

6. RESULTS

The analysis to estimate the costs to decommission Palo Verde relied primarily upon the site-specific, technical information developed for previous analyses. The systems and structures data was updated for the current estimate. While not an engineering study, the estimates provide the OA with sufficient information to assess its financial obligations as they pertain to the eventual decommissioning of the nuclear station.

The estimates described in this report are based on numerous fundamental assumptions, including regulatory requirements, project contingencies, LLRW disposal practices, high-level radioactive waste management options, and site restoration requirements. The decommissioning scenarios assume continued operation of the plant's spent fuel pool for a minimum of six years following the cessation of operations for continued cooling of the assemblies. An ISFSI will be used to store the spent fuel until such time that the DOE can complete the transfer of the assemblies to its repository.

The cost projected to promptly decommission (DECON) Palo Verde is estimated to be \$2.96 billion (2019 dollars). The majority of this cost, approximately 80%, is associated with the physical decontamination and dismantling of the nuclear units so that the licenses can be terminated. The management, interim storage, and eventual transfer of the spent fuel accounts for approximately 5%. The remaining 15% is for the demolition of the designated structures and limited restoration of the site and off-site facilities.

The primary cost contributors, identified in Tables 6.1, are either labor-related or associated with the management and disposition of the radioactive waste. Program management 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, and the duration of the program. It is assumed, for purposes of this analysis, that the OA will oversee the decommissioning program and self-manage the decommissioning labor force and the associated subcontractors. The size and composition of the management organization varies with the decommissioning phase and associated site activities. However, once the operating licenses are 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 pools will remain operational for six years following the cessation of operations. The pools will be isolated and an independent spent fuel island created. This will allow decommissioning operations to proceed in

***Palo Verde Nuclear Generating Station
2019 Decommissioning Cost Study***

***Document A04-1761-001, Rev. 1
Section 6, Page 79 of 183***

and around the pool area. Over the six-year period, the spent fuel will be packaged into DOE-provided transport casks (21 assemblies per canister) or transferred to the ISFSI for interim storage (37 assemblies per canister). The costs of transferring the fuel to the DOE from the spent fuel pool or the ISFSI are assumed to be non-reimbursable by the DOE and are therefore included in this estimate in Appendix L.

The cost for waste disposal includes only those costs associated with the controlled disposition of the LLRW generated from decontamination and dismantling activities, including plant equipment and components, structural material, filters, resins and dry-active waste. Other radioactively contaminated material will be sent to the EnergySolutions facility for burial. Highly activated components, requiring additional isolation from the environment, are packaged for geologic disposal. The cost of geologic disposal is based upon a cost equivalent for spent fuel.

The cost identified in the summary table for off-site waste processing of metallic wastes is reported as zero, since the pricing for such processing of metallic waste is not cost effective with the current LLRW disposal rates.

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 union wages. Non-radiological demolition is a natural extension of the decommissioning process. 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. Prompt demolition reduces future liabilities and can be more cost effective than deferral, due to the deterioration of the facilities (and therefore the working conditions) with time.

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 primarily moved overland by truck.

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

***Palo Verde Nuclear Generating Station
2019 Decommissioning Cost Study***

***Document A04-1761-001, Rev. 1
Section 6, Page 80 of 183***

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

TABLE 6.1
SUMMARY OF DECOMMISSIONING COST ELEMENTS - TOTAL COSTS
Palo Verde Nuclear Generating Station
(thousands of 2019 dollars)

Column Index	(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)	(I)	(J)	(K)	(L)	(M)	(N)
Report Reference	Unit 1 App. C-1	Unit 2 App. C-2	Unit 3 App. C-3	Shared Facilities							Total ⁽¹⁾	Unit 1 ⁽²⁾ (Including allocations)	Unit 2 ⁽³⁾ (Including allocations)	Unit 3 ⁽⁴⁾ (Including allocations)
				ISFSI App. L	Stored S/G & Storage Fac. App. G	Stored Rx Closure Head & Storage Fac. App. M	Water Reclamation Facility App. H	Water Reclamation Facility Supply Line App. I	Evaporation Ponds App. J	Make-up Water Reservoir App. K				
Work Category														
Characterization and License Termination Surveys	19,931	15,595	17,490	5,223	-	-	-	-	238	73	58,550	21,776	17,440	19,335
Decon	19,772	19,679	21,518	-	-	-	-	-	-	-	60,969	19,772	19,679	21,518
DOC Staff	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Energy	16,889	16,117	16,117	120	-	-	-	-	-	-	49,243	16,929	16,157	16,157
GTCC DOE Disposal	29,260	29,260	29,260	-	-	-	-	-	-	-	87,780	29,260	29,260	29,260
Health Physics Supplies	12,777	13,126	13,958	-	-	-	-	-	-	-	39,861	12,777	13,126	13,958
Insurance	13,300	11,027	9,569	123	-	-	-	-	-	-	34,018	13,341	11,068	9,610
LLRW Disposal	76,495	95,367	100,699	4,355	25,194	2,048	-	-	-	-	304,157	87,027	105,899	111,231
Non-Craft Contractors	10,356	4,507	4,507	-	-	-	719	719	1,472	-	22,279	11,326	5,476	5,476
Off-Site LLRW Processing	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Other	7,670	7,142	10,612	2,759	676	689	-	-	3,871	135	33,554	10,380	9,852	13,322
Packaging	15,540	17,190	17,472	396	26,498	552	-	-	-	-	77,649	24,689	26,339	26,621
Process Liquid Waste	16,116	16,215	16,753	-	-	-	-	-	-	-	49,084	16,116	16,215	16,753
Property Taxes	4,259	3,931	3,349	-	-	-	-	-	-	-	11,540	4,259	3,931	3,349
Regulatory / NRC	5,691	3,546	2,346	602	-	-	-	-	-	-	12,185	5,892	3,746	2,547
Removal	94,869	99,946	124,509	6,905	564	87	9,131	53,305	54,912	4,412	448,642	137,975	143,052	167,615
RV	26,557	26,557	26,557	-	-	-	-	-	-	-	79,672	26,557	26,557	26,557
RV Internals	44,528	44,661	44,661	-	-	-	-	-	-	-	133,851	44,528	44,661	44,661
Security	79,671	76,354	71,090	281	-	-	-	-	-	-	227,397	79,765	76,448	71,184
Shipping	5,295	6,262	6,627	3,066	4,144	2,028	-	-	-	-	27,421	8,374	9,341	9,706
Spent Fuel / EP / ISFSI Equipment & Materials	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Spent Fuel / EP / ISFSI Labor	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Spent Fuel / EP / ISFSI Other	13,902	13,081	11,620	-	-	-	-	-	-	-	38,602	13,902	13,081	11,620
Spent Fuel Capital and Transfer	-	-	-	121,440	-	-	-	-	-	-	121,440	40,480	40,480	40,480
Spent Fuel Pool Isolation	13,062	8,708	8,708	-	-	-	-	-	-	-	30,477	13,062	8,708	8,708
Steam Generators	28,278	28,278	28,278	-	-	-	-	-	-	-	84,835	28,278	28,278	28,278
Remedial Action Surveys	7,823	8,606	8,606	-	-	-	-	-	-	-	25,036	7,823	8,606	8,606
Utility Staff	240,559	219,386	279,193	724	-	-	1,178	-	5,515	449	747,004	243,181	222,008	281,815
Utility Transition Costs	50,781	50,781	50,781	-	-	-	-	-	-	-	152,342	50,781	50,781	50,781
Total	853,384	835,323	924,279	145,994	57,074	5,405	11,027	54,024	66,009	5,069	2,957,587	968,251	950,190	1,039,146
NRC License Termination	785,071	769,585	817,726	-	56,465	5,288	-	-	-	-	2,434,134	805,655	790,169	838,310
Spent Fuel Management	13,902	13,081	11,620	145,994	-	-	-	-	-	-	184,596	62,567	61,745	60,284
Site Restoration	54,411	52,657	94,934	-	609	117	11,027	54,024	66,009	5,069	338,856	100,029	98,275	140,552
Total ⁽¹⁾	853,384	835,323	924,279	145,994	57,073	5,405	11,027	54,024	66,009	5,069	2,957,586	968,251	950,190	1,039,146

TLG Services, Inc.

TABLE 6.1a
SUMMARY OF DECOMMISSIONING COST ELEMENTS - LICENSE TERMINATION COSTS
Palo Verde Nuclear Generating Station
(thousands of 2019 dollars)

Column Index	(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)	(I)	(J)	(K)	(L)	(M)	(N)
Report Reference	Unit 1 App. C-1	Unit 2 App. C-2	Unit 3 App. C-3	Shared Facilities							Total ⁽¹⁾	Unit 1 ⁽²⁾ (Including allocations)	Unit 2 ⁽³⁾ (Including allocations)	Unit 3 ⁽⁴⁾ (Including allocations)
				ISFSI App. L	Stored S/G & Storage Fac. App. G	Stored Rx Closure Head & Storage Fac. App. M	Water Reclamation Facility App. H	Water Reclamation Facility Supply Line App. I	Evaporation Ponds App. J	Make-up Water Reservoir App. K				
Work Category														
Characterization and License Termination Surveys	19,931	15,595	17,490	-	-	-	-	-	-	-	53,016	19,931	15,595	17,490
Decon	19,772	19,679	21,518	-	-	-	-	-	-	-	60,969	19,772	19,679	21,518
DOC Staff	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Energy	16,384	15,612	15,612	-	-	-	-	-	-	-	47,607	16,384	15,612	15,612
GTCC DOE Disposal	29,260	29,260	29,260	-	-	-	-	-	-	-	87,780	29,260	29,260	29,260
Health Physics Supplies	12,777	13,126	13,958	-	-	-	-	-	-	-	39,861	12,777	13,126	13,958
Insurance	13,300	11,027	9,569	-	-	-	-	-	-	-	33,895	13,300	11,027	9,569
LLRW Disposal	76,495	95,367	100,699	-	25,194	2,048	-	-	-	-	299,802	85,575	104,447	109,779
Non-Craft Contractors	9,415	4,104	4,104	-	-	-	-	-	-	-	17,623	9,415	4,104	4,104
Off-Site LLRW Processing	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Other	7,621	7,092	7,103	-	630	660	-	-	-	-	23,107	8,051	7,522	7,533
Packaging	15,540	17,190	17,472	-	26,498	552	-	-	-	-	77,253	24,557	26,207	26,489
Process Liquid Waste	16,116	16,215	16,753	-	-	-	-	-	-	-	49,084	16,116	16,215	16,753
Property Taxes	3,567	3,239	2,656	-	-	-	-	-	-	-	9,462	3,567	3,239	2,656
Regulatory / NRC	5,691	3,546	2,346	-	-	-	-	-	-	-	11,584	5,691	3,546	2,346
Removal	58,397	64,689	65,598	-	-	-	-	-	-	-	188,684	58,397	64,689	65,598
RV	26,557	26,557	26,557	-	-	-	-	-	-	-	79,672	26,557	26,557	26,557
RV Internals	44,528	44,661	44,661	-	-	-	-	-	-	-	133,851	44,528	44,661	44,661
Security	73,143	69,826	64,562	-	-	-	-	-	-	-	207,532	73,143	69,826	64,562
Shipping	5,295	6,262	6,627	-	4,144	2,028	-	-	-	-	24,356	7,353	8,319	8,684
Spent Fuel / EP / ISFSI Equipment & Materials	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Spent Fuel / EP / ISFSI Labor	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Spent Fuel / EP / ISFSI Other	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Spent Fuel Capital and Transfer	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Spent Fuel Pool Isolation	13,062	8,708	8,708	-	-	-	-	-	-	-	30,477	13,062	8,708	8,708
Steam Generators	28,278	28,278	28,278	-	-	-	-	-	-	-	84,835	28,278	28,278	28,278
Remedial Action Surveys	7,823	8,606	8,606	-	-	-	-	-	-	-	25,036	7,823	8,606	8,606
Utility Staff	231,337	210,164	254,808	-	-	-	-	-	-	-	696,309	231,337	210,164	254,808
Utility Transition Costs	50,781	50,781	50,781	-	-	-	-	-	-	-	152,342	50,781	50,781	50,781
Total	785,071	769,584	817,725	-	56,465	5,288	-	-	-	-	2,434,134	805,655	790,169	838,310
NRC License Termination	785,071	769,585	817,726	-	56,465	5,288	-	-	-	-	2,434,134	805,655	790,169	838,310
Spent Fuel Management	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Site Restoration	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total ⁽¹⁾	785,071	769,585	817,726	-	56,465	5,288	-	-	-	-	2,434,134	805,655	790,169	838,310

TABLE 6.1b
SUMMARY OF DECOMMISSIONING COST ELEMENTS – SPENT FUEL MANAGEMENT COSTS
Palo Verde Nuclear Generating Station
(thousands of 2019 dollars)

Column Index	(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)	(I)	(J)	(K)	(L)	(M)	(N)
Report Reference	Unit 1 App. C-1	Unit 2 App. C-2	Unit 3 App. C-3	Shared Facilities							Total ⁽¹⁾	Unit 1 ⁽³⁾ (Including allocations)	Unit 2 ⁽³⁾ (Including allocations)	Unit 3 ⁽⁴⁾ (Including allocations)
				ISFSI App. L	Stored S/G & Storage Fac. App. G	Stored Rx Closure Head & Storage Fac. App. M	Water Reclamation Facility App. H	Water Reclamation Facility Supply Line App. I	Evaporation Ponds App. J	Make-up Water Reservoir App. K				
Work Category														
Characterization and License Termination Surveys	-	-	-	5,223	-	-	-	-	-	-	5,223	1,741	1,741	1,741
Decon	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DOC Staff	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Energy	-	-	-	120	-	-	-	-	-	-	120	40	40	40
GTCC DOE Disposal	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Health Physics Supplies	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Insurance	-	-	-	123	-	-	-	-	-	-	123	41	41	41
LLRW Disposal	-	-	-	4,355	-	-	-	-	-	-	4,355	1,452	1,452	1,452
Non-Craft Contractors	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Off-Site LLRW Processing	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Other	-	-	-	2,759	-	-	-	-	-	-	2,759	920	920	920
Packaging	-	-	-	396	-	-	-	-	-	-	396	132	132	132
Process Liquid Waste	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Property Taxes	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Regulatory / NRC	-	-	-	602	-	-	-	-	-	-	602	201	201	201
Removal	-	-	-	6,905	-	-	-	-	-	-	6,905	2,302	2,302	2,302
RV	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RV Internals	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Security	-	-	-	281	-	-	-	-	-	-	281	94	94	94
Shipping	-	-	-	3,066	-	-	-	-	-	-	3,066	1,022	1,022	1,022
Spent Fuel / EP / ISFSI Equipment & Materials	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Spent Fuel / EP / ISFSI Labor	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Spent Fuel / EP / ISFSI Other	13,902	13,081	11,620	-	-	-	-	-	-	-	38,602	13,902	13,081	11,620
Spent Fuel Capital and Transfer	-	-	-	121,440	-	-	-	-	-	-	121,440	40,480	40,480	40,480
Spent Fuel Pool Isolation	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Steam Generators	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Remedial Action Surveys	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Utility Staff	-	-	-	724	-	-	-	-	-	-	724	241	241	241
Utility Transition Costs	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	13,902	13,081	11,620	145,994	-	-	-	-	-	-	184,596	62,567	61,745	60,284
NRC License Termination	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Spent Fuel Management	13,902	13,081	11,620	145,994	-	-	-	-	-	-	184,596	62,567	61,745	60,284
Site Restoration	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total ⁽¹⁾	13,902	13,081	11,620	145,994	-	-	-	-	-	-	184,596	62,567	61,745	60,284

TLG Services, Inc.

