	287	287	-	-	288	198	-	-	-	24,419	1,479	-
	Rx Recirculation	56	58	6	4	7	65	-	61	258	258	-	-	43	190	-	-	-	14,095	1,580	-
2a.1.5.51	1 Snubbers 2 Standby Liquid Control - Insul - RCA	-	169 4	2	5 0	63 4	30	-	60 2	331 9	331 9	=	-	377 22	90	-	-	-	21,009 904	2,548 48	-
2a.1.5.52 2a.1.5.53		-	26	1	2	41	-		13	83	83	-	-	245	-	-	-	-	9,969	341	-
	4 Stator Cooling - RCA	-	7	0	1	21	-		5	35	35	-	-	126	-	-	_	-	5,135	98	_
	5 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
	a Collateral Costs				***		22-		4.5	¥.a	E				¥0-				24.0:-	40.	
2a.3.1 2a.3.2	Process decommissioning water waste Process decommissioning chemical flush waste	85 5	-	57 216	102 702	-	232 1,619	-	122 534	598 3,077	598 3,077	-	-	-	532 2,093	-	-	-	31,942 223,008	104 392	-
2a.3.2 2a.3.3	Small tool allowance	Э	324	216	702	-	1,619	-	49	3,077	3,077	-	37	-	2,093	-	-	-	223,008	392	-
2a.3.3	Spent Fuel Capital and Transfer	-	- 524	-	-	-	-	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	-
	a 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 Health physics supplies	-	2,356	-	-	=	-	4,383	438 589	4,821 2,945	4,821 2,945	=	-	-	-	-	-	-	-	-	-
2a.4.4 2a.4.5	Heavy equipment rental	-	3,627	-	-	-	-	-	544	4,171	4,171	-	-	-	_	-		-	-	-	-
2a.4.6	Disposal of DAW generated	-	5,021	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	-	-	-	-	-	-	1,224 162	184 24	1,408 187	-	1,408	-	-	-	-	-	-	-	-	-
2a.4.12 2a.4.13	ISFSI Operating Costs Railroad Track Maintenance	-	-	-	-	-	-	181	24 27	208	208	187	-	-	-	-	-	-	-	-	-
2a.4.13	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
PERIOI	D 2b - Site Decontamination																				
Period 2l	b Direct Decommissioning Activities																				
	of Plant Systems																				
2b.1.1.1		-	18	0	1	6	3	-	6	35	35	-	-	35	10	-	-	-	2,060	277	-
2b.1.1.2 2b.1.1.3		-	16 1	0	0	16 0	- 0	-	7 0	40 2	40 2	=	-	93	- 0	-	-	-	3,765 129	185 17	-
2b.1.1.3		-	445	6	24	400	30	-	183	1,089	1,089		-	2,389	90	-		-	102,726	6,325	-
2b.1.1.5		-	2,698	48	218	3,906	-	-	1,298	8,167	8,167	-	-	23,344	-	-		-	948,013	37,107	_
2b.1.1.6		-	101	1	6	103	-	-	42	253	253	-	-	614	-	-	-	-	24,917	1,324	-
2b.1.1.7		-	305	7	27	446	34	-	156	975	975	-	-	2,665	100	-	-	-	114,598	4,111	-
2b.1.1.8		-	324	6	26	461	-	-	155	971	971	-	-	2,752		-	-	-	111,779	3,985	-
2b.1.1.9		-	483	16	61	1,007	76	-	302	1,945	1,945	-	-	6,018	227	-	-	-	258,789	7,101	-
) Heating Boiler - Insulated - RCA 1 Liquid Radwaste	- 588	3 687	0 48	0 63	4 514	586	-	1 703	9 3,188	9 3,188	-	-	26 3,073	1,728	-	-	-	1,058 235,484	35 17,194	-
	2 Makeup Demin - RCA	988	103	48	14	246	986	-	703 65	3,188	3,188	-	-	3,073 1.471	1,728	-	-	-	235,484 59.747	17,194	-
	Non-Essential Diesel Generator - RCA	-	27	3	13	238		-	45	327	327	-	-	1,424		-		-	57,832	395	-
	4 Off Gas Holdup	-	342	21	38	461	214	-	216	1,291	1,291	-	-	2,755	630	-	-	-	152,277	4,769	-
	5 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	3 Process Radiation Monitors	-	46	2	2	24	18	-	20	111	111	-	-	142	52	-	-	-	9,115	649	-

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Table C

Monticello Nuclear Generating Plant

DECON Decommissioning Cost Estimate with DOE Pickup of Industry Fuel Starting in 2035

(Thousands of 2020 Dollars)

		_			_	Off-Site	LLRW				NRC	Spent Fuel	Site	Processed			Volumes	~~~~	Burial /		Utility and
Activity Index		Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Processing Costs	Disposal Costs	Other Costs	Total Contingency	Total Costs	Lic. Term. Costs	Management Costs	Restoration Costs	Volume Cu. Feet	Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet	Processed Wt., Lbs.	Craft Manhours	Contractor Manhours
Dienosal	of Plant Systems (continued)																				
	Rx Bldg Closed Clng Water - Insul - RCA	_	114	2	9	163	_	_	54	343	343	-	_	977	-	_	_	_	39,675	1,484	_
	Rx Bldg Closed Clng Water - RCA	-	184	15	66	1,187	-	-	235	1,687	1,687	-	-	7,093		-	-	-	288,031	2,489	-
	Rx Component Handling Equip	27	142	18	27	194	279	-	154	840	840	-	-	1,158		-	-	-	99,730	2,462	-
	Rx Pressure Vessel	28	47	6	5	13	78	-	48	225	225	-	-	75		-	-	-	17,816	1,051	-
	Rx Water Cleanup	172	265 124	19	16	22 170	251	-	222 81	965 483	965 483	-	-	130 1,017		•	-	-	52,670	5,736 1,763	-
2b.1.1.22 2b.1.1.23	Secondary Containment Service & Seal Water - Insulated - RCA	-	124	2	14 11	197	86	-	62	483 392	483 392	-	-	1,017			-	-	57,567 47,917	1,763	-
	Service & Seal Water - RCA	-	159	4	17	303	-	-	88	570	570	-	-	1,809		-	-	-	73,453	2,016	-
2b.1.1.25		-	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	-
	Structures & Buildings	-	78	2	5	60	29	-	37	210	210	-	-	357	85	-	-	-	19,933	1,128	-
2b.1.1.28		-	10		-		-	-	1	11	-	-	11	-	-	-	-	-	-	144	-
2b.1.1.29		1 150	52	1	3	57	9.055	-	22	136	136	-	- 11	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	-
Decontari 2b.1.3.1	nination of Site Buildings 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.1.3.1 2b.1.3.2	Admin	5,202 106	2,903		316	8,044	1,181	-	4,924 59	22,948 189	22,948 189	-	-	48,077	7,014	-	-	-	2,317,670 6,840	1,600	-
2b.1.3.2 2b.1.3.3	HPCI Room	29	28	1	3	20	14		29	123	123	-		118		-	-	-	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		-	-	-	15,948	785	-
2b.1.3.8	Radwaste	121	61	3	17	29	96	-	107	435	435	-	-	172		-	-	-	49,943	2,503	-
2b.1.3.9	Radwaste Material Storage Warehouse Recombiner	64 27	24 25	2	9 5	- 33	52	-	52 32	202 148	202 148	-	-	199	495 216	-	-	-	23,400 18,405	1,197 695	-
2b.1.3.10	Turbine	705	25 353	21	104	215	24 564	-	632	2,594	2,594	-	-	1,283			-	-	303,150	14,443	-
2b.1.3.11 2b.1.3.12		58	21	1	8	210	45	-	47	181	181	-	-	1,200	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		-	-	-	2,880,206	145,889	-
2b.1.4 2b.1.5	Prepare/submit License Termination Plan Receive NRC approval of termination plan	-	-	-	-	-	-	526	79	605 a	605	-	-	-	-	-	-	-	-	-	4,096
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 2h	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 2b.3.5	Spent Fuel Capital and Transfer Retention and Severance	-	-	-	-	-	-	117,112 $6,277$	17,567 942	134,679 7,218	7,218	134,679	-	-	-	-	-	-	-	-	-
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 2h	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	101	52	=	419	-	407	3,117 694	3,117 694	-	-	-	E 004	-	-	-	101 670	166	-
2b.4.6 2b.4.7	Disposal of DAW generated Plant energy budget	-	-	101	- 5Z	-	419	1,437	123 216	1,653	1,653	-	-	-	5,084	-	-	-	101,679	100	-
2b.4.7 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 2b.4.14	ISFSI Operating Costs Railroad Track Maintenance	-	-	-	-	-	-	118 458	18 69	136 527	- 527	136	-	-	-	-	-	-	-	-	-
2b.4.14 2b.4.15	Remedial Actions Surveys	-	-	-	-	-	-	1,182	177	1,359	1,359	-	-	-	-	-	-	-	-	-	-
20.4.10	Tomoulai riculiis bai vojs	-	-	-	-	-	-	1,102	111	1,555	1,000	-	-	-	-	-	-	-	-	-	-

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

See the series of the series o							Off-Site	LLRW				NRC	Spent Fuel	Site	Processed		Rurio1	Volumes		Burial /		Utility and
Section Sect	Activity	у	Decon	Removal	Packaging	Transport			Other	Total	Total					Class A			GTCC		Craft	Contractor
See			Cost	Cost					Costs		Costs					Cu. Feet	Cu. Feet	Cu. Feet		Wt., Lbs.	Manhours	
See	D. 4. 101	Production of Contract of the Designation of the De																				
1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1									15 095	9 380	18 314	18 914										236 040
19.1. 19.1.	2b.4.17		-	-	-	-	-	-					-	-	-	-	-	-	-	-	-	160,160
1. The Control of the	2b.4.18		-	-	-	-	-	-					-	-	-	-	-	-	-	-	-	297,283
Property	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
No. Marche Marc	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
Second S	PERIOD	O 2d - Decontamination Following Wet Fuel Storage																				
Second S	Pariod 2d	d Direct Decommissioning Activities																				
Section Sect	2d.1.1		654	58	103	149	-	2,572	-	1,017	4,553	4,553	-	-	-	7,653	-	-	-	486,170	906	-
Section Sect	Dienocal	of Plant Systems																				
## 1412 Service Commenment Per Per Per 1 2 40 3 10 11 11 11 2 20 9 16.33 108 108 11 11 11 11 11	2d.1.2.1		-	3	0	1	17	-	_	4	25	25	_	-	103	-	-	_	_	4.184	48	_
Math	2d.1.2.2	Electrical - Contaminated Fuel Pool	-		1		40	3	-	19	112	112	-	-	240	9	-	-	-	10,334	665	-
24.1.5 24.	2d.1.2.3		-		5	23		-	-	140			-	-			-	-	-			-
1.1	2d.1.2.4		-		Ü	1		-	-	-			-	-			-	-	-			-
24 12 19 1 1 2 2 7 3 6 9 1 1 2	2d.1.2.5								-				-	-			-	-	-			-
18.1 18.1			27		3	-			-				-	-			-	-	-			-
14 12 1 Startmunt & Service ANS-REA-Peal Peal Col 1 29 1 2 1 5 0 - 11 91 91 91 91 91 91 91 91 91 91 91 91			-		1				-				-	-			-	-	-			-
14. 1 Years			-		1			-	-				-	-		-	-	-	-			
24.1. A Baser (Poer Paul) 946 2,999 172 913 229 10.216 . 3,880 19.006 19.006 . 1.909 62.088 . 2,774_06 45.703 . 2.14.1 3 Tools 1.008 19.006 19.005 19	2d.1.2.0		273		45			502	-				-	-		1,479	-	-	-			=
24.1. A Baser (Poer Paul) 946 2,999 172 913 229 10.216 . 3,880 19.006 19.006 . 1.909 62.088 . 2,774_06 45.703 . 2.14.1 3 Tools 1.008 19.006 19.005 19	_																					
Seal			0.40	0.500	170	010	200	10.010		0.000	10.050	10.050			1.000	00.000				0.500.400	45 500	
24.1 Saffolding in support of decommissioning 25.1 Saffolding in support of decommissioning 26.1 Saffolding in support of decommissioning 26.1 Saffolding in support of decommissioning 26.1 Saffolding in support of decommissioning 27. Saffolding in support of decommissioning in water was a support of decommissioning water was a support of the support of decommissioning water was a support of decommissioning decommissioning water was a support of decommissioning decommissioning water was a suppo									-				-	-			-	-	-			-
2. Suboral Period 24 Activity Coess	2u.1.5	Totals	540	2,555	172	913	323	10,210	-	3,880		ŕ	-	-	1,505	02,030	•	•	•	2,752,400	45,705	•
Period 24 Additional Costs	2d.1.4	Scaffolding in support of decommissioning	-	566	6	3	48	8	-	152	782	782	-	-	257	23	-	-	-	13,028	5,641	-
Lease Ferminanis Survey Planning	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	-
2.2 Subtoral Period 2d Additional Costs																						
Period 2d Collateral Costs 2d.3.1 Process decommissioning water waste 1	2d.2.1		-	-	-	-	-	-					-	-	-	-	-	-	-	-		12,480
28.3.1 Process decommissioning water waste 79	2d.2	Subtotal Period 2d Additional Costs	-	-	-	-	-	-	1,458	437	1,896	1,896	-	-	-	-	-	-	-	-	-	12,480
28.3.1 Process decommissioning water waste 79	Period 2d	d Collateral Costs																				
28.3.3 Small tool allowance 9.9	2d.3.1		79	-	54	96	-	220	-	114	563	563	-	-	-	504	-	-	-	30,239	98	-
2d.3 d Second Se	2d.3.2		1		26	84	-	193	-				-	-	-	249	-	-	-	26,553	47	-
Period 2d Period-Dependent Costs Period 2d Period-Dependent Costs Period 2d Period-Dependent Costs Period 2d Period-Dependent Costs Refine September 1	2d.3.3		-	91			-		-				-	-	-		-	-	-	-		-
Period P	2d.3.4		-										-	-			-	-	-			
24.4 Decon supplies	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	-
Sala																						
24.4 Poperty taxes	2d.4.1		244	-	-	-	-	-	-				-	-	-	-	-	-	-	-	-	-
2d.4 Health physics supplies 86			-	-	-	-	-	-					-	-	-	-	-	-	-	-	-	-
24.4 Heavy equipment rental 1,936			-	-	-	-	-	-	1,662				-	-	-	-	-	-	-	-	-	-
2d.4.6 Disposal of DAW generated			-		-	-	-	-	-				-	-	-	-	-	-	-	-	-	-
2d.4.7 Plant energy budget 2d.4.8 NRC Fees 2d.4.9 Emergency Planning Fees 2d.4.9 Emergency Planning Fees 2d.4.10 Fixed Overhead 2d.4.11 Liquid Radwaste Processing Equipment/Services 2d.4.12 IsFSI Operating Costs 2d.4.13 Railroad Track Maintenance 2d.4.14 Security Staff Cost 2d.4.15 Security Staff Cost 2d.4.16 Security Staff Cost 2d.4.17 Utility Staff Cost 2d.4.18 Utility Staff Cost 2d.4.19 Subtoal Period-Dependent Costs 2d.4.19 Subtoal Period-Dependent Costs 2d.4.10 Subtoal Period-Dependent Costs 2d.4.11 Security Staff Cost 2d.4.12 Subtoal Period-Dependent Costs 2d.4.13 Subtoal Period-Dependent Costs 2d.4.14 Subtoal Period-Dependent Costs 2d.4.15 Subtoal Period-Dependent Costs 2d.4.16 Subtoal Period-Dependent Costs 2d.4.17 Subtoal Period-Dependent Costs 2d.4.18 Subtoal Period-Dependent Costs 2d.4.19 Subtoal Period-Dependent Costs 2d.4.10 Subtoal Period-Dependent Costs 2d.4.10 Subtoal Period-Dependent Costs 2d.4.10 Subtoal Period-Dependent Costs 2d.4.11 Subtoal Period-Dependent Costs 2d.4.12 Subtoal Period-Dependent Costs 2d.4.13 Subtoal Period-Dependent Costs 2d.4.14 Subtoal Period-Dependent Costs 2d.4.15 Subtoal Period-Dependent Costs 2d.4.16 Subtoal Period-Dependent Costs 2d.4.17 Subtoal Period-Dependent Costs 2d.4.18 Subtoal Period-Dependent Costs 2d.4.19 Subtoal Period-Dependent Costs 2d.4.10 Subtoal Per			-	1,956	40		-	167					-	-	-	5 030	-	-	-	40.600	- 66	-
2d.4.8 NRC Fees MRC Fees			-	-	- 40	21	-	-					-	-	-	2,030	-	-	-	40,000	- 00	
2d.4.9 Emergency Planning Fees	2d.4.7		_	-	-	_	-	-					-	-	-	-	-	-	-	-	_	-
2d.4.10 Fixed Overhead	2d.4.9		-	-	-	-	-	-			123		123	-	-	-	-	-	-	-	-	-
2d.4.12 ISFSI Operating Costs	2d.4.10	Fixed Overhead	-	-	-	-	-	-	1,597	239				-	-	-	-	-	-	-	-	-
2d.4.13 Railroad Track Maintenance	2d.4.11		-	-	-	-	-	-					-	-	-	-	-	-	-	-	-	-
2d.4.14 Remedial Actions Surveys	2d.4.12		-	-	-	-	-	-						-	-	-	-	-	-	-	-	-
2d.4.15 Security Staff Cost	2d.4.13		-	-	-	-	-	-					-	-	-	-	-	-	-	-	-	-
2d.4.16 DOC Staff Cost	2d.4.14		-	-	-	-	-	-					9.500	-	-	-	-	-	-	-	-	100.00
2d.4.17 Utility Staff Cost 10,052 1,508 11,560 10,670 890 149,66 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 66 390,99			-	-	-	-	-	-						-	-	-	-	-	-	-		
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 66 390,99			-	-	-	-	-	-						-	-	-		-	-	-	-	
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 67.993 403.47	2d.4.17		244	2,743	40	21	-	167			,			-	=	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

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

						Off-Site	LLRW				NRC	Spent Fuel	Site	Processed			Volumes		Burial /		Utility and
Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Processing Costs	Disposal Costs	Other Costs	Total Contingency	Total Costs	Lic. Term. Costs	Management Costs	Restoration Costs	Volume Cu. Feet	Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet	Processed Wt., Lbs.	Craft Manhours	Contractor Manhours
PERIOD	2f - License Termination																				
Period 2f I 2f.1.1	Direct Decommissioning Activities ORISE confirmatory survey	_	_	_	_		_	166	50	216	216	_	_	_	_	_	_	_	_	_	_
2f.1.2	Terminate license							100	50	a a	210										
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
	Collateral Costs																				
2f.3.1 2f.3	DOC staff relocation expenses Subtotal Period 2f Collateral Costs	-	-	-	-	-	-	1,264 1,264	190 190	1,454 1,454	1,454 1,454		-	-	-	-	-	-	-	-	-
21.5	Subtotal Feriod 21 Collateral Costs	•	-	-	-	-	-	1,264	190	1,454	1,454	-	-	-	-	-	-	-	-	-	-
	Period-Dependent Costs							*00	.	¥00	***										
2f.4.1 2f.4.2	Insurance Property taxes	-	-	-	-	-	-	530 1,471	53 147	583 1,618	583 1,618		-	-	-	-	-	-	-	-	-
2f.4.3	Health physics supplies	- -	708	-	-	-	-		177	884	884		- -	-	-	-	-	-	-	-	-
2f.4.4	Disposal of DAW generated	-	-	7	4	-	29	- 074	9	48	48		-	-	355	-	-	-	7,097	12	-
2f.4.5 2f.4.6	Plant energy budget NRC Fees	-	-	-	-	-	-	274 426	41 43	315 468	315 468		-	-	-	-	-	-	-	-	-
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 2f.4.10	ISFSI Operating Costs Railroad Track Maintenance	-	-	-	-	-		84 94	13 14	97 108	108	97	-	-	-				-	-	-
2f.4.11	Security Staff Cost	-	-	-	-	-	-	10,999	1,650	12,649	8,918		-	-	-	-	-	-	-	-	162,981
2f.4.12	DOC Staff Cost	-	-	-	-	÷	-	5,393	809	6,201	6,201	-	-	-	-	-	-	-	-	-	57,200
2f.4.13 2f.4	Utility Staff Cost Subtotal Period 2f Period-Dependent Costs	-	708	- 7	4	-	29	5,762 $26,741$	864 4,070	6,626 31,558	5,738 26,719	888 4,839		-	355	-	-	-	7,097	12	80,707 300,888
2f.0	TOTAL PERIOD 2f COST		708	7	4		29	35,090	,		37,383	,			355				7,097	95,059	307,128
	2 TOTALS	19 791			10,731	40.097	72,577		6,385	42,223	576,281	170,606		288,160		1 401	1 170	-			2,393,096
		13,731	69,966	20,473	10,751	49,937	12,511	385,298	128,647	746,960	576,261	170,606	19	200,100	174,123	1,481	1,178	-	21,552,260	727,310	2,393,096
PERIOD	3b - Site Restoration																				
Period 3b	Direct Decommissioning Activities																				
	n of Remaining Site Buildings																				
	Reactor Building Condensate Tanks Foundation	-	1,971 10	-	-	-	-	-	296 1	2,267 11	-	-	2,267 11	-	-	-	-	-	-	13,911 50	-
	Discharge Retention Basin	-	4	-	-	-		-	1	5	-	-	5	-	-	-			-	25	-
3b.1.1.4	HPCI Room	-	19	-	-	-	-	-	3	22	-	-	22	-	-	-	-	-	-	97	-
3b.1.1.5 3b.1.1.6	Hot Shop Hydrogen & Oxygen Storage	·	16 2	-	-	-	-	-	2 0	19 2	-	-	19	-	-	-	-	-	-	177 19	-
	LLRW Storage & Shipping	-	83	-	-	=	-	-	12	95	-	-	95	-	-	-	-	-	-	662	-
	MSIV	-	4	-	-	-	-	-	1	4	-	-	4	-	-	-	-	-	-	42	-
	Misc Structures 2017 Offgas Stack	-	1,410 108	-	-	-		-	212 16	1,622 124	-	-	1,622 124	-	-	-	-	-	-	13,042 544	-
	Offgas Storage & Compressor	-	39	-	-	-	-	-	6	45	-	-	45	-	-	-	-	-	-	199	-
3b.1.1.12		-	228	-	-	=	-	-	34	262	-	-	262	-	-	-	-	-	-	1,220	-
	Recombiner Security Barrier	-	128 186	-	-	-		-	19 28	147 214	-	-	147 214	-	-				-	713 933	-
3b.1.1.15	Structures Greater than 3' Below Grade	-	2,461	-	-	-	-	-	369	2,830	-	-	2,830	-	-	-	-	-	-	12,649	-
	Tank Farm	-	1 250	-	-	-	-	-	1	5	-	-	5	-	-	-	-	-	-	21	-
3b.1.1.17 3b.1.1.18	Turbine Turbine Building Addition	-	1,259 55	-	-	-	-	-	189 8	1,448 63	-	-	1,448 63	-	-	-	-	-	-	13,036 618	-
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	-
	out Activities																				
3b.1.2 3b.1.3	Grade & landscape site Final report to NRC	-	896	-	-	-	-	200	134 30	1,031 231	231	-	1,031	-	-	-	-	-	-	1,841	1,560
3b.1	Subtotal Period 3b Activity Costs	-	9,065	-	-	-	-	200	1,390	10,655	231		10,425	-	-	-	-	-	-	60,726	1,560
Powind 91	Additional Costs																				
3b.2.1	Clean Concrete Disposal	-	3,322	-	-	-	-	13	500	3,835	-	-	3,835	-	-	-	-	-	-	12	-