TABLE 6.1c
SUMMARY OF DECOMMISSIONING COST ELEMENTS – SITE RESTORATION COSTS
Palo Verde Nuclear Generating Station
(thousands of 2019 dollars)

Column Index	(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)	(I)	(J)	(K)	(L)	(M)	(N)	
Work Category	Report Reference	Unit 1 App. C-1	Unit 2 App. C-2	Unit 3 App. C-3	Shared Facilities						Total ⁽¹⁾	Unit 1 ⁽²⁾ (Including allocations)	Unit 2 ⁽³⁾ (Including allocations)	Unit 3 ⁽⁴⁾ (Including allocations)	
					ISFSI	Stored S/G & Storage Fac.	Stored Rx Closure Head & Storage Fac.	Water Reclamation Facility	Reclamation Facility Supply Line	Evaporation Ponds					Make-up Water Reservoir
Characterization and License Termination Surveys	-	-	-	-	-	-	-	-	238	73	311	104	104	104	
Decon	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
DOC Staff	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Energy	505	505	505	-	-	-	-	-	-	-	1,515	505	505	505	
GTCC DOE Disposal	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Health Physics Supplies	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Insurance	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
LLRW Disposal	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Non-Craft Contractors	941	403	403	-	-	-	719	719	1,472	-	4,655	1,911	1,372	1,372	
Off-Site LLRW Processing	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Other	49	49	3,509	-	45	43	-	-	3,871	135	7,702	1,414	1,414	4,874	
Packaging	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Process Liquid Waste	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Property Taxes	693	693	693	-	-	-	-	-	-	-	2,078	693	693	693	
Regulatory / NRC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Removal	36,473	35,257	58,912	-	564	74	9,131	53,305	54,912	4,412	253,039	77,272	76,056	99,711	
RV	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
RV Internals	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Security	6,528	6,528	6,528	-	-	-	-	-	-	-	19,584	6,528	6,528	6,528	
Shipping	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Spent Fuel / EP / ISFSI Equipment & Materials	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Spent Fuel / EP / ISFSI Labor	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Spent Fuel / EP / ISFSI Other	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Spent Fuel Capital and Transfer	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Spent Fuel Pool Isolation	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Steam Generators	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Remedial Action Surveys	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Utility Staff	9,222	9,222	24,385	-	-	-	1,178	-	5,515	449	49,971	11,603	11,603	26,765	
Utility Transition Costs	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Total	54,411	52,657	94,934	-	609	117	11,027	54,024	66,009	5,069	338,856	100,029	98,275	140,552	
NRC License Termination	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Spent Fuel Management	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Site Restoration	54,411	52,657	94,934	-	609	117	11,027	54,024	66,009	5,069	338,856	100,029	98,275	140,552	
Total ⁽¹⁾	54,411	52,657	94,934	-	609	117	11,027	54,024	66,009	5,069	338,856	100,029	98,275	140,552	

Notes for Tables 6.1, 6.1a, 6.1b and 6.1c

- 1) Numbers may not total due to rounding
- 2) Column L represents the Unit 1 costs from Column A, plus 1/3 of the shared facilities costs totals from columns D through J
- 3) Column M represents the Unit 2 costs from Column B, plus 1/3 of the shared facilities costs totals from columns D through J
- 4) Column N represents the Unit 3 costs from Column C, plus 1/3 of the shared facilities costs totals from columns D through J

7. REFERENCES

1. NRC issued Operating Licenses; NPF-41, NPF-51, NPF-74 through Amendment No. 180 issued September 29, 2010.
2. U.S. Code of Federal Regulations, Title 10, Parts 30, 40, 50, 51, 70 and 72, "General Requirements for Decommissioning Nuclear Facilities," Nuclear Regulatory Commission, Federal Register Volume 53, Number 123 (p 24018 et seq.), June 27, 1988. [\[Open\]](#)
3. U.S. Nuclear Regulatory Commission, Regulatory Guide 1.159, "Assuring the Availability of Funds for Decommissioning Nuclear Reactors," Rev. 2, October 2011. [\[Open\]](#)
4. "Regulatory Improvement for Power Reactors Transitioning to Decommissioning," NRC Regulatory Basis Document, Docket ID NRC-2015-0070, RIN Number 3150-AJ59, November 20, 2017 [\[Open\]](#)
5. U.S. Code of Federal Regulations, Title 10, Parts 2, 50 and 51, "Decommissioning of Nuclear Power Reactors," Nuclear Regulatory Commission, Federal Register Volume 61 (p 39278 et seq.), July 29, 1996. [\[Open\]](#)
6. U.S. Code of Federal Regulations, Title 10, Parts 20, 30, 40, 50, 70, and 72, "Decommissioning Planning," Nuclear Regulatory Commission, Federal Register Volume 76, (p 35512 et seq.), June 17, 2011. [\[Open\]](#)
7. "Nuclear Waste Policy Act of 1982," 42 U.S. Code 10101, et seq. [\[Open\]](#)
8. Charter of the Blue Ribbon Commission on America's Nuclear Future, "Objectives and Scope of Activities," [\[Open\]](#)
9. "Blue Ribbon Commission on America's Nuclear Future, Report to the Secretary of Energy," p. 27, 32, January 2012 [\[Open\]](#)
10. "Strategy for the Management and Disposal of Used Nuclear Fuel and High-Level Radioactive Waste," U.S. DOE, January 11, 2013. [\[Open\]](#)
11. United States Court of Appeals for the District of Columbia Circuit, In Re: Aiken County, Et Al., August 2013, [\[Open\]](#)

7. REFERENCES

(continued)

12. In 2008, the DOE issued a report to Congress in which it concluded that it did not have authority, under present law, to accept spent nuclear fuel for interim storage from decommissioned commercial nuclear power reactor sites. 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.” For planning purposes only, the estimates do not assume that PVNGS, as permanently shutdown units, will receive priority; the fuel removal schedule assumed in this estimate is based upon DOE acceptance of fuel according to the “Oldest Fuel First” priority ranking. The OA will seek the most expeditious means of removing fuel from the site when DOE commences performance. [\[Open\]](#)
13. U.S. Code of Federal Regulations, Title 10, Part 50, “Domestic Licensing of Production and Utilization Facilities,” Subpart 54 (bb), “Conditions of Licenses.” [\[Open\]](#)
14. U.S. Code of Federal Regulations, Title 10, Part 72, Subpart K, “General License for Storage of Spent Fuel at Power Reactor Sites.” [\[Open\]](#)
15. “Low-Level Radioactive Waste Policy,” Public Law 96-573, 1980. [\[Open\]](#)
16. “Low-Level Radioactive Waste Policy Amendments Act of 1985,” Public Law 99-240, January 15, 1986. [\[Open\]](#)
17. U.S. Code of Federal Regulations, Title 10, Part 61, “Licensing Requirements for Land Disposal of Radioactive Waste” [\[Open\]](#)
18. U.S. Code of Federal Regulations, Title 10, Part 20, Subpart E, “Radiological Criteria for License Termination,” Federal Register, Volume 62, Number 139 (p 39058 et seq.), July 21, 1997. [\[Open\]](#)

7. REFERENCES

(continued)

19. "Establishment of Cleanup Levels for CERCLA Sites with Radioactive Contamination," EPA Memorandum OSWER No. 9200.4-18, August 22, 1997. [\[Open\]](#)
20. U.S. Code of Federal Regulations, Title 40, Part 141.66, "Maximum contaminant levels for radionuclides." [\[Open\]](#)
21. "Memorandum of Understanding Between the Environmental Protection Agency and the Nuclear Regulatory Commission: Consultation and Finality on Decommissioning and Decontamination of Contaminated Sites," OSWER 9295.8-06a, October 9, 2002. [\[Open\]](#)
22. "Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM)," NUREG-1575, Rev. 1, EPA 402-R-97-016, Rev. 1, August 2000. [\[Open\]](#)
23. T.S. LaGuardia et al., "Guidelines for Producing Commercial Nuclear Power Plant Decommissioning Cost Estimates," AIF/NESP-036, May 1986. [\[Open\]](#)
24. W.J. Manion and T.S. LaGuardia, "Decommissioning Handbook," U.S. Department of Energy, DOE/EV/10128-1, November 1980. [\[Open\]](#)
25. "Building Construction Cost Data 2019," RSMeans (From the Gordian Group), Rockland, Massachusetts. [\[Open\]](#)
26. "Decommissioning of Nuclear Power Reactors," Regulatory Guide 1.184, Nuclear Regulatory Commission, October 2013 [\[Open\]](#)
27. "Standard Format and Content of Decommissioning Cost Estimates for Nuclear Power Reactors," Regulatory Guide 1.202, Nuclear Regulatory Commission, February 2005 [\[Open\]](#)
28. Project and Cost Engineers' Handbook, Second Edition, p. 239, American Association of Cost Engineers, Marcel Dekker, Inc., New York, New York, 1984.
29. "Technical Position Paper for Establishing an Appropriate Contingency Factor for Inclusion in the Decommissioning Revenue Requirements", Study Number: DECON-POS-H002, Revision A, Status: Preliminary. [\[Open\]](#)

7. REFERENCES
(continued)

30. Public Utility Commission of Texas' Substantive Rule §25.231(b)(1)(F)(i). [\[Open\]](#)
31. U.S. Department of Transportation, Title 49 of the Code of Federal Regulations, "Transportation," Parts 173 through 178. [\[Open\]](#)
32. Tri-State Motor Transit Company, Radioactive Materials Tariffs, TSMT 7000, January 2019. [\[Open\]](#)
33. J.C. Evans et al., "Long-Lived Activation Products in Reactor Materials" NUREG/CR-3474, Pacific Northwest Laboratory for the Nuclear Regulatory Commission. August 1984. [\[Open\]](#)
34. R.I. Smith, G.J. Konzek, W.E. Kennedy, Jr., "Technology, Safety and Costs of Decommissioning a Reference Pressurized Water Reactor Power Station," NUREG/CR-0130 and addenda, Pacific Northwest Laboratory for the Nuclear Regulatory Commission. June 1978. [\[Open Main Report\]](#) [\[Open Appendices\]](#)
35. H.D. Oak, et al., "Technology, Safety and Costs of Decommissioning a Reference Boiling Water Reactor Power Station," NUREG/CR-0672 and addenda, Pacific Northwest Laboratory for the Nuclear Regulatory Commission. June 1980. [\[Open Main Report\]](#) [\[Open Appendices\]](#)
36. "Microsoft Project Professional," Microsoft Corporation, Redmond, WA.
37. "Atomic Energy Act of 1954," (68 Stat. 919). [\[Open\]](#)

APPENDIX A

SUMMARY OF 1998 STUDY

COST REDUCTION ALTERNATIVES

**Excerpt from 1998 Palo Verde Decommissioning Cost Study - Executive
Summary:**

**EXECUTIVE SUMMARY APPENDIX
COST ALTERNATIVE STUDY**

A study prepared for the Operating Agent (OA) of the Palo Verde Nuclear Generating Station (PVNGS) by TLG Services, Inc. (TLG), evaluates the costs associated with decommissioning cost reduction alternatives. A baseline estimate for Unit 1 of PVNGS using the DECON decommissioning alternative was prepared for use as a comparison of cost savings. The following is a summary of the ten alternatives evaluated. A breakdown of cost savings and associated comments is reported in the Summary Table herein.

1. Removal of the reactor vessel and internals as an integrated package, transported for intact disposal.
2. Use of a second shift in the decontamination and dismantling of PVNGS, assessing the ultimate impact on the decommissioning schedule and associated costs.
3. Use of alternative disposal sites for clean waste. This evaluation will consider expanding the current on-site waste disposal facility. Each alternative will be ranked based on feasibility and overall cost.
4. Evaluation of alternative burial sites for LLW. This evaluation will consider development of an on-site, Part 61 licensed facility. Each alternative will be ranked based on feasibility and overall cost.
5. Incremental decontamination and dismantling costs of a single unit with secondary-side contamination at two levels: (1) Current Unit 1, and (2) Unit 2 immediately after 1989 tube rupture event.
6. Establishment of an on-site LLW decontamination, processing, and salvage facility. Three cases will be established for a 70%, 80%, and 90% reduction in the volume of LLW that will require controlled disposal.
7. Disposal of all LLW at the Chem-Nuclear Systems, Inc., Barnwell, S.C., disposal facility. Costs will be based on the November 1, 1996, CNSI instituted weight-based cost schedule.

***Palo Verde Nuclear Generating Station
2019 Decommissioning Cost Study***

***Document A04-1761-001, Rev. 1
Appendix A, Page 92 of 183***

8. The assumption of responsibility for the management of all decommissioning operations by the OA (currently assumed to be performed by a DOC).
9. Based on item 8 above, evaluation of decommissioning planning being initiated early, so as to have the required approvals at or shortly after (3-6 months) final shutdown. (Decontamination and dismantling would begin as soon as possible for Unit 1. Schedules for Units 2 and 3 would follow so as to maximize the use of rented, leased, or purchased equipment.)
10. Isolation of the fuel building from the remainder of the facility (electrical, thermal, and hydraulic) so as not to impede D&D operations. This will include alternatives to monitor and control the fuel building activities from other than the current location.

The alternatives were evaluated and grouped into three categories to better define their cost impact.

Cost Bounding: These alternatives change the base scope of the study by adding assumptions that currently should be considered, and further bound the cost estimate by identifying changes that will add to the scope or further define the level of detail required.

Cost Reductions: Changes to the base case that reduce the overall cost of the decommissioning project. This category can be further defined by cost reductions that can occur under current regulatory requirements and those which would require modifications to current requirements.

Not Cost-Effective: Those alternatives that showed no cost benefit, or that increase the base cost.

After reviewing each alternative and evaluating the cost impacts and savings to the original decommissioning cost estimate, TLG has developed a list of three recommendations for inclusion into the base case study.

TLG recommends three of the cost reduction alternatives. Alternative #8, the OA management of the decommissioning project (serving as DOC) is the highest ranked alternative for cost reduction. Of all the current options, it is the most feasible and easiest to adopt and offers a potential cost savings of \$18.5 million. The next two recommendations are waste-related. Alternative # 3, the on-site disposition of clean construction debris rather than shipment to a local vendor would result in substantial savings of approximately \$7.6 million. Similarly, Alternative # 6 the on-

***Palo Verde Nuclear Generating Station
2019 Decommissioning Cost Study***

***Document A04-1761-001, Rev. 1
Appendix A, Page 93 of 183***

site processing of low-level waste is a viable alternative. A review of state-of-the-art processes in processing and volume reduction is recommended; TLG feels the potential of 90% volume reduction is not unrealistic and should be investigated prior to the planning of such a facility. Although even 70% reduction could yield \$.9 million dollars in savings, a 90% reduction could result in savings of up to \$5.5 million.

TLG also recommends further investigation into one of the cost savings alternatives that would require regulatory revisions for the OA -- that being to create an on-site facility for the storage of low-level waste. While the cost for such a facility might not be economical for a single unit, the money to be saved with three units would be substantial. The site's remote location, its stable profile as a nuclear area, and the fact that Arizona is the next host state for the Southwest Compact all contribute to the potential for a successful and profitable venture. TLG recommends that the OA consider a feasibility study to determine the technical and political viability of obtaining a Part 61 license. A feasibility study would not only examine the financial aspects (startup, operation, maintenance) of such a venture, but would also consider such environmental aspects as community involvement and licensing issues/requirements.