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Appendix C, Page 9 of 11

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

						Off-Site	LLRW				NRC	Spent Fuel	Site	Processed		Burial	Volumes		Burial /		Utility and
Activity	Antimita Denomination	Decon	Removal		Transport	Processing	Disposal	Other	Total	Total	Lic. Term.	Management	Restoration	Volume	Class A	Class B	Class C	GTCC Cu. Feet	Processed	Craft	Contractor
Index	Activity Description	Cost	Cost	Costs	Costs	Costs	Costs	Costs	Contingency	Costs	Costs	Costs	Costs	Cu. Feet	Cu. Feet	Cu. Feet	Cu. Feet	ou. reet	Wt., Lbs.	Manhours	Manhours
Period 3b 3b.2.2	Additional Costs (continued) Intake Structure Cofferdam		335						50	385			385							2,584	
3b.2.2	Construction Debris		-	-	-	-	-	1,170	176	1,346	-	-	1,346	-	-	-	-	-	-	2,564	-
3b.2.4	Backfill	-	5,583	-	-	-	-	-	837	6,421	-	-	6,421	-	-	-	-	-	-	5,422	-
3b.2.5 3b.2	Discharge Structure Cofferdam Subtotal Period 3b Additional Costs	-	$442 \\ 9,682$	-	-	-	-	1,183	66 1,630	508 $12,495$	-	-	508 12,495	-	-	-	-	-	-	3,552 $11,570$	-
	Collateral Costs																				
3b.3.1 3b.3	Small tool allowance Subtotal Period 3b Collateral Costs	-	110 110	-	-	-	-	-	17 17	127 127	-	-	127 127	-	-	-	-	-	-	-	-
Period 3b	Period-Dependent Costs																				
3b.4.1 3b.4.2	Insurance Property taxes	-	-	-	-	-	-	1,220 2,543	122 254	1,342 2,797	1,342	2,797	-	-	-	-	-	-	-	-	-
3b.4.2 3b.4.3	Heavy equipment rental	-	5,842	-	-	-	-	2,543	254 876	6,719	-	2,191	6,719	-	-	-	-	-	-	-	-
3b.4.4	Plant energy budget	-	-	-	-	-	-	315	47	362	-	362	-	-	-	-	-	-	-	-	-
3b.4.5 3b.4.6	NRC ISFSI Fees Emergency Planning Fees	-	-	-	-	-	-	$\frac{356}{257}$	36 26	391 283	-	391 283	-	-	-	-	-	-	-	-	-
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 3b.4.10	Railroad Track Maintenance Security Staff Cost	-	-	-	-	-	-	543 25.319	81 3,798	624 29.117	249 0	375 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
	3c - Fuel Storage Operations/Shipping																				
Period 3c	Direct Decommissioning Activities																				
	Collateral Costs																				
3c.3.1 3c.3	Spent Fuel Capital and Transfer Subtotal Period 3c Collateral Costs	-	-	-	-	-	-	30,633 30,633	4,595 4,595	35,228 $35,228$	-	35,228 $35,228$	-	-	-	-	-	-	-	-	-
Period 3c 3c.4.1	Period-Dependent Costs Insurance							24,659	2,466	27,125	_	27,125									
3c.4.1	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 3c.4.6	Emergency Planning Fees Fixed Overhead	-	-	-	-	-	-	5,198 7,552	520 1,133	5,718 8,685	-	5,718 8,685	-	-	-	-	-	-	-	-	-
3c.4.6	ISFSI Operating Costs	-			-	-	-	3,924	1,133 589	4,513	-	4,513	-	-	-	-			-	-	-
3c.4.8	Railroad Track Maintenance	-	-	-	-	-	-	4,384	658	5,042	-	5,042	-	-	-	-	-	-	-	-	.
3c.4.9 3c.4.10	Security Staff Cost Utility Staff Cost	-	-	-	-	-	-	150,786 36,020	22,618 5,403	173,404 41,423	-	173,404 41,423	-	-	-	-	-	-	-	-	1,896,060 492,246
3c.4.10	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 S	team Supply System Removal																				
	Vessel & Internals GTCC Disposal Totals	-	-	1,083 1,083		-	4,313 4,313		918 918	6,314 6,314	6,314 6,314	-	-	-	-	-	-	1,160 1,160	225,765 $225,765$		-
3d.1.1	Subtotal Period 3d Activity Costs	-	-	1,083		-	4,313		918	6,314	6,314	-	-	-	-	-	-	1,160	225,765	-	-
Period 3d 3d.3.1	Collateral Costs							28		00		00									
3d.3.1 3d.3	Spent Fuel Capital and Transfer Subtotal Period 3d Collateral Costs	-	-	-	-	-	-	28 28	4	32 32	-	32 32	-	-	-	-	-	-	-	-	-
	Period-Dependent Costs										_										
3d.4.1 3d.4.2	Insurance Property taxes	-	-	-	-		-	27 35	3	30 38	30 38	-	-	-	-	-	-	-	-	-	-
3d.4.2 3d.4.4	NRC ISFSI Fees	-	-	-	-	-	-	39 8	1	38 9	- 38	9	-	-	-	-	-	-	-	-	-
3d.4.5	Emergency Planning Fees	-	-	-	-	-	-	6	1	6	-	6	-	-	-	-	-	-	-	-	-

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

						Off-Site	LLRW				NRC	Spent Fuel	Site	Processed		Rurial	Volumes		Burial /		Utility and
Activit		Decon		Packaging		Processing	Disposal	Other	Total	Total	Lic. Term.	Management	Restoration	Volume	Class A	Class B	Class C	GTCC	Processed	Craft	Contractor
Index	Activity Description	Cost	Cost	Costs	Costs	Costs	Costs	Costs	Contingency	Costs	Costs	Costs	Costs	Cu. Feet	Cu. Feet	Cu. Feet	Cu. Feet	Cu. Feet	Wt., Lbs.	Manhours	Manhours
	d 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 3d.4.9	Security Staff Cost Utility Staff Cost	-	-	-	-	-	-	165 39	25 6	190 45	190 45	-	-	-	-	-	-	-	-	-	2,074 539
3d.4.5	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
	O 3e - ISFSI Decontamination			-,			-,			5,010	*,**-							-,	,		_,,
Period 3	e Direct Decommissioning Activities																				
	e 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
	e Period-Dependent Costs							110		140	140										
3e.4.1 3e.4.2	Insurance Property taxes	-	-	-	-	-	-	118 249	30 62	148 312	148 312	-	-	-	-	-	-	-	-	-	-
3e.4.2 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
PERIO	O 3f - ISFSI Site Restoration																				
Period 3	f Direct Decommissioning Activities																				
Period 3	f 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
	f Collateral Costs																				
3f.3.1	Small tool allowance	-	12	-	-	-	-	-	2	14	-	-	14	-	-	-	-	-	-	-	-
3f.3	Subtotal Period 3f Collateral Costs	-	12	-	-	-	-	-	2	14	-	-	14	-	-	-	-	-	-	-	-
	f Period-Dependent Costs																				
3f.4.2	Property taxes	-	-	-	-	-	-	126	13	138	-	-	138	-	-	-	-	-	-	-	-
3f.4.3	Heavy equipment rental	-	117	-	-	-	-	- 6	17	134 7	-	-	134	-	-	-	-	-	-	-	-
3f.4.4 3f.4.5	Plant energy budget Fixed Overhead	-	-	-	-	-	-	6 36	1 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
PERIO	O 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

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Xcel Energy

Monticello Nuclear Generating Plant Decommissioning Cost Analysis

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Utility and Contractor

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

NRC Spent Fuel
Lic. Term. Management
Costs Costs

Restoration

Total Costs

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	T Conti
	•								_
TOTAL COST TO I	DECOMMISSION WITH 17.82% CONTINGENO	CY:			\$1,399,471	thousands of	2020 dollars		
TOTAL NRC LICE	NSE TERMINATION COST IS 55.32% OR:				\$776,355	thousands of	2020 dollars		
SPENT FUEL MAN	NAGEMENT COST IS 39.42% OR:				\$549,339	thousands of	2020 dollars		
NON-NUCLEAR D	EMOLITION COST IS 5.26% OR:				\$73,776	thousands of	2020 dollars		
TOTAL LOW-LEVE	EL RADIOACTIVE WASTE VOLUME BURIED	(EXCLUDING	GTCC):		200,160	Cubic Feet			
TOTAL GREATER	THAN CLASS C RADWASTE VOLUME GENE	ERATED:			1,160	Cubic Feet			
TOTAL SCRAP ME	CTAL REMOVED:				23,123	Tons			
TOTAL CRAFT LA	BOR 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 $\frac{1}{2} \left(\frac{1}{2} \right) = \frac{1}{2} \left(\frac{1}{2} \right) = \frac{1}$

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Monticello Nuclear Generating Plant Decommissioning Cost Analysis – 70 Year Lifetime Document X01-1775-003, Rev. 0 Appendix D, Page 1 of 11

APPENDIX D

DETAILED COST ANALYSIS

SCENARIO 2: DECON with 60 Year DFS

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Table D

Monticello Nuclear Generating Plant

DECON Decommissioning Cost Estimate with 60 Years of Spent Fuel Storage

(Thousands of 2020 Dollars)

Activity Decon Removal Packaging Transport Processing Disposal Other Total Total Lic. Term. Management Rest	storation Vol	cessed blume Class A Cu. Fee	A Class B	al Volumes B Class C et Cu. Feet				Utility and Contractor
Index Activity Description Cost Cost Costs			et Cu. Feet	et Cu. Feet				
Period 1a Direct Decommissioning Activities 1a.1.1 Prepare preliminary decommissioning cost 167 25 192 192 -	-					wt., Lbs.	Manhours	
1a.1.1 Prepare preliminary decommissioning cost 167 25 192 192 -	-							
	-							
			-	-	-	-	-	1,300
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								2,000
1a.1.7 Review plant dwgs & specs.	-		-	-	-	-	-	4,600
1a.1.8 Perform detailed rad survey a								
1a.1.9 Estimate by-product inventory - - - - - 129 19 148 148 - 1a.1.10 End product description - - - - - 129 19 148 148 -	-	-	-	-	-	-	-	1,000 1,000
1a.1.10 End product description - - - - - 129 19 148 148 - 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 - 1a.1.15 Perform Site-Specific Cost Study - - - - 643 96 739 739 -	-	-	-	-	-	-	-	7,500 5,000
1a.1.15 Ferform Site-Specific Cost Study 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 - 1a.1.17.3 NSSS Decontamination Flush - - - - 64 10 74 74 -	62	-	-	-	-	-	-	4,167 500
1a.1.17.3 NSSS Decontamination Flush - - - - - 64 10 74 74 - 1a.1.17.4 Reactor internals - - - - 912 137 1,049 1,049 -	-		-	-	-	-	-	7,100
1a.1.17.5 Reactor vessel	-		_	-	-	-	-	6,500
1a.1.17.6 Sacrificial shield 64 10 74 74 -	-		-	-	-	-	-	500
1a.1.17.7 Moisture separators/reheaters - - - - 129 19 148 148 - 1a.1.17.8 Reinforced concrete - - - - - 206 31 236 118 -	-		-	-	-	-	-	1,000
1a.1.17.8 Reinforced concrete - - - - - - 206 31 236 118 - 1a.1.17.9 Main Turbine - - - - - - 268 40 309 309 -	118		-	-	-	-	-	1,600 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 - 1a.1.17.14 Waste management - - - - - 591 89 680 680 -	231		-	-	-	-	-	3,120 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								2.400
1a.1.18 Prepare dismantling sequence - - - - - 308 46 355 355 - 1a.1.19 Plant prep. & temp. svces - - - - - 3,500 525 4,025 4,025 -	-		-	-	-	-	-	2,400
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 -	-		-	-	-	-	-	· -
1a.1.22 Procure casks/liners & containers - - - - - 158 24 182 182 - 1a.1 Subtotal Period 1a Activity Costs - - - - - 16,569 2,485 19,054 18,505 -	550		-	-	-	-	-	1,230 83,013
	550		-	-	-	-	-	65,015
Period 1a Collateral Costs								
1a.3.1 Spent Fuel Capital and Transfer - - - - - 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.4.2 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 -	-	- 61	10 -	-	-	12,190) 20	j -
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.4.7 NKU Fees	-			-	-	-	-	-
1a.4.9 Fixed Overhead 2,616 392 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.4.12 Kairoda Frack Maintenance 125 19 144 144 16.372 2.456 18.827 18.827 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
$13.4 \text{Subtotal Period 1a Period 1a Period Dependent Costs} \qquad \qquad 1,367 \qquad 12 \qquad 6 \qquad \qquad 50 \qquad 59,634 \qquad 8,703 \qquad 69,772 \qquad 64,902 \qquad 4,870 \qquad 69,772 \qquad 64,902 \qquad 69,702 \qquad 69,$	-	- 61	10 -	-	-	12,190) 20	

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Table D

Monticello Nuclear Generating Plant

DECON Decommissioning Cost Estimate with 60 Years of Spent Fuel Storage

(Thousands of 2020 Dollars)

Activit	v	Decon	Removal	Packaging	Transport	Off-Site Processing	LLRW Disposal	Other	Total	Total	NRC Lic. Term.	Spent Fuel Management	Site Restoration	Processed Volume	Class A	Burial Class B	Volumes Class C	GTCC	Burial / Processed	Craft	Utility and Contractor
Index		Cost	Cost	Costs	Costs	Costs	Costs	Costs	Contingency	Costs	Costs	Costs	Costs	Cu. Feet	Cu. Feet		Cu. Feet	Cu. Feet	Wt., Lbs.	Manhours	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
PERIO	D 1b - Decommissioning Preparations																				
Period 1	b Direct Decommissioning Activities																				
	Work Procedures							608	01	700	630		70								4.722
	Plant systems NSSS Decontamination Flush	-	-	-	-	-	-	129	91 19	700 148	148	-	- 10	-	-		-	-	-	-	4,733 1,000
1b.1.1.3		-	-	-	-	-	-	514	77	591	591	-	-	-	-	-	-	-	-	-	4,000
	Remaining buildings	-	-	-	-	-	-	174	26	200	50	-	150	-	-	-	-	-	-	-	1,350
	CRD housings & NIs	-	-	-	-	-	-	129 129	19 19	148	148	-	-	-	-	-	-	-	-	-	1,000 1,000
1b.1.1.6 1b.1.1.7		-	-	-	-	-	-	257	39	148 296	148 296	-	-	-	-		-	-	-	-	2,000
1b.1.1.8		-	-	-	-	-	-	467	70	537	537	-	-	-	-	-	-	-	-	-	3,630
1b.1.1.9		=	-	-	-	-	=	154	23	177	89	-	89	=	-	-	-	-	-	-	1,200
	Sacrificial shield	-	-	-	-	-	-	154	23	177	177	-	-	-	-	-	-	-	-	-	1,200
	Reinforced concrete Main Turbine	-	-	-	-	-	-	129 267	19 40	148 307	74 307	- -	74	-	-	-	-	-	-	-	1,000 2.080
	Main Condensers	-	-	-	-	-	-	268	40	309	309	-	-	-	-		-	-	-	-	2,088
	Moisture separators & reheaters	-	-	-	-	-	-	257	39	296	296	-	-	-	-	-	-	-	-	-	2,000
	5 Radwaste building	-	-	-	-	-	-	351	53	403	363	-	40	-	-	-	-	-	-	-	2,730
1b.1.1.16 1b.1.1	3 Reactor building Total	-	-	-	-	-	-	351 4,336	53 650	403 4,987	363 4,524	-	40 463	-	-	-	-	-	-	-	2,730 33,741
10.1.1	Total	-	-	-	-	-	-	4,556	690	4,961	4,524	=	465	-	-	-	-	-	-	-	55,741
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
David 1	b 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				-	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 1	b 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			102	-	53	263	263	-	-	-	233		-	-	13,991	45	-
1b.3.4 1b.3.5	Process decommissioning chemical flush waste Small tool allowance	1	- 2	24	. 77	-	1,526	-	396 0	2,024	2,024 2	-	-	=	-	231	-	-	24,599	43	-
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	- 0.105		-	-	-	-	6,340	951	7,291	7,291	-	-	-	-	- 001	-	-	-	-	-
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	-
	b Period-Dependent Costs																				
1b.4.1	Decon supplies	39		-	-	Ē	-	1 101	10	48	48	÷	-	-	-	-	-	-	-	-	-
1b.4.2 1b.4.3	Insurance Property taxes	-	-	-	-	-		1,161 1,710	116 171	1,277 1,881	1,277 1,881	-	-	-	-	-	-	-	-	-	-
1b.4.4	Health physics supplies	-	344	-	-	-	-	1,710	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 1b.4.9	NRC Fees Emergency Planning Fees	-	-	-	-	-	-	323 1,416	32 142	355 1,557	355	1,557	-	-		-	-	-	-	-	-
1b.4.10	Fixed Overhead	-	-	-	-	-	-	1,305	196	1,500	1,500	1,557	-	-	-	-	-	-	-	-	-
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 Security Staff Cost	-	-	-	-	-	-	62 8 169	1 995	72	72	-	-	-	-	-	-	-	-	-	100 004
1b.4.14 1b.4.15	DOC Staff Cost	-	-	-	-	-	-	8,163 5,846	1,225 877	9,388 6,723	9,388 6,723	-	-	-		-	-	-	-	-	122,384 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
PERIO	D 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

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Table D

Monticello Nuclear Generating Plant

DECON Decommissioning Cost Estimate with 60 Years of Spent Fuel Storage

(Thousands of 2020 Dollars)

Marty Process Proces
Part
Period 2a Direct Decommissioning Activities Period 2a Direct Dec
Notear Seam Supply System Removal 24.1.1.1 Recirculation System Removal 24.1.1.1 Recirculation System Removal 24.1.1.1 Carlot System Removal 24.1.1 Carlot System Removal 24.1.1 Carlot System Removal 24.1.1 Carlot System Removal 24.1 System Removal
2a.1.1 Recirculation System Piping & Valvos
2a.1.12 Recirculation Pumpas Motors 40 63 16 51 42 539 186 998 998 998 996 946 . 112.200 1.563
2a.1.1 a Rebba & Nise Removal 194 1,000 415 1.15 1.130 686 3,591 3,591 - 3,744 - 1,210 1.708 1.7
Part Feath Feath Part
Remoral of Major Equipment
24.1.2 Main Turbine Generator Main Turbi
Cascarige Casc
2a.1.4.2 Reactor Building 32
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$
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.1.5.1.5 Demin Water - Insulated - RCA - 1.5 0 1 1 14 6 36 36 3,445 181 -
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$
2a.10.15.18 beyord Atmosphere Cooling - RCA - 38 1 5 92 - 24 159 159 - 548 22,244 550 - 22,244 550 -
2a.1.5.19 EDG Emerg Service Water - Insul - RCA - 0 0 0 0 0 1 1 1 2 84 4 -
2a.1.5.20 Electrical - Clean - 13 2 15 182 182
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 -
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$
2a.1.5.27 High Presenter Column Region Control Regi
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.1.5.1.51 Hydrogen Bear Office 1
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 -
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$
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
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$
2a.1.5.42 Post Accident Sampling - 1
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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Table D

Monticello Nuclear Generating Plant

DECON Decommissioning Cost Estimate with 60 Years of Spent Fuel Storage

(Thousands of 2020 Dollars)

						Off-Site	LLRW				NRC	Spent Fuel	Site	Processed			Volumes		Burial /		Utility and
Activity Index		Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Processing Costs	Disposal Costs	Other Costs	Total Contingency	Total Costs	Lic. Term. Costs	Management Costs	Restoration Costs	Volume Cu. Feet	Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet	Processed Wt., Lbs.	Craft Manhours	Contractor Manhours
	•																		,		
	of Plant Systems (continued)	000	250	150	150	1.050	0.0*1		0.00	¥ 0.40	* 0.40			0.400	0.010				0.15.0.11	4.10	
	Residual Heat Removal Residual Heat Removal - Insulated	362 622	252 554	172 61	178 82	1,072 563	2,051 880	-	962 772	5,049 3,535	5,049 3,535	-	-	6,406 3,367	6,012 2,607	-	-	-	647,941 303,087	4,135 10,340	-
	Rx Core Isolation Cooling	-	49	2	4	43	26	-	26	150	150	_	_	259	76	-	_	_	15,396	691	-
	Rx Core Isolation Cooling - Insulated	-	107	5	7	48	67	-	52	287	287	-	-	288	198	-	-	-	24,419	1,479	-
	Rx Recirculation	56	58	6	4	7	65	-	61	258	258	-	-	43	190	-	-	-	14,095	1,580	-
	Snubbers	-	169 4	2	5 0	63 4	30	-	60	331 9	331 9	-	-	377 22	90	-	-	-	21,009 904	2,548 48	-
2a.1.5.52	Standby Liquid Control - Insul - RCA Standby Liquid Control - RCA	-	26	1	2	41	-	-	13	83	83	-	-	22 245	_	-	_	-	9.969	48 341	-
2a.1.5.54	• •	-	7	0	1	21	-	-	5	35	35	_	_	126	-	-	_	-	5,135	98	-
2a.1.5.55		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
	Collateral Costs																				
2a.3.1	Process decommissioning water waste	85	-	57	102	-	232	-	122	598	598	-	-	-	532	-	-	-	31,942	104	-
2a.3.2 2a.3.3	Process decommissioning chemical flush waste Small tool allowance	5	324	216	702	-	1,619	-	534 49	3,077 373	3,077 336	-	37	-	2,093	-	-	-	223,008	392	-
2a.3.4	Spent Fuel Capital and Transfer	-	- 524	-	_	-	-	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 2a.4.4	Property taxes Health physics supplies	-	2,356	-	-	-	-	4,383	438 589	4,821 2,945	4,821 2,945	=	-	=	-	-	-	-	-	-	-
2a.4.4 2a.4.5	Heavy equipment rental	-	3,627	-	-	-	-	-	544	4,171	2,945 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 2a.4.10	Emergency Planning Fees	-	-	-	-	-	-	4,115 3,071	412 461	4,527 3,532	3,532	4,527	-	-	-	-	-	-	-	-	-
2a.4.10 2a.4.11	Fixed Overhead Spent Fuel Pool O&M		-	-	-	-	-	1,224	184	1,408	5,552	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 DOC Staff Cost	-	-	-	-	-	-	21,881 21,021	3,282 3,153	25,164	25,164 24,174	-	-	=	-	-	-	-	-	-	325,574 229,108
2a.4.16 2a.4.17	Utility Staff Cost	-	-	-	-	-	-	27,906	4,186	24,174 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
	•					OF 00F							69	141.010		1 401	1.150				
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
	2b - Site Decontamination Direct Decommissioning Activities																				
	Ü																				
	of Plant Systems ALARA/Radiological	_	18	0	1	6	9	_	6	35	35	_	_	35	10	_	_	_	2,060	277	_
2b.1.1.1 2b.1.1.2	Alternate N2 - RCA	-	16	0	1	16	-	-	7	40	40	-	-	93	- 10	-	-	-	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	-
	Fire - RCA HVAC Ductwork	=	101 305	1	6 27	103 446	34	-	42 156	253 975	253 975	-	-	614 2,665	100	-	-	-	24,917 114,598	1,324 4,111	-
	HVAC/Chilled Water - RCA	-	305 324	6	26	446 461	ə4 -	-	155	975	975 971	-	-	2,752	100	-	-	-	111,779	3,985	-
	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	-
	Liquid Radwaste	588	687	48	63	514	586	-	703	3,188	3,188	-	-	3,073	1,728	-	-	-	235,484	17,194	-
	Makeup Demin - RCA Non-Essential Diesel Generator - RCA	-	103 27	3	14 13	246 238	•	-	65 45	431 327	431 327	-	-	1,471	-	-	•	-	59,747 57,832	1,412 395	-
	Off Gas Holdup	-	342	21	38	238 461	214	-	45 216	1,291	1,291	-	-	1,424 2,755	630		-	-	57,832 152,277	4,769	-
	Primary Containment	-	455	42	87	1,038	507	-	414	2,543	2,543	-	-	6,201	1,506	-	-	-	347,704	6,454	-
	Process Radiation Monitors	-	46	2	2	24	18	-	20	111	111	-	-	142	52	-	-	-	9,115	649	-

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Table D

Monticello Nuclear Generating Plant

DECON Decommissioning Cost Estimate with 60 Years of Spent Fuel Storage

(Thousands of 2020 Dollars)

						Off-Site	LLRW				NRC	Spent Fuel	Site	Processed		Buriol	Volumes		Burial /		Utility and
Activity		Decon	Removal	Packaging	Transport	Processing	Disposal	Other	Total	Total	Lic. Term.	Management	Restoration	Volume	Class A	Class B	Class C	GTCC	Processed	Craft	Contractor
Index	Activity Description	Cost	Cost	Costs	Costs	Costs	Costs	Costs	Contingency	Costs	Costs	Costs	Costs	Cu. Feet	Cu. Feet	Cu. Feet		Cu. Feet	Wt., Lbs.	Manhours	Manhours
Disposal o	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	-
	Rx Bldg Closed Clng Water - RCA	-	184	15	66	1,187	-	-	235	1,687	1,687	-	-	7,093	-	-	-	-	288,031	2,489	-
	Rx Component Handling Equip	27	142	18	27	194	279	-	154	840	840	-	-	1,158	829	-	-	-	99,730	2,462	-
	Rx Pressure Vessel	28	47	6	5	13	78	-	48	225	225	-	-	75	230	-	-	-	17,816	1,051	-
	Rx Water Cleanup	172		19	16	22	251	-	222	965	965	-	-	130	737	-	-	-	52,670	5,736	-
	Secondary Containment Service & Seal Water - Insulated - RCA	-	124 120	$\frac{7}{2}$	14 11	170 197	86	-	81 62	483 392	483 392	-	-	1,017 1,180	255	-	-	-	57,567 47,917	1,763 1,565	-
	Service & Seal Water - RCA	-	159	4	17	303	-	-	88	570	570			1,809	-	-	-	-	73,453	2,016	-
	Service Air Blower - RCA	-	15	0	2	34	-	-	9	62	62	-	-	206	_	-	-	-	8,364	206	-
	Solid Radwaste	338	494	36	49	399	467	-	480	2,264	2,264	-	-	2,387	1,380	-	-	-	185,221	10,820	-
	Structures & Buildings	-	78	2	5	60	29	-	37	210	210	-	-	357	85	-	-	-	19,933	1,128	-
		-	10	-	-	-	-	-	1	11	-	-	11		-	-	-	-		144	-
	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	-
	ination of Site Buildings	# aaa	0.000	150	F10	0.044	1 101		4.004	99.040	99.040			40.055	E 01 1				0.015.050	110 #10	
	Reactor Building Admin	5,202 106	2,903 6	178 0	516 3	8,044	1,181 15	-	4,924 59	22,948 189	22,948 189	-	-	48,077	7,014 145	-	-	-	2,317,670 6,840	112,518 1,600	-
	Admin HPCI Room	106	28	1	3 3	20	15 14		59 29	189 123	189 123	-	-	118	145 125	-	-	-	10,759	7,600	-
	Hot Shop	17	4	0	2	- 20	11	-	12	46	46	-	-	-	103	-	-	-	4.860	286	-
	LLRW Storage & Shipping	58	24	2	8	5	45	-	48	191	191	-	_	31	433	-	-	-	21,708	1,127	-
	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	-
	Radwaste	121	61	3	17	29	96	-	107	435	435	-	-	172	910	-	-	-	49,943	2,503	-
	Radwaste Material Storage Warehouse	64	24	2	9		52	-	52	202	202	-	-	-	495	-	-	-	23,400	1,197	-
		27	25	1	5	33	24	-	32	148	148	-	-	199	216	-	-	-	18,405	695	-
2b.1.3.11		705 58	353 21	21	104	215	564 45	-	632 47	2,594 181	2,594 181	-	-	1,283	5,299 434	-	-	-	303,150 20,478	14,443 1,087	-
	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 2b.1.5	Prepare/submit License Termination Plan Receive NRC approval of termination plan	-	-	-	-	-	-	526	79	605 a	605	-	-	-	-	-	-	-	-	-	4,096
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
Davied 9h	Additional Costs																				
2b.2.1	Operational Equipment			23	92	1,211	_	_	198	1,524	1,524		-	11,760					294,000	32	_
2b.2.1	Excavation of Underground Services	-	1,972	-	- 52	1,211	-	376	550	2,898	2,898	-	-	-	-	-	-	-	234,000	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	-
	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	-	-	-	-	117.198	55 17 500	418 134.778	418	194 550	-	-	-	-	-	-	-	-	-
2b.3.4 2b.3.5	Spent Fuel Capital and Transfer Retention and Severance	-	-	-	-	-	-	6,277	17,580 942	134,778 7,218	7,218	134,778	-	-	-	-	-	-	-	-	-
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	-	-	-	- 410	-	407	3,117	3,117 694	-	-	-	- F 004	-	-	-	101.650	-	-
2b.4.6 2b.4.7	Disposal of DAW generated Plant energy budget	-	-	101	52	-	419	1,437	123 216	694 1,653	694 1,653	-	-	-	5,084	-	-	-	101,679	166	-
2b.4.7 2b.4.8	NRC Fees	-	-	-	-	-	-	623	62	685	1,655	-	-	-	-	-	-	-	-	-	-
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	-	-	-	-	-	-	-	-	-
	Railroad Track Maintenance	-	-	-	-	-	-	458	69	527	527	-	-	-	-	-	-	-	-	-	-
2b.4.15	Remedial Actions Surveys	-	-	-	-	-	-	1,182	177	1,359	1,359	-	-	-	-	-	-	-	-	-	-

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Table D

Monticello Nuclear Generating Plant

DECON Decommissioning Cost Estimate with 60 Years of Spent Fuel Storage

(Thousands of 2020 Dollars)

						Off-Site	LLRW				NRC	Spent Fuel	Site	Processed		Rusio1	Volumes		Burial /		Utility and
Activity	7	Decon	Removal	Packaging	Transport	Processing	Disposal	Other	Total	Total	Lic. Term.	Management	Restoration	Volume	Class A	Class B	Class C	GTCC	Processed	Craft	Contractor
Index		Cost	Cost	Costs	Costs	Costs	Costs	Costs	Contingency	Costs	Costs	Costs	Costs	Cu. Feet	Cu. Feet		Cu. Feet			Manhours	
	P. I. I. P I G C I D.																				
Period 2b 2b.4.16	Period-Dependent Costs (continued) Security Staff Cost							15,925	2,389	18,314	18,314	-								-	236,949
2b.4.16 2b.4.17	DOC Staff Cost	-	-	-	-	-	-	15,925 $14,772$	2,369	16,988	16,988	-	-	-		-	-		-	-	160,160
2b.4.17	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	
	-																				
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
PERIOL	2d - Decontamination Following Wet Fuel Storage																				
Period 2d 2d.1.1	l Direct Decommissioning Activities Remove spent fuel racks	654	58	103	149		2,572		1,017	4,553	4,553	_		_	7,653				486,170	906	
20.1.1	nemove spent ruei racks	004	00	100	140		2,012		1,011	4,000	4,000				1,000				400,170	500	
Disposal	of Plant Systems																				
		-	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	- 040	11	0	1	10	455	-	4	26	26	-	-	62	1 0 4 1	-	-	-	2,499	143	
2d.1.2.5 2d.1.2.6	Fuel Pool Cooling & Cleanup Fuel Pool Cooling & Cleanup - Insulated	246 27	428 41	34	37 3	197 11	455 40	-	382 36	1,781 161	1,781 161	-	-	1,179 67	1,341 117	-	-	-	133,939 10,220	8,380 848	
2d.1.2.6 2d.1.2.7	HVAC Ductwork - Fuel Pool Area	21	34	ن 1	3 3	50	40	-	36 17	108	108	-	-	296	117	-	-	-	12,733	848 457	
2d.1.2.7 2d.1.2.8	HVAC/Chilled Water - RCA Fuel Pool Area	-	33	0	2	37	4	-	14	87	87	-	-	223	- 11	-	-	-	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	
Docontor	nination 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		172	913	329	10,216	-	3,880	19,056	19,056	-	-	1,969	62,698		_	-	2,732,406	45,703	
	Scaffolding in support of decommissioning			6	3		8														
2d.1.4		-	566			48		-	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	-
	l 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	l 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 Subtotal Period 2d Collateral Costs	- 80	- 01	- 010	262	1,112	-	27 27	4 432	32 2,805	2,773	32	-	-	1 000	-	-	-	- 000 400	-	-
2d.3	Subtotal Period 2d Collateral Costs	80	91	210	262	1,112	590	21	432	2,805	2,113	32	-	6,000	1,282	-	-	-	360,400	292	-
	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	-	900	-	-	-	-	1,662	166 202	1,828 1,008	1,828	-	-	-	-	-	-	-	-	-	-
2d.4.4 2d.4.5	Health physics supplies Heavy equipment rental	-	806 1,936	-	-	-	-	-	290	2,227	1,008 2,227	-	-	-	-	-	-	-	-	-	-
2d.4.6	Disposal of DAW generated	-	1,956	40	21	-	167	-	49	2,221	2,227	-	-	-	2,030	-	-	-	40,600	- 66	-
2d.4.7	Plant energy budget	-	-	40	21	-	107	547	82	630	630	•	-	-	2,030	-	-	-	40,600	00	-
2d.4.7 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

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Table D

Monticello Nuclear Generating Plant

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

Activity		Decon	Pamaval	Packaging	Transpart	Off-Site Processing	LLRW Disposal	Other	Total	Total	NRC Lic. Term.	Spent Fuel Management	Site Restoration	Processed Volume	Class A	Burial 'Class B	Volumes Class C	GTCC	Burial / Processed	Craft	Utility and Contractor
Index	Activity Description	Cost	Cost	Costs	Costs	Costs	Costs	Costs	Contingency	Costs	Costs	Costs	Costs	Cu. Feet	Cu. Feet		Cu. Feet		Wt., Lbs.	Manhours	Manhours
PERIOD 2	2f - License Termination																				
Period 2f D	Direct Decommissioning Activities																				
2f.1.1	ORISE confirmatory survey	-	-	-	-	-	-	166	50	216	216	-	-	-	-	-	-	-	-	-	-
	Terminate license Subtotal Period 2f Activity Costs	-	-	-	-	-	-	166	50	a 216	216	-	-	-	-	-	-	-	-	-	-
Period 2f A	additional Costs																				
	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
	Collateral Costs 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-Dependent Costs Insurance							530	53	583	583										
2f.4.2	Property taxes	-	-	-	-	-	-	1,471	147	1,618	1,618	-	-	-	-	-	-	-	-	-	
	Health physics supplies	-	708	- 7	- ,	-	-	-	177	884	884	-	-	-	-	-	-	-	-	-	-
2f.4.4 2f.4.5	Disposal of DAW generated Plant energy budget	-	-	7	4	-	29	274	9 41	48 315	48 315	-	-	-	355 -	-	-	-	7,097	12	-
2f.4.6	NRC Fees	-	-	-	-	-	-	426	43	468	468	-	-	-	-	-	-	-	-	-	-
	Emergency Planning Fees Fixed Overhead	-	-	-	-	-	-	112 1,597	11 239	123 1,836	1,836	123	-	-	-	-	-	-	-	-	-
	ISFSI Operating Costs	-	-	-	-	-	-	1,597	239 13	1,836	1,836	97	-	-	-	-	-	-	-	-	-
2f.4.10	Railroad Track Maintenance	-	-	-	-	=	-	94	14	108	108	=	-	-	-	-	-	-	-	-	-
	Security Staff Cost DOC Staff Cost	-	-	-	-	-	-	10,999 5,393	1,650 809	12,649 6,201	8,918 6,201	3,732	-	-	-	-	-	-	-	-	162,981 57,200
	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	ē	-	355	-	-	-	7,097	95,059	307,128
PERIOD 2	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 I	Direct Decommissioning Activities																				
	of Remaining Site Buildings																				
	Reactor Building Condensate Tanks Foundation	-	1,971 10	-	-	-	-	-	296 1	2,267 11	-	-	2,267 11	-	-	-	-	-	-	13,911 50	-
	Discharge Retention Basin	-	4	-	-	-	-	-	1	5	-	-	5	-	-	-	-	-	-	25	-
3b.1.1.4 3b.1.1.5	HPCI Room	-	19 16	-	-	Ē	-	-	3 2	22 19	-	-	22 19	-	-	-	-	-	-	97 177	-
	Hydrogen & Oxygen Storage	-	2	-	-	-		-	0	2	-	-	2		-	-	-		-	19	-
3b.1.1.7	LLRW Storage & Shipping	-	83	-	-	-	-	-	12	95	-	-	95	-	-	-	-	-	-	662	-
	MSIV Misc Structures 2017	-	4 1,410	-	-	-	-	-	$\frac{1}{212}$	4 1,622	-	-	4 1,622	-	-	-	-	-	-	42 13,042	-
	Offgas Stack	-	108	-	-	-	-	-	16	124	-	-	124	-	-	-	-	-	-	544	-
	Offgas Storage & Compressor	-	39 228	-	-	-	-	-	6	45	-	-	45	-	-	-	-	-	-	199	-
3b.1.1.12 3b.1.1.13	Recombiner	-	228 128	-	-	-		-	34 19	262 147	-	-	262 147	-			-	-	-	1,220 713	-
3b.1.1.14	Security Barrier	-	186	-	-	=	-	-	28	214	-	-	214	-	-	-	-	-	-	933	-
	Structures Greater than 3' Below Grade Tank Farm	-	2,461	-	-	-	-	-	369 1	2,830 5	-	-	2,830 5	-	-	-	-	-	-	12,649 21	-
3b.1.1.16 3b.1.1.17		-	1,259	-	-	-	-	-	189	1,448	-	-	1,448	-	-	-	-	-	-	13,036	-
3b.1.1.18	Turbine Building Addition	-	55	-	-	-	-	-	8	63	-	-	63	-	-	-	-	-	-	618	-
	Turbine Pedestal Totals	-	182 8,169	-	-	-	-	-	$\frac{27}{1,225}$	209 9,394	-	-	209 9,394	-	-	-	-	-	-	926 58,885	-
	out Activities																				
	Grade & landscape site Final report to NRC	-	896	-	-	-	-	200	134 30	1,031 231	231	-	1,031	-	-	-	-	-	-	1,841	1.560
	Subtotal Period 3b Activity Costs	-	9,065	-	-	-	-	200	1,390	10,655	231	-	10,425	-		-	-	-	-	60,726	1,560

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Appendix D, Page 9 of 11

Table D

Monticello Nuclear Generating Plant

DECON Decommissioning Cost Estimate with 60 Years of Spent Fuel Storage

(Thousands of 2020 Dollars)

						Off-Site	LLRW				NRC	Spent Fuel	Site	Processed		Runial	Volumes		Burial /		Utility and
Activity	Ÿ	Decon	Removal	Packaging	Transport			Other	Total	Total	Lic. Term.	Management	Restoration	Volume	Class A	Class B	Class C	GTCC	Processed	Craft	Contractor
Index		Cost	Cost	Costs	Costs	Costs	Costs	Costs	Contingency	Costs	Costs	Costs	Costs	Cu. Feet	Cu. Feet	Cu. Feet		Cu. Feet	Wt., Lbs.	Manhours	Manhours
D : 1 :-	A1177 10 A																				
Period 3l 3b.2.1	o Additional Costs Clean Concrete Disposal		3,322					13	500	3,835			3,835							12	
3b.2.1 3b.2.2	Intake Structure Cofferdam	-	3,322	-	-	-	-	- 13	500 50	3,835 385	-	-	3,835 385	-	-	-	-	-	-	2,584	-
3b.2.2	Construction Debris	-	-	-	-	-	-	1,170	176	1,346	-	-	1,346	-	-	-	-	-	-	2,564	-
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 3l	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-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	-	-	-	-	- 015	876	6,719	-	-	6,719	-	-	-	-	-	-	-	-
3b.4.4 3b.4.5	Plant energy budget NRC ISFSI Fees	-	-	-	-	-	-	315 356	47	362 391	-	362 391	-	-	-	-	-	-	-	-	-
3b.4.5 3b.4.6	NRU ISFSI Fees Emergency Planning Fees	-	-	-	-	-	-	356 257	36 26	391 283	-	391 283	-	-	-	-	-	-	-	-	-
3b.4.6 3b.4.7	Fixed Overhead	-	-	-	-	-	-	1,122	168	1,290	429	860	-	-	-	-	-	-	-	-	-
3b.4.7 3b.4.8	ISFSI Operating Costs	-	-	-	-	-	-	1,122	29	223	- 425	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
PERIOI	3c - Fuel Storage Operations/Shipping																				
Period 3	Direct Decommissioning Activities																				
Period 3	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 3	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 3c.4.7	Fixed Overhead ISFSI Operating Costs	-	-	-	-	-	-	11,431 5,940	1,715 891	13,146 6,831	-	13,146 6,831	-	-	-	-	-	-	-	-	-
3c.4.7 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
PERIOI	O 3d - GTCC shipping																				
Period 3	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	-	-
	l 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 3	l Period-Dependent Costs																				
	Insurance	-	-	-	-	-	-	27	3	30	30	-	-	-	-	-	-	-	-	-	-

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Table D

Monticello Nuclear Generating Plant

DECON Decommissioning Cost Estimate with 60 Years of Spent Fuel Storage

(Thousands of 2020 Dollars)

						Off-Site	LLRW				NRC	Spent Fuel	Site	Processed		Burial	Volumes		Burial /		Utility and
Activity		Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Processing Costs		Other Costs	Total	Total Costs	Lic. Term. Costs	Management Costs	Restoration Costs	Volume Cu. Feet	Class A Cu. Feet	Class B	Class C Cu. Feet	GTCC Cu. Feet	Processed Wt., Lbs.	Craft Manhours	Contractor
Index	Activity Description	Cost	Cost	Costs	Costs	Costs	Costs	Costs	Contingency	Costs	Costs	Costs	Costs	Cu. reet	Cu. reet	ou. reet	Cu. reet	Cu. reet	wt., Lbs.	wannours	Manhours
	Period-Dependent Costs (continued)							0.0	0	0.0	0.0										
3d.4.2 3d.4.4	Property taxes NRC ISFSI Fees	-	-	-	-	-	-	35 8	3 1	38 9	38	- Q	-	-	-	-	-	-	-	-	-
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 3d.4.9	Security Staff Cost Utility Staff Cost	-	-	-	-	-	-	165 39	25 6	190 45	190 45	-	-	-	-	-	-	-	-	-	2,074 539
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																				
	Additional Costs																				
3e.2.1 3e.2	License Termination ISFSI Subtotal Period 3e Additional Costs	-	57 57		987 987	-	5,925 5,925	2,185 $2,185$	2,336 2,336	11,678 11,678	11,678 11,678	-	-	-	21,949 21,949	-	-	-	2,633,402 2,633,402	11,541 11,541	
	Period-Dependent Costs																				
3e.4.1	Insurance	-	-	-	-	-	-	118	30	148	148	-	-	-	-	-	-	-	-	-	-
3e.4.2 3e.4.3	Property taxes Plant energy budget	-	-	-	-	-	-	249 12	62 3	312 15	312 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																				
	Additional Costs																				
3f.2.1	Demolition and Site Restoration of ISFSI	-	1,786		-	-	-	270	308	2,365	=	-	2,365	-	-	-	-	-	-	8,361	
3f.2	Subtotal Period 3f Additional Costs	-	1,786	-	-	-	-	270	308	2,365	-	-	2,365	-	-	-	-	-	<u>-</u>	8,361	160
Period 3f (Collateral Costs Small tool allowance		12				_	_	2	14	_	_	14							_	_
3f.3	Subtotal Period 3f Collateral Costs	=	12		-	-	-	-	2	14	-	-	14	-	-	-	-	-	-	-	-
	Period-Dependent Costs																				
3f.4.2	Property taxes	-	-	-	-	-	-	126	13	138	-	-	138	-	-	-	-	-	-	-	-
3f.4.3 3f.4.4	Heavy equipment rental Plant energy budget	-	117	-	-	-	-	- 6	17 1	134 7	-	-	134	-	-	-	-	-	-	-	-
3f.4.4 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 3f.4	Utility Staff Cost Subtotal Period 3f Period-Dependent Costs	-	- 117	-	-	-	-	109 475	16 82	126 674	-	-	126 674	-	-	-	-	-	-	-	1,564 4,084
3f.0	TOTAL PERIOD 3f COST	- -	1,915		- -	-	<u>-</u>	745	393	3,053	- -	- -	3,053	- -	- -	-		<u>-</u>	- -	8,361	
	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	
	OST TO DECOMMISSION	17,263	95,526	ŕ	11,878	49,952	-,	1,098,123	238,920	1,618,023	776,355	767,892	73,776	288,203	ŕ	1,711	1,178	,	,,	851,356	, ,
		.,	/	,,,,,,	,,,,,	- /	- /	,, =	,-=-	,,,	,	,	,	,=	,	,	,	,	, . ,	,	.,,

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 Processed
 Burial Volumes
 Burial /

 Volume
 Class A
 Class B
 Class C
 GTCC
 Processed

 Cu. Feet
 Cu. Feet
 Cu. Feet
 Cu. Feet
 Cu. Feet
 Wt., Lbs.

Xcel Energy

Monticello Nuclear Generating Plant Decommissioning Cost Analysis

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Craft

Utility and Contractor Manhours

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

Total

NRC Lic. Term. Costs

Total

Spent Fuel Management Costs

Restoration

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Processing Costs	Disposal Costs	Other Costs	(
TOTAL COST TO	DECOMMISSION WITH 17.31% CONTINGENC	Y:			\$1,618,023	thousands of	2020 dollars		1
TOTAL NRC LICE	ENSE TERMINATION COST IS 47.87% OR:				\$776,355	thousands of	2020 dollars		
SPENT FUEL MAI	NAGEMENT COST IS 47.58% OR:				\$767,892	thousands of	2020 dollars		
NON-NUCLEAR D	DEMOLITION COST IS 4.55% OR:				\$73,776	thousands of	2020 dollars		
TOTAL LOW-LEV	EL RADIOACTIVE WASTE VOLUME BURIED	(EXCLUDING	GTCC):		200,160	Cubic Feet			
TOTAL GREATER	R THAN CLASS C RADWASTE VOLUME GENE	RATED:			1,160	Cubic Feet			
TOTAL SCRAP MI	ETAL REMOVED:				23,123	Tons			
TOTAL CRAFT LA	ABOR 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

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Xcel Energy

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Monticello Nuclear Generating Plant Decommissioning Cost Analysis - 70 Year Lifetime Document X01-1775-003, Rev. 0 Appendix E, Page 1 of 11

APPENDIX E

DETAILED COST ANALYSIS

SCENARIO 3: DECON with 100 Year DFS

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Table E

Monticello Nuclear Generating Plant

DECON Decommissioning Cost Estimate with 100 Years of Spent Fuel Storage

(Thousands of 2020 Dollars)