Two cost reduction alternatives were approved by the OA to be utilized in the development of this cost study:

Alternative # 8 in which the OA will act as Decommissioning Operations Contractor (DOC), providing contract management of the decommissioning labor force and subcontractors, directing all decontamination and dismantling activities. Other activities that are included but not limited to, are engineering services for such items as writing activity specifications, detailed procedures, detailed activation analyses, and structural modifications.

Alternative # 3 in which an on-site facility will be used for clean construction debris disposal is the second alternative utilized in the study. Environmental closure requirements will need to be defined before selection of the on-site location is determined.

**Palo Verde Nuclear Generating Station
2019 Decommissioning Cost Study**

**Document A04-1761-001, Rev. 1
Appendix A, Page 94 of 183**

SUMMARY TABLE: COST REDUCTION ALTERNATIVES
(Millions of 1998 Dollars)

	Alternative	Category	Potential Cost Impact/ Savings	TLG Rec	Comments
1	One-Piece Vessel Lift	C	(35.2)		Regulation revisions required, several utilities submitting similar scenario. Until NRC approves scenario, alternative remains unlikely.
2	Alternative Shift Schedule	NC	3.0		Fuel storage restricts schedule reduction, savings are offset by cost of second shift operations.
3	Alternative Disposal Site - Clean fill	C	(7.6)	Yes	Existing voids created by Evaporator Ponds and Water Make-up utilized for clean fill disposal, acceptable per Arizona Revised Statute.
4	Alternative Burial Site- On-site Part 61 Licensed LLW Facility	C	(220)	Yes *	Regulation revision required, on-site development highly speculative, greatest potentials for savings with highest risk.
5	Secondary-Side Contamination	B	20.7	Yes	Major cost impact, should be added to cost estimate. Further characterization should be performed to verify extent of contamination.
6	On-Site Recycling				
	-70% Vol. Reduction	C	(0.9)	Yes *	On-site facility capital and operating cost (70% reduction) is within 1% of off-site vendor cost. Due to responsibilities assumed by vendor and potential of achieving similar savings, recommend further investigation. New technologies yet to be proven must be evaluated as they become available.
	-80% Vol. Reduction		(7.0)		
	-90% Vol. Reduction		(5.5)		
7	Weight-Based Burial	B	(3.7)	*	Savings less than 1% of total decommissioning cost to utilize Barnwell. Recommend cost estimate to assume Southwest Compact burial will be available.
8	OA Assumes DOC Responsibilities	C	(18.5)	Yes	Most feasible and easiest to adopt. Minimal risk with good record indicated at other utilities.
9	Pre-Planning	NC	(1.2)		Cost savings are offset by delay in fuel storage pool decommissioning. \$4.2 million savings offset by \$3 million additional cost due to lengthening of schedule caused by fuel storage delay. Savings in period not worth increase in schedule.
10	Fuel Building Isolation	B	0		Base estimate allocates \$2.1 million (21,000 man-hours) for license and related document modifications. This is equal to several current utility allocations. Including building modification cost of \$1.1 million, base estimate allocates \$3.2 million. No savings are indicated.

Legend: * Further investigation required.
B = Cost Bounding C = Cost Reduction NC = Not Cost-Effective

***Palo Verde Nuclear Generating Station
2019 Decommissioning Cost Study***

***Document A04-1761-001, Rev. 1
Appendix B, Page 95 of 183***

APPENDIX B

SCHEDULE OF ANNUAL EXPENDITURES

**Palo Verde Nuclear Generating Station
2019 Decommissioning Cost Study**

**Document A04-1761-001, Rev. 1
Appendix B, Page 96 of 183**

**TABLE B-1
SCHEDULE OF ANNUAL EXPENDITURES
DECON, UNIT 1
(thousands, 2019 dollars)**

Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2040	363	0	0	0	0	363
2041	619	0	0	0	0	619
2042	619	0	0	0	0	619
2043	3,501	0	0	0	0	3,501
2044	5,550	0	0	0	0	5,550
2045	60,536	1,142	1,567	13	4,408	67,666
2046	84,200	14,005	4,000	11,408	21,967	135,581
2047	66,378	29,431	2,539	27,795	7,976	134,118
2048	65,719	28,558	2,515	27,402	7,941	132,135
2049	51,766	12,858	2,004	19,646	6,992	93,266
2050	51,766	12,858	2,004	19,646	6,992	93,266
2051	35,021	9,492	1,347	15,448	6,030	67,338
2052	5,167	210	0	4	2,307	7,688
2053	5,153	210	0	4	2,301	7,667
2054	18,624	1,161	332	11	2,034	22,163
2055	14,691	9,198	305	2	603	24,800
2056	12,712	10,466	268	0	394	23,839
2057	382	315	8	0	12	716
2058-96	0	0	0	0	0	0
2097	0	3,227	0	0	29,260	32,486
Total	482,769	133,129	16,889	121,378	99,218	853,384

**Palo Verde Nuclear Generating Station
2019 Decommissioning Cost Study**

**Document A04-1761-001, Rev. 1
Appendix B, Page 97 of 183**

**TABLE B-2
SCHEDULE OF ANNUAL EXPENDITURES
DECON, UNIT 2
(thousands, 2019 dollars)**

Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2046	82,381	2,122	1,911	675	5,727	92,816
2047	65,827	29,184	3,415	33,993	17,045	149,463
2048	69,354	30,951	2,545	37,350	8,278	148,479
2049	56,028	17,893	2,186	23,422	7,092	106,620
2050	49,268	11,218	2,004	16,309	6,493	85,292
2051	49,268	11,218	2,004	16,309	6,493	85,292
2052	29,444	7,675	1,138	12,361	5,268	55,886
2053	5,349	262	0	4	2,174	7,789
2054	18,699	1,180	332	11	1,849	22,071
2055	14,644	9,156	305	2	572	24,680
2056	12,657	10,417	268	0	394	23,735
2057	380	313	8	0	12	713
2058-96	0	0	0	0	0	0
2097	0	3,227	0	0	29,260	32,486
Total	453,299	134,816	16,117	140,435	90,656	835,323

**Palo Verde Nuclear Generating Station
2019 Decommissioning Cost Study**

**Document A04-1761-001, Rev. 1
Appendix B, Page 98 of 183**

**TABLE B-3
SCHEDULE OF ANNUAL EXPENDITURES
DECON, UNIT 3
(thousands, 2019 dollars)**

Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2047	12,324	227	271	2	713	13,538
2048	95,352	12,959	3,566	12,753	17,022	141,652
2049	69,361	30,651	2,539	36,513	8,114	147,176
2050	68,834	29,346	2,500	35,246	8,004	143,930
2051	61,962	12,332	2,004	18,728	6,580	101,605
2052	62,131	12,366	2,010	18,779	6,598	101,884
2053	59,856	12,041	1,909	18,368	6,398	98,573
2054	39,607	4,790	736	5,749	2,775	53,657
2055	26,058	15,556	305	2	2,127	44,048
2056	24,033	17,866	268	0	2,229	44,395
2057	722	537	8	0	67	1,334
2058-96	0	0	0	0	0	0
2097	0	3,227	0	0	29,260	32,486
Total	520,239	151,895	16,117	146,141	89,887	924,279

**Palo Verde Nuclear Generating Station
2019 Decommissioning Cost Study**

**Document A04-1761-001, Rev. 1
Appendix B, Page 99 of 183**

**TABLE B-4
SCHEDULE OF ANNUAL EXPENDITURES
STORED STEAM GENERATORS & STORAGE FACILITY**
(thousands, 2019 dollars)

Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2045	399	196	0	0	0	594
2046	3,371	10,007	0	12,597	2,072	28,047
2047	3,371	10,007	0	12,597	2,072	28,047
2048	0	0	0	0	0	0
2049	0	0	0	0	0	0
2050	0	0	0	0	0	0
2051	0	0	0	0	0	0
2052	0	0	0	0	0	0
2053	0	0	0	0	0	0
2054	0	0	0	0	0	0
2055	78	308	0	0	0	386
Total	7,219	20,518	0	25,194	4,144	57,074

**Palo Verde Nuclear Generating Station
2019 Decommissioning Cost Study**

**Document A04-1761-001, Rev. 1
Appendix B, Page 100 of 183**

**TABLE B-5
SCHEDULE OF ANNUAL EXPENDITURES
WATER RECLAMATION FACILITY
(thousands, 2019 dollars)**

Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2047	1,603	293	0	0	0	1,896
2048	809	65	0	0	0	874
2049	809	65	0	0	0	874
2050	809	65	0	0	0	874
2051	809	65	0	0	0	874
2052	809	65	0	0	0	874
2053	809	65	0	0	0	874
2054	809	65	0	0	0	874
2055	946	2,069	0	0	0	3,014
Total	8,208	2,819	0	0	0	11,027

**Palo Verde Nuclear Generating Station
2019 Decommissioning Cost Study**

**Document A04-1761-001, Rev. 1
Appendix B, Page 101 of 183**

**TABLE B-6
SCHEDULE OF ANNUAL EXPENDITURES
WATER RECLAMATION SUPPLY SYSTEM PIPELINE & STRUCTURES
(thousands, 2019 dollars)**

Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2047	425	293	0	0	0	719
2048	6,981	563	0	0	0	7,544
2049	6,981	563	0	0	0	7,544
2050	6,981	563	0	0	0	7,544
2051	6,981	563	0	0	0	7,544
2052	6,981	563	0	0	0	7,544
2053	6,981	563	0	0	0	7,544
2054	6,981	563	0	0	0	7,544
2055	156	341	0	0	0	497
Total	49,446	4,578	0	0	0	54,024

**Palo Verde Nuclear Generating Station
2019 Decommissioning Cost Study**

**Document A04-1761-001, Rev. 1
Appendix B, Page 102 of 183**

**TABLE B-7
SCHEDULE OF ANNUAL EXPENDITURES
EVAPORATION PONDS
(thousands, 2019 dollars)**

Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2045	12,476	10,195	0	0	0	22,670
2046	0	0	0	0	0	0
2047	0	0	0	0	0	0
2048	2,998	2,998	0	0	0	5,996
2049	2,998	2,998	0	0	0	5,996
2050	2,998	2,998	0	0	0	5,996
2051	2,998	2,998	0	0	0	5,996
2052	2,998	2,998	0	0	0	5,996
2053	2,998	2,998	0	0	0	5,996
2054	2,998	2,998	0	0	0	5,996
2055	684	684	0	0	0	1,369
Total	34,145	31,864	0	0	0	66,009

TABLE B-8
SCHEDULE OF ANNUAL EXPENDITURES
MAKE-UP WATER RESERVOIRS
(thousands, 2019 dollars)

Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2045	0	0	0	0	0	0
2046	0	0	0	0	0	0
2047	253	0	0	0	0	253
2048	333	333	0	0	0	666
2049	333	333	0	0	0	666
2050	333	333	0	0	0	666
2051	333	333	0	0	0	666
2052	333	333	0	0	0	666
2053	333	333	0	0	0	666
2054	333	333	0	0	0	666
2055	76	76	0	0	0	152
Total	2,661	2,408	-	-	-	5,069

**TABLE B-9
SCHEDULE OF ANNUAL EXPENDITURES
DECON, ISFSI
(thousands, 2019 dollars)**

Year	ISFSI Operations (Each Unit's Shut Down through End of DOE ISFSI Pickup)	ISFSI License Termination	ISFSI Demolition and Site Restoration	Total
2047	1,288	-	-	1,288
2048	4,510	-	-	4,510
2049	3,221	-	-	3,221
2050	4,832	-	-	4,832
2051	3,221	-	-	3,221
2052	3,221	-	-	3,221
2053	3,221	-	-	3,221
2054	2,255	-	-	2,255
2055	2,255	-	-	2,255
2056	2,255	-	-	2,255
2057	2,255	-	-	2,255
2058	1,933	-	-	1,933
2059	2,255	-	-	2,255
2060	2,255	-	-	2,255
2061	2,255	-	-	2,255
2062	2,255	-	-	2,255
2063	2,255	-	-	2,255
2064	2,255	-	-	2,255
2065	2,255	-	-	2,255
2066	1,933	-	-	1,933
2067	2,255	-	-	2,255
2068	2,255	-	-	2,255
2069	2,255	-	-	2,255
2070	2,255	-	-	2,255
2071	2,255	-	-	2,255
2072	2,255	-	-	2,255
2073	2,255	-	-	2,255
2074	1,933	-	-	1,933

*Palo Verde Nuclear Generating Station
2019 Decommissioning Cost Study*

*Document A04-1761-001, Rev. 1
Appendix B, Page 105 of 183*

TABLE B-9 (continued)
SCHEDULE OF ANNUAL EXPENDITURES
DECON, ISFSI
(thousands, 2019 dollars)

Year	ISFSI Operations (Each Unit's Shut Down through End of DOE ISFSI Pickup)	ISFSI License Termination	ISFSI Demolition and Site Restoration	Total
2075	2,255	-	-	2,255
2076	2,255	-	-	2,255
2077	2,255	-	-	2,255
2078	2,255	-	-	2,255
2079	2,255	-	-	2,255
2080	2,255	-	-	2,255
2081	2,255	-	-	2,255
2082	1,933	-	-	1,933
2083	2,255	-	-	2,255
2084	2,255	-	-	2,255
2085	2,255	-	-	2,255
2086	2,255	-	-	2,255
2087	2,255	-	-	2,255
2088	2,255	-	-	2,255
2089	2,255	-	-	2,255
2090	1,933	-	-	1,933
2091	2,255	-	-	2,255
2092	2,255	-	-	2,255
2093	2,255	-	-	2,255
2094	2,255	-	-	2,255
2095	1,288	-	-	1,288
2096	3,865	-	-	3,865
2097	1,933	-	-	1,933
2098	-	15,848	8,706	24,554
2099	-			
Total	121,440	15,848	8,706	145,994

**Palo Verde Nuclear Generating Station
2019 Decommissioning Cost Study**

**Document A04-1761-001, Rev. 1
Appendix B, Page 106 of 183**

**TABLE B-10
SCHEDULE OF ANNUAL EXPENDITURES
STORED REACTOR CLOSURE HEADS & STORAGE FACILITY
(thousands, 2019 dollars)**

Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2045	393	293	0	0	0	686
2046	138	138	0	1,024	1,014	2,314
2047	138	138	0	1,024	1,014	2,314
2048						0
2049						0
2050						0
2051						0
2052						0
2053						0
2054	54	36	0	0	0	90
2055	0	0	0	0	0	0
Total	723	606	0	2,048	2,028	5,405

APPENDIX C
DETAILED COST ANALYSIS
DECON

	<u>Page</u>
Palo Verde Nuclear Generating Station, Unit 1	108
Palo Verde Nuclear Generating Station, Unit 2	117
Palo Verde Nuclear Generating Station, Unit 3	125