						Off-Site	LLRW				NRC	Spent Fuel	Site	Processed		Burial	Volumes		Burial /		Utility and
Activity Index Activi	ity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Processing Costs	Disposal Costs	Other Costs	Total Contingency	Total Costs	Lic. Term. Costs	Management Costs	Restoration Costs	Volume Cu. Feet	Class A Cu. Feet	Class B		GTCC Cu. Feet	Processed Wt., Lbs.	Craft Manhours	Contractor Manhours
PERIOD 1a - Shutdown through T	Fransition																				•
Period 1a Direct Decommissioning Act																					
1a.1.1 Prepare preliminary decom	nmissioning cost	-	_	_	_	-	-	167	25	192	192	_	-	-	_	-	-		_	_	1,300
1a.1.2 Notification of Cessation of										a											
1a.1.3 Remove fuel & source mate										n/a											
1a.1.4 Notification of Permanent										a											
1a.1.5 Deactivate plant systems & 1a.1.6 Prepare and submit PSDA								257	39	a 296	296										2,000
1a.1.7 Review plant dwgs & specs			-	-	-	-	-	591	89	680	680	-	-	-	-	-	-	-	-	-	4,600
1a.1.8 Perform detailed rad surve								501	00	a	000										1,000
1a.1.9 Estimate by-product inven-		-	-	-	_	-	-	129	19	148	148	-	-	-	-	-	-	-	-	-	1,000
1a.1.10 End product description		-	-	-	-	-	-	129	19	148	148	-	-	-	-	-	-	-	-	-	1,000
1a.1.11 Detailed by-product invent		-	-	-	-	-	-	167	25	192	192	-	-	-	-	-	-	-	-	-	1,300
1a.1.12 Define major work sequence	ce	-	-	-	-	-	-	964	145	1,108	1,108	-	-	-	-	-	-	-	-	-	7,500
1a.1.13 Perform SER and EA 1a.1.14 Prepare/submit Defueled T	Pachnical Specifications	-	-	-	-	-	-	398 964	60 145	458 1,108	458 1,108	-	-		-	-	-	-	-	-	3,100 7,500
1a.1.14 Perform Site-Specific Cost		-	-	-	-	-	-	643	96	739	739	-	-	-		-		-	-	-	5,000
1a.1.16 Prepare/submit Irradiated		-	-	-	-	-	-	129	19	148	148	-	-	-	-	-	-	-	-	-	1,000
Activity Specifications																					
1a.1.17.1 Plant & temporary facilitie	es	-	_	_	-	-	_	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 Flu	lush	-	-	-	_	-	-	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/reheat	iters	-	-	-	-	-	-	129 206	19	148	148	-	- 110	-	-	-	-	-	-	-	1,000 1,600
1a.1.17.8 Reinforced concrete 1a.1.17.9 Main Turbine		-	-	-	-	-	-	206 268	31 40	236 309	118 309	-	118	-	-	-	-	-	-	-	2,088
1a.1.17.9 Main Turbine 1a.1.17.10 Main Condensers		-	-	-	-	-	-	268	40	309	309	-	-	-	-	-	-	-	-	-	2,088
1a.1.17.11 Pressure suppression struc	cture	_	_	_	_	-	-	257	39	296	296	-	-	-	-	-	_	_	-	_	2,000
1a.1.17.12 Drywell		-	-	_	_	-	-	206	31	236	236	-	-	-	-	-	_	-	-	-	1,600
1a.1.17.13 Plant structures & building	igs	-	-	-	-	-	-	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 1a.1.17 Total		-	-	-	-	-	-	116 5,486	17 823	133 6,308	67 5,759	-	67 550	-	-	-	-	-	-	-	900 42,683
		-	•	-	•	•	-	5,460	623	0,506	5,755	-	550	-	-	-	-	-	-	-	42,000
Planning & Site Preparations																					
1a.1.18 Prepare dismantling seque		-	-	-	-	-	-	308	46	355	355	-	-	-	-	-	-	-	-	-	2,400
1a.1.19 Plant prep. & temp. svces 1a.1.20 Design water clean-up syst		-	-	-	-	-	-	3,500 180	525 27	4,025 207	4,025 207	-	-	-	-	-	-	-	-	-	1,400
1a.1.20 Design water clean-up syst 1a.1.21 Rigging/Cont. Cntrl Envlps		-	-	-	-	-		2,400	360	2,760	2,760	-	-	-		-	-	-	-	-	1,400
1a.1.22 Procure casks/liners & cont		-	-	-	_	-	-	158	24	182	182	-	-	_	-	-	_	-	-	_	1,230
1a.1 Subtotal Period 1a Activity		-	-	-	-	-	-	16,569	2,485	19,054	18,505	-	550	-	-	-	-	-	-	-	83,013
Period 1a Collateral Costs																					
1a.3.1 Spent Fuel Capital and Tra	ransfer	-	-	-	_	-	-	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 Collater	eral 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	-	-	-	-	-	153 113	767 866	767 866	-	-	-	-	-	-	-	-	-	=
1a.4.4 Heavy equipment rental 1a.4.5 Disposal of DAW generated	d	-	753	12	- 6	-	50	-	113 15	866	866	-	-	-	610	-	-	-	12,190	20	-
1a.4.6 Plant energy budget		-	-	- 12	-	-	-	1,817	272	2,089	2,089	-	-	-	-	-	-	-	12,130	- 20	-
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 Maintenand 1a.4.13 Security Staff Cost	nce	-	-	-	-	-	-	125 $16,372$	19 2,456	144 18,827	144 18,827	-	-	-	-	-	-	-	-	-	245,440
1a.4.14 Utility Staff Cost		-	-	-	-	-	-	27,285	2,456 4,093	31,378	31,378	-	-	-	-	-	-	-	-	-	422,240
1a.4 Subtotal Period 1a Period-1	Dependent Costs	-	1,367	12	6	-	50	59,634	8,703	69,772	64,902	4,870	-	-	610	-	-	-	12,190	20	

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Table E

Monticello Nuclear Generating Plant

DECON Decommissioning Cost Estimate with 100 Years of Spent Fuel Storage

(Thousands of 2020 Dollars)

_																					
Activit	v	Decon	Removal	Packaging	Transport	Off-Site Processing	LLRW Disposal	Other	Total	Total	NRC Lic. Term.	Spent Fuel Management	Site Restoration	Processed Volume	Class A	Burial Class B	Volumes Class C	GTCC	Burial / Processed	Craft	Utility and Contractor
Index		Cost	Cost	Costs	Costs	Costs	Costs	Costs	Contingency	Costs	Costs	Costs	Costs	Cu. Feet	Cu. Feet		Cu. Feet	Cu. Feet	Wt., Lbs.	Manhours	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
PERIO	D 1b - Decommissioning Preparations																				
Period 1	b Direct Decommissioning Activities																				
	Work Procedures							200	01	500	600		50								4.500
	Plant systems NSSS Decontamination Flush	-	_	-	-	-	-	608 129	91 19	700 148	630 148	-	70	-	_		-		-	-	4,733 1,000
1b.1.1.3		-	-	-	_	-	-	514	77	591	591	-	-	-	_		-	-	-	_	4,000
	Remaining buildings	=	-	-	-	-	=	174	26	200	50	-	150	-	-	-	-	-	-	-	1,350
	CRD housings & NIs	Ē	-	-	-	-	-	129	19	148	148	-	-	-	-	-	-	-	-	-	1,000
1b.1.1.6 1b.1.1.7		-	-	-	-	-	-	129 257	19 39	148 296	148 296	-	-	-	-	•	-	-	-	-	1,000 2,000
1b.1.1.8		-	-	-	-	-	-	467	70	537	537	-	-	-	-			-	-	-	3,630
1b.1.1.9	Facility closeout	-	-	-	-	-	-	154	23	177	89	-	89	-	-	-	-	-	-	-	1,200
	Sacrificial shield	Ē	-	-	-	-	-	154	23	177	177	-		-	-	-	-	-	-	-	1,200
	1 Reinforced concrete 2 Main Turbine	-	-	-	-	-	-	129 267	19 40	148 307	74 307	-	74	-	-	-	-	-	-	-	1,000 2.080
	3 Main Condensers	-	-	-	-	-	-	268	40	307	309		-	-	-		-	-	-	-	2,088
	Moisture separators & reheaters	-	-	-	-	-	-	257	39	296	296	-	-	-	-	-	-	-	-	-	2,000
	5 Radwaste building	-	-	-	-	-	-	351	53	403	363	-	40	-	-	-	-	-	-	-	2,730
	3 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
D. J. 141	b Additional Costs																				
1b.2.1	Spent Fuel Pool Isolation							12,675	1,901	14,576	14,576								_	-	
1b.2.1 1b.2.2	Site Characterization	-	-	-	-	-	-	5,930	1,779	7,708	7,708	-	-	-	_		-	-	-	30,500	10,852
1b.2.3	Mixed & RCRA Waste	-	-	28			-	-	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 1	b 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			102	-	53	263	263	-	-	-	233	-	-	-	13,991	45	-
1b.3.4 1b.3.5	Process decommissioning chemical flush waste Small tool allowance	1	- 2	24	77	-	1,526	-	396 0	2,024	2,024 2	-	-	=	-	231	-	-	24,599	43	-
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	- 0.107	1 000	-	-	-	1 600	6,340	951	7,291	7,291	. 0.150	-	-	-	- 001	-	-	- 00 500	-	-
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	-
	b Period-Dependent Costs																				
1b.4.1	Decon supplies	39		-	-	-	-	1 101	10	48	48	-	-	-	-	-	-	-	-	-	-
1b.4.2 1b.4.3	Insurance Property taxes	-	-	-	-	-	-	1,161 1,710	116 171	1,277 1,881	1,277 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 NRC Fees	-	-	-	-	-	-	1,812 323	272	2,083 355	2,083 355	-	-	-	-	-	-	-	-	-	-
1b.4.8 1b.4.9	Emergency Planning Fees	-	-	-	-	-	-	1,416	32 142	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 Security Staff Cost	-	-	-	-	-	-	62 8,163	1 225	72 9,388	72 9,388	-	-	-	-	-	-	-	-	-	122,384
1b.4.14 1b.4.15	DOC Staff Cost	-	-	-	-	-	-	5,846	1,225 877	6,723	9,388 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
PERIO	D 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

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Monticello Nuclear Generating Plant

Decommissioning Cost Analysis

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Table E

Monticello Nuclear Generating Plant

DECON Decommissioning Cost Estimate with 100 Years of Spent Fuel Storage

(Thousands of 2020 Dollars)

						Off-Site	LLRW				NRC	Spent Fuel	Site	Processed		Burial V	Volumes		Burial /		Utility and
Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Processing Costs	Disposal Costs	Other Costs	Total Contingency	Total Costs	Lic. Term. Costs	Management Costs	Restoration Costs	Volume Cu. Feet	Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet	Processed Wt., Lbs.	Craft Manhours	Contractor Manhours
	•	Cost	Cost	Custs	Costs	Costs	Custs	Costs	Contingency	Costs	Costs	Custs	Costs	ou. reet	ou. reet	ou. reet	ou. reet	ou. reet	11 0., 1105.	Mannours	Mannours
	Large Component Removal																				
Period 2a Direc	et Decommissioning Activities																				
	Supply System Removal irculation System Piping & Valves	111	94	27	50		528		221	1,031	1,031				1,430				99,742	2,905	
2a.1.1.2 Reci	irculation Pumps & Motors	40	63	16	51	42	539	-	186	938	938	-	-	96	945	-	-	-	112,200	1,563	-
	OMs & NIs Removal ctor Vessel Internals	194 244	1,020 6,722	415 12,852	135 2,696	-	1,130 29,845	364	696 24,027	3,591 76,749	3,591 76,749	-	-	-	3,741 1,252	1,481	1,178	-	213,700 343,150	17,768 30,515	1,379
2a.1.1.5 Rea	ctor 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 Tota	als	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 Maj 2a.1.2 Mai	jor Equipment n Turbine/Generator	_	385	1,356	521	6,139	439	_	1,341	10,182	10,182	_	_	24,835	1,383	_	_	_	1,577,959	5,438	_
	n Condensers	-	1,347	360	194	3,225	244	-	947	6,317	6,317	-	-	17,396	727	-	-	-	828,955	18,831	-
	es from Clean Building Demolition																				
	ctor Building waste	-	332 25	-	-	-	-	-	50 4	381 28	381 28	-	-	-	-	-	-	-	-	2,217 127	-
2a.1.4.2 Rau 2a.1.4.3 Turl		-	127	-	-	-	-	-	19	146	146	-	-	-	-		-	-	-	1,254	-
2a.1.4 Tota	als	-	483	-	-	-	-	-	72	556	556	-	-	-	-	-	-	-	-	3,598	-
Disposal of Plan	nt Systems omatic Press Relief		118	7	10	134	70		5 0	410	410			803	206				45,852	1,656	
	omatic Press Relief mistry Sampling	-	118 27	1	12 2	134 26	13	-	70 14	410 83	410 83	-	-	803 156	206 37	-	-	-	45,852 8,681	1,656	-
2a.1.5.3 Che	mistry Sampling - Insulated	-	2	0	0	-	0	-	1	3	3	-	-	-	1	-	-	-	72	28	-
	culating Water - RCA abustible Gas Control - Insul - RCA	-	207	14 0	62 2	1,114 36	-	-	230 13	1,626	1,626	-	-	6,656	-	-	-	-	270,307	2,860 378	-
	abustible Gas Control - Insul - RCA	-	29 18	1	3	48	-	-	12	80 81	80 81	-	-	212 285	-	-	-	-	8,617 11,577	245	-
2a.1.5.7 Con	densate & Feedwater	-	987	183	329	3,337	2,464	-	1,431	8,731	8,731	-	-	19,947	7,319	-	-	-	1,275,810	14,196	-
	densate & Feedwater - Insulated densate Demin	-	492	34 30	63	699 560	408 339	-	343	2,038	2,038	-	-	4,176	1,207 1,000	-	-	-	246,693	6,964	-
	densate Demin densate Storage	-	545 726	33	51 82	1,193	270	-	316 444	1,840 2,748	1,840 2,748	-	-	3,346 7,131	795	-	-	-	199,936 340,568	7,618 10,345	-
2a.1.5.11 Con	trol Rod Drive	-	3	0	0	3	1	-	2	9	9	-	-	19	4	-	-	-	1,009	41	-
	trol Rod Drive Hydraulic	-	416	16	26	277	190 176	-	199	1,124	1,124	-	-	1,658	562 521	-	-	-	103,306	5,898	-
	e Spray e Spray - Insulated	-	79 145	20 8	51 13	734 137	90	-	184 82	1,244 474	1,244 474	-	-	4,384 818	264	-	-	-	211,329 50,149	1,163 2,033	-
2a.1.5.15 Dem	nin Water - Insulated - RCA	-	15	0	1	14	-	-	6	36	36	-	-	85	-	-	-	-	3,445	181	-
	nin Water - RCA	=	41 2	1	2	42	-	-	17	104	104 7	-	-	253	-	-	-	-	10,278	508	-
2a.1.5.17 Dies 2a.1.5.18 Dry	well Atmosphere Cooling - RCA	-	38	0 1	0 5	4 92	-	-	$\frac{1}{24}$	7 159	159	-	-	23 548	-	-	-	-	931 22,244	25 550	-
2a.1.5.19 EDG	G Emerg Service Water - Insul - RCA	-	0	0	0	0	-	-	0	1	1	-	-	2	-	-	-	-	84	4	-
	etrical - Clean ergency Service Water - Insul - RCA	-	13 21	. 0	-	23	-	-	2 9	15 55	- 55	-	15	137	-	-	-	-	-	182 281	-
	ergency Service Water - Insul - RCA ergency Service Water - RCA	-	21	0	0	23	-	-	9	ээ 5	ээ 5	-	-	137	-	-	-	-	5,544 512	281	-
2a.1.5.23 GEZ	ZIP - RCA	-	3	0	1	17	-	-	4	25	25	-	-	103	-	-	-	-	4,184	48	-
	erator Physical Design - RCA O2 Control Analyzing	-	5 6	0	0	5	- 5	-	2 3	12 15	12 15	-	-	31 6	- 10	-	-	-	1,250	67 81	-
	O2 Control Analyzing O2 Control Analyzing - Insulated	-	6	0	0	1	5 5	-	3	15 15	15	-	-	6	13 13	-	-	-	1,080 1.080	81	-
2a.1.5.27 High	h Pressure Coolant Injection	-	67	6	13	163	70	-	61	381	381	-	-	972	209	-	-	-	52,792	966	-
2a.1.5.28 High 2a.1.5.29 Hyd	h Pressure Coolant Injection - Insula	-	219 8	14	24	267	163	-	141 1	830 10	830	-	- 10	1,598	481	-	-	-	95,733	3,079 118	-
	lrogen Cooling lrogen Cooling - RCA	-	8 7	- 0	- 0	- 7	-	-	3	10 17	17	-	- 10	39	-	-	-	-	1.600	79	-
2a.1.5.31 Hyd	lrogen Seal Oil - RCA	-	17	0	2	32	-	-	9	60	60	-	-	189	-	-	-	-	7,669	212	-
	lrogen Water Chemistry - RCA crument & Service Air - RCA	-	24 225	0	1 17	23 296	-	-	10 103	59 644	59 644	-	-	140 1.768	-	-	-	-	5,672 71,810	304 2.733	-
	n Condenser	-	196	12	20	223	139	-	122	712	712	-	-	1,333	411	-	-	-	80,439	2,746	-
2a.1.5.35 Mai	n Steam	-	249	17	32	359	201	-	173	1,029	1,029	-	-	2,148	594	-	-	-	125,135	3,512	-
	n Turbine	-	1,012 214	205 18	353 37	3,306 423	2,921 225	-	1,553 180	9,350 1,097	9,350 1,097	-	-	19,760 2,530	8,687 667	-	-	-	1,354,661 145,208	14,733 3,069	-
	n Turbine - Insulated cellaneous	-	43	18	37	423 51	225	-	180	1,097	1,097	-	-	2,530 302	- 667	-	-	-	145,208	3,069 622	-
2a.1.5.39 Off	Gas Recombiner	-	189	19	32	300	257	-	163	960	960	-	-	1,795	764	-	-	-	121,554	2,708	-
	Gas Recombiner - Insulated	-	387 25	19	27	229 9	240	-	197	1,100	1,100	-	-	1,366 53	709 33	-	-	-	100,933	5,385 345	-
	t Accident Sampling t Accident Sampling - Insulated	-	25 17	1	1	9	11 13	-	11 8	58 43	58 43	-	-	53 17	33 37	-	-	-	4,318 3,116	345 212	-
	R Service Water - Insulated - RCA	-	83	3	14	248	-	-	60	409	409	-	-	1,485	-	-	-	-	60,293	1,125	-
	R Service Water - RCA	-	4	0	0	6	-	-	2	12	12	-	-	35	-	-	-	-	1,410	57	-
2a.1.5.45 Rea	ctor Feedwater Pump Seal	-	56	2	4	32	33	-	28	155	155	-	-	193	96	-	-	-	14,009	773	-

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Table E

Monticello Nuclear Generating Plant

DECON Decommissioning Cost Estimate with 100 Years of Spent Fuel Storage

				1	DECON DE	ecommissi			ate with 100 of 2020 Dollar		or Spent r	uei Storage									
		_			_	Off-Site	LLRW				NRC	Spent Fuel	Site	Processed		Burial			Burial /		Utility and
Activit Index		Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Processing Costs	Disposal Costs	Other Costs	Total Contingency	Total Costs	Lic. Term. Costs	Management Costs	Restoration Costs	Volume Cu. Feet	Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet	Processed Wt., Lbs.	Craft Manhours	Contractor Manhours
Disposal	of Plant Systems (continued)																				
	Residual Heat Removal	362	252	172	178	1,072	2,051	-	962	5,049	5,049	-	-	6,406	6,012	-	-	-	647,941	4,135	-
	Residual Heat Removal - Insulated Rx Core Isolation Cooling	622	554 49	61 2	82 4	563 43	880 26	-	772 26	3,535 150	3,535 150	-	-	3,367 259	2,607 76	-	-	-	303,087 15,396	10,340 691	-
2a.1.5.49		-	107	5	7	48	67	-	52	287	287	-	-	288	198	-	-	-	24,419	1,479	-
2a.1.5.50		56	58	6	4	7	65	-	61	258	258	-	-	43	190	-	-	-	14,095	1,580	-
2a.1.5.51 2a.1.5.52	Snubbers Standby Liquid Control - Insul - RCA	-	169 4	2	5	63 4	30	-	60 2	331 9	331 9	-	-	377 22	90	-	-	-	21,009 904	2,548 48	-
2a.1.5.53		-	26	1	2	41	-	-	13	83	83	- -	=	245	-	-	-	-	9,969	341	=
2a.1.5.54			7	0	1	21	-	-	5	35	35	-	-	126		-	-	-	5,135	98	-
2a.1.5.55 2a.1.5	Traversing Incore Probe Totals	0 1,040	4 8,221	0 924	0 1,572	0 16,339	$\frac{2}{11,425}$	-	1 8,209	7 47,730	7 47,706	-	24	97,654	5 33,808	-	-	-	386 6,125,515	51 119,943	-
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
	a Collateral Costs	-,!==	20,121	10,040	0,300	20,001	00,012	.20	11,110	100,000	100,000		24	111,010	30,010	1,101	2,270		10,100,010	200,040	2,.00
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 Spent Fuel Capital and Transfer	-	324	-	-	-	-	24,169	49	373 27,795	336	97.70	37	-	-	-	-	-	-	-	-
2a.3.4 2a.3.5	Retention and Severance	-	-	-	-	-	-	13,145	3,625 1,972	15,117	15,117	27,795	-	-	-	-		-	-	-	-
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 2	a Period-Dependent Costs																				
2a.4.1	Decon supplies	112	-	-	-	-	-	1.010	28	140	140	-	-	-	-	-	-	-	-	-	-
2a.4.2 2a.4.3	Insurance Property taxes	-	-	-	-	-	-	1,019 4,383	102 438	1,121 4,821	1,121 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 2a.4.7	Disposal of DAW generated Plant energy budget	-	-	110	57	-	457	2,501	134 375	758 2,876	758 2,876	-	-	-	5,551	-	-	-	111,023	181	-
2a.4.7	NRC Fees	-	_	-	-	-	-	856	86	942	942	-	-	-	-		-	-	-	-	-
2a.4.9	Emergency Planning Fees	=	-	-	-	-	-	4,115	412	4,527	-	4,527	-	-	-	-	-	-	-	-	-
2a.4.10 2a.4.11	Fixed Overhead Spent Fuel Pool O&M	-	-	-	-	-	-	3,071 1,224	461 184	3,532 1,408	3,532	1,408	-	-	-	-	-	-	-	-	-
2a.4.11 2a.4.12	ISFSI Operating Costs	-		-	-	-		162	24	1,408	-	1,408	-	-	-				-	-	-
2a.4.13	Railroad Track Maintenance	-	-	-	-	-	-	181	27	208	208	-	-	-	-	-	-	-	-	-	-
2a.4.14	Remedial Actions Surveys	-	-	-	-	-	-	1,624 21,881	244	1,867	1,867	-	-	-	-	-	-	-	-	-	995 574
2a.4.15 2a.4.16	Security Staff Cost DOC Staff Cost	-	-	-	-	-	-	21,001	3,282 3,153	25,164 $24,174$	25,164 24,174	-	-	-	-	-		-	-	-	325,574 229,108
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
PERIO	2b - Site Decontamination																				
Period 2	Direct Decommissioning Activities																				
	of Plant Systems																				
2b.1.1.1 2b.1.1.2	ALARA/Radiological Alternate N2 - RCA	-	18 16	0	1	6 16	3	-	6 7	35 40	35 40	-	-	35 93	10	-	-	-	2,060 3,765	277 185	-
2b.1.1.2 2b.1.1.3		-	1	0	0	0	0	-	0		2	-	-	2	0		-	-	129	17	-
2b.1.1.4	Electrical - Contaminated	=	445	6	24		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 2b.1.1.7		-	101 305	7	6 27	103 446	34	-	42 156	253 975	253 975	-	-	614 2,665	100			-	24,917 114,598	1,324 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		-	483	16		1,007	76	-	302	1,945	1,945	-	-	6,018	227	-	-	-	258,789	7,101	-
	Heating Boiler - Insulated - RCA Liquid Radwaste	- 588	3 687	0 48	0 63	4 514	586	-	1 703	9 3,188	9 3,188	-	-	26 3,073	1,728	-	-	-	1,058 235,484	35 17,194	- -
	Makeup Demin - RCA	-	103	3	14		-	-	65	431	431	-	-	1,471	1,720	-	-	-	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	-
	Off Gas Holdup	-	342	21	38	461	214	-	216	1,291	1,291	-	-	2,755	630	-	-	-	152,277	4,769	-
	Primary Containment Process Radiation Monitors	-	455 46	42 2	87 2	1,038 24	507 18	-	414 20	2,543 111	2,543 111	-	-	6,201 142	1,506 52	-	-	-	347,704 9,115	6,454 649	- -
	•		_	_	_					_									-, -		

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Table E

Monticello Nuclear Generating Plant

DECON Decommissioning Cost Estimate with 100 Years of Spent Fuel Storage

(Thousands of 2020 Dollars)