Table C-1
Palo Verde NGS Unit 1
DECON Decommissioning Cost Estimate
(Thousands of 2019 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	OffSite Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Fees Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed -Offsite- Cu Feet	Class A Cu Feet	Class B Cu Feet	Class C Cu Feet	GFCF Cu Feet	Burial/Processed Wt, lbs	Craft Manhours	Utility and Outsource Manhours
PERIOD 0a - Pre-Shutdown Early Planning																					
Period 0a Direct Decommissioning Activities																					
Period 0a Collateral Costs																					
0a 3	Subtotal Period 0a Collateral Costs	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Period 0a Period Dependent Costs																					
0a 4.1	Insurance	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
0a 4.2	Property taxes	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
0a 4.3	Plant energy budget	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
0a 4.4	Utility Staff Cost	-	-	-	-	-	-	1,616	242	1,858	1,858	-	-	-	-	-	-	-	-	-	20,280
0a 4	Subtotal Period 0a Period Dependent Costs	-	-	-	-	-	-	1,616	242	1,858	1,858	-	-	-	-	-	-	-	-	-	20,280
0a 0	TOTAL PERIOD 0a COST	-	-	-	-	-	-	1,616	242	1,858	1,858	-	-	-	-	-	-	-	-	-	20,280
PERIOD 0b - Pre-Shutdown Preparations																					
Period 0b Direct Decommissioning Activities																					
0b 1.1	Prepare preliminary decommissioning cost	-	-	-	-	-	-	99	15	114	114	-	-	-	-	-	-	-	-	-	1,300
0b 1.2	Notification of Cessation of Operations	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
0b 1.3	Remove fuel & source material	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
0b 1.4	Notification of Permanent Defueling	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
0b 1.5	Deactivate plant systems & process waste	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
0b 1.6	Prepare and submit PSDAR	-	-	-	-	-	-	152	23	175	175	-	-	-	-	-	-	-	-	-	2,000
0b 1.7	Review plant dwgs & specs	-	-	-	-	-	-	140	52	402	402	-	-	-	-	-	-	-	-	-	4,600
0b 1.8	Perform detailed rad survey	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
0b 1.9	Estimate by product inventory	-	-	-	-	-	-	76	11	87	87	-	-	-	-	-	-	-	-	-	1,000
0b 1.10	End product description	-	-	-	-	-	-	76	11	87	87	-	-	-	-	-	-	-	-	-	1,000
0b 1.11	Detailed by product inventory	-	-	-	-	-	-	99	15	114	114	-	-	-	-	-	-	-	-	-	1,300
0b 1.12	Define major work sequence	-	-	-	-	-	-	570	85	655	655	-	-	-	-	-	-	-	-	-	7,600
0b 1.13	Perform SER and EA	-	-	-	-	-	-	236	35	271	271	-	-	-	-	-	-	-	-	-	3,100
0b 1.14	Prepare/submit Detailed Technical Specifications	-	-	-	-	-	-	570	85	655	655	-	-	-	-	-	-	-	-	-	7,600
0b 1.15	Perform Site Specific Cost Study	-	-	-	-	-	-	380	67	437	437	-	-	-	-	-	-	-	-	-	5,000
0b 1.16	Prepare/submit Irradiated Fuel Management Plan	-	-	-	-	-	-	76	11	87	87	-	-	-	-	-	-	-	-	-	1,000
Activity Specifications																					
0b 1.17.1	Plant & temporary facilities	-	-	-	-	-	-	374	56	430	387	-	43	-	-	-	-	-	-	-	4,920
0b 1.17.2	Plant systems	-	-	-	-	-	-	317	47	364	328	-	36	-	-	-	-	-	-	-	4,167
0b 1.17.3	NSSS Decontamination Flush	-	-	-	-	-	-	38	6	44	44	-	-	-	-	-	-	-	-	-	500
0b 1.17.4	Reactor internals	-	-	-	-	-	-	639	81	620	620	-	-	-	-	-	-	-	-	-	7,100
0b 1.17.5	Reactor vessel	-	-	-	-	-	-	494	74	568	568	-	-	-	-	-	-	-	-	-	6,600
0b 1.17.6	Biological shield	-	-	-	-	-	-	38	6	44	44	-	-	-	-	-	-	-	-	-	500
0b 1.17.7	Steam generators	-	-	-	-	-	-	237	36	273	273	-	-	-	-	-	-	-	-	-	3,120
0b 1.17.8	Reinforced concrete	-	-	-	-	-	-	122	18	140	140	-	70	-	-	-	-	-	-	-	1,600
0b 1.17.9	Main Turbine	-	-	-	-	-	-	30	5	35	35	-	-	-	-	-	-	-	-	-	400
0b 1.17.10	Main Condensers	-	-	-	-	-	-	30	5	35	35	-	-	-	-	-	-	-	-	-	400
0b 1.17.11	Plant structures & buildings	-	-	-	-	-	-	237	36	273	136	-	136	-	-	-	-	-	-	-	3,120
0b 1.17.12	Waste management	-	-	-	-	-	-	349	52	402	402	-	-	-	-	-	-	-	-	-	4,600
0b 1.17.13	Facility & site closure	-	-	-	-	-	-	68	10	79	39	-	39	-	-	-	-	-	-	-	900
0b 1.17	Total	-	-	-	-	-	-	2,874	431	3,305	2,910	-	395	-	-	-	-	-	-	-	37,827
0b 1	Subtotal Period 0b Activity Costs	-	-	-	-	-	-	6,665	833	6,389	5,994	-	395	-	-	-	-	-	-	-	73,127
Period 0b Collateral Costs																					
0b 3	Subtotal Period 0b Collateral Costs	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Period 0b Period Dependent Costs																					
0b 4.1	Insurance	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
0b 4.2	Property taxes	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
0b 4.3	Plant energy budget	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
0b 4.4	Utility Staff Cost	-	-	-	-	-	-	4,083	613	4,696	4,696	-	-	-	-	-	-	-	-	-	47,906
0b 4	Subtotal Period 0b Period Dependent Costs	-	-	-	-	-	-	4,083	613	4,696	4,696	-	-	-	-	-	-	-	-	-	47,906
0b 0	TOTAL PERIOD 0b COST	-	-	-	-	-	-	9,639	1,446	11,085	10,690	-	395	-	-	-	-	-	-	-	121,032

Table C-1
Palo Verde NGS Unit 1
DECON Decommissioning Cost Estimate
(Thousands of 2019 Dollars)

Activity Index	Activity Description	Decom Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	Lic. Term. Costs	NRC Management Costs	Spent Fuel Restoration Costs	Site Restoration Costs	Processed Volume Cu. Feet	Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet	Burial/Processed Wt. Lbs.	Craft Manhours	Utility and Contractor Manhours
PERIOD 1a - Shutdown through Transition																						
Period 1a Direct Decommissioning Activities																						
Planning & Site Preparations																						
1a 1.1	Prepare dismantling sequence	-	-	-	-	-	-	182	27	210	-	-	-	-	-	-	-	-	-	-	-	2,400
1a 1.2	Plant prep & temp. access	-	-	-	-	-	-	3,400	610	3,910	-	-	-	-	-	-	-	-	-	-	-	-
1a 1.3	Design water clean up system	-	-	-	-	-	-	106	10	122	-	-	-	-	-	-	-	-	-	-	-	1,400
1a 1.4	Rigging/Cont. Vent. Envelope/cooling/etc.	-	-	-	-	-	-	2,400	300	2,700	-	-	-	-	-	-	-	-	-	-	-	-
1a 1.6	Procure casks/liners & containers	-	-	-	-	-	-	93	14	107	-	-	-	-	-	-	-	-	-	-	-	1,230
1a 1	Subtotal Period 1a Activity Costs	-	-	-	-	-	-	6,182	927	7,109	-	-	-	-	-	-	-	-	-	-	-	5,030
Period 1a Additional Costs																						
1a 2.1	Staff Transition	-	-	-	-	-	-	39,281	6,892	46,173	-	-	-	-	-	-	-	-	-	-	-	-
1a 2	Subtotal Period 1a Additional Costs	-	-	-	-	-	-	39,281	6,892	46,173	-	-	-	-	-	-	-	-	-	-	-	-
Period 1a Collateral Costs																						
1a 3	Subtotal Period 1a Collateral Costs	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Period 1a Period Dependent Costs																						
1a 4.1	Insurance	-	-	-	-	-	-	3,479	349	3,827	-	-	-	-	-	-	-	-	-	-	-	-
1a 4.2	Property taxes	-	-	-	-	-	-	333	33	366	-	-	-	-	-	-	-	-	-	-	-	-
1a 4.3	Health physics supplies	-	513	-	-	-	-	128	641	641	-	-	-	-	-	-	-	-	-	-	-	-
1a 4.4	Heavy equipment rental	-	646	-	-	-	-	82	628	628	-	-	-	-	-	-	-	-	-	-	-	-
1a 4.6	Disposal of DAW generated	-	-	31	10	-	18	-	7	46	-	-	-	-	-	610	-	-	-	12,190	20	-
1a 4.6	Plant energy budget	-	-	-	-	-	-	2,724	349	2,672	-	-	-	-	-	-	-	-	-	-	-	-
1a 4.7	NRC Fees	-	-	-	-	-	-	1,058	110	1,208	-	-	-	-	-	-	-	-	-	-	-	-
1a 4.8	Emergency Planning Fees	-	-	-	-	-	-	1,050	105	1,155	-	-	1,155	-	-	-	-	-	-	-	-	-
1a 4.9	Spent Fuel Pool O&M	-	-	-	-	-	-	828	124	952	-	-	952	-	-	-	-	-	-	-	-	-
1a 4.10	Security Staff Cost	-	-	-	-	-	-	9,522	1,428	10,951	-	-	-	-	-	-	-	-	-	-	-	-
1a 4.11	Utility Staff Cost	-	-	-	-	-	-	31,981	4,797	36,778	-	-	-	-	-	-	-	-	-	-	-	-
1a 4	Subtotal Period 1a Period Dependent Costs	-	1,069	31	10	-	18	60,614	7,611	59,223	-	-	2,107	-	-	610	-	-	-	12,190	20	695,455
1a 0	TOTAL PERIOD 1a COST	-	1,069	31	10	-	18	96,078	14,331	111,506	-	-	2,107	-	-	610	-	-	-	12,190	20	600,486
PERIOD 1b - Decommissioning Preparations																						
Period 1b Direct Decommissioning Activities																						
Detailed Work Procedures																						
1b 1.1.1	Plant systems	-	-	-	-	-	-	360	64	414	-	-	41	-	-	-	-	-	-	-	-	4,733
1b 1.1.2	NSRS Decontamination Flush	-	-	-	-	-	-	76	11	87	-	-	-	-	-	-	-	-	-	-	-	1,000
1b 1.1.3	Reactor interiors	-	-	-	-	-	-	100	28	218	-	-	-	-	-	-	-	-	-	-	-	2,500
1b 1.1.4	Remaining buildings	-	-	-	-	-	-	103	16	118	-	-	88	-	-	-	-	-	-	-	-	1,360
1b 1.1.6	CRD cooling assembly	-	-	-	-	-	-	76	11	87	-	-	-	-	-	-	-	-	-	-	-	1,000
1b 1.1.6	CRD housings & ICI tubes	-	-	-	-	-	-	76	11	87	-	-	-	-	-	-	-	-	-	-	-	1,000
1b 1.1.7	Incore instrumentation	-	-	-	-	-	-	76	11	87	-	-	-	-	-	-	-	-	-	-	-	1,000
1b 1.1.8	Reactor vessel	-	-	-	-	-	-	276	41	317	-	-	-	-	-	-	-	-	-	-	-	3,630
1b 1.1.9	Facility closeout	-	-	-	-	-	-	91	14	105	-	-	62	-	-	-	-	-	-	-	-	1,200
1b 1.1.10	Missile shields	-	-	-	-	-	-	31	6	39	-	-	-	-	-	-	-	-	-	-	-	460
1b 1.1.11	Boltopical shield	-	-	-	-	-	-	91	14	105	-	-	-	-	-	-	-	-	-	-	-	1,200
1b 1.1.12	Steam generator	-	-	-	-	-	-	349	52	402	-	-	-	-	-	-	-	-	-	-	-	4,690
1b 1.1.13	Reinforced concrete	-	-	-	-	-	-	76	11	87	-	-	44	-	-	-	-	-	-	-	-	1,000
1b 1.1.14	Main Turbine	-	-	-	-	-	-	119	18	136	-	-	-	-	-	-	-	-	-	-	-	1,660
1b 1.1.15	Main Condensers	-	-	-	-	-	-	119	18	136	-	-	-	-	-	-	-	-	-	-	-	1,660
1b 1.1.16	Auxiliary building	-	-	-	-	-	-	207	31	239	-	-	216	-	-	-	-	-	-	-	-	2,730
1b 1.1.17	Reactor building	-	-	-	-	-	-	207	31	239	-	-	216	-	-	-	-	-	-	-	-	2,730
1b 1.1	Total	-	-	-	-	-	-	2,625	379	2,904	-	-	2,368	-	-	-	-	-	-	-	-	13,243
1b 1.2	Decom primary loop	-	1,047	-	-	-	-	-	623	1,570	-	-	-	-	-	-	-	-	-	-	1,067	-
1b 1	Subtotal Period 1b Activity Costs	-	1,047	-	-	-	-	2,625	902	4,475	-	-	646	-	-	-	-	-	-	-	1,067	53,241
Period 1b Additional Costs																						
1b 2.1	Spent Fuel Pool Isolation	-	-	-	-	-	-	12,326	1,849	14,174	-	-	-	-	-	-	-	-	-	-	-	-
1b 2.2	Site Characterization	-	-	-	-	-	-	6,991	1,797	7,788	-	-	-	-	-	-	-	-	-	-	30,600	10,852
1b 2	Subtotal Period 1b Additional Costs	-	-	-	-	-	-	18,316	3,646	21,963	-	-	-	-	-	-	-	-	-	-	30,600	10,852

Table C-1
Palo Verde NGS Unit 1
DECON Decommissioning Cost Estimate
(Thousands of 2019 Dollars)

Activity Codes	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	OTOC Cu. Feet	Burial/ Processed Wt. Lbs.	Craft Manhours	Utility and Overhead Manhours
Period 1b	Collateral Costs																				
1b 3.1	Decon equipment		1,026	-	-	-	-	-	154	1,180	1,180	-	-	-	-	-	-	-	-	-	-
1b 3.2	Staff relocation expenses			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1b 3.3	Process decommissioning water waste		70	42	61	-	90	-	71	333	333	-	-	-	429	-	-	-	25,760	81	-
1b 3.4	Process decommissioning chemical flash waste		4	125	378	-	7,130	-	1,854	9,490	9,490	-	-	-	-	1,329	-	-	141,637	249	-
1b 3.5	Small tool allowance			1	-	-	-	-	0	2	2	-	-	-	-	-	-	-	-	-	-
1b 3.6	Pipe cutting equipment			1,200	-	-	-	-	180	1,380	1,380	-	-	-	-	-	-	-	-	-	-
1b 3.7	Deconrig		2,093	-	-	-	-	-	314	2,407	2,407	-	-	-	-	-	-	-	-	-	-
1b 3	Subtotal Period 1b Collateral Costs		1,193	1,201	166	438	7,220	-	2,572	14,791	14,791	-	-	-	129	1,329	-	-	167,397	332	-
Period 1b	Period Dependent Costs																				
1b 4.1	Dioxin supplies		37	-	-	-	-	-	9	46	46	-	-	-	-	-	-	-	-	-	-
1b 4.2	Insurance			-	-	-	-	1,744	174	1,919	1,919	-	-	-	-	-	-	-	-	-	-
1b 4.3	Property taxes			-	-	-	-	107	17	184	184	-	-	-	-	-	-	-	-	-	-
1b 4.4	Health physics supplies			250	-	-	-	-	72	362	362	-	-	-	-	-	-	-	-	-	-
1b 4.5	Heavy equipment rental			274	-	-	-	-	41	315	315	-	-	-	-	-	-	-	-	-	-
1b 4.6	Disposal of DAW generated			-	6	6	11	-	4	27	27	-	-	-	359	-	-	-	7,183	12	-
1b 4.7	Plant energy budget			-	-	-	-	2,330	349	2,679	2,679	-	-	-	-	-	-	-	-	-	-
1b 4.8	NRC Fees			-	-	-	-	305	31	336	336	-	-	-	-	-	-	-	-	-	-
1b 4.9	Emergency Planning Fees			-	-	-	-	636	63	699	699	-	-	-	-	-	-	-	-	-	-
1b 4.10	Spent Fuel Pool O&M			-	-	-	-	416	62	477	477	-	-	-	-	-	-	-	-	-	-
1b 4.11	Security Staff Cost			-	-	-	-	4,774	716	5,490	5,490	-	-	-	-	-	-	-	-	-	86,837
1b 4.12	Utility Staff Cost			-	-	-	-	21,234	3,185	24,419	24,419	-	-	-	-	-	-	-	-	12	278,441
1b 4	Subtotal Period 1b Period Dependent Costs		37	584	6	6	11	31,495	4,714	36,832	36,776	1,066	-	-	359	-	-	-	7,183	12	346,277
1b 0	TOTAL PERIOD 1b COST		4,276	1,765	173	444	7,231	62,337	11,835	78,061	76,468	1,066	546	-	789	1,329	-	-	174,580	31,911	1,009,957
PERIOD 1 TOTALS			4,276	2,924	183	451	7,249	148,415	26,165	189,566	188,858	3,163	546	-	1,398	1,329	-	-	186,771	31,931	1,009,957
PERIOD 2a - Large Component Removal																					
Period 2a	Direct Decommissioning Activities																				
Nuclear Steam Supply System Removal																					
2a 1.1.1	Reactor Coolant Piping		142	137	30	37	-	387	210	943	943	-	-	-	1,789	-	-	-	124,853	6,464	-
2a 1.1.2	Pressurizer Quench Tank		8	7	1	4	-	44	18	84	84	-	-	-	201	-	-	-	14,061	376	-
2a 1.1.3	Reactor Coolant Pumps & Motors		133	70	365	369	-	885	395	2,197	2,197	-	-	-	10,637	-	-	-	1,108,000	5,539	100
2a 1.1.4	Pressurizer		32	41	190	98	-	229	149	1,039	1,039	-	-	-	2,879	-	-	-	324,870	2,373	625
2a 1.1.5	Steam Generators		210	3,029	8,030	1,201	-	6,762	3,536	22,769	22,769	-	-	-	49,516	-	-	-	4,416,367	45,354	958
2a 1.1.6	CRDMs/ICIS/Service Structure Removal		132	336	414	80	-	1,033	462	2,457	2,457	-	-	-	8,222	-	-	-	333,327	10,981	-
2a 1.1.7	Reactor Vessel Internals		113	6,767	19,204	1,018	-	8,190	14,351	50,143	50,143	-	-	-	2,379	673	224	-	308,755	43,357	1,893
2a 1.1.8	Reactor Vessel		102	8,117	3,499	882	-	3,621	511	9,221	26,353	26,353	-	-	-	17,963	-	-	1,350,028	43,357	1,893
2a 1.1	Totals		872	18,491	32,414	1,680	-	21,161	1,021	28,342	106,985	106,985	-	-	93,686	673	224	-	7,966,740	157,799	6,469
Removal of Major Equipment																					
2a 1.2	Main Turbine/Generator		119	-	-	-	-	-	18	137	-	-	137	-	-	-	-	-	-	-	1,424
2a 1.3	Main Condensers		1,281	1,223	699	-	12,914	-	3,776	19,893	19,893	-	-	-	65,676	-	-	-	4,165,812	35,411	-
Cascading Costs from Clean Building Demolition																					
2a 1.4.1	Auxiliary Building		156	-	-	-	-	-	23	179	179	-	-	-	-	-	-	-	-	-	1,392
2a 1.4.2	Containment		408	-	-	-	-	-	61	470	470	-	-	-	-	-	-	-	-	-	4,270
2a 1.4.3	Main Steam Support Structure		31	-	-	-	-	-	6	36	36	-	-	-	-	-	-	-	-	-	274
2a 1.4.4	Radwaste Building		164	-	-	-	-	-	25	188	188	-	-	-	-	-	-	-	-	-	2,404
2a 1.4.5	Fuel Building		70	-	-	-	-	-	10	80	80	-	-	-	-	-	-	-	-	-	632
2a 1.4	Totals		829	-	-	-	-	-	124	953	953	-	-	-	-	-	-	-	-	-	8,883
Disposal of Plant Systems																					
2a 1.6.1	Auxiliary Feedwater (AF)		39	-	-	-	-	-	6	45	-	-	45	-	-	-	-	-	-	-	1,309
2a 1.6.2	Auxiliary Steam (AS)		44	-	-	-	-	-	7	51	-	-	51	-	-	-	-	-	-	-	1,500
2a 1.6.3	Auxiliary Steam (AS) RCA		168	36	17	-	313	-	126	660	660	-	-	-	1,569	-	-	-	100,889	3,888	-
2a 1.6.4	CT Makeup & Blowdown (TB)		18	3	2	-	37	-	14	74	74	-	-	-	186	-	-	-	11,785	451	-
2a 1.6.5	Chemical Production (CT)		17	-	-	-	-	-	2	19	-	-	19	-	-	-	-	-	-	-	630
2a 1.6.6	Chlorine Injection (CI)		56	-	-	-	-	-	8	64	-	-	64	-	-	-	-	-	-	-	1,829
2a 1.6.7	Circulating Water (CW)		107	-	-	-	-	-	16	124	-	-	124	-	-	-	-	-	-	-	3,546
2a 1.6.8	Condensate (CD)		191	-	-	-	-	-	29	219	-	-	219	-	-	-	-	-	-	-	6,510
2a 1.6.9	Condensate Storage & Transfer (CT)		248	-	-	-	307	-	145	719	719	-	-	-	1,642	-	-	-	99,006	6,046	-
2a 1.6.10	Condensate Air Removal (AR)		39	33	17	-	-	-	6	45	-	-	45	-	-	-	-	-	-	-	1,316
2a 1.6.11	Demineralized Water (DW)		64	-	-	-	-	-	10	73	-	-	73	-	-	-	-	-	-	-	2,085
2a 1.6.12	Diesel Fuel Oil & Transfer (DP)		49	-	-	-	-	-	7	56	-	-	56	-	-	-	-	-	-	-	1,492
2a 1.6.13	Diesel Generator (DG)		58	-	-	-	-	-	9	67	-	-	67	-	-	-	-	-	-	-	1,862
2a 1.6.14	PW Heater Exhaust Steam & Drains (ED)		442	-	-	-	-	-	442	508	508	-	-	-	-	-	-	-	-	-	14,838
2a 1.6.15	Feedwater (FW)		93	-	-	-	-	-	14	107	-	-	107	-	-	-	-	-	-	-	3,094

Table C-1
Palo Verde NGS Unit 1
DECON Decommissioning Cost Estimate
(Thousands of 2019 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 - Netowork Cu Feet	Class A Cu Feet	Class B Cu Feet	Class C Cu Feet	GTCC Cu Feet	Burial/Processed Wt. Lbs	Craft Manhours	Utility and Contractor Manhours
Disposal of Plant Systems (Continued)																					
2a 1 5 16	Feedwater (F.W.) RCA		21	12	7	-	129	-	40	209	209	-	-	-	656	-	-	-	41 735	541	
2a 1 5 17	Generator Hydrogen & CO2 (G.H.)		3	-	-	-	-	-	0	3	-	-	3	-	-	-	-	-	102		
2a 1 5 18	Generator Seal Oil (SO)		7	-	-	-	-	-	1	8	-	-	-	-	-	-	-	-	236		
2a 1 5 19	HVAC Misc Site Structures (H.S.)		16	-	-	-	-	-	2	18	-	-	18	-	-	-	-	-	630		
2a 1 5 20	Lube Oil (L.O.)		36	-	-	-	-	-	5	42	-	-	42	-	-	-	-	-	1 188		
2a 1 5 21	Lube Oil Stor & Trans & Purification (OS)		32	-	-	-	-	-	5	36	-	-	36	-	-	-	-	-	1 038		
2a 1 5 22	Main Steam (S.O.)		233	-	-	-	-	-	30	263	-	-	263	-	-	-	-	-	8 032		
2a 1 5 23	Main Steam (S.O.) RCA		94	37	20	-	772	-	123	647	647	-	268	-	1 878	-	-	-	119 916	2 297	
2a 1 5 24	Main Turbine (MT)		370	572	332	-	6 127	-	1 731	9 133	9 133	-	-	-	31 043	-	-	-	1 976 452	10 489	
2a 1 5 25	Main Turbine Control Oil (CO)		6	-	-	-	-	-	1	6	-	-	6	-	-	-	-	-	176		
2a 1 5 26	Secondary Chemical Control (S.C.)		171	-	-	-	-	-	26	197	-	-	197	-	-	-	-	-	6 637		
2a 1 5 27	Stator Cooling (CS)		4	-	-	-	-	-	1	5	-	-	5	-	-	-	-	-	139		
2a 1 5 28	Steam Gen Feedwater Pump Turbine (PT)		184	72	38	-	701	-	214	1 229	1 220	-	-	-	3 630	-	-	-	226 098	4 717	
2a 1 5 29	Turbine Cooling Water (TC)		140	-	-	-	-	-	21	161	-	-	161	-	-	-	-	-	4 675		
2a 1 5 30	Turbine Steam Seal & Drain (GS)		109	19	16	-	184	-	77	400	400	-	-	-	927	-	-	-	59 477	2 711	
2a 1 6	Totals		3 060	785	442	-	8 170	-	2 768	15 225	11 100	-	2 125	-	41 331	-	-	-	2 635 358	92 914	
2a 1 6	Scaffolding in support of decommissioning		2 995	18	16	-	193	-	800	4 017	4 017	-	-	-	978	-	-	-	62 169	33 763	
2a 1	Subtotal Period 2a Activity Costs		872	26 779	34 441	4 832	42 438	1 021	35 828	146 211	143 948	-	2 263	-	201 470	671	224	-	14 819 070	332 194	6 469
Period 2a Collateral Costs																					
2a 3 1	Process decommissioning water waste	119	-	73	106	-	167	-	122	577	577	-	-	-	749	-	-	-	44 939	146	
2a 3 2	Process decommissioning chemical flush waste		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
2a 3 3	Small tool allowance		253	-	-	-	-	-	38	291	292	-	29	-	-	-	-	-	-	-	
2a 3	Subtotal Period 2a Collateral Costs	119	253	73	106	-	167	-	160	868	839	-	29	-	749	-	-	-	44 939	146	
Period 2a Period Dependent Costs																					
2a 4 1	Decon supplies	148	-	-	-	-	-	-	37	185	185	-	-	-	-	-	-	-	-	-	
2a 4 2	Insurance		-	-	-	-	1 693	-	169	1 863	1 863	-	-	-	-	-	-	-	-	-	
2a 4 3	Property taxes		-	-	-	-	676	-	68	744	744	-	-	-	-	-	-	-	-	-	
2a 4 4	Health physics supplies		2 642	-	-	-	-	-	660	3 302	3 302	-	-	-	-	-	-	-	-	-	
2a 4 5	Heavy equipment rental		4 332	-	-	-	-	-	650	4 982	4 982	-	-	-	-	-	-	-	-	-	
2a 4 6	Disposal of DAW generated		-	110	100	-	184	-	72	467	467	-	-	-	6 230	-	-	-	124 603	203	
2a 4 7	Plant energy budget		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
2a 4 8	NRC Fees		-	-	-	-	4 481	-	672	5 154	5 154	-	-	-	-	-	-	-	-	-	
2a 4 9	Emergency Planning Fees		-	-	-	-	1 123	-	112	1 236	1 236	-	-	-	-	-	-	-	-	-	
2a 4 10	Spent Fuel Pool O&M		-	-	-	-	1 759	-	171	1 860	1 860	1 860	-	-	-	-	-	-	-	-	
2a 4 11	Remedial Actions Surveys		-	-	-	-	1 690	-	252	1 932	1 932	-	-	-	-	-	-	-	-	-	
2a 4 12	Security Staff Cost		-	-	-	-	2 665	-	2 665	2 665	2 665	-	-	-	-	-	-	-	-	-	
2a 4 13	Utility Staff Cost		-	-	-	-	17 177	-	2 677	19 754	19 754	-	-	-	-	-	-	-	-	-	
2a 4	Subtotal Period 2a Period Dependent Costs	148	6 974	110	100	-	184	101 668	16 025	126 199	121 388	3 812	-	-	6 230	-	-	-	124 603	203	309 462
2a 0	TOTAL PERIOD 2a COST	1,140	34 006	34 624	5 038	-	42 779	102 679	62 013	272 278	266 176	3 812	2 292	-	208 449	673	224	-	14 988 610	332 643	1 229 040
PERIOD 2b - Site Decontamination																					
Period 2b Direct Decommissioning Activities																					
Disposal of Plant Systems																					
2b 1 1 1	Chemical & Volume Control (C.H.)	1 658	2 075	424	209	-	3 865	-	2 388	10 619	10 619	-	-	-	19 442	-	-	-	1 246 583	90 947	
2b 1 1 2	Chemical Waste (CM)	348	474	66	34	-	625	-	461	2 007	2 007	-	-	-	3 149	-	-	-	201 601	18 864	
2b 1 1 3	Containment Building (CB)		1	0	0	-	0	-	0	1	1	-	-	-	2	-	-	-	118	15	
2b 1 1 4	Containment Hydrogen Control (HP)		92	17	8	-	149	-	63	329	329	-	-	-	748	-	-	-	48 116	2 154	
2b 1 1 5	Containment Leakage Test (CL)		30	12	7	-	136	-	44	229	229	-	-	-	690	-	-	-	43 834	812	
2b 1 1 6	Containment Purge (CP)		31	11	6	-	114	-	38	201	201	-	-	-	677	-	-	-	36 798	827	
2b 1 1 7	Domestic Water (DS)		109	-	-	-	-	-	16	126	126	-	-	-	126	-	-	-	-	3 676	
2b 1 1 8	Electrical (Clean)		988	-	-	-	148	-	148	1 136	1 136	-	-	-	1 136	-	-	-	-	30 827	
2b 1 1 9	Electrical (Clean) RCA		734	128	78	-	1 447	-	570	2 957	2 957	-	-	-	7 349	-	-	-	466 836	16 187	
2b 1 1 10	Electrical (Contaminated)		4 260	430	275	-	5 081	-	2 419	12 465	12 465	-	-	-	25 799	-	-	-	1 638 961	97 766	
2b 1 1 11	Essential Chilled Water (EC)		16	-	-	-	-	-	2	18	18	-	-	-	18	-	-	-	-	547	
2b 1 1 12	Essential Chilled Water (EC) RCA		168	27	12	-	217	-	101	624	624	-	-	-	1 082	-	-	-	60 840	3 797	
2b 1 1 13	Essential Cooling Water (FW)		67	-	-	-	-	-	8	66	66	-	-	-	65	-	-	-	-	1 903	
2b 1 1 14	Essential Cooling Water (FW) RCA		83	26	14	-	264	-	92	479	479	-	-	-	1 334	-	-	-	85 125	1 997	
2b 1 1 15	Essential Spray Pond (SP)		287	-	-	-	-	-	43	330	330	-	-	-	330	-	-	-	-	9 865	
2b 1 1 16	Fire Protection (FP)		166	-	-	-	-	-	16	122	122	-	-	-	122	-	-	-	-	3 646	
2b 1 1 17	Fire Protection (FP) RCA		527	131	62	-	1 162	-	442	2 314	2 314	-	-	-	5 785	-	-	-	371 672	12 068	
2b 1 1 18	Gaseous Radwaste (GR)		220	13	14	-	265	-	127	659	659	-	-	-	1 327	-	-	-	86 625	6 181	
2b 1 1 19	HVAC Auxiliary Building (HA)		409	255	114	-	2 099	-	669	3 646	3 646	-	-	-	10 477	-	-	-	677 114	10 352	
2b 1 1 20	HVAC Containment Building (HC)		421	162	74	-	1 362	-	472	2 481	2 481	-	-	-	6 829	-	-	-	439 260	9 673	
2b 1 1 21	HVAC Control Building (HB)		88	-	-	-	-	-	13	102	102	-	-	-	102	-	-	-	-	3 112	