						Off-Site	LLRW				NRC	Spent Fuel	Site	Processed		Buriol	Volumes		Burial /		Utility and
Activity		Decon	Removal	Packaging	Transport	Processing	Disposal	Other	Total	Total	Lic. Term.	Management	Restoration	Volume	Class A	Class B	Class C	GTCC	Processed	Craft	Contractor
Index	Activity Description	Cost	Cost	Costs	Costs	Costs	Costs	Costs	Contingency	Costs	Costs	Costs	Costs	Cu. Feet	Cu. Feet	Cu. Feet		Cu. Feet	Wt., Lbs.	Manhours	Manhours
Disposal o	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	-
	Rx Bldg Closed Clng Water - RCA	-	184	15	66	1,187	-	-	235	1,687	1,687	-	-	7,093	-	-	-	-	288,031	2,489	-
	Rx Component Handling Equip	27	142	18	27	194	279	-	154	840	840	-	-	1,158	829	-	-	-	99,730	2,462	-
	Rx Pressure Vessel	28	47	6	5	13	78	-	48	225	225	-	-	75	230	-	-	-	17,816	1,051	-
	Rx Water Cleanup	172		19	16	22	251	-	222	965	965	-	-	130	737	-	-	-	52,670	5,736	-
	Secondary Containment Service & Seal Water - Insulated - RCA	-	124 120	$\frac{7}{2}$	14 11	170 197	86	-	81 62	483 392	483 392	-	-	1,017 1,180	255	-	-	-	57,567 47,917	1,763 1,565	-
	Service & Seal Water - RCA	-	159	4	17	303	-	-	88	570	570			1,809	-	-	-	-	73,453	2,016	-
	Service Air Blower - RCA	-	15	0	2	34	-	-	9	62	62	-	-	206	_	-	-	-	8,364	206	-
	Solid Radwaste	338	494	36	49	399	467	-	480	2,264	2,264	-	-	2,387	1,380	-	-	-	185,221	10,820	-
	Structures & Buildings	-	78	2	5	60	29	-	37	210	210	-	-	357	85	-	-	-	19,933	1,128	-
2b.1.1.28		-	10	-	-	-	-	-	1	11	-	-	11	-	-	-	-	-	-	144	-
	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	-
	ination of Site Buildings	# aaa	0.000	150	F10	0.044	1 101		4.004	99.040	99.040			40.055	E 01 1				0.015.050	110 #10	
2b.1.3.1 2b.1.3.2	Reactor Building Admin	5,202 106	2,903 6	178 0	516 3	8,044	1,181 15	-	4,924 59	22,948 189	22,948 189	-	-	48,077	7,014 145	-	-	-	2,317,670 6,840	112,518 1,600	-
	Admin HPCI Room	106	28	1	3 3	20	15 14		59 29	189	189 123	-	-	118	145 125	-	-	-	10,759	7,600	-
2b.1.3.4	Hot Shop	17	4	0	2	- 20	11	-	12	46	46	-	-	-	103	-	-	-	4.860	286	-
	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	-
		27	25	1	5	33	24	-	32	148	148	-	-	199	216	-	-	-	18,405	695	-
2b.1.3.11		705 58	353 21	21	104	215	564 45	-	632 47	2,594 181	2,594 181	-	-	1,283	5,299 434	-	-	-	303,150 20,478	14,443 1,087	-
2b.1.3.12 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 2b.1.5	Prepare/submit License Termination Plan Receive NRC approval of termination plan	-	-	-	-	-	-	526	79	605 a	605	-	-	-	-	-	-	-	-	-	4,096
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
Davied 9h	Additional Costs																				
2b.2.1	Operational Equipment			23	92	1,211	-	_	198	1,524	1,524		-	11,760					294,000	32	_
2b.2.1	Excavation of Underground Services	-	1,972	-	- 52	1,211	-	376	550	2,898	2,898	-	-	-	-	-	-	-	234,000	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	-
	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	-	-	-	-	117.198	55 17 500	418 134.778	418	194 550	-	-	-	-	-	-	-	-	-
2b.3.4 2b.3.5	Spent Fuel Capital and Transfer Retention and Severance	-	-	-	-	-	-	6,277	17,580 942	7,218	7,218	134,778	-	-	-	-	-	-	-	-	-
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	-	-	-	- 410	-	407	3,117	3,117 694	-	-	-	- F 004	-	-	-	101.650	-	-
2b.4.6 2b.4.7	Disposal of DAW generated Plant energy budget	-	-	101	52	-	419	1,437	123 216	694 1,653	694 1,653	-	-	-	5,084	-	-	-	101,679	166	-
2b.4.7 2b.4.8	NRC Fees	-	-	-	-	-	-	623	62	1,653	1,653	-	-	-	-	-	-	-	-	-	-
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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Table E

Monticello Nuclear Generating Plant

DECON Decommissioning Cost Estimate with 100 Years of Spent Fuel Storage

(Thousands of 2020 Dollars)

						Off-Site	LLRW				NRC	Spent Fuel	Site	Processed		Rusio1	Volumes		Burial /		Utility and
Activity	•	Decon	Removal	Packaging	Transport	Processing	Disposal	Other	Total	Total	Lic. Term.	Management	Restoration	Volume	Class A	Class B	Class C	GTCC	Processed	Craft	Contractor
Index		Cost	Cost	Costs	Costs	Costs	Costs	Costs	Contingency	Costs	Costs	Costs	Costs	Cu. Feet	Cu. Feet		Cu. Feet			Manhours	
D 1 ol	Post of Proceedings (control of the																				
2b.4.16	Period-Dependent Costs (continued) 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	
2b.0	TOTAL PERIOD 2b COST	9,591	21,850	861	2,046	21,692	6,143	196,814	40.041	302,937	163,694	139,232	11	134,029	30,882				6,794,433	309,941	698,488
	2d - Decontamination Following Wet Fuel Storage	9,391	21,650	801	2,046	21,692	6,145	190,014	43,941	302,937	165,694	139,232	11	154,029	30,882	-	-	-	6,794,455	509,941	690,400
Period 2d 2d.1.1	Direct Decommissioning Activities 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																				
	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 2d.1.2.4	Electrical - Decontam. Fuel Pool Area Fire - RCA - Fuel Pool Area	-	297 11	5 0	23 1	411 10	-	-	140 4	876 26	876 26	-	-	2,457 62	-	-	-	-	99,783 2,499	4,090 143	
2d.1.2.4 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	-
Decontar	nination 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 2d.3.5	Decommissioning Equipment Disposition	-	-	130	82	1,112	178	27	237	1,739 32	1,739	32	-	6,000	529	-	-	-	303,608	147	
2d.3.3	Spent Fuel Capital and Transfer Subtotal Period 2d Collateral Costs	80	91	210	262	1,112	590	27	4 432	2,805	2,773	32	-	6,000	1,282	-	-	-	360,400	292	-
Davied 9d	Period-Dependent Costs																				
2d.4.1	Decon supplies	244	_	-	-	-	_	_	61	305	305	_	_	_	_		_	_	_	_	-
2d.4.1	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 2d.4.9	NRC Fees Emergency Planning Fees	-	-	-	-	-	-	424 112	42 11	466 123	466	123	-	-	-	-	-	-	-	-	-
2d.4.9 2d.4.10	Emergency Planning Fees Fixed Overhead	-	-	-	-	-	-	1,597	239	1,836	1,836	123	-	-	•	-	-	-	-	-	-
2d.4.10 2d.4.11	Liquid Radwaste Processing Equipment/Services	-	-	-	-	-	-	320	48	368	368	-	-	-			-	-	-	-	-
2d.4.11	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	-		-	-	-	1.0=	10,052	1,508	11,560	10,670	890	-	-	- 0.000	-	-	-	-	-	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

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Table E

Monticello Nuclear Generating Plant

DECON Decommissioning Cost Estimate with 100 Years of Spent Fuel Storage

(Thousands of 2020 Dollars)

Part	
Part	Utility and Contractor
Professional Pro	Manhours
1000 1000	
Part	
Saloud Prioring Pri	-
1 1 1 1 1 1 1 1 1 1	-
Salotal Permit Methinane Consession 1	
Part College College	6,24 6,24
14.1	0,21
Saketal Period I Collateral Corts	-
Parish P	-
24.1	
Health playses supplies	-
24.4 Disposit of DAY generated	-
24.6 Plant energy budget	-
24.4 Second Sec	-
24.4 Seed Overhead	-
24.1	
24.11 Security Staff Cost	-
26.1 2 DOC Staff Cost	162,98
2f. d Subtotal Period Period Dependent Costs	57,20
PRIOD 2 TOTAL PERIOD 2 COST 13,731 65,66 20,473 10,731 49,937 72,577 396,00 130,253 75,268 576,281 182,914 73 288,160 174,123 1,481 1,178 21,552,260 72,731 72,577 73,583 74,945 74,94	80,70 300,88
Period 3b - Site Restoration Period 3c Demolitration Period 3c Demolitration Period 3c Demolitration Period 3c Period 3c	307,12
Period 3b Direct Decommissioning Activities	2,393,09
Demolition of Remaining Site Buildings	
Sab.1.1.1 Reactor Building 1,971	
3b.1.1.2 Condensate Tanks Foundation 10	
3b.1.13 Discharge Retention Basin 4 - - 1 5 - 5 - - 2 3b.1.14 HPCI Room 19 - - 3 22 - 22 - - 1 3b.1.15 Hydrogen & Oxygen Storage 2 - - 0 2 - 1 2 - - 1 3b.1.17 LLRW Storage & Shipping 83 - - 12 95 - 95 - - 6 3b.1.18 MSIV - 4 - - 1 4 - - 4 3b.1.19 Misc Structures 2017 1,410 - - 212 1,622 - 1,622 - - - 13,00	-
3b.1.1.4 HPCI Room 19 - - 3 22 - 22 - - 3 3b.1.1.5 Hot Shop 16 - - 2 19 - 19 - 17 3b.1.1.6 Hydrogen & Oxygen Storage 2 - - 0 2 - 2 - - 1 3b.1.1.7 LRW Storage & Shipping 83 - - 12 95 - 95 - - - - 4 3b.1.1.8 MSIV - 4 - - 1 4 - - 4 - - 4 3b.1.1.9 Misc Structures 2017 1,410 - - - 212 1,622 - 1,622 - - - 13,04	-
3b.1.16 Hydrogen & Oxygen Storage	-
3b.1.1.7 LIRW Storage & Shipping - 83 12 95 95 66 3b.1.1.8 MSIV - 4 1 1 4 4 66 3b.1.1.9 Misc Structures 2017 - 1,410 12 1,622 13,04	-
3b.1.1.9 Misc Structures 2017 - 1,410 212 1,622 1,622 13,04	-
	-
	-
3b.1.1.1 Offgas Storage & Compressor - 39	-
3b.1.1.12 Radwaste - 228 34 262 262 1,22 3b.1.1.13 Recombiner - 128 128 7	-
3b.1.1.14 Security Barrier - 186 28 214 214 93	-
3b.1.1.15 Structures Greater than 3' Below Grade 2,461 369 2,830 2,830 12,64	-
3b.1.1.16 Tank Farm - 4 1 5 5 2 3b.1.1.17 Turbine - 1,259 189 1,448 1,448 13,03	-
3b.1.1.18 Turbine Building Addition - 55 8 63 63 61	-
3b.1.1.19 Turbine Pedestal 182 - - - 27 209 - - 209 - - - - 92 3b.1.1 Totals 8,169 - - - 1,225 9,394 - - 9,394 - - - 58,88	-
Site Closeout Activities	
3b.1.2 Grade & landscape site - 896 134 1,031 1,031 1,84	1.50
3b.1.3 Final report to NRC 200 30 231 231	1,56 1,56

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Monticello Nuclear Generating Plant Decommissioning Cost Analysis

Table E

Monticello Nuclear Generating Plant

DECON Decommissioning Cost Estimate with 100 Years of Spent Fuel Storage

(Thousands of 2020 Dollars)

						Off-Site	LLRW				NRC	Spent Fuel	Site	Processed		Burial	Volumes		Burial /		Utility and
Activity		Decon	Removal	Packaging	Transport		Disposal	Other	Total	Total	Lic. Term.	Management	Restoration	Volume	Class A	Class B		GTCC	Processed	Craft	Contractor
Index	Activity Description	Cost	Cost	Costs	Costs	Costs	Costs	Costs	Contingency	Costs	Costs	Costs	Costs	Cu. Feet	Cu. Feet	Cu. Feet	Cu. Feet		Wt., Lbs.	Manhours	Manhours
Period 3b Ad	dditional Costs																				
3b.2.1	Clean Concrete Disposal	-	3,322	-	-	-	-	13	500	3,835	-	-	3,835	-	-	-	-	-	-	12	-
	ntake Structure Cofferdam	-	335	-	-	-	-	-	50	385	-	-	385	-	-	-	-	-	-	2,584	-
	Construction Debris	-	-	-	-	-	-	1,170	176	1,346	-	-	1,346	-	-	-	-	-	-	-	-
	Backfill	-	5,583	-	-	-	-	-	837	6,421	-	-	6,421	-	-	-	-	-	-	5,422	-
	Discharge Structure Cofferdam	-	442	-	-	-	-	-	66	508	-	-	508	-	-	-	-	-	-	3,552	-
	Disposition of Original MPC Canisters	-		-	954		5,641		1,649	8,244	8,244	-		-	21,097	-	-	-	2,501,800		-
3b.2 S	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	-
	ollateral Costs																				
	Small tool allowance	-	110	-	-	-	-		17	127	-	-	127	-	-	-	-	-	-	-	-
	Spent Fuel Capital and Transfer Subtotal Period 3b Collateral Costs	-	110	-	-	-	-	109 109	16 33	$\frac{125}{252}$	-	125 125	127	-	-	-	-	-	-	-	-
Davied 9h De	eriod-Dependent Costs																				
	eriod-Dependent Costs Insurance	<u>-</u>	_	-	-	_	_	1,220	122	1,342	1,342	_	_	-	-	-	-	-	-	-	-
	Property taxes	-	-	-	-	-	-	2,543	254	2,797	1,542	2,797	-	-	-	-	-	-	-	-	-
	Heavy equipment rental	-	5,842	_	-	-	-	2,040	876	6,719	-	2,707	6,719	-	_	_	_	_	-	_	_
	Plant energy budget	-		-	_	_	-	315	47	362	-	362	-	-	-	_	-	_	-	-	_
	NRC ISFSI Fees	-	-	-	-	-	-	356	36	391	-	391	-	-	-	-	-	-	-	-	-
	Emergency Planning Fees	-	-	-	-	-	-	257	26	283	-	283	-	-	-	-	-	-	-	-	-
3b.4.7 F	Fixed Overhead	-	-	-	-	-	-	1,122	168	1,290	429	860	-	-	-	-	-	-	-	-	-
	SFSI Operating Costs	-	-	-	-	-	-	194	29	223	-	223	-	-	-	-	-	-	-	-	-
	Railroad Track Maintenance	-	-	-	-	-	-	543	81	624	249	375	-	-	-	-	-	-	-	-	-
	Security Staff Cost	-	-	-	-	-	-	25,319	3,798	29,117	0	8,589	20,527	-	-	-	-	-	-	-	375,152
	OOC Staff Cost	-	-	-	-	-	-	11,729	1,759	13,489	-	-	13,489	-	-	-	-	-	-	-	122,646
	Utility Staff Cost	-	-	-	-	-	-	7,148	1,072	8,220	-	2,129	6,091	-	-	-	-	-	-	-	101,904
3b.4 S	Subtotal Period 3b Period-Dependent Costs	-	5,842	-	-	-	-	50,745	8,269	64,857	2,020	16,010	46,826	-	-	-	-	-	-	-	599,702
3b.0 Т	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 3	c - Fuel Storage Operations/Shipping																				
Period 3c Di	irect Decommissioning Activities																				
	ollateral Costs																				
	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	-	-	-	-	-	-	-	-	-
	eriod-Dependent Costs																				
	nsurance	-	-	-	-	-	-	65,480	6,548	72,028	-	72,028	-	-	-	-	-	-	-	-	-
	Property taxes	-	-	-	-	-	-	84,564	8,456	93,020	-	93,020	-	-	-	-	-	-	-	-	-
	NRC ISFSI Fees	-	-	-	-	-	-	20,571	2,057	22,628	-	22,628	-	-	-	-	-	-	-	-	-
	Emergency Planning Fees	-	-	-	-	-	-	13,803	1,380	15,183	-	15,183	-	-	-	-	-	-	-	-	-
	Fixed Overhead	-	-	-	-	-	-	20,053	3,008	23,061	-	23,061	-	-	-	-	-	-	-	-	-
	SFSI Operating Costs	-	-	-	-	-	-	10,420	1,563	11,983	-	11,983	-	-	-	-	-	-	-	-	-
	Railroad Track Maintenance	-	-	-	-	=	=	11,641 400,396	1,746	13,387 460,455	-	13,387	-	-	-	-	-	-	-	-	E 094 554
	Security Staff Cost DOC Staff Cost	-	-	-	-	-	-		60,059 4,281	460,455 32,822	-	460,455 32,822	-	-	-	-	-	-	-	-	5,034,774 193,645
	Utility Staff Cost	-	-	-	-	-	-	28,541 177,875	4,281 26,681	32,822 204,556	-	32,822 204,556	-	-	-	-	-	-	-	-	2,565,798
	Subtotal Period 3c Period-Dependent Costs	-	-	-	-	-	-	833,343	115,781	949,123	-	949,123	-	-	-	-	-	-	-	-	7,794,217
3с.0 Т	FOTAL PERIOD 3c COST	-	-	-	-	-	-	1,455,078	209,041	1,664,118	-	1,664,118	-	-	-	-	-	-	-	-	7,794,217
PERIOD 3	d - GTCC shipping																				
	irect Decommissioning Activities																				
	-																				
	am Supply System Removal Vessel & Internals GTCC Disposal	_	_	1,083		_	4,313	-	918	6,314	6,314	_	_	_	_	_	_	1,160	225,765	_	_
	Fotals	-	-	1,083		-	4,313	-	918	6,314	6,314	-	-	-	-	-	-	1,160		-	-
	Subtotal Period 3d Activity Costs	-	-	1,083		-	4,313	-	918	6,314	6,314	-	-	-	-	-	-	1,160		-	-
Period 3d Co	ollateral Costs																				
	Spent Fuel Capital and Transfer	-	-	-	-	-	-	28	4	32	-	32	-	-	-	-	-	-	-	-	-
	Subtotal Period 3d Collateral Costs	-	-	_	_	-	-	28	4	32	-	32	-	-	_	_	_	_	-	-	-
									•			32									

Period 3d Period-Dependent Costs

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Table E

Monticello Nuclear Generating Plant

DECON Decommissioning Cost Estimate with 100 Years of Spent Fuel Storage

(Thousands of 2020 Dollars)

						Off-Site	LLRW				NRC	Spent Fuel	Site	Processed		Rurial	Volumes		Burial /		Utility and
Activity		Decon		Packaging		Processing	Disposal	Other	Total	Total	Lic. Term.	Management	Restoration	Volume	Class A	Class B	Class C	GTCC	Processed	Craft	Contractor
Index	Activity Description	Cost	Cost	Costs	Costs	Costs	Costs	Costs	Contingency	Costs	Costs	Costs	Costs	Cu. Feet	Cu. Feet	Cu. Feet	Cu. Feet	Cu. Feet	Wt., Lbs.	Manhours	Manhours
3d.4.1 Insurance		-	-	-	-	-	-	27	3	30	30	-	-	-	-	-	-	-	-	-	-
3d.4.2 Property taxes		-	-	-	-	-	-	35	3	38 9	38	- 9	-	-	-	-	-	-	-	-	-
3d.4.4 NRC ISFSI Fees 3d.4.5 Emergency Plant		-	_	-	-	-	-	8	1	6	-	9	-	-	-	-	-	-	-	-	-
3d.4.6 Fixed Overhead	ming rees	-	-	-	-	=	-	8	1	10	10	-	-	-	-	-	-	-	-	-	-
3d.4.7 Railroad Track N		-	-	-	-	-	-	5	1	6	6	-	-	-	-	-	-	-	-	-	-
3d.4.8 Security Staff Co 3d.4.9 Utility Staff Cost		-	-	-	-	-	-	165 39	25 6	190 45	190 45	-	-	-	-	-	-	-	-	-	2,074 539
	t 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 Decor	ntamination																				
Period 3e Direct Decommiss	sioning Activities																				
Period 3e Additional Costs																					
3e.2.1 License Termina 3e.2 Subtotal Period S	tion ISFSI 3e Additional Costs	-	0	3	33 33	-	283 283	2,223 2,223	636 636	3,178 3,178	3,178 3,178	-	-	-	848 848	-	-	-	131,507 131,507	11,351 11,351	
Period 3e Period-Dependent	t Costs							118	00	148	148										
3e.4.1 Insurance 3e.4.2 Property taxes		-	-	-	-	-	-	118 249	30 62	312	148 312	-	-	-	-	-	-	-	-	-	-
3e.4.3 Plant energy bud	dget	-	-	-	-	-	-	12	3	15	15	-	_	-	_	-	-	-	-	-	_
3e.4.4 Fixed Overhead		-	-	-	-	-	-	71	18	89	89	-	-	-	-	-	-	-	-	-	-
3e.4.5 Railroad Track N 3e.4.6 Security Staff Co		-	-	-	-	-	-	41 352	10 88	52 440	52 440	-	-	-	-	-	-	-	-		4,999
3e.4.7 Utility Staff Cost		-	-	-	-	-	-	261	65	326	326	-	-	-	-	-	-	-	-	-	3,792
	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 R	Restoration																				
Period 3f Direct Decommissi	ioning Activities																				
Period 3f Additional Costs																					
	Site Restoration of ISFSI 3f Additional Costs	-	1,864 1,864	-	-	-	-	293 293	324 324	2,480 2,480	-	-	2,480 2,480	-	-	-	-	-	-	8,713 8,713	
	51 Additional Costs	-	1,004	-	-	-	-	293	324	2,460	-	-	2,400	-	-	-	-	-	-	0,715	160
Period 3f Collateral Costs 3f.3.1 Small tool allows	ance	_	13	_	_	_	_	_	2	15	_	_	15	-	-	_	_	_	_	_	_
	3f Collateral Costs	-	13	-	-	-	-	-	2		-	-	15	-	-	-	-	-	-	-	•
Period 3f Period-Dependent	Costs																				
3f.4.2 Property taxes		-	-	-	-	-	-	126	13	138	-	-	138	-	-	-	-	-	-	-	-
3f.4.3 Heavy equipmen 3f.4.4 Plant energy bud		-	117	-	-	-	-	- 6	17 1	134 7	-	-	134	-	-	-	-	-	-	-	-
3f.4.5 Fixed Overhead		-	-	-	-	-	-	36	5	41	-	-	41	-	-	-	-	-	-	-	-
3f.4.6 Railroad Track M	Maintenance	-	-	-	-	-	-	21	3	24	-	-	24	-	-	-	-	-	-	-	-
3f.4.7 Security Staff Co		-	-	-	-	÷	-	177	27	204	=	=	204	-	-	-	-	-	-	-	2,520
3f.4.8 Utility Staff Cost 3f.4 Subtotal Period 3	t 3f Period-Dependent Costs	-	117	-	-	-	-	109 475	16 82	126 674	-	-	126 674	-	-	-	-	-	-	-	1,564 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 DECOME	MISSION	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

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 Processed
 Burial Volumes
 Burial /

 Volume
 Class A
 Class B
 Class C
 GTCC
 Processed

 Cu. Feet
 Cu. Feet
 Cu. Feet
 Cu. Feet
 Cu. Feet
 Wt., Lbs.