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Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu Feet	Class A Cu Feet	Class B Cu Feet	Class C Cu Feet	GTCC Cu Feet	Burial/Processed Wt. Lbs	Craft Manhours	Utility and Overhead Manhours
Disposal of Plant Systems (Continued)																					
2b 1 1 22	HVAC - Diesel Generator Building (HD)	-	9	-	-	-	-	-	1	10	-	-	10	-	-	-	-	-	-	296	
2b 1 1 23	HVAC - Radwaste (HR)	-	123	35	19	-	359	-	127	663	663	-	-	1,812	-	-	-	-	115,774	2,861	
2b 1 1 24	HVAC - Turbine Building (HT)	-	166	-	-	-	-	-	25	190	-	-	190	-	-	-	-	-	-	6,322	
2b 1 1 26	Instrument & Service Air (IA)	-	36	-	-	-	-	-	6	41	-	-	41	-	-	-	-	-	-	1,213	
2b 1 1 26	Instrument & Service Air (IA) RCA	-	718	118	41	-	767	-	387	2,022	2,022	-	-	3,734	-	-	-	-	244,352	14,701	
2b 1 1 27	Liquid Radwaste (LR)	451	731	106	49	-	906	-	682	2,804	2,804	-	-	4,638	-	-	-	-	291,979	27,224	
2b 1 1 28	Normal Chilled Water (WC)	-	70	-	-	-	-	-	10	80	-	-	80	-	-	-	-	-	-	2,362	
2b 1 1 29	Normal Chilled Water (WC) RCA	-	199	38	19	-	347	-	143	746	746	-	-	1,747	-	-	-	-	112,038	4,662	
2b 1 1 30	Nuclear Cooling Water (NC)	-	63	-	-	-	-	-	8	61	-	-	61	-	-	-	-	-	-	1,746	
2b 1 1 31	Nuclear Cooling Water (NC) - RCA	-	473	218	114	-	2,111	-	686	3,601	3,601	-	-	10,647	-	-	-	-	680,829	11,451	
2b 1 1 32	Nuclear Sampling (SS)	-	226	26	10	-	176	-	104	641	641	-	-	867	-	-	-	-	66,786	6,121	
2b 1 1 33	Only Waste & Nonradioactive Waste (DW)	-	662	66	35	-	663	-	311	1,619	1,619	-	-	3,292	-	-	-	-	210,616	13,291	
2b 1 1 34	Plant Cooling Water (PW)	-	116	-	-	-	-	-	17	132	-	-	132	-	-	-	-	-	-	3,929	
2b 1 1 35	Post Accident Sampling	-	11	1	1	-	10	-	6	27	-	-	-	6	-	-	-	-	3,169	275	
2b 1 1 36	Radiation Monitoring (SQ)	-	32	4	2	-	14	-	17	89	-	-	-	167	-	-	-	-	10,820	782	
2b 1 1 37	Radioactive Waste Drain (RD)	438	464	62	28	-	614	-	473	1,971	1,971	-	-	2,691	-	-	-	-	165,934	19,457	
2b 1 1 38	Reactor Coolant (RC)	16	171	17	6	-	118	-	83	412	412	-	-	586	-	-	-	-	38,217	4,444	
2b 1 1 39	Safety Injection (SI)	-	1,669	676	283	-	6,219	-	1,819	9,656	9,656	-	-	26,194	-	-	-	-	1,683,406	41,386	
2b 1 1 40	Service Gases (GA) RCA	-	202	31	12	-	222	-	111	680	680	-	-	1,097	-	-	-	-	71,633	4,164	
2b 1 1 41	Solid Radwaste (SR)	122	211	34	16	-	304	-	196	883	883	-	-	1,628	-	-	-	-	98,132	7,907	
2b 1 1 42	Decommissioning Crew Set-up	-	3,428	-	-	-	-	-	614	3,942	-	-	3,942	-	-	-	-	-	-	83,076	
2b 1 1	Totals	1,034	20,819	3,036	1,543	-	28,604	-	13,810	70,766	64,413	-	6,364	143,437	-	-	-	-	9,194,566	569,826	
2b 1 2	Scaffolding in support of decommissioning	-	3,744	23	13	-	241	-	1,000	5,021	5,021	-	-	-	-	-	-	-	77,698	42,204	
Decontamination of Site Buildings																					
2b 1 3 1	Auxiliary Building	649	361	66	90	-	634	-	544	2,248	2,248	-	-	9,861	-	-	-	-	488,398	22,859	
2b 1 3 2	Contaminant	1,180	1,730	269	482	-	6,479	-	2,492	11,633	11,633	-	-	68,640	-	-	-	-	2,623,111	67,811	
2b 1 3 3	Decontamination & Laundry Facility	62	21	16	7	-	106	-	66	278	278	-	-	629	-	-	-	-	37,732	2,123	
2b 1 3 4	Holdup Tank & Pump House	343	316	73	26	-	466	-	378	1,698	1,698	-	-	2,281	-	-	-	-	149,929	16,083	
2b 1 3 5	Radwaste Building	747	293	211	91	-	1,386	-	828	3,566	3,566	-	-	8,651	-	-	-	-	622,790	22,190	
2b 1 3 6	Refueling Water Storage Tank	473	382	70	28	-	608	-	471	1,942	1,942	-	-	2,496	-	-	-	-	163,942	21,082	
2b 1 3	Totals	3,354	3,106	713	728	-	8,677	-	4,778	21,256	21,256	-	-	82,560	-	-	-	-	1,986,921	151,348	
2b 1 4	Prepare/submit License Termination Plan	-	-	-	-	-	-	311	47	358	168	-	-	-	-	-	-	-	-	4,096	
2b 1 6	Receive NRC approval of termination plan	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
2b 1	Subtotal Period 2b Activity Costs	6,388	27,668	3,771	2,286	-	37,323	111	19,666	97,401	91,048	-	6,364	227,220	-	-	-	-	13,268,680	763,377	4,096
Period 2b Additional Costs																					
2b 2 1	Excavation of Underground Services	-	1,624	-	-	-	-	339	467	2,419	2,419	-	-	-	-	-	-	-	-	10,228	
2b 2	Subtotal Period 2b Additional Costs	-	1,624	-	-	-	-	339	467	2,419	2,419	-	-	-	-	-	-	-	-	10,228	
Period 2b Collateral Costs																					
2b 3 1	Process decommissioning water waste	287	-	182	263	-	391	-	299	1,422	1,422	-	-	1,862	-	-	-	-	111,707	363	
2b 3 2	Process decommissioning chemical flush waste	7	-	215	652	-	866	-	337	2,066	2,066	-	-	2,291	-	-	-	-	244,381	429	
2b 3 3	Small tool allowance	-	462	-	-	-	-	-	69	631	631	-	-	-	-	-	-	-	-	-	
2b 3	Subtotal Period 2b Collateral Costs	294	462	397	916	-	1,246	-	705	4,019	4,019	-	-	4,155	-	-	-	-	156,088	792	
Period 2b Period-Dependent Costs																					
2b 4 1	Decon supplies	1,821	-	-	-	-	-	-	456	2,276	2,276	-	-	-	-	-	-	-	-	-	
2b 4 2	Insurance	-	-	-	-	-	2,064	-	206	2,270	2,270	-	-	-	-	-	-	-	-	-	
2b 4 3	Property taxes	-	-	-	-	-	824	-	82	907	907	-	-	-	-	-	-	-	-	-	
2b 4 4	Health/physics supplies	-	4,829	-	-	-	-	-	1,207	6,036	6,036	-	-	-	-	-	-	-	-	-	
2b 4 6	Heavy equipment rental	-	6,444	-	-	-	-	-	817	6,261	6,261	-	-	-	-	-	-	-	-	-	
2b 4 6	Disposal of DRW generated	-	-	186	170	-	313	-	122	792	792	-	-	10,680	-	-	-	-	211,696	144	
2b 4 7	Plant energy budget	-	-	-	-	-	4,311	-	647	4,958	4,958	-	-	-	-	-	-	-	-	-	
2b 4 8	NRC Fees	-	-	-	-	-	1,369	-	137	1,506	1,506	-	-	-	-	-	-	-	-	-	
2b 4 9	Emergency Planning Fees	-	-	-	-	-	2,082	-	208	2,291	2,291	-	2,291	-	-	-	-	-	-	-	
2b 4 10	Spent Fuel Pool O&M	-	-	-	-	-	2,947	-	307	2,354	2,354	-	2,354	-	-	-	-	-	-	-	
2b 4 11	Liquid Radwaste Processing Equipment/Services	-	-	-	-	-	616	-	77	693	693	-	-	-	-	-	-	-	-	-	
2b 4 12	Remedial Actions Surveys	-	-	-	-	-	3,114	-	314	3,114	3,114	-	-	-	-	-	-	-	-	-	
2b 4 13	Security Staff Cost	-	-	-	-	-	20,933	-	3,140	24,072	24,072	-	-	-	-	-	-	-	-	177,106	
2b 4 14	Utility Staff Cost	-	-	-	-	-	60,408	-	9,961	69,469	69,469	-	-	-	-	-	-	-	-	806,328	
2b 4	Subtotal Period 2b Period-Dependent Costs	1,821	10,273	186	170	-	313	97,667	16,468	126,899	122,264	-	4,646	-	10,680	-	-	-	211,696	346	1,182,433
2b 0	TOTAL PERIOD 2b COST	8,603	40,027	4,364	3,370	-	38,882	98,317	37,286	230,738	210,730	-	4,646	6,364	241,956	-	-	-	13,826,260	774,742	1,186,629

Table C-1
Palo Verde NGS Unit 1
DECON Decommissioning Cost Estimate
(Thousands of 2019 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	Lic Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet	Burial/Processed Wt. Lbs.	Craft Manhours	Utility and Contractor Manhours
PERIOD 2d - Decontamination Following Wet Fuel Storage																					
Period 2d Direct Decommissioning Activities																					
2d 1 1	Remove spent fuel racks	310	31	128	17		692		354	1,553	1,553	-	-		3,515				223,325	968	
Disposal of Plant Systems																					
2d 1 2 1	Electrical Spent Fuel	-	184	91	19		348		139	720	720	-	-		1,766				112,166	4,048	
2d 1 2 2	Fuel Pool Cooling & Cleanup (P.C.)	391	393	138	67		1,237		627	2,855	2,855	-	-		6,204				399,088	13,370	
2d 1 2 3	HVA C. Fuel Building (WF)	-	159	88	40		747		241	1,276	1,276	-	-		3,736				240,970	3,820	
2d 1 2 4	Sanitary Drainage & Treatment (ST)	-	16						2	19		-	19						-	677	
2d 1 2	Totals	391	753	257	126	-	2,332		1,010	4,809	4,809	-	19		11,706				752,223	21,816	
Decommissioning of Site Buildings																					
2d 1 3 1	Fuel Building	414	491	54	22	-	364		430	1,776	1,776	-	-		2,151				128,216	22,125	
2d 1 3	Totals	414	493	54	22	-	364		430	1,776	1,776	-	-		2,151				128,216	22,125	
2d 1 4	Scaffolding in support of decommissioning		749	5	3		48		200	1,004	1,004	-	-		245				15,640	8,441	
2d 1	Subtotal Period 2d Activity Costs	1,115	2,025	443	188	-	4,436		1,994	9,202	9,183	-	19		17,617				1,119,304	63,350	
Period 2d Additional Costs																					
2d 2 1	Operational Equipment			21	67	-	911	-	240	1,239	1,239	-	-		11,700				294,000	32	
2d 2	Subtotal Period 2d Additional Costs			21	67	-	911	-	240	1,239	1,239	-	-		11,700				294,000	32	
Period 2d Collateral Costs																					
2d 3 1	Process decommissioning water waste	74		47	68	-	102		78	370	170	-	-		485				29,108	95	
2d 3 2	Process decommissioning chemical flush waste	2		69	208	-	273		107	659	659	-	-		732				77,960	137	
2d 3 3	Small tool allowance		38			-			6	44	44	-	-								
2d 3 4	Decommissioning Equipment Disposition			99	50	-	1,042		279	1,476	1,476	-	-		8,290				316,079	147	
2d 3	Subtotal Period 2d Collateral Costs	77	38	215	333	-	1,417		470	2,549	2,548	-	-		6,507				443,147	378	
Period 2d Period Dependent Costs																					
2d 4 1	Decon supplies	115							29	144	144	-	-								
2d 4 2	Insurance							400	40	440	440	-	-								
2d 4 3	Property taxes							100	16	176	176	-	-								
2d 4 4	Health physics supplies		460						115	576	576	-	-								
2d 4 5	Heavy equipment rental	1,055							158	1,213	1,213	-	-								
2d 4 6	Disposal of DAW generated								19	122	122	-	-		1,648				32,963	54	
2d 4 7	Plant energy budget			29	27	49		446	67	512	512	-	-								
2d 4 8	NRC Fees							253	25	278	278	-	-								
2d 4 9	Emergency Planning Fees							404	40	444		444									
2d 4 10	Liquid Radiowaste Processing Equipment/Services							200	30	230	230	-	-								
2d 4 11	Remedial Action Survey							603		603	603	-	-								
2d 4 12	Security Staff Cost							1,440	216	1,656	1,656	-	-								25,911
2d 4 13	Utility Staff Cost							7,231	1,085	8,316	8,315	-	-								98,729
2d 4	Subtotal Period 2d Period Dependent Costs	115	1,516	29	27	49	11,136		1,840	14,711	14,327	444			1,648				32,963	54	124,640
2d 0	TOTAL PERIOD 2d COST	1,307	3,578	707	415		5,813	11,136	4,644	27,700	27,238	444	19		37,532				1,889,414	53,814	124,640
PERIOD 2e - Delay before License Termination																					
Period 2e Direct Decommissioning Activities																					
Period 2e Additional Costs																					
2e 2 1	License Termination Survey Planning							842	253	1,095	1,095	-	-								4,160
2e 2	Subtotal Period 2e Additional Costs							842	253	1,095	1,095	-	-								4,160
Period 2e Collateral Costs																					
2e 3	Subtotal Period 2e Collateral Costs											-	-								
Period 2e Period Dependent Costs																					
2e 4 1	Insurance							2,073	207	2,280	2,280	-	-								
2e 4 2	Property taxes							829	81	911	911	-	-								
2e 4 3	Health physics supplies		230						57	287	287	-	-								
2e 4 4	Disposal of DAW generated			4	4			7	1	19	19	-	-		248				4,954	8	
2e 4 5	Plant energy budget											-	-								
2e 4 6	NRC Fees							622	62	684	684	-	-								

Table C-1
Palo Verde NGS Unit 1
DECON Decommissioning Cost Estimate
(Thousands of 2018 Dollars)

Activity Index	Activity Description	Decom Cost	Removal Cost	Packaging Costs	Transport Costs	On-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu Feet	Class A Cu Feet	Class B Cu Feet	Class C Cu Feet	GTCC Cu Feet	Burial/Processed Wt, Lbs	Craft Manhours	Utility and Contractor Manhours
Period 2e Period Dependent Costs (Continued)																					
2e 4.7	Emergency Planning Fees	-	-	-	-	-	-	1,671	167	1,838	-	1,838	-	-	-	-	-	-	-	-	-
2e 4.8	Security Staff Cost	-	-	-	-	-	-	7,462	1,119	8,581	8,581	-	-	-	-	-	-	-	-	-	134,293
2e 4.9	Utility Staff Cost	-	-	-	-	-	-	2,919	438	3,357	3,357	-	-	-	-	-	-	-	-	-	36,181
2e 4	Subtotal Period 2e Period Dependent Costs	-	230	4	4	-	7	16,676	2,137	17,967	16,119	1,838	-	-	248	-	-	-	4,964	8	170,474
2e 0	TOTAL PERIOD 2e COST	-	230	4	4	-	7	16,417	2,390	19,052	17,214	1,838	-	-	248	-	-	-	4,964	8	174,634
PERIOD 2f - License Termination																					
Period 2f Direct Decommissioning Activities																					
2f 1.1	ORISE confirmatory survey	-	-	-	-	-	-	170	61	221	221	-	-	-	-	-	-	-	-	-	-
2f 1.2	Terminate license	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2f 1	Subtotal Period 2f Activity Costs	-	-	-	-	-	-	170	61	221	221	-	-	-	-	-	-	-	-	-	-
Period 2f Additional Costs																					
2f 2.1	License Termination Survey	-	-	-	-	-	-	8,465	2,640	11,005	11,005	-	-	-	-	-	-	-	-	187,642	2,080
2f 2	Subtotal Period 2f Additional Costs	-	-	-	-	-	-	8,465	2,640	11,005	11,005	-	-	-	-	-	-	-	-	187,642	2,080
Period 2f Collateral Costs																					
2f 3.1	Staff relocation expenses	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2f 3	Subtotal Period 2f Collateral Costs	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Period 2f Period-Dependent Costs																					
2f 4.1	Insurance	-	-	-	-	-	-	618	64	701	701	-	-	-	-	-	-	-	-	-	-
2f 4.2	Property taxes	-	-	-	-	-	-	266	26	280	280	-	-	-	-	-	-	-	-	-	-
2f 4.3	Health physics supplies	-	839	-	-	-	-	-	210	1,049	1,049	-	-	-	-	-	-	-	-	-	-
2f 4.4	Disposal of DAW generated	-	-	6	5	-	10	-	4	24	21	-	-	-	324	-	-	-	6,482	11	-
2f 4.6	Plant energy budget	-	-	-	-	-	-	355	53	409	409	-	-	-	-	-	-	-	-	-	-
2f 4.6	NRC Fees	-	-	-	-	-	-	403	40	444	444	-	-	-	-	-	-	-	-	-	-
2f 4.7	Security Staff Cost	-	-	-	-	-	-	2,296	344	2,640	2,640	-	-	-	-	-	-	-	-	-	41,310
2f 4.8	Utility Staff Cost	-	-	-	-	-	-	6,904	901	6,904	6,904	-	-	-	-	-	-	-	-	-	77,906
2f 4	Subtotal Period 2f Period Dependent Costs	-	839	6	5	-	10	9,960	1,641	12,461	12,461	-	-	-	324	-	-	-	6,482	11	119,216
2f 0	TOTAL PERIOD 2f COST	-	819	6	5	-	10	18,686	4,232	23,677	23,677	-	-	-	324	-	-	-	6,482	187,652	121,296
PERIOD 2 TOTALS		10,950	78,680	19,695	9,032	-	87,491	247,134	100,463	673,445	554,042	10,739	8,664	-	488,507	673	224	-	30,716,720	1,348,759	2,836,138
PERIOD 3b - Site Restoration																					
Period 3b Direct Decommissioning Activities																					
Demolition of Remaining Site Buildings																					
3b 1.1.1	Auxiliary Building	-	1,403	-	-	-	-	-	210	1,614	-	-	1,614	-	-	-	-	-	-	11,728	-
3b 1.1.2	Chemical Injection Pump House	-	5	-	-	-	-	-	1	6	-	-	6	-	-	-	-	-	-	63	-
3b 1.1.3	Condensate Storage Tank	-	108	-	-	-	-	-	16	124	-	-	124	-	-	-	-	-	-	1,787	-
3b 1.1.4	Containment	-	2,618	-	-	-	-	-	393	3,011	-	-	3,011	-	-	-	-	-	-	25,043	-
3b 1.1.5	Control Building	-	648	-	-	-	-	-	97	745	-	-	745	-	-	-	-	-	-	9,292	-
3b 1.1.6	Cooling Tower Electrical Equipment	-	16	-	-	-	-	-	2	18	-	-	18	-	-	-	-	-	-	188	-
3b 1.1.7	Cooling Towers	-	1,085	-	-	-	-	-	163	1,248	-	-	1,248	-	-	-	-	-	-	7,341	-
3b 1.1.8	Corridor Building	-	68	-	-	-	-	-	10	78	-	-	78	-	-	-	-	-	-	922	-
3b 1.1.9	Decontamination & Laundry Facility	-	87	-	-	-	-	-	11	100	-	-	100	-	-	-	-	-	-	688	-
3b 1.1.10	Diesel Generator Building	-	266	-	-	-	-	-	40	306	-	-	306	-	-	-	-	-	-	2,158	-
3b 1.1.11	Holdup Tank & Pump House	-	17	-	-	-	-	-	6	42	-	-	42	-	-	-	-	-	-	266	-
3b 1.1.12	Intake Structure, Canals, & Curt. Tunnels	-	1,351	-	-	-	-	-	201	1,554	-	-	1,554	-	-	-	-	-	-	3,859	-
3b 1.1.13	Main Steam Support Structure	-	181	-	-	-	-	-	27	209	-	-	209	-	-	-	-	-	-	1,700	-
3b 1.1.14	Miscellaneous Structures & Foundations	-	176	-	-	-	-	-	26	201	-	-	201	-	-	-	-	-	-	1,256	-
3b 1.1.16	Nuclear Service Spray Ponds	-	1,091	-	-	-	-	-	164	1,255	-	-	1,255	-	-	-	-	-	-	7,165	-
3b 1.1.16	Operations Support Building	-	117	-	-	-	-	-	18	135	-	-	135	-	-	-	-	-	-	1,730	-
3b 1.1.17	Radwaste Building	-	1,473	-	-	-	-	-	221	1,694	-	-	1,694	-	-	-	-	-	-	21,636	-
3b 1.1.18	Refueling Water Storage Tank	-	70	-	-	-	-	-	10	80	-	-	80	-	-	-	-	-	-	462	-
3b 1.1.19	Subsynchronous Resonance Protection	-	2	-	-	-	-	-	0	3	-	-	3	-	-	-	-	-	-	30	-
3b 1.1.20	Switchgear Building	-	24	-	-	-	-	-	1	28	-	-	28	-	-	-	-	-	-	322	-
3b 1.1.21	Transformer Area	-	69	-	-	-	-	-	10	79	-	-	79	-	-	-	-	-	-	447	-
3b 1.1.22	Turbine Building	-	1,737	-	-	-	-	-	261	1,997	-	-	1,997	-	-	-	-	-	-	37,106	-
3b 1.1.23	Turbine Building Pedestal	-	3,678	-	-	-	-	-	537	4,115	-	-	4,115	-	-	-	-	-	-	69,426	-
3b 1.1.24	Turbine Maintenance Facility	-	15	-	-	-	-	-	2	17	-	-	17	-	-	-	-	-	-	244	-
3b 1.1.26	Yard Tunnels	-	331	-	-	-	-	-	50	380	-	-	380	-	-	-	-	-	-	5,290	-
3b 1.1.26	Fuel Building	-	641	-	-	-	-	-	96	738	-	-	738	-	-	-	-	-	-	6,150	-
3b 1.1	Totals	-	17,197	-	-	-	-	-	2,680	19,777	-	-	19,777	-	-	-	-	-	-	206,190	-

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Cost/Energy	Total Costs	NRC Lic Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu Feet	Class A Cu Feet	Class B Cu Feet	Class C Cu Feet	GTCC Cu Feet	Burial / Processed Wt./Lbs.	Craft Manhours	Utility and Overseeer Manhours
Site Closeout Activities																					
3b 1.2	Grade & landscape site	-	69	-	-	-	-	-	9	68	-	-	68	-	-	-	-	-	-	325	-
3b 1.3	Final report to NRC	-	-	-	-	-	-	119	18	136	136	-	-	-	-	-	-	-	-	-	1,560
3b 1	Subtotal Period 3b Activity Costs	-	17,256	-	-	-	-	119	2,606	19,981	136	-	19,845	-	-	-	-	-	-	206,616	1,560
Period 3b Additional Costs																					
3b 2.1	Concrete Crushing	-	1,133	-	-	-	-	3	170	1,307	-	-	13,07	-	-	-	-	-	-	5,508	-
3b 2.2	Construction Debris	-	-	-	-	-	-	40	6	46	-	-	46	-	-	-	-	-	-	-	-
3b 2	Subtotal Period 3b Additional Costs	-	1,133	-	-	-	-	43	176	1,353	-	-	1,153	-	-	-	-	-	-	5,508	-
Period 3b Collateral Costs																					
3b 3.1	Small tool allowance	-	123	-	-	-	-	-	18	141	-	-	141	-	-	-	-	-	-	-	-
3b 3	Subtotal Period 3b Collateral Costs	-	123	-	-	-	-	-	18	141	-	-	141	-	-	-	-	-	-	-	-
Period 3b Period Dependent Costs																					
3b 4.1	Insurance	-	-	-	-	-	-	630	63	693	-	-	693	-	-	-	-	-	-	-	-
3b 4.2	Property taxes	-	-	-	-	-	-	-	850	6,800	-	-	6,800	-	-	-	-	-	-	-	-
3b 4.3	Heavy equipment rental	-	5,669	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3b 4.4	Plant energy budget	-	-	-	-	-	-	439	66	505	-	-	-	-	-	-	-	-	-	-	-
3b 4.5	Security Staff Cost	-	-	-	-	-	-	5,677	851	6,528	-	-	6,528	-	-	-	-	-	-	-	-
3b 4.6	Utility Staff Cost	-	-	-	-	-	-	8,019	1,203	9,222	-	-	9,222	-	-	-	-	-	-	-	-
3b 4	Subtotal Period 3b Period Dependent Costs	-	5,669	-	-	-	-	14,765	3,084	23,468	-	-	23,468	-	-	-	-	-	-	-	-
3b 0	TOTAL PERIOD 3b COST	-	24,182	-	-	-	-	14,925	5,835	44,943	136	-	44,906	-	-	-	-	-	-	212,023	207,923
PERIOD 3c - Fuel Storage Operations/Shipping																					
Period 3c Direct Decommissioning Activities																					
Period 3c Collateral Costs																					
3c 3	Subtotal Period 3c Collateral Costs	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Period 3c Period Dependent Costs																					
3c 4.1	Insurance	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3c 4.2	Property taxes	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3c 4.3	Plant energy budget	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3c 4.4	Utility Staff Cost	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3c 4	Subtotal Period 3c Period Dependent Costs	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3c 0	TOTAL PERIOD 3c COST	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PERIOD 3d - GTCC shipping																					
Period 3d Direct Decommissioning Activities																					
Nuclear Steam Supply System Removal																					
3d 1.1.1	Vessel & Internals GTCC Disposal	-	-	2,581	-	-	25,443	-	4,462	32,486	32,486	-	-	-	-	-	-	4,433	906,613	-	-
3d 1.1	Totals	-	-	2,581	-	-	25,443	-	4,462	32,486	32,486	-	-	-	-	-	-	4,433	906,613	-	-
3d 1	Subtotal Period 3d Activity Costs	-	-	2,581	-	-															

Table C-1
Palo Verde NGS Unit 1
DECON Decommissioning Cost Estimate
(Thousands of 2019 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu Feet	Class A Cu Feet	Class B Cu Feet	Class C Cu Feet	GTCC Cu Feet	Burial/Processed Wt, Lbs	Craft Manhours	Utility and Contractor Manhours
	TOTAL COST TO DECOMMISSION WITH 19.88% CONTINGENCY					\$562,884	thousands of 2019 dollars														
	TOTAL NRC LICENSE TERMINATION COST IS 92% OR					\$755,071	thousands of 2019 dollars														
	SPENT FUEL MANAGEMENT COST IS 1.68% OR					\$13,902	thousands of 2019 dollars														
	NON-NUCLEAR DEMOLITION COST IS 6.88% OR					\$54,411	thousands of 2019 dollars														
	TOTAL LOW-LEVEL RADIOACTIVE WASTE VOLUME BURIED (EXCLUDING GTCC)					492,102	Cubic Feet														
	TOTAL GREATER THAN CLASS C RADWASTE VOLUME GENERATED					4,488	Cubic Feet														
	TOTAL SCRAP METAL REMOVED					61,844	Tons														
	TOTAL CRAFT LABOR REQUIREMENTS					1,692,712	Man-hours														

End Notes
n/a - indicates that this activity not charged as decommissioning expense
s - 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