Xcel Energy

Monticello Nuclear Generating Plant Decommissioning Cost Analysis

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Craft

Utility and Contractor Manhours

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

Total

Total

NRC Spent Fuel
Lic. Term. Management
Costs Costs

Restoration

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	
TOTAL COST TO	O DECOMMISSION WITH 16.19% CONTINGEN	CY:			\$2,725,392	thousands of	2020 dollars		7
	CENSE TERMINATION COST IS 28.44% OR:				. ,,				
					\$776,400				
SPENT FUEL M	ANAGEMENT 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-LE	VEL RADIOACTIVE WASTE VOLUME BURIEI	(EXCLUDING	GTCC):		200,155	Cubic Feet			
TOTAL GREATE	ER THAN CLASS C RADWASTE VOLUME GEN	ERATED:			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

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Xcel Energy

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Monticello Nuclear Generating Plant Decommissioning Cost Analysis – 70 Year Lifetime Document X01-1775-003, Rev. 0 Appendix F, Page 1 of 11

APPENDIX F

DETAILED COST ANALYSIS

SCENARIO 4: DECON with 200 Year DFS

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Table F

Monticello Nuclear Generating Plant

DECON Decommissioning Cost Estimate with 200 Years of Spent Fuel Storage

(Thousands of 2020 Dollars)

			_		_	Off-Site	LLRW				NRC	Spent Fuel	Site	Processed			Volumes		Burial /		Utility and
Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Processing Costs	Disposal Costs	Other Costs	Total Contingency	Total Costs	Lic. Term. Costs	Management Costs	Restoration Costs	Volume Cu. Feet	Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet	Processed Wt., Lbs.	Craft Manhours	Contractor Manhours
PERIOD	la - Shutdown through Transition																				_
	Direct Decommissioning Activities																				
1a.1.1 1a.1.2	Prepare preliminary decommissioning cost Notification of Cessation of Operations	-	-	-	-	-	-	167	25	192 a	192	-	-	-	-	-	-	-	-	-	1,300
1a.1.3	Remove fuel & source material									n/a											
1a.1.4 1a.1.5	Notification of Permanent Defueling Deactivate plant systems & process waste									a 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 1a.1.9	Perform detailed rad survey Estimate by-product inventory							129	19	a 148	148										1.000
1a.1.9 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 1a.1.13	Define major work sequence Perform SER and EA	-	-	-	-	-	•	964 398	145 60	1,108 458	1,108 458	-	-	-	•	-	-	-	-	-	7,500 3,100
1a.1.13	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
	specifications Plant & temporary facilities							632	95	727	654		73								4,920
	Plant systems	-	-	-	-	-	-	536	80 80	616	554	-	62	-	-		-	-	-	-	4,920
1a.1.17.3	NSSS Decontamination Flush	-	-	-	-	-	-	64	10	74	74	-	-	-	-	-	-	-	-	-	500
	Reactor internals	-	-	-	-	-	-	912	137	1,049	1,049	-	-	-	-	-	-	-	-	-	7,100
	Reactor vessel Sacrificial shield	-	-	-	-	-		835 64	125 10	961 74	961 74	-	-	-		-	-	-	-	-	6,500 500
	Moisture separators/reheaters	-	-	-	-	-	-	129	19	148	148	-	-	-	-	-	-	-	-	-	1,000
	Reinforced concrete	-	-	-	-	-	-	206	31	236	118	-	118	-	-	-	-	-	-	-	1,600
	Main Turbine O Main Condensers	-	-	-	-	-		268 268	40 40	309 309	309 309	-	-	-		-	-	-	-	-	2,088 2,088
	1 Pressure suppression structure	-	-	-	-	-	-	257	39	296	296	-	-	-	-	-	-	-	-	-	2,000
	2 Drywell	-	-	-	-	-	-	206	31	236	236	-	-	-	-	-	-	-	-	-	1,600
	3 Plant structures & buildings 4 Waste management	-	-	-	-	-	-	401 591	60 89	461 680	231 680	-	231	-	-	-	-	-	-	-	3,120 4,600
	5 Facility & site closeout	-	-	-	-	-	-	116	17	133	67	-	67	-	-	-	-	-	-	-	900
1a.1.17	Total	-	-	-	-	-	-	5,486	823	6,308	5,759	-	550	-	-	-	-	-	-	-	42,683
	& Site Preparations							200													2.400
1a.1.18 1a.1.19	Prepare dismantling sequence Plant prep. & temp. svces	-	-	-	-	-		308 3,500	46 525	355 $4,025$	355 $4,025$	-	-	-		-	-	-	-	-	2,400
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	-	-	-	-	-	-	-	-	-	1 000
1a.1.22 1a.1	Procure casks/liners & containers Subtotal Period 1a Activity Costs	-	-	-	-	-	-	158 16,569	24 2,485	182 19,054	182 18,505	-	550	-	-	-	-	-		-	1,230 83,013
								-,	, 22	-,	-,										
Period 1a 1a.3.1	Collateral Costs 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-Dependent Costs							2 22-	200	2 - 2 - 2	0.50										
1a.4.1 1a.4.2	Insurance Property taxes	-	-	-	-	-	-	2,328 3,570	233 357	2,561 3,927	2,561 3,927	-	-	-	-	-	-	-	-	-	-
1a.4.2 1a.4.3	Health physics supplies	-	614	-	-	-	-	- 5,570	153	767	767	-	-	-	-	-	-	-	-		-
1a.4.4	Heavy equipment rental	-	753	-		-	-	-	113	866	866	-	-	-	-	-	-	-	-	-	-
1a.4.5 1a.4.6	Disposal of DAW generated Plant energy budget	-	-	12	6	-	50	1,817	15 272	83 2,089	83 2,089	-	-	-	610	-	-	-	12,190	20	-
1a.4.6 1a.4.7	NRC Fees	-	-	-		-	-	1,817	114	1,251	2,089 1,251	-	-	-	-		-	-	-		-
1a.4.8	Emergency Planning Fees	-	-	-		-	-	3,428	343	3,770	-	3,770	-	-	-	-	-	-	-		-
1a.4.9	Fixed Overhead Spent Fuel Pool O&M	-	-	-	-	-	-	2,616 845	392 127	3,009 971	3,009	971	-	-	-	-	-	-	-	-	-
1a.4.10 1a.4.11	ISFSI Operating Costs	-	-	-		-	-	845 112	127	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 1a.4	Utility Staff Cost Subtotal Period 1a Period-Dependent Costs	=	1,367	12	- e	-	50	27,285 59,634	4,093 8,703	31,378 69,772	31,378 64,902	4,870	-	-	610	-	-	-	12,190	20	422,240 667,680
	croa ra r croa Dependent Costo		1,001	12	U		50	50,004	0,100	00,114	34,002	4,010			010				12,100	20	301,000

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Table F

Monticello Nuclear Generating Plant

DECON Decommissioning Cost Estimate with 200 Years of Spent Fuel Storage

(Thousands of 2020 Dollars)

140 1																						
Mary	Activit	V.	Dagar	Ramaval	Pagkagir -	Transport			Othon	Total	Total					Class A			GTCC		Croft	
Mary		Activity Description									Costs	Costs								Wt., Lbs.		Manhours
Part	1a.0		-			6	-								-		-	-	-			750,693
Secondary Seco	18.0	TOTAL PERIOD 18 COST	-	1,367	12	6	-	50	88,295	12,958	102,689	94,783	7,357	550	-	610	-	-	-	12,190	20	750,693
New Property	PERIOD	O 1b - Decommissioning Preparations																				
March Marc	Period 1b	b Direct Decommissioning Activities																				
1.1. 1.1.	Detailed	Work Procedures																				
14.1.1 Segretarian segretaria segretari	1b.1.1.1	Plant systems	-	-	-	-	-	-					-	70	-	-	-	-	-	-	-	
18.1.1 Seminar incoming constant on the content of the content o	1b.1.1.2		-	-	-	-	-	-					-	-	-	-	-	-	-	-	-	
19.15. 19.15. 19.25. 19			-	-	-	-	-	-					-	150	-	-	-	-	-	-	-	
13.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.			-	-	-	-	-	-					-	150	-	-	-		-	-		
18.1. I general promotements			-	-	-	-	-	-					-	-	-	-	-	-	-	-	-	
13.1.13 Succious Condition 1.	1b.1.1.7		-	-	-	-	-	-					-	-	-	-	-	-	-	-	-	
13.1.10 Substitution 1.1.10 Substitution	1b.1.1.8	Reactor vessel	-	-	-	-	-	-		70			-	-	-	-	-	-	-	-	-	
18.1.1 Marilane Gossele			-	-	-	-	-	-					-	89	-	-	-	-	-	-	-	
16.1.1.1 Main Trubber 16.1.2 Main Trubber 16.1			-	-	-	-	-	-					-	-	-	-	-	-	-	-	-	
18.1.1 18.			-	-	-	-	-	-					-	74	-	-	-	-	-	-	-	
11.1.1.1 Missian sugaration of relations of the properties of the			-	-	-	-	-	-					-	-	-	-		-	-	-	-	
18.1.1 Blankers hilling 18.1.1			-	-	-	-	=	-					÷	-	-	-	-	-	-	-	-	
15.1 Total			-	-	-	-	-	-	351	53	403	363	-	40	-	-	-	-	-	-	-	2,730
1.			-	-	-	-	-	-					-		-	-	-	-	-	-		
18. Subtaced Proceed In Authority Conteres 18. Subtaced Proceed In Authority Conteres 18. Super In Marked Proceed In Authority Contered 18. Super In Marked	1b.1.1	Total	-	-	-	-	-	-	4,336	650	4,987	4,524	-	463	-	-	-	-	-	-	-	33,741
18. Subtaced Proceed In Authority Conteres 18. Subtaced Proceed In Authority Conteres 18. Super In Marked Proceed In Authority Contered 18. Super In Marked	1h 1 9	Dogon NGSS	296							1/18	444	444									1.067	
Note 11 Austriant Rom 18-22 1-22					-	-	-	-						463	-	-		-	-	-		33 741
1.1 1.2	10.1	Subtotal Forton 15 Houvily Costs	200						1,000		0,101	1,000		100							1,001	55,111
1.0.2 Sir Chanesteration	Period 1b	b Additional Costs																				
18-28 Morel of KUCK Warter 28 28 29 14 18 18 18 28 29 14 18 18 18 28 29 14 18 18 18 28 29 14 18 18 18 18 18 18 18	1b.2.1		-	-	-	-	-	-					-	-	-	-	-	-	-			-
18.2 Skolar Parcial Multifrance Care 18.3 Skolar			-	-	-									-			-	-	-			
Principle			-	-										-			-	-	-			
18.3.1 Decone equipment 1.05	10.2	Subtotal Feriod 16 Additional Costs	-	-	20	29	14	-	18,605	3,009	22,369	22,369	-	-	45	-	-	-	-	5,255	50,661	10,852
18.3 OC staff relocation expenses	Period 1b	b Collateral Costs																				
18.3 Process decommissioning water wastes 38 25 45 192 53 283	1b.3.1	Decon equipment	1,055	-	-	-	-	-	-				-	-	-	-	-	-	-	-	-	-
18.4 Process decommissioning themical flush waste	1b.3.2		-	-	-	-	-		1,264				-	-	-	-	-	-	-			-
18.36 Saul tool allowance							-						-	-	-	233	- 001	-	-			-
18.36 Spee tuting equipment 1.200 1.200 1.200 1.300 1.380			1		24	: 11	-						-	-	-	-	231	-	-	24,599	43	-
18.5 18.5 26.5 26.5 27.5			-	_	-	-	-	-					-	-	-	-	-	-	-	-	-	-
18.3 Specific and Severage 1.5	1b.3.7		2,104		-	-	-	-	-				-	-	-	-	_	_	_	-	-	-
18-3 Substal Period lb Collateral Costs	1b.3.8	Spent Fuel Capital and Transfer			-	-	-	-				-	3,153	-	-	-	-	-	-	-	-	-
Period Period-Dependent Cost			-		-	-	-	-						-	-	-	-	-	-	-	-	-
1b.1 1 1b.2 1b.2 1b.2 1b.3 1b.4 1b.4 1b.4 1b.2 1b.4	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	-
1b.1 1 1b.2 1b.2 1b.2 1b.3 1b.4 1b.4 1b.4 1b.2 1b.4	Period 1b	b Period-Dependent Costs																				
1h.4 Property taxes	1b.4.1	Decon supplies	39	-	-	-	-	-					-	-	-	-	-	-	-	-	-	-
1b.4.4 Health physics supplies	1b.4.2		-	-	-	-	-	-					-	-	-	-	-	-	-	-	-	-
1h.4 6 Heavy equipment rental	1b.4.3		-	-	-	-	-	-	1,710				-	-	-	-	-	-	-	-	-	-
1b.4.6 Disposal of DAW generated			-		-	-	-	-	-				-	-	-	-	-	-	-	-	-	-
1. 1	1b.4.6		-	- -	7	4	-	29					-	-	-	356	-		-	7.122	12	-
1b.4.8 NRC Fees - <	1b.4.7		-	-	- '		=	-					÷	-	-	-	-	-	-	-,:22	- 12	-
1b.4.10 Fixed Overhead 1b.4.11 Spent Fuel Pool O&M 1	1b.4.8	NRC Fees	-	-	-	-	-	-	323	32	355		-	-	-	-	-	-	-	-	-	-
1b.4.11 Spent Fuel Pool O&M 1b.4.12 ISFSI Operating Costs 1b.4.13 Railroad Track Maintenance 1b.4.13 Railroad Track Maintenance 1b.4.14 Security Staff Cost 1b.4.15 Security Staff Cost 1b.4.16 Security Staff Cost 1b.4.17 Security Staff Cost 1b.4.18 Security Staff Cost 1b.4.19 Security Staff Cost 1b.4.10 DOC Staff Cost 1b.4.10 Utility Staff Cost 1b.4.11 Substaff Cost 1b.4.12 Security Staff Cost 1b.4.13 Security Staff Cost 1b.4.14 Security Staff Cost 1b.4.15 DOC Staff Cost 1b.4.16 Utility Staff Cost 1b.4.16 Utility Staff Cost 1b.4.17 Substaff Cost 1b.4.18 Security Staff Cost 1b.4.19 Substaff Cost 1b.4.10 Staff Cost 1b.4.10 Substaff Cost 1b.4.10 Staff Cost 1b.4.11 Staff Cost 1b.4.12 Staff Cost 1b.4.13 Staff Cost 1b.4.14 Substaff Cost 1b.4.15 Staff Cost 1b.4.16 Staff Cos	1b.4.9		-	-	-	-	-	-					1,557	-	-	-	-	-	-	-	-	-
1b.4.12 ISFSI Operating Costs			-	-	-	-	-	-					404	-	-	-	-	-	-	-	-	-
1b.4.13 Railroad Track Maintenance			-	-	-	-	-	-						-	-	-	-	-	-	-	-	-
1b.4.14 Security Staff Cost			-	-	-	-	-	-						-	-	-	-		-	-	-	-
1b.4.15 DOC Staff Cost	1b.4.14		-	-	-	-	-	-						-	-	-	-	-	-	-	-	122,384
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 12 397,225 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	1b.4.15	DOC Staff Cost	-	-	-	-	-	-	5,846	877	6,723	6,723	-	-	-	-	-	-	-	-	-	63,266
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	1b.4.16		-	-	-	-	-						-	-	-	-	-	-	-	-		
	1b.4	Subtotal Period 1b Period-Dependent Costs	39	719	7	4	ē	29	35,956	5,323	42,078	39,972	2,106	-	-	356	-	-	-	7,122	12	397,229
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	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	O 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

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Table F

Monticello Nuclear Generating Plant

DECON Decommissioning Cost Estimate with 200 Years of Spent Fuel Storage

(Thousands of 2020 Dollars)

						\	io asamas .	of 2020 Dollar	/											
Activity Index Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Class A Cu. Feet	Class B	Volumes 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 2a.1.1.2 Recirculation Pumps & Motors 2a.1.1.3 CRDMs & NIs Removal 2a.1.1.4 Reactor Vessel Internals 2a.1.1.5 Reactor Vessel 2a.1.1 Totals	111 40 194 244 113 702	94 63 1,020 6,722 9,121 17,020	27 16 415 12,852 2,672 15,982	50 51 135 2,696 1,167 4,099	42 - - - 42	528 539 1,130 29,845 5,861 37,903	364 364 728	221 186 696 24,027 10,842 35,973	1,031 938 3,591 76,749 30,140 112,449	1,031 938 3,591 76,749 30,140 112,449	- - - - -	- - - - -	96 - - 96	3,741 1,252 16,169	1,481 1,481	1,178 1,178	- - - - -	99,742 112,200 213,700 343,150 1,105,210 1,874,002	2,905 1,563 17,768 30,515 30,515 83,267	1,379 1,379 2,758
Removal of Major Equipment 2a.1.2 Main Turbine/Generator 2a.1.3 Main Condensers	:	385 1,347	1,356 360	521 194	6,139 3,225	439 244	-	1,341 947	10,182 6,317	10,182 6,317	-		24,835 17,396		-	- -		1,577,959 828,955	5,438 18,831	-
Cascading Costs from Clean Building Demolition 2a.1.4.1 Reactor Building 2a.1.4.2 Radwaste 2a.1.4.3 Turbine 2a.1.4 Totals	- - - -	332 25 127 483	- - -	- - - -	- - - -	- - - -	- - - -	50 4 19 72	381 28 146 556	381 28 146 556	- - - -	- - - -	- - - -	- - - -	- - - -	- - - -	- - -	- - - -	2,217 127 1,254 3,598	- - - -
Disposal of Plant Systems 2a.1.5.1 Automatic Press Relief 2a.1.5.2 Chemistry Sampling 2a.1.5.3 Chemistry Sampling - Insulated 2a.1.5.4 Circulating Water - RCA 2a.1.5.5 Combustible Gas Control - Insul - RCA 2a.1.5.6 Combustible Gas Control - RCA 2a.1.5.7 Condensate & Feedwater 2a.1.5.8 Condensate & Feedwater - Insulated 2a.1.5.9 Condensate Storage 2a.1.5.10 Condensate Demin 2a.1.5.11 Control Rod Drive 2a.1.5.12 Control Rod Drive 2a.1.5.13 Core Spray - Insulated 2a.1.5.14 Core Spray - Insulated 2a.1.5.15 Demin Water - RCA 2a.1.5.17 Diesel Oil - RCA 2a.1.5.18 Drywell Atmosphere Cooling - RCA 2a.1.5.19 EDG Emerg Service Water - Insul - RCA 2a.1.5.20 Electrical - Clean 2a.1.5.21 Emergency Service Water - Insul - RCA 2a.1.5.23 GEZIP - RCA 2a.1.5.24 Generator Physical Design - RCA 2a.1.5.26 H2-O2 Control Analyzing 2a.1.5.27 High Pressure Coolant Injection - Insula 2a.1.5.29 Hydrogen Cooling - RCA 2a.1.5.29 Hydrogen Cooling - RCA 2a.1.5.29 Hydrogen Cooling - RCA 2a.1.5.21 High Pressure Coolant Injection - Insula 2a.1.5.23 Hydrogen Seal Oil - RCA 2a.1.5.24 Hydrogen Cooling - RCA 2a.1.5.25 High Pressure Coolant Injection - Insula 2a.1.5.29 Hydrogen Seal Oil - RCA 2a.1.5.30 Hydrogen Seal Oil - RCA 2a.1.5.31 Hydrogen Seal Oil - RCA 2a.1.5.33 Main Condenser 2a.1.5.34 Main Condenser 2a.1.5.35 Main Steam 2a.1.5.38 Miscellaneous 2a.1.5.39 Off Gas Recombiner - Insulated 2a.1.5.39 Off Gas Recombiner - Insulated 2a.1.5.39 Off Gas Recombiner - Insulated 2a.1.5.30 Off		118 27 2 2 207 29 18 987 492 545 726 3 416 6 79 145 15 41 2 2 38 6 6 6 67 219 8 8 7 17 24 225 196 249 1,012 214 43 189 387	7 1 1 0 14 0 14 0 11 183 34 30 0 16 6 20 8 8 0 1 0 0 0 0 0 0 0 0 0 4 12 17 205 18 1 19 19	12 2 0 62 2 3 329 63 51 13 1 2 0 0 5 0 0 1 0 0 0 1 0 0 0 1 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0		70 13 0 2,464 408 339 270 1 190		70 14 1 230 13 12 1,431 343 316 444 2 199 184 82 6 6 17 1 24 0 2 2 9 9 1 4 2 3 3 61 141 1 3 9 10 103 122 173 1,553 180 19 163	410 83 3 1,626 80 81 8,731 2,038 1,840 2,748 9 1,1244 474 36 104 7 7 159 55 52 12 15 15 381 1830 10 177 60 59 644 471 2,038 1,124 1,038 1,124 1,	410 83 3 1,626 80 81 8,731 2,038 1,840 2,748 9 1,1244 4474 366 104 77 159 55 525 12 15 381 830 - 17 60 59 644 712 1,029 9,350 1,029 9,350		15	803 156 - 6,656 2112 285 19,947 4,176 3,346 7,131 19 1,658 4,384 818 85 253 23 548 2 - 137 13 103 311 6 6 972 1,598 140 1,768 1,833 2,148 1,9760 2,530 302 1,795 1,366 1,333 2,148 1,333 2,148 1,366 1,366 1,366 1,667 1,678 1,788 1	37 1 - 7,319 1,207 1,000 795 4 562 521 264 - - - - - - - - - - - - -				45,852 8,681 72 270,307 8,617 11,577 1,275,810 246,693 199,936 340,568 1,009 103,306 211,329 50,149 3,445 10,278 931 22,244 84 - 5,544 512 4,184 1,250 1,080 1,080 52,792 95,733 - 1,600 7,669 5,672 71,810 80,439 125,135 1,354,661 145,208 12,283 12,284 12,284 12,155 1,000	1,656 400 28 2,860 378 245 14,196 6,964 7,618 10,345 41 5,898 1,163 2,033 181 1508 25 550 4 182 281 122 48 67 81 81 966 3,079 118 79 212 304 2,733 3,049 622 2,708 5,385	
2a.1.5.40 On Gas Recombiner - Instanceu 2a.1.5.41 Post Accident Sampling 2a.1.5.42 Post Accident Sampling - Insulated 2a.1.5.43 RHR Service Water - Insulated - RCA 2a.1.5.44 RHR Service Water - RCA 2a.1.5.45 Reactor Feedwater Pump Seal	- - - - -	25 17 83 4 56	1 1 1 3 0 2	1 1 14 0 4	229 9 3 248 6 32	240 11 13 - - 33	- - - -	111 8 60 2 28	1,100 58 43 409 12 155	1,100 58 43 409 12 155	- - - -	- - - -	1,366 53 17 1,485 35 193	33 37 -	- - - -	- - - -	- - - -	4,318 3,116 60,293 1,410 14,009	345 212 1,125 57 773	- - - -

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Table F

Monticello Nuclear Generating Plant

DECON Decommissioning Cost Estimate with 200 Years of Spent Fuel Storage

(Thousands of 2020 Dollars)

							(11)	iousanus (of 2020 Dollar	3)											
						Off-Site	LLRW				NRC	Spent Fuel	Site	Processed		Burial V	Volumes		Burial /		Utility and
Activit		Decon Cost	Removal Cost		Transport Costs	Processing Costs	Disposal	Other	Total	Total	Lic. Term. Costs	Management Costs	Restoration Costs	Volume	Class A Cu. Feet	Class B	Class C	GTCC Cu. Feet	Processed	Craft Manhours	Contractor
Index	Activity Description	Cost	Cost	Costs	Costs	Costs	Costs	Costs	Contingency	Costs	Costs	Costs	Costs	Cu. Feet	Cu. reet	Cu. reet	Cu. Feet	Cu. reet	Wt., Lbs.	Mannours	Manhours
	l of Plant Systems (continued)																				
	6 Residual Heat Removal 7 Residual Heat Removal - Insulated	362 622	252 554	172 61	178 82	1,072 563	2,051 880	-	962 772	5,049 3,535	5,049 3,535	-	-	6,406 3,367	6,012 2,607	-	-	-	647,941 303,087	4,135 10,340	-
	8 Rx Core Isolation Cooling	622	49	2	4	43	26	-	26	150	150	-	-	259	2,607	-	-	-	15,396	691	-
2a.1.5.4		-	107	5	7	48	67	_	52	287	287	_	-	288	198	-	_	-	24,419	1,479	-
2a.1.5.5	0 Rx Recirculation	56	58	6	4	7	65	-	61	258	258	-	-	43	190	-	-	-	14,095	1,580	-
	1 Snubbers	-	169	2	5	63	30	-	60	331	331	-	-	377	90	-	-	-	21,009	2,548	<u>-</u>
2a.1.5.55 2a.1.5.55		-	4 26	0	0 2	4 41	-	-	2 13	9 83	9 83	-	-	$\frac{22}{245}$	-	-	-	-	904 9,969	48 341	-
2a.1.5.5		-	26 7	0	1	21	-	-	5	35	35	-	-	126	-	-	-	-	5,135	98	-
2a.1.5.5		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
	a Collateral Costs						22-				¥.a								24.2.1		
2a.3.1 2a.3.2	Process decommissioning water waste Process decommissioning chemical flush waste	85 5	-	57 216	102 702	-	232 1,619	-	122 534	598 3,077	598 3,077	-	-	-	532 2,093	-	-	-	31,942 223,008	104 392	-
2a.3.2 2a.3.3	Small tool allowance	-	324	210	702	-	1,015	-	49	373	336	-	37	-	2,033	-	-	-	223,008	-	-
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	-
	a Period-Dependent Costs																				
2a.4.1	Decon supplies	112	-	-	-	-	-	-	28	140	140	-	-	-	-	-	-	-	-	-	-
2a.4.2 2a.4.3	Insurance Property taxes	-	-	-	-	-	-	1,019 4,383	102 438	1,121 4,821	1,121 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 2a.4.8	Plant energy budget NRC Fees	-	-	-	-	-	-	2,501 856	375 86	2,876 942	2,876 942	-	-	-	-	-	-	-	-	-	-
2a.4.9	Emergency Planning Fees		-	-	-	-	-	4,115	412	4,527	- 542	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	-	-	-	-	-	-	-	-	<u>-</u>
2a.4.13 2a.4.14	Railroad Track Maintenance Remedial Actions Surveys	-	-	-	-	-	-	181 1,624	$\frac{27}{244}$	208 1,867	208 1,867	-	-	-	-	-	-	-	-	-	-
2a.4.14	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
PERIO	D 2b - Site Decontamination																				
	b Direct Decommissioning Activities																				
Disposa 2b.1.1.1	l of Plant Systems ALARA/Radiological		18	0	1	6	3		6	35	35			35	10				2,060	277	
2b.1.1.1 2b.1.1.2		-	16	0	1	16			7	40	40	-	-	93	-			-	3,765	185	-
2b.1.1.3		-	1	0	0	0	0	-	0	2	2	-	-	2	0	-	-	-	129	17	-
2b.1.1.4		-	445	6	24		30	-	183	1,089	1,089	-	-	2,389	90	-	-	-	102,726	6,325	-
2b.1.1.5		-	2,698	48	218	3,906	-	-	1,298	8,167	8,167	-	-	23,344	-	-	-	-	948,013	37,107	-
	Fire - RCA HVAC Ductwork	-	101 305	7	6 27	103 446	34	-	42 156	253 975	253 975	-	-	614 2,665	100	-	-	-	24,917 114,598	1,324 4,111	-
2b.1.1.8		-	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	-
	0 Heating Boiler - Insulated - RCA	-	3	0	0	4	-	-	1	9	9	-	-	26		-	-	-	1,058	35	-
	1 Liquid Radwaste 2 Makeup Demin - RCA	588	687 103	48 3	63 14	514 246	586	-	703 65	3,188 431	3,188	-	-	3,073	1,728	-	-	-	235,484	17,194	-
	2 Makeup Demin - RCA 3 Non-Essential Diesel Generator - RCA	-	103 27	3 3	14	246 238	-	-	65 45	431 327	431 327	-	-	1,471 1,424	-	-	-	-	59,747 57,832	1,412 395	-
	4 Off Gas Holdup	-	342	21	38	461	214	-	216	1,291	1,291	-	-	2,755	630	-	-	-	152,277	4,769	-
2b.1.1.1	5 Primary Containment	-	455	42	87	1,038	507	-	414	2,543	2,543	-	-	6,201	1,506	-	-	-	347,704	6,454	-
2b.1.1.1	6 Process Radiation Monitors	-	46	2	2	24	18	-	20	111	111	-	-	142	52	-	-	-	9,115	649	-

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Table F

Monticello Nuclear Generating Plant

DECON Decommissioning Cost Estimate with 200 Years of Spent Fuel Storage

(Thousands of 2020 Dollars)

						Off-Site	LLRW				NRC	Spent Fuel	Site	Processed		Ruriol	Volumes		Burial /		Utility and
Activity		Decon	Removal	Packaging	Transport	Processing	Disposal	Other	Total	Total	Lic. Term.	Management	Restoration	Volume	Class A	Class B	Class C	GTCC	Processed	Craft	Contractor
Index	Activity Description	Cost	Cost	Costs	Costs	Costs	Costs	Costs	Contingency	Costs	Costs	Costs	Costs	Cu. Feet	Cu. Feet	Cu. Feet	Cu. Feet		Wt., Lbs.	Manhours	Manhours
	f 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	-
	Rx Bldg Closed Clng Water - RCA	-	184	15	66	1,187	-	-	235	1,687	1,687	-	-	7,093	-	-	-	-	288,031	2,489	-
	Rx Component Handling Equip	27	142	18	27	194	279	-	154	840	840	-	-	1,158	829	-	-	-	99,730	2,462	-
	Rx Pressure Vessel	28 172	47 265	6 19	5 16	13 22	78 251	-	$\frac{48}{222}$	$\frac{225}{965}$	225 965	-	-	75 130	230 737	-	-	-	17,816 52,670	1,051 5,736	-
	Rx Water Cleanup Secondary Containment	172	265 124	7	16	170	251 86	-	81	483	483	-	-	1,017	255	-	-	-	57,567	1,763	-
	Service & Seal Water - Insulated - RCA		120	2	11	197	- 00	-	62	392	392	-	-	1,180	200	-		-	47,917	1,765	-
	Service & Seal Water - RCA	-	159	4	17	303	-	-	88	570	570	-	-	1,809	-	-	-	-	73,453	2,016	-
	Service Air Blower - RCA	-	15	0	2	34	-	_	9	62	62	_	-	206	_	-	-	-	8,364	206	-
	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	-
	Wells & Domestic Water	-	10	-	-	-	-	-	1	11	-	-	11	-	-	-	-	-	-	144	-
	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	-
	nation of Site Buildings	E 909	9.009	170	£10	0.044	1 101		4.094	99.049	99.049			10.077	7.014				9 917 670	110 #10	
	Reactor Building Admin	5,202 106	2,903	178 0	516 3	8,044	1,181 15	-	4,924	22,948	22,948	-	-	48,077	7,014 145	-	-	-	2,317,670 6,840	112,518 1.600	-
	HPCI Room	29	28	1	3	20	15 14	-	59 29	189 123	189 123	-	-	118	145 125	_	-	-	10,759	789	-
	Hot Shop	17	4	0	2	- 20	11	-	12	46	46	-	-	- 116	103	-	-	-	4,860	286	-
	LLRW Storage & Shipping	58	24	2	8	5	45	-	48	191	191	_	_	31	433	-	-	-	21,708	1,127	-
	Offgas Stack	372	269	7	23	225	82	-	312	1,289	1,289	-	-	1,343	669	-	-	-	87,045	8,860	-
	Offgas Storage & Compressor	41	17	1	6	4	33	-	34	136	136	-	-	25	316	-	-	-	15,948	785	-
	Radwaste	121	61	3	17	29	96	-	107	435	435	-	-	172	910	-	-	-	49,943	2,503	-
	Radwaste Material Storage Warehouse	64	24	2	9	-	52	-	52	202	202	-	-	-	495	-	-	-	23,400	1,197	-
	Recombiner	27	25	1	5	33	24	-	32	148	148	-	-	199	216	-	-	-	18,405	695	-
2b.1.3.11		705	353	21	104	215	564	-	632	2,594	2,594	-	-	1,283	5,299	-	-	-	303,150	14,443	-
	Turbine Building Addition	58 6,799	21 3,736	1 218	8 704	8,574	$\frac{45}{2,164}$	-	47 6,288	181 28,483	181 28,483	-	-	51,247	434 16,159	-	-	-	20,478 2,880,206	1,087 145,889	-
	Totals	6,799	5,750	210	704	0,974	2,164	-				-	-	51,247	16,159	-	-	-	2,000,200		
	Prepare/submit License Termination Plan Receive NRC approval of termination plan	-	-	-	-	-	-	526	79	605 a	605	-	-	-	-	-	-	-	-	-	4,096
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
	Additional Costs																				
	Operational Equipment	-	-	23	92	1,211	-	-	198	1,524	1,524	-	-	11,760	-	-	-	-	294,000	32	-
	Excavation of Underground Services	-	1,972	-	-	-	-	376	550	2,898	2,898	-	-	-	-	-	-	-	-	12,493	-
	Security Modifications	-	1.070	-	-	1.011	-	8,696	1,304	10,000	10,000	-	-	11.700	-	-	-	-	-	10 505	-
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	-
	Collateral Costs																				
	Process decommissioning water waste	198	-	135	240	-	546	-	285	1,404	1,404	-	-	-	1,253	-	-	-	75,186	244	-
	Process decommissioning chemical flush waste	1	-	43	138	-	319	-	105	607	607	-	-	-	413	-	-	-	43,978	77	-
	Small tool allowance	-	364	-	-	-	-	117 100	55 17 500	418	418	104.550	-	-	-	-	-	-	-	-	-
	Spent Fuel Capital and Transfer Retention and Severance	-	-	-	-	-	-	117,198 6,277	17,580 942	134,778 7,218	7,218	134,778	-	-	-	-	-	-	-	-	-
	Subtotal Period 2b Collateral Costs	199	364	178	378	-	865	123,475	18,966	1,216 $144,425$	9,647	134,778	-	-	1,666	-	-	-	119,165	322	-
Period 2b	Period-Dependent Costs																				
	Decon supplies	1,440	-	-	-	-	-	-	360	1,799	1,799	-	-	-	-	-	-	-	-	-	-
	Insurance	- 1	-	-	-	-	-	742	74	816	816	-	-	-	-	-	-	-	-	-	-
	Property taxes	-	-	-	-	-	-	2,698	270	2,967	2,967	-	-	-	-	-	-	-	-	-	-
	Health physics supplies	-	2,376	-	-	-	-	-	594	2,970	2,970	-	-	-	-	-	-	-	-	-	-
	Heavy equipment rental	-	2,711	-		-	-	-	407	3,117	3,117	-	-	-		-	-	-		-	-
	Disposal of DAW generated	-	-	101	52	-	419	1.405	123	694	694	-	-	-	5,084	-	-	-	101,679	166	-
	Plant energy budget NRC Fees	-	-	-	-	-	-	1,437 623	216 62	1,653 685	1,653 685	-	-	-	-	-	-	-	-	-	-
2b.4.8 2b.4.9	Emergency Planning Fees	-	-	-	-	-	-	623 2,995	62 299	3,294	689	3,294	-	-	-	-	-	-	-	-	-
	Fixed Overhead	-	-	-	-	-	-	2,235	335	2,570	2,570	5,254	-	-	-	-	-	-	-	-	-
	Spent Fuel Pool O&M	_	-	-	_	-	-	891	134	1,024		1,024	-	-	-	-	-	-	-	-	-
	Liquid Radwaste Processing Equipment/Services	-	-	-	-	-	-	224	34	258	258	-	-	-	-	-	-	-	-	-	-
2b.4.13	ISFSI Operating Costs	-	-	-	-	-	-	118	18	136	-	136	-	-	-	-	-	-	-	-	-
	Railroad Track Maintenance	-	-	-	-	-	-	458	69	527	527	-	-	-	-	-	-	-	-	-	-
2b.4.15	Remedial Actions Surveys	•	-	-	-	-	-	1,182	177	1,359	1,359	-	-	-	-	-	-	-	-	-	-

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Table F

Monticello Nuclear Generating Plant

DECON Decommissioning Cost Estimate with 200 Years of Spent Fuel Storage

(Thousands of 2020 Dollars)

						Off-Site	LLRW				NRC	Spent Fuel	Site	Processed		Rurial	Volumes		Burial /		Utility and
Activit	У	Decon	Removal	Packaging	Transport	Processing	Disposal	Other	Total	Total	Lic. Term.	Management	Restoration	Volume	Class A	Class B		GTCC	Processed	Craft	Contractor
Index		Cost	Cost	Costs	Costs	Costs	Costs	Costs	Contingency	Costs	Costs	Costs	Costs	Cu. Feet				Cu. Feet		Manhours	
D . 10																					
2b.4.16	b Period-Dependent Costs (continued) Security Staff Cost							15,925	2.389	18,314	18.314									-	236,949
2b.4.16 2b.4.17	DOC Staff Cost	-	-	-	-	-	-	14,772	2,369	16,988	16,988	-	-	-	-	-	-	-	-	-	160,160
2b.4.17 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	
	•																				
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
PERIOI	D 2d - Decontamination Following Wet Fuel Storage																				
Period 2 2d.1.1	d Direct Decommissioning Activities Remove spent fuel racks	654	58	103	149		2,572		1,017	4,553	4,553				7,653				486,170	906	
2u.1.1	Remove spent ruer racks	054	90	103	149	-	2,812	-	1,017	4,555	4,555	-	-	-	1,000	-	-	-	400,170	300	-
	of Plant Systems																				
2d.1.2.1		-	3	0	1	17	-	-	4	25	25	-	-	103	-	-	-	-	4,184	48	
2d.1.2.2		-	47	1	2	40	3	-	19	112	112	-	-	240	9	-	-	-	10,334	665	
2d.1.2.3		-	297	5	23	411	-	-	140	876	876	-	-	2,457	-	-	-	-	99,783	4,090	
2d.1.2.4		-	11	0	1	10	-	-	4	26	26	-	-	62		-	-	-	2,499	143	
2d.1.2.5		246	428	34	37	197	455	-	382	1,781	1,781	-	-	1,179	1,341	-	-	-	133,939	8,380	
2d.1.2.6		27	41	3	3	11	40	-	36	161	161	-	-	67	117	-	-	-	10,220	848	
2d.1.2.7		-	34	1	3	50	4	-	17	108	108	-	-	296	11	-	-	-	12,733	457	
2d.1.2.8		-	33	0	2	37	-	-	14	87	87	-	-	223	-	-	-	-	9,072	397	
2d.1.2.9		-	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	-
Deconta	mination of Site Buildings																				
2d.1.3.1		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	-
D : 10	14188 10 4																				
2d.2.1	d Additional Costs License Termination Survey Planning							1,458	437	1,896	1,896									-	12,480
2d.2.1	Subtotal Period 2d Additional Costs	-	-	-	-	-	-	1,458	437	1,896	1,896	-	-	-		-			-	-	12,480
								,			,										,
	d Collateral Costs	50			0.0		222		***	¥00	*40				T 0.4				00.000	00	
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	-	-	- 1110	150	-	14	105	105	-	-	-	-	-	-	-	-	1.45	-
2d.3.4 2d.3.5	Decommissioning Equipment Disposition Spent Fuel Capital and Transfer	-	-	130	82	1,112	178	27	237	1,739 32	1,739	32	-	6,000	529	-	-	-	303,608	147	-
2d.3	Subtotal Period 2d Collateral Costs	80	91	210	262	1,112	590	27	4 432	2,805	2,773	32 32	-	6,000	1,282	-			360,400	292	-
24.0	Subtotal I crioù 2d conateral costs	00	01	210	202	1,112	000	2.	402	2,000	2,110	02		0,000	1,202				500,400	202	
	d 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		-	-	-	-	-	-	7,311	1,097	8,408	8,408		-	-	-	-	-	-	-	-	78,356
2d.4.17		-			-	-	-	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

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Table F

Monticello Nuclear Generating Plant

DECON Decommissioning Cost Estimate with 200 Years of Spent Fuel Storage

(Thousands of 2020 Dollars)

						(11)	nousanas	of 2020 Dollar	rs)											
					Off-Site	LLRW				NRC	Spent Fuel	Site	Processed		Burial '	Volumes		Burial /		Utility and
Activity Index Activity Description	Decon	Removal	Packaging				Other	Total	Total	Lic. Term.	Management	Restoration	Volume	Class A	Class B	Class C	GTCC	Processed	Craft	Contractor
•	Cost	Cost	Costs	Costs	Costs	Costs	Costs	Contingency	Costs	Costs	Costs	Costs	Cu. Feet	Cu. Feet	Cu. Feet	Cu. Feet	Cu. Feet	Wt., Lbs.	Manhours	Manhours
PERIOD 2f - License Termination																				
Period 2f Direct Decommissioning Activities 2f.1.1 ORISE confirmatory survey							166	50	216	216										-
2f.1.1 ORISE confirmatory survey 2f.1.2 Terminate license	-	-	-	-	-	-	166	00	216 a	216	-	-	-	-	-	-	-	-	-	-
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	-	-	-	-	-	-	-	-	95,048	6,240
2f.2 Subtotal Period 2f Additional Costs	-	-	-	-	-	-	6,920	2,076	8,995	8,995	-	-	-	-	-	-	-	-	95,048	6,24
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 2f.4.2 Property taxes	-	-	-	-	-	-	530 1,471	53 147	583 1,618	583 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 2f.4.6 NRC Fees	-	-	-	-	-	-	274 426	41 43	315 468	315 468	-	-	-	-	-	-	-	-	-	-
2f.4.7 Emergency Planning Fees	-	-	-	-	-	-	112	11	123	400	123	-	-	-	-	-	-	-	-	-
2f.4.8 Fixed Overhead	-	-	-	-	-	-	1,597	239	1,836	1,836	-	-	-	-	-	-	-	-	-	-
2f.4.9 ISFSI Operating Costs	-	-	-	-	-	-	84	13		-	97	-	-	-	-	-	-	-	-	-
2f.4.10 Railroad Track Maintenance 2f.4.11 Security Staff Cost	-	-	-	-	-	-	94 10,999	14 1,650		108 8,918	3,732	-	-	-	-	-	-	-	-	162,98
2f.4.11 Security Staff Cost 2f.4.12 DOC Staff Cost	-	-	-	-	-	-	5,393	809		6,201	5,752	-	-		-		-	-	-	57,20
2f.4.13 Utility Staff Cost	=	-	-	-	-	-	5,762	864	6,626	5,738	888	-	-	-	-	-	-	-	-	80,70
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 3b.1.1.3 Discharge Retention Basin	-	10 4	-	-	-	-	-	1	11 5	-	-	11 5	-	-	-	-	-	-	50 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 3b.1.1.7 LLRW Storage & Shipping	-	2 83	-	-	-	-	-	0 12	2 95	-	-	2 95	-	-	-	-	-	-	19 662	-
3b.1.1.8 MSIV	-	4	-		-	-		12	4	-	-	4	-					-	42	-
3b.1.1.9 Misc Structures 2017	-	1,410	-	-	-	-	-	212		-	-	1,622	-	-	-	-	-	-	13,042	-
3b.1.1.10 Offgas Stack	-	108	-	-	-	-	-	16		-	-	124	-	-	-	-	-	-	544	-
3b.1.1.11 Offgas Storage & Compressor 3b.1.1.12 Radwaste	-	39 228	-	-	-	-		6 34	$\frac{45}{262}$	-	-	45 262	-	-	-		-	-	199 1,220	-
3b.1.1.13 Recombiner	- -	128	-	-	=	-	-	19		-	-	147	-	-	-	-	-	-	713	-
3b.1.1.14 Security Barrier	-	186	-	-	-	-	-	28	214	-	-	214	-	-	-	-	-	-	933	-
3b.1.1.15 Structures Greater than 3' Below Grade 3b.1.1.16 Tank Farm	-	2,461	-	-	-	-	-	369 1	2,830	-	-	2,830	-	-	-	-	-	-	12,649 21	-
3b.1.1.17 Turbine	-	1,259	-	-	-	-	-	189		-	-	1,448	-	-	-	-	-	-	13,036	-
3b.1.1.18 Turbine Building Addition	-	55	-	-	-	-	-	8	63	-	-	63	-	-	-	-	-	-	618	-
3b.1.1.19 Turbine Pedestal	-	182 8,169	-	-	-	-	-	27	209 9,394	-	-	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	-	-	-	-	-	-	-	-	-	1,560
3b.1 Subtotal Period 3b Activity Costs	-	9,065	-	-	-	-	200	1,390	10,655	231	-	10,425	-	-	-	-	-	-	60,726	1,560

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Table F

Monticello Nuclear Generating Plant

DECON Decommissioning Cost Estimate with 200 Years of Spent Fuel Storage

(Thousands of 2020 Dollars)

							(11	10 4041140	oi 2020 Dollai	,											
Activit		Decon	Removal		g Transport	Off-Site Processing		Other	Total	Total	NRC Lic. Term.	Spent Fuel Management	Site Restoration	Processed Volume	Class A	Class B	Volumes Class C		Burial / Processed	Craft	Utility and Contractor
Index	Activity Description	Cost	Cost	Costs	Costs	Costs	Costs	Costs	Contingency	Costs	Costs	Costs	Costs	Cu. Feet	Cu. Feet	Cu. Feet	Cu. Feet	Cu. Feet	Wt., Lbs.	Manhours	Manhours
Period 3l	b 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 3b.2.4	Construction Debris Backfill	-	5,583	-	-	-	-	1,170	176 837	1,346 6,421	-	-	1,346 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 31	b Collateral Costs																				
3b.3.1	Small tool allowance	-	110	-	-	-	-	-	17	127	-	-	127	-	-	-	-	-	-	-	-
3b.3.2	Spent Fuel Capital and Transfer	-	-	-	-	-	-	109	16		-	125		-	-	-	-	-	-	-	-
3b.3	Subtotal Period 3b Collateral Costs	-	110	-	-	-	-	109	33	252	=	125	127	-	-	-	-	-	-	-	-
Period 3l	b Period-Dependent Costs																				
3b.4.1	Insurance	-	-	-	-	-	-	1,220	122	1,342	1,342	-	-	-	-	-	-	-	-	-	-
3b.4.2 3b.4.3	Property taxes	-	5,842	-	-	-	-	2,543	254 876	2,797 6,719	-	2,797	6,719	-	-	-	-	-	-	-	-
3b.4.4	Heavy equipment rental Plant energy budget	-	5,642	-	-	-	-	315	47	362	-	362	6,719	-	-		-		-	-	-
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 3b.4.9	ISFSI Operating Costs Railroad Track Maintenance	-	-	-	-	-	-	194 543	29 81	223 624	249	223 375	-	-	-	-	-	-	-	-	-
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
PERIOI	O 3c - Fuel Storage Operations/Shipping																				
Period 3	c Direct Decommissioning Activities																				
Period 3	c Collateral Costs																				
3c.3.1	Spent Fuel Capital and Transfer	-	-	-	-	-	-	1,585,563		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 3	c 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 3c.4.4	Plant energy budget NRC ISFSI Fees	-	-	-	-	-	-	41,099	4,110	45,209	-	45,209	-	-	-	-	-	-	-	-	-
3c.4.4	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 3c.4.9	Railroad Track Maintenance Security Staff Cost	-	-	-	-	-	-	24,154 830,756	3,623 124,613	27,777 955,369	-	27,777 955,369	-	-	-	-	-	-	-	-	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
PERIOI	O 3d - GTCC shipping																				
Period 3	d Direct Decommissioning Activities																				
	Steam Supply System Removal				_																
3d.1.1.1 3d.1.1	Vessel & Internals GTCC Disposal Totals	-	-	1,083 1,083		-	4,313 4,313	-	918 918	6,314 6,314	6,314 6,314	-	-	-	-	-	-	1,160 1,160			-
3d.1.1	Subtotal Period 3d Activity Costs	-	-	1,088		-	4,313	-	918 918	6,314	6,314	-	-	-	-	-	-	1,160			-
	•			,						•	•								,		
Period 3e 3d.3.1	d Collateral Costs Spent Fuel Capital and Transfer						-	28	4	32	_	32	_		_			_	_	-	
3d.3	Subtotal Period 3d Collateral Costs	-	-	-	-	-	-	28	4	32	-	32	-	-	-	-	-	-	-	-	-

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Table F

Monticello Nuclear Generating Plant

DECON Decommissioning Cost Estimate with 200 Years of Spent Fuel Storage

(Thousands of 2020 Dollars)

							,														
						Off-Site	LLRW				NRC	Spent Fuel	Site	Processed	-		Volumes		Burial /		Utility and
Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Processing Costs	Disposal Costs	Other Costs	Total Contingency	Total Costs	Lic. Term. Costs	Management Costs	Restoration Costs	Volume Cu. Feet	Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet	Processed Wt., Lbs.	Craft Manhours	Contractor Manhours
-																			,		
	eriod-Dependent Costs Insurance							27	3	30	30										
	Property taxes	-	-	-	-	-	-	35	3	38	38		-	-	-	-	-	-	-	-	-
	Plant energy budget					_		-		-	-										
	NRC ISFSI Fees	_	_	_	_	_	_	8	1	9	_	9	_	_	_	_	_	_	_	_	_
	Emergency Planning Fees	-	-	-	-	-	-	6	1	6	-	6	-	-	-	-	-	-	-	-	-
	Fixed Overhead	-	-	-	-	-	-	8	1	10	10	-	-	-	-	-	-	-	-	-	-
3d.4.7 I	Railroad Track Maintenance	-	-	-	-	-	-	5	1	6	6	-	-	-	-	-	-	-	-	-	-
	Security Staff Cost	-	-	-	-	-	-	165	25	190	190	-	-	-	-	-	-	-	-	-	2,074
	Utility Staff Cost	-	-	-	-	-	-	39	6		45	-	-	-	-	-	-	-	-	-	539
3d.4 S	Subtotal Period 3d Period-Dependent Costs	-	-	-	-	-	-	293	40	333	318	15	-	-	-	-	-	-	-	-	2,613
3d.0	ГОТАL PERIOD 3d COST	-	-	1,083	-	-	4,313	320	962	6,678	6,632	47	-	-	-	-	-	1,160	225,765	-	2,613
PERIOD 3	e - ISFSI Decontamination																				
Period 3e D	irect Decommissioning Activities																				
	dditional Costs																				
	License Termination ISFSI	-	0	3	33		283		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
	eriod-Dependent Costs																				
	Insurance	-	-	-	-	-	-	118	30	148	148	-	-	-	-	-	-	-	-	-	-
	Property taxes	-	-	-	-	-	-	249	62		312	-	-	-	-	-	-	-	-	-	-
	Plant energy budget	-	-	-	-	-	-	12	3		15	-	-	-	-	-	-	-	-	-	-
	Fixed Overhead	-	-	-	-	-	-	71	18		89	-	-	-	-	-	-	-	-	-	-
	Railroad Track Maintenance	-	-	-	-	-	-	41 352	10 88	52	52 440	-	-	-	-	-	-	-	-	-	4,999
	Security Staff Cost Utility Staff Cost	-	-	-	-	-	-	352 261	65	440 326	326	-	-	-	-	-	-	-	-	-	4,999 3,792
	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 3	f - ISFSI Site Restoration																				
Period 3f Di	irect Decommissioning Activities																				
Period 3f Ad	dditional Costs																				
	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
D : 1000	n 10 .																				
	ollateral Costs		10						2	1.5			15								
	Small tool allowance Subtotal Period 3f Collateral Costs	-	13 13	-	-	-	-	-	2 2	15 15	-	-	15 15	-	-	-	-	-	-	-	-
31.3 k	Subtotal Leriou 31 Conateral Costs	-	10	-	•	-	•	-	2	10	•	-	15	-	-	•	•	-	-	•	-
	eriod-Dependent Costs							126	10	138			138								
	Property taxes Heavy equipment rental	-	117	-	-	-	-	126	13 17	138 134	-	-	138 134	-	-	-	-	-	-	-	-
	Plant energy budget	-	111	-	-	-	-	- 6	17	154	-	-	154	-	-	-	-		-	-	-
	Fixed Overhead	-	-	-	-	-	-	36	5	•	-	-	41	-	-	-	-	-	-	-	-
	Railroad Track Maintenance	-	-	-	-	-	-	21	3	24	-	-	24	-	-	-	-	-	-	-	-
	Security Staff Cost	-	-	-	_	-	-	177	27	204	-	-	204	-	-	-	-	_	_	_	2,520
	Utility Staff Cost	-	-	-	-	-	-	109	16		-	-	126	-	-	-	-	-	-	-	1,564
	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 COS	ST 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

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 Processed
 Burial Volumes
 Burial /

 Volume
 Class A
 Class B
 Class C
 GTCC
 Processed

 Cu. Feet
 Cu. Feet
 Cu. Feet
 Cu. Feet
 Cu. Feet
 Wt., Lbs.

Xcel Energy

Monticello Nuclear Generating Plant Decommissioning Cost Analysis

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Craft

Utility and Contractor Manhours

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

Total

Total

NRC Spent Fuel
Lic. Term. Management
Costs Costs

Restoration

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	
TOTAL COST TO	D DECOMMISSION WITH 15.43% CONTINGENCY:				\$4,852,175	thousands of	2020 dollars		1
TOTAL NRC LIC	CENSE TERMINATION COST IS 15.98% OR:				\$776,400	thousands of	2020 dollars		
SPENT FUEL M	ANAGEMENT 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-LE	VEL RADIOACTIVE WASTE VOLUME BURIED (E	XCLUDING	GTCC):		200,155	Cubic Feet			
TOTAL GREATE	ER THAN CLASS C RADWASTE VOLUME GENERA	ATED:			1,160	Cubic Feet			
TOTAL SCRAP	METAL REMOVED:				23,123	Tons			
TOTAL CRAFT I	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

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APPENDIX G

ISFSI DECOMMISSIONING

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

Monticello Nuclear Generating Plant Decommissioning Cost Analysis Docket No. E002/M-20-___ Schedule L Page 174 of 175 **Document X01-1775-003 Rev. 0 Appendix G, Page 2 of 3**

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)

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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									
					251	251			1,120
Planning (characterization, specs and procedures) Decontamination (activated disposition)	0	3	33	283		320	848	29	
License Termination (radiological surveys)					1,500	1,500		11,322	-
	- 0	- n	33	283	· ·		848	· · · · · · · · · · · · · · · · · · ·	1 100
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)

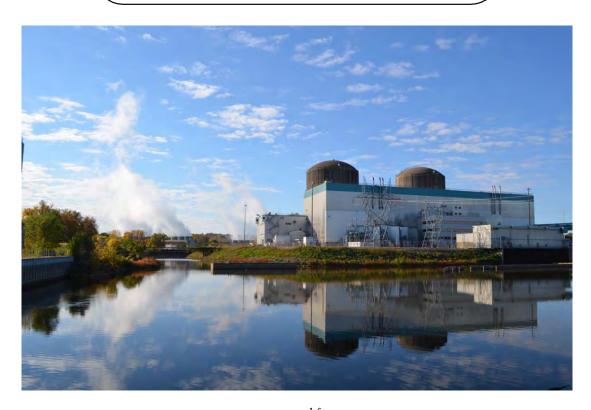
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DECOMMISSIONING COST ANALYSIS

for the

PRAIRIE ISLAND NUCLEAR GENERATING PLANT



 $prepared \ for$

Xcel Energy

prepared by

TLG Services, LLC Bridgewater, Connecticut

October 2020

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Xcel Energy

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APPROVALS

Project Manager

| Project Manager | Project Engineer | Project Engine

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REVISION LOG

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

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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

TLG Services, LLC

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

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approximately four years after operations cease. The spent fuel will remain in the ISFSI until the DOE is able to complete the transfer of the fuel to a federal facility (e.g., a monitored retrievable storage facility). [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.

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

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.

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

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

<u>SAFSTOR</u> 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." 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 <u>Ibid</u>. Page FR24022, Column 3

⁵ Thid

^{6 &}lt;u>Ibid.</u> Page FR24023, Column 2

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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).

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

[&]quot;Standard Format and Content of Decommissioning Cost Estimates for Nuclear Power Reactors," Regulatory Guide 1.202, Nuclear Regulatory Commission, February 2005

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

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Scenario	1 st Spent Fuel Canister Replacement	1 st 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.

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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

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

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

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decommissioning over the remaining operating life of the station, or duration of the decommissioning program and dry fuel storage period.

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

Low-Level Radioactive Waste Disposal

The and neutron-activated material contaminated generated 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.

[&]quot;Low-Level Radioactive Waste Policy Act," Public Law 96-573, 1980

^{13 &}quot;Low-Level Radioactive Waste Policy Amendments Act of 1985," Public Law 99-240, 1986

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

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

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

The DOE issued its final Environmental Impact Statement for the disposal of GTCC on January 2016.^[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.

High-Level Radioactive Waste Management

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

[&]quot;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 &}quot;Nuclear Waste Policy Act of 1982 and Amendments," DOE's Office of Civilian Radioactive Management, 1982

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begin accepting spent fuel by January 31, 1998; however, to date no progress in the removal of spent fuel from commercial generating sites has been made.

Today, the country is at an impasse on high-level waste disposal, even with the License Application for a geologic repository submitted by the DOE to the NRC in 2008. The Obama administration cut the budget for the repository program while promising to "conduct a comprehensive review of policies for managing the back end of the nuclear fuel cycle ... and make recommendations for a new plan." [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 "[0]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:

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

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

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

- <u>101u</u>., p.2

²³ Ibid., p.2

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

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asked the NRC to suspend the review of this application. Subsequently, WCS and Orano USA (formerly Areva Nuclear Materials) formed a joint venture to license the facility. In response to letters to the NRC in June and July 2018 from the joint venture, Interim Storage Partners, the NRC restarted its review of the application

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

Completion of the decommissioning process is dependent upon the DOE's ability to remove spent fuel from the site in a timely manner. DOE's repository program had originally assumed that spent fuel allocations would be accepted for disposal from the nation's commercial nuclear plants, with limited exceptions, in the order (the "queue") in which it was discharged from the reactor. [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]

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 ..."

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

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

²⁷ Ibid.

[&]quot;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

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

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

An ISFSI, operated under a Part 72 Site Specific License (in accordance with 10 CFR 72^[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

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

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

Consequently, non-essential site structures addressed by this analysis are completely removed (including foundations) as required by Minnesota statute [31]. The site is then graded and stabilized. The cost for the site restoration of nonessential 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.

Minnesota Administrative Rule part 7035.0400 "General Requirements"

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

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

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

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

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

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SCENARIO 1: DECON WITH 42 YEARS DFS DECOMMISSIONING COST ELEMENTS

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

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

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SCENARIO 2: DECON WITH 60 YEAR DFS DECOMMISSIONING COST ELEMENTS

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

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

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SCENARIO 3: DECON WITH 100 YEAR DFS DECOMMISSIONING COST ELEMENTS

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

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

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SCENARIO 4: DECON WITH 200 YEAR DFS DECOMMISSIONING COST ELEMENTS

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

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SCENARIO 5: SAFSTOR WITH 42 YEAR DFS DECOMMISSIONING COST ELEMENTS

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

Includes engineering costs

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

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SCENARIO 6: SAFSTOR WITH 60 YEAR DFS DECOMMISSIONING COST ELEMENTS

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

Includes engineering costs

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

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SCENARIO 7: SAFSTOR WITH 100 YEAR DFS DECOMMISSIONING COST ELEMENTS

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

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

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SCENARIO 8: SAFSTOR WITH 200 YEAR DFS DECOMMISSIONING COST ELEMENTS

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
	Í	ŕ	ŕ
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

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

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1. INTRODUCTION

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

The analysis relies upon site-specific, technical information from an earlier evaluation prepared in 2017, [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

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years. In April 2008, Nuclear Management Company (as agent for Xcel Energy), submitted an application for renewed licenses (i.e., 20 year extensions). The application was approved by the NRC in June 2011. Therefore, for the purposes of this study, final shutdown dates (license expiration) for Unit 1 and Unit 2 are August 9, 2033 and October 29, 2034, respectively, assuming a 60-year operating life (the current operating licenses' expiration dates).

1.2 SITE DESCRIPTION

Prairie Island is located in Goodhue County Minnesota, on the west bank of the Mississippi River, approximately 26 miles southeast of the Twin City Metropolitan Area and within the city limits of Red Wing.

The Nuclear Steam Supply System (NSSS) consists of a pressurized water reactor and a two-loop reactor coolant system. The system is comprised of the reactor vessel and two closed reactor coolant loops connected in parallel to the reactor vessel, each containing a reactor coolant pump and a steam generator. An electrically heated pressurizer is connected to one of the loops.

The system is housed within the reactor containment vessel, a free-standing cylindrical steel shell with a hemispherical dome and ellipsoidal bottom designed to withstand the internal pressure accompanying a loss-of-coolant accident. The reactor containment vessel is surrounded by a cylindrical shield building constructed of reinforced concrete, which serves as a radiation shielding for normal operations and for the loss-of-coolant condition.

Heat produced in the reactor is converted to electrical energy by the plant's power conversion system. A turbine-generator converts the thermal energy of steam produced in the steam generators into mechanical shaft power and then into electrical energy. The turbine-generator consists of one high-pressure, double-flow and two low-pressure, double-flow elements driving a direct-coupled generator at 1800 rpm. The turbines are operated in a closed feedwater cycle in which the steam is condensed and returned to the steam generators by the feedwater system.

Heat rejected in the main condensers is removed by the circulating water system, which provides the heat sink for the removal of the waste heat in the power plant's thermal cycle. The majority of the heat is removed through dilution with river water in the discharge canal. Forced draft cooling towers provide supplemental heat removal.

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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 Docket No. E002/RP-24-67 Appendix BB: 2022-2024 Triennial Nuclear Plant Decommissioning Study and Assumptions - Page 1621 of 1964

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additional rulemaking would be needed before this option could be treated as a generic alternative.

The NRC had considered rulemaking to alter the 60-year time for completing decommissioning and to clarify the use of engineered barriers for reactor entombments. 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).

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In 2011, the NRC published amended regulations to improve decommissioning planning and thereby reduce the likelihood that any current operating facility will become a legacy site. [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."

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In January 2013, the DOE issued the "Strategy for the Management and Disposal of Used Nuclear Fuel and High-Level Radioactive Waste," in response to the recommendations made by the Blue Ribbon Commission and as "a framework for moving toward a sustainable program to deploy an integrated system capable of transporting, storing, and disposing of used nuclear fuel..." [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

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Storage) under the provisions of 10 CFR Part 72. The application is currently under NRC review.

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

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

Completion of the decommissioning process is dependent upon the DOE's ability to remove spent fuel from the site in a timely manner. DOE's repository program had originally assumed that spent fuel allocations would be accepted for disposal from the nation's commercial nuclear plants, with limited exceptions, in the order (the "queue") in which it was discharged from the reactor.[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

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costs, if any, arising from storage of used nuclear fuel that may be incurred by the state of Minnesota, and any tribal community, county, city, or township where used nuclear fuel is located following the cessation of operations at a nuclear plant."[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.

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

An ISFSI, operated under a Part 72 Site Specific License (in accordance with 10 CFR 72^[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

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"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 EnergySolutions' facility in Clive, Utah. Therefore, disposal costs for Class A waste were based upon current contract rates. This facility is not licensed to receive the higher activity portion (Classes B and C) of the decommissioning waste stream.

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

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

The DOE issued its final Environmental Impact Statement for the disposal of GTCC on January 2016. The study evaluated the potential environmental impacts associated with constructing and operating a new facility or using an existing facility, disposal methods, and locations. DOE is awaiting Congressional action on the report and its recommendations. At this time, the federal government has not

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identified a specific cost for disposing of GTCC or a schedule for acceptance.

For purposes of this analysis, the GTCC radioactive waste is assumed to be packaged and disposed of in a similar manner as high-level waste and at a cost equivalent to that envisioned for the spent fuel. The GTCC is packaged in the same canisters used for spent fuel and either stored on site or shipped directly to a DOE facility as it is generated (depending upon the timing of the decommissioning and whether the spent fuel has been removed from the site prior to the start of decommissioning).

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

1.3.3 Radiological Criteria for License Termination

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

It should be noted that the NRC and the Environmental Protection Agency (EPA) differ on the amount of residual radioactivity considered acceptable in site remediation. The EPA has two limits that apply to radioactive materials. An EPA limit of 15 millirem per year is derived from criteria established by the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA or Superfund). [23]

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

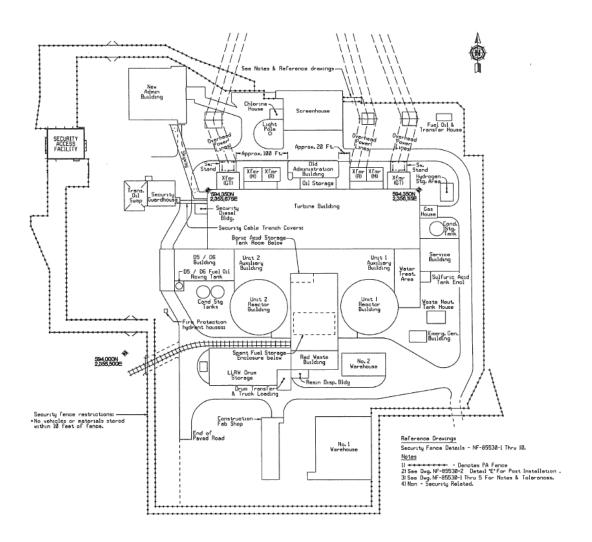
On October 9, 2002, the NRC signed an agreement with the EPA on the radiological decommissioning and decontamination of NRC-licensed sites. The Memorandum of Understanding (MOU) [25] provides that EPA will defer exercise of authority under CERCLA for the majority of facilities decommissioned under NRC 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.

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FIGURE 1.1 PRAIRIE ISLAND NUCLEAR GENERATING PLANT GENERAL PLAN



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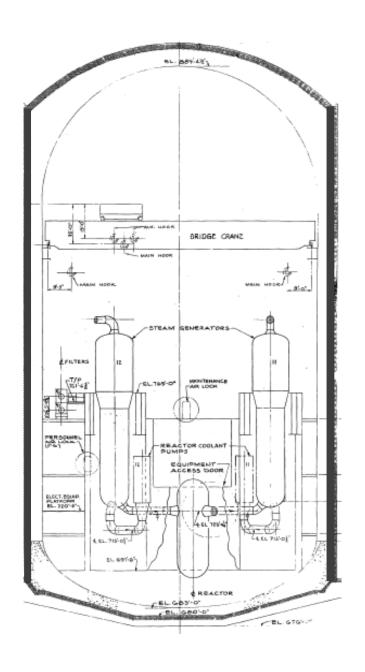
FIGURE 1.2 PRAIRIE ISLAND NUCLEAR GENERATING PLANT AERIAL VIEW



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FIGURE 1.3 PRAIRIE ISLAND NUCLEAR GENERATING PLANT REACTOR BUILDING SECTION



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2. DECOMMISSIONING ALTERNATIVES

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

The following scenarios were evaluated and are intended to bound the liability associated with the removal of spent fuel from the site. The current operating licenses expire in 2033 and 2034. The scenarios consist of four spent fuel management scenarios, each with a DECON and a SAFSTOR decommissioning scenario for eight total scenarios, The duration of the spent fuel scenarios has little impact to the decommissioning costs and timing of the power block systems and structures. The spent fuel in the plant's spent fuel storage pool is transferred to the ISFSI within the first four years. The equipment, structures, and portions of the plant containing radioactive contaminants are removed or decontaminated to a level that permits the facility to be released for unrestricted use. Non-essential structures are then demolished. Spent fuel storage operations continue at the ISFSI until the transfer of the fuel to the DOE is completed (as shown in the "Last Spent Fuel Assembly" column in the following table).

Scenario	1 st Spent Fuel Canister Replacement	1 st 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

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For Scenarios 1 and 5, although they only provide a total fuel storage period of 42 years following Unit 2 shutdown, some of the Prairie Island casks have been in storage since 1995. Xcel Energy directed TLG Services to not include the cost of transferring the spent fuel in dry storage to new canisters for those casks that exceed 50 years. The assumption to not transfer spent fuel at 50-years total storage duration for these two scenarios was premised on the likelihood that the life of the canisters could be successfully extended for the additional years.

For Scenarios 2 and 6, although they provide a total fuel storage period of nominally 60 years following shutdown, Xcel Energy directed TLG Services to not include the cost of transferring the spent fuel in dry storage to new canisters at the 50-year mark.

In Scenarios 3, 4, 7 and 8, the Dry Shielded Canisters (DSCs) are assumed to be replaced after fifty years of use. Since the auxiliary building spent fuel storage pool and fuel handling facilities are removed by the year 2037, a dry fuel transfer facility is assumed to be constructed on site to perform the transfers from the old to the new DSCs. For Scenarios 3 and 7, two such transfers are needed over the time frame assumed. For Scenarios 4 and 8, the spent fuel will be transferred four times following initial placement in the ISFSI.

The following sections describe the basic activities associated with each alternative. Although detailed procedures for each activity identified are not provided, and the actual sequence of work may vary, the activity descriptions provide a basis not only for estimating but also for the expected scope of work (i.e., engineering and planning at the time of decommissioning).

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

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

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2.1 DECON

The DECON alternative, as defined by the NRC, is "the alternative in which the equipment, structures, and portions of a facility and site containing radioactive contaminants are removed or decontaminated to a level that permits the property to be released for unrestricted use shortly after cessation of operations." This study does not address the cost to dispose of the spent fuel residing at the site; such costs are funded through a surcharge on electrical generation. However, the study does estimate the costs incurred with the interim on-site storage of the fuel pending shipment by the DOE to an off-site disposal facility. Those costs are separately presented as "Spent Fuel Management" expenditures in this report.

2.1.1 Period 1 - Preparations

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

Engineering and Planning

The PSDAR, required prior to, or within two years of permanent cessation of operations, provides a description of the licensee's planned decommissioning activities, a timetable, a site-specific decommissioning cost estimate, and the associated financial requirements of the intended decommissioning program. Upon receipt of the PSDAR, the NRC will make the document available to the public for comment in a local meeting to be held in the vicinity of the reactor site. Ninety days following submittal and NRC receipt of the PSDAR, the licensee may begin to perform major decommissioning activities under a modified 10 CFR §50.59 procedure, (10 CFR §50.59 establishes the conditions under which licensees may make changes to the facility or procedures and conduct test or experiments, i.e., without prior NRC approval). Major activities are defined as any activity that results in permanent removal of major radioactive components, permanently modifies the structure of the containment, or results in dismantling components (for shipment)

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containing GTCC, as defined by 10 CFR §61. Major components are further defined as comprising the reactor vessel and internals, large bore reactor coolant system piping, and other large components that are radioactive. The NRC includes the following additional criteria for use of the §50.59 process in decommissioning. The proposed activity must not:

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

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

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

Site Preparations

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

• Characterization of the site and surrounding environs. This includes radiation surveys of work areas, major components (including the

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reactor vessel and its internals), internal piping, and primary shield cores.

- An ISFSI has been constructed to support continued plant operation and will need to be expanded following the cessation of operations to offload the spent fuel pool in support of the decommissioning program.
- Isolation of the spent fuel storage pool and fuel handling systems, such that decommissioning operations can commence on the balance of the plant. Decommissioning operations are scheduled around the fuel handling area to optimize the overall project schedule. It is assumed that the fuel pool remains operational for the transfer of fuel for approximately four years following the cessation of operations.
- Specification of transport and disposal requirements for activated materials and/or hazardous materials, including shielding and waste stabilization.
- Development of procedures for occupational exposure control, control and release of liquid and gaseous effluent, processing of radwaste (including dry-active waste, resins, filter media, metallic and nonmetallic components generated in decommissioning), site security and emergency programs, and industrial safety.
- Perform chemical decontamination of the NSSS to reduce radiation levels in support of removal operations.

2.1.2 Period 2 - Decommissioning Operations

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

- Construction of temporary facilities and/or modification of existing facilities to support dismantling activities. This may include a centralized processing area to facilitate equipment removal and component preparations for off-site disposal.
- Reconfiguration and modification of site structures and facilities as needed to support decommissioning operations. This may include the upgrading of roads (on- and off-site) to facilitate hauling and transport. Modifications may be required to the containment

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structure to facilitate access of large/heavy equipment. Modifications may also be required to the refueling area of the building to support the segmentation of the reactor vessel internals and component extraction.

- Transfer of the spent fuel from the spent fuel storage pool to the ISFSI pad for interim storage.
- Design and fabrication of temporary and permanent shielding to support removal and transportation activities, construction of contamination control envelopes, and the procurement of specialty tooling.
- Procurement (lease or purchase) of shipping canisters, cask liners, and industrial packages.
- Decontamination of components and piping systems as required to control (minimize) worker exposure.
- Removal of piping and components no longer essential to support decommissioning operations.
- Removal of control rod drive housings and the head service structure from reactor vessel head. Segment the vessel closure head.
- Removal and segmentation of the upper internals assemblies.
 Segmentation will maximize the loading of the shielded transport casks, (i.e., by weight and activity). The operations are conducted under water using remotely operated tooling and contamination controls.
- Disassembly and segmentation of the remaining reactor internals, including the core former and lower core support assembly. Some material is expected to exceed Class C disposal requirements. As such, the segments will be packaged in modified spent fuel storage canisters for geologic disposal.
- Segmentation of the reactor vessel. A shielded platform is installed for segmentation as cutting operations are performed in air using remotely operated equipment within a contamination control envelope. The water level is maintained just below the cut to minimize the working area dose rates. Segments are transferred inair to containers that are stored under water, for example, in an isolated area of the refueling canal.
- Removal of the activated portions of the concrete biological shield and accessible contaminated concrete surfaces. If dictated by the steam generator and pressurizer removal scenarios, those portions of the

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associated cubicles necessary for access and component extraction are removed.

- Removal of the steam generators and pressurizer for material recovery and controlled disposal. The generators will be moved to an on-site processing center, the steam domes are removed and the internal components segregated for off-site processing. The lower shell and tube bundle will be packaged for direct disposal. These components can serve as their own burial containers provided that all penetrations are properly sealed and the internal contaminants are stabilized. Steel shielding is added, as necessary, to those external areas of the steam generators to meet transportation limits and regulations.
- Expansion of the ISFSI and transfer of the spent fuel from the storage pool to the ISFSI pad for interim storage. Spent fuel storage operations continue throughout the active decommissioning period. Fuel transfer to DOE is expected to be completed by the end of the year 2074 (Scenario 1).

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

- Removal of remaining plant systems and associated components as they become nonessential to the decommissioning program or worker health and safety (e.g., waste collection and treatment systems, electrical power and ventilation systems).
- Removal of the steel liners from the refueling canal, disposing of the activated and contaminated sections as radioactive waste. Removal of any activated/contaminated concrete.
- Surveys of the decontaminated areas of the containment structure.
- Removal of the contaminated equipment and material from the auxiliary building and any other contaminated facility. Use radiation

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and contamination control techniques until radiation surveys indicate that the structures can be released for unrestricted access and conventional demolition. This activity may necessitate the dismantling and disposition of most of the systems and components (both clean and contaminated) located within these buildings. This activity will facilitate surface decontamination and subsequent verification surveys required prior to obtaining release for demolition.

- Removal of the remaining components, equipment, and plant services in support of the area release survey(s).
- Routing of material removed in the decontamination and dismantling to a central processing area. Material certified to be free of contamination is released for unrestricted disposition, e.g., as scrap, recycle, or general disposal. Contaminated material is characterized and segregated for additional off-site processing (disassembly, chemical cleaning, volume reduction, and waste treatment), and/or packaged for controlled disposal at a low-level radioactive waste disposal facility.

Incorporated into the LTP is the Final Survey Plan. This plan identifies the radiological surveys to be performed once the decontamination activities are completed and is developed using the guidance provided in the "Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM)."[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.