Table C-2
Palo Verde NGS Unit 2
DECON Decommissioning Cost Estimate
(Thousands of 2019 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu Feet	Burial Volumes				Burial / Processed Wt, Lbs	Craft Manhours	Utility and Construction Manhours
															Class A Cu Feet	Class B Cu Feet	Class C Cu Feet	GTCC Cu Feet			
PERIOD 1a - Shutdown through Transition																					
Period 1a Direct Decommissioning Activities																					
1a 1.1	Prepare preliminary decommissioning cost							42	6	49	49										556
1a 1.2	Notification of Cessation of Operations							a													
1a 1.3	Remove fuel & source material							n/a													
1a 1.4	Notification of Permanent Defueling							a													
1a 1.5	Deactivate plant systems & process waste							a													
1a 1.6	Prepare and submit PSDAR							65	10	75	75										866
1a 1.7	Review plant dwns & specs							190	22	172	172										1 969
1a 1.8	Perform detailed rad survey																				
1a 1.9	Estimate by product inventory	-						33	5	37	37	-									428
1a 1.10	Rad product description	-						33	5	37	37	-									428
1a 1.11	Detailed by product inventory	-						42	6	49	49	-									556
1a 1.12	Define major work sequence	-						244	37	280	280	-									3 210
1a 1.13	Perform SER and EA	-						181	15	196	196	-									1 327
1a 1.14	Prepare/submit Defueled Technical Specifications	-						244	37	280	280	-									3 210
1a 1.15	Perform Site-Specific Cost Study	-						163	24	187	187	-									2 140
1a 1.16	Prepare/submit Irradiated Fuel Management Plan	-						33	5	37	37	-									428
Activity Specifications																					
1a 1.17.1	Plant & temporary facilities							160	24	184	166		18								2 106
1a 1.17.2	Plant systems							135	20	155	149		16								1 783
1a 1.17.3	MSDS Decontamination Plan							16	2	18	19										214
1a 1.17.4	Reactorinternals							231	35	265	265										3 039
1a 1.17.5	Reactorvessel	-						211	32	243	243										2 782
1a 1.17.6	Biological shield	-						16	2	19	19										214
1a 1.17.7	Steam generators	-						101	15	117	117	-									1 335
1a 1.17.8	Reinforced concrete	-						52	8	60	30	-									685
1a 1.17.9	Main Turbine	-						13	2	15		-									171
1a 1.17.10	Main Condensers	-						13	2	15		-									171
1a 1.17.11	Plant structures & buildings	-						101	15	117	58	-									1 335
1a 1.17.12	Waste management	-						150	22	172	172	-									1 969
1a 1.17.13	Facility & site closure	-						29	4	34	17	-									385
1a 1.17	Total							1,230	184	1 414	1,245		169								16,190
Planning & Site Preparations																					
1a 1.18	Prepare dismantling sequence	-						78	12	90	90										1 027
1a 1.19	Plant prep. & temp. svce	-						3,400	510	3 910	3 910										699
1a 1.20	Design water clean up system	-						46	7	52	52										
1a 1.21	Rugging/Cont. Ctrlrl Envirp/cooling/etc	-						2,400	300	2 700	2 700	-									
1a 1.22	Procure caseliner & containers	-						40	6	46	45	-									526
1a 1	Subtotal Period 1a Activity Costs							8,141	1 251	9 592	9 424		169								31 451
Period 1a Additional Costs																					
1a 2.1	Staff Transition							39 281	5,892	45 171	45 173	-									
1a 2	Subtotal Period 1a Additional Costs							39 281	5,892	45,173	45 173										
Period 1a Collateral Costs																					
1a 3	Subtotal Period 1a Collateral Costs																				
Period 1a Period Dependent Costs																					
1a 4.1	Insurance							2,316	232	2 548	2,548	-									
1a 4.2	Property taxes							222	22	244	244	-									
1a 4.3	Health physics supplies		321	-					80	401	481	-									
1a 4.4	Heavy equipment rental		364	-					55	418	473	-									
1a 4.5	Disposal of DAW generated								4	28	32				376						
1a 4.6	Plant energy budget							1,547	232	1 779	1,779								7 522		12
1a 4.7	NRC Fees							502	50	552	552										
1a 4.8	Emergency Planning Fees							769	77	845		845									
1a 4.9	Spent Fuel Pool O&M							551	83	634		634									
1a 4.10	Security/Staff Cost							6 340	951	7 291	7,291										115,118
1a 4.11	Utility/Staff Cost							17 900	2 550	19 550	19 550										229,871
1a 4	Subtotal Period 1a Period Dependent Costs		685	7	6		11	29,246	4,536	34,290	32 811	1,479							7 522	12	345 190
1a 0	TOTAL PERIOD 1a COST		685	7	6		11	76 868	11 479	88 055	87,407	1,479	169		376				7 522	12	378 641

Table C-2
Palo Verde NGS Unit 2
DECON Decommissioning Cost Estimate
(Thousands of 2019 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	OffSite Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	OTC C Cu. Feet	Burial/Processed Wt., Lbs.	Craft Manhours	Utility and Supporter Manhours
PERIOD 1b - Decommissioning Preparations																					
Period 1b Direct Decommissioning Activities																					
Detailed Work Procedures																					
1b 1.1	Plant systems	-	-	-	-	-	-	164	23	177	159	-	18	-	-	-	-	-	-	-	2,026
1b 1.1.2	NSDS Decontamination Flush	-	-	-	-	-	-	33	5	37	37	-	-	-	-	-	-	-	-	-	428
1b 1.1.3	Reactor internals	-	-	-	-	-	-	81	12	93	91	-	-	-	-	-	-	-	-	-	1,070
1b 1.1.4	Remaining buildings	-	-	-	-	-	-	44	7	50	13	-	18	-	-	-	-	-	-	-	578
1b 1.1.6	CRD cooling assembly	-	-	-	-	-	-	33	5	37	37	-	-	-	-	-	-	-	-	-	428
1b 1.1.6	CRD housings & ICI tubes	-	-	-	-	-	-	33	5	37	37	-	-	-	-	-	-	-	-	-	428
1b 1.1.7	Instrumentation	-	-	-	-	-	-	33	5	37	37	-	-	-	-	-	-	-	-	-	428
1b 1.1.8	Reactor vessel	-	-	-	-	-	-	118	18	136	136	-	-	-	-	-	-	-	-	-	1,654
1b 1.1.9	Facility closeout	-	-	-	-	-	-	39	6	45	22	-	22	-	-	-	-	-	-	-	514
1b 1.1.10	Missile shields	-	-	-	-	-	-	15	2	17	17	-	-	-	-	-	-	-	-	-	193
1b 1.1.11	Biological shield	-	-	-	-	-	-	39	6	45	45	-	-	-	-	-	-	-	-	-	514
1b 1.1.12	Steam generators	-	-	-	-	-	-	150	22	172	172	-	-	-	-	-	-	-	-	-	1,969
1b 1.1.13	Reinforced concrete	-	-	-	-	-	-	33	5	37	19	-	19	-	-	-	-	-	-	-	428
1b 1.1.14	Main Turbine	-	-	-	-	-	-	51	8	58	58	-	58	-	-	-	-	-	-	-	668
1b 1.1.16	Main Condensers	-	-	-	-	-	-	31	8	58	58	-	58	-	-	-	-	-	-	-	668
1b 1.1.16	Auxiliary building	-	-	-	-	-	-	89	11	102	92	-	10	-	-	-	-	-	-	-	1,168
1b 1.1.17	Reactor building	-	-	-	-	-	-	80	13	102	92	-	10	-	-	-	-	-	-	-	1,168
1b 1.1	Total	-	-	-	-	-	-	1,081	162	1,243	1,009	-	234	-	-	-	-	-	-	-	14,228
1b 1.2	Decon primary loop	1,047	-	-	-	-	-	-	621	1,570	1,570	-	-	-	-	-	-	-	-	1,067	-
1b 1	Subtotal Period 1b Activity Costs	1,047	-	-	-	-	-	1,081	686	2,813	2,589	-	234	-	-	-	-	-	-	1,067	14,228
Period 1b Additional Costs																					
1b 2.1	Spent Fuel Pool Isolation	-	-	-	-	-	-	8,217	1,233	9,449	9,449	-	-	-	-	-	-	-	-	-	-
1b 2.2	Site Characterization	-	-	-	-	-	-	2,662	709	3,330	3,330	-	-	-	-	-	-	-	-	11,042	4,640
1b 2	Subtotal Period 1b Additional Costs	-	-	-	-	-	-	10,779	2,001	12,780	12,780	-	-	-	-	-	-	-	-	11,042	4,640
Period 1b Collateral Costs																					
1b 3.1	Decon equipment	1,026	-	-	-	-	-	-	164	1,180	1,180	-	-	-	-	-	-	-	-	-	-
1b 3.2	Staff relocation expenses	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1b 3.3	Process decommissioning water waste	74	-	44	64	-	95	-	76	352	352	-	-	-	453	-	-	-	27,199	88	-
1b 3.4	Process decommissioning chemical flush waste	4	-	125	378	-	7,130	-	1,864	9,490	9,490	-	-	-	-	1,329	-	-	141,637	249	-
1b 3.5	Small tool allowance	-	1	-	-	-	-	-	0	2	2	-	-	-	-	-	-	-	-	-	-
1b 3.6	Pipe cutting equipment	-	1,200	-	-	-	-	-	180	1,980	1,980	-	-	-	-	-	-	-	-	-	-
1b 3.7	Decon rig	2,093	-	-	-	-	-	-	314	2,407	2,407	-	-	-	-	-	-	-	-	-	-
1b 3	Subtotal Period 1b Collateral Costs	3,197	1,201	169	442	-	7,225	-	2,676	14,810	14,810	-	-	-	458	1,329	-	-	168,836	337	-
Period 1b Period Dependent Costs																					
1b 4.1	Decon supplies	25	-	-	-	-	-	-	6	31	31	-	-	-	-	-	-	-	-	-	-
1b 4.2	Insurance	-	-	-	-	-	-	1,172	117	1,290	1,290	-	-	-	-	-	-	-	-	-	-
1b 4.3	Property taxes	-	-	-	-	-	-	112	11	123	123	-	-	-	-	-	-	-	-	-	-
1b 4.4	Health physics supplies	-	182	-	-	-	-	-	46	228	228	-	-	-	-	-	-	-	-	-	-
1b 4.5	Heavy equipment rentals	-	184	-	-	-	-	-	28	212	212	-	-	-	-	-	-	-	-	-	-
1b 4.6	Disposal of DAW generated	-	-	1	4	-	7	-	3	17	17	-	-	-	224	-	-	-	4,488	7	-
1b 4.7	Plant energy budget	-	-	-	-	-	-	1,666	235	1,801	1,801	-	-	-	-	-	-	-	-	-	-
1b 4.8	NRC Fees	-	-	-	-	-	-	131	13	144	144	-	-	-	-	-	-	-	-	-	-
1b 4.9	Emergency Planning Fees	-	-	-	-	-	-	388	39	427	-	427	-	-	-	-	-	-	-	-	-
1b 4.10	Spent Fuel Pool O&M	-	-	-	-	-	-	270	42	321	-	321	-	-	-	-	-	-	-	-	-
1b 4.11	Security Staff Cost	-	-	-	-	-	-	3,209	481	3,690	3,690	-	-	-	-	-	-	-	-	-	68,371
1b 4.12	Utility Staff Cost	-	-	-	-	-	-	11,064	1,668	12,713	12,713	-	-	-	-	-	-	-	-	-	149,298
1b 4	Subtotal Period 1b Period Dependent Costs	25	366	4	4	-	7	17,911	2,678	20,996	20,247	748	-	-	224	-	-	-	4,488	7	207,669
1b 0	TOTAL PERIOD 1b COST	4,268	1,568	173	445	-	7,232	29,771	7,941	61,398	60,417	748	234	-	678	1,329	-	-	173,324	14,453	226,638
PERIOD 1 TOTALS																					
PERIOD 2a - Large Component Removal																					
Period 2a Direct Decommissioning Activities																					
Nuclear Steam Supply System Removal																					
2a 1.1.1	Reactor Coolant Piping	142	137	30	37	-	387	-	210	943	943	-	-	-	1,789	-	-	-	124,863	6,464	-
2a 1.1.2	Pressurizer Quench Tank	8	7	1	1	-	44	-	18	84	84	-	-	-	201	-	-	-	14,061	375	-
2a 1.1.3	Reactor Coolant Pumps & Motors	173	70	365	369	-	885	-	396	2,197	2,197	-	-	-	10,637	-	-	-	1,108,000	5,639	100
2a 1.1.4	Pressurizer	12	41	98	58	-	239	-	149	1,038	1,038	-	-	-	2,879	-	-	-	124,870	625	-
2a 1.1.6	Steam Generators	210	3,029	8,030	1,201	-	6,762	-	3,636	22,769	22,769	-	-	-	49,616	-	-	-	4,416,257	45,354	968

Table C-2
Palo Verde NGS Unit 2
DECON Decommissioning Cost Estimate
(Thousands of 2019 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu Feet	Class A Cu Feet	Class B Cu Feet	Class C Cu Feet	CYCC Cu Feet	Processed Burial/ Wt. Lbs	Craft Manhours	Utility and Contractor Manhours
Nuclear Steam Supply System Removal (Continued)																					
2a 1 1 6	CRDMs/CIA/Service Structure Removal		132	336	414	80	1,033		462	2,457	2,457	-	-		8,222				133,327	10,981	
2a 1 1 7	Reactor Vessel Internals		113	6,757	19,204	1,018	8,190	511	14,361	50,143	50,143	-	-		2,379	673	224	-	165,755	43,357	1,893
2a 1 1 8	Reactor Vessel		102	8,117	3,899	882	1,621	511	9,221	26,353	26,353	-	-		17,963				1,269,528	43,357	1,891
2a 1 1	Totals		872	18,495	32,414	3,680	21,161	1,021	28,342	105,585	105,585	-	-		91,585	673	224	-	7,955,740	167,799	5,469
Removal of Major Equipment																					
2a 1 2	Main Turbine/Generator			119	-	-	-	-	18	137	-	-	137						-	1,424	
2a 1 3	Main Condensers			1,281	1,223	609			1,776	19,893	19,893	-	-		65,575				4,165,812	35,411	
Cascading Costs from Clean Building Demolition																					
2a 1 4 1	Auxiliary Building			156	-	-	-	-	23	179	179	-	-						-	1,303	
2a 1 4 2	Containment			408	-	-	-	-	61	470	470	-	-						-	4,270	
2a 1 4 3	Main Steam Support Structure			31	-	-	-	-	5	36	36	-	-						-	274	
2a 1 4 4	Radwaste Building			164	-	-	-	-	25	188	188	-	-						-	2,404	
2a 1 4 5	Fuel Building			70	-	-	-	-	10	80	80	-	-						-	612	
2a 1 4	Totals			829	-	-	-	-	124	954	953	-	-						-	8,883	
Disposal of Plant Systems																					
2a 1 5 1	Auxiliary Feedwater (AF)		-	39	-	-	-	-	6	45	-	-	45						-	1,300	
2a 1 5 2	Auxiliary Steam (AS)			44	-	-	-	-	7	51	-	-	51						-	1,500	
2a 1 5 3	Auxiliary Steam (AS) RCA		-	168	36	17		113	126	660	660	-	-		1,569				100,880	3,888	
2a 1 5 4	CT Makeup & Blowdown (TB)			18	3	2		17	14	74	74	-	-		185				11,785	451	
2a 1 5 5	Chemical Production (CO)			17	-	-		-	2	19	-	-	19						-	630	
2a 1 5 6	Chlorine Injection (CI)			56	-	-		-	8	64	-	-	64						-	1,820	
2a 1 5 7	Circulating Water (CW)			107	-	-		-	16	124	-	-	124						-	3,545	
2a 1 5 8	Condensate (CD)			943	757	191		3,521	-	1,180	6,191	6,191	-	-	-	17,742			1,135,825	24,161	
2a 1 5 9	Condensate Storage & Transfer (CT)			248	33	17		387	-	145	749	749	-	-	-	1,942			99,805	6,046	
2a 1 5 10	Condenser Air Removal (AR)			19	-	-		-	6	45	-	-	45						-	1,316	
2a 1 5 11	Demineralized Water (DW)			64	-	-		-	10	73	-	-	73						-	2,085	
2a 1 5 12	Diesel Fuel Oil & Transfer (DF)			49	-	-		-	7	56	-	-	56						-	1,492	
2a 1 5 13	Diesel Generator (DG)			58	-	-		-	9	67	-	-	67						-	1,862	
2a 1 5 14	PW Heater Exhaust Steam & Drains (ED)			2,098	650	350		6,637	-	2,363	12,047	12,047	-	-	33,605				2,140,957	54,662	
2a 1 5 15	Feedwater (FW)			382	155	97		1,784	-	572	2,990	2,990	-	-	9,050				575,585	10,447	
2a 1 5 16	Feedwater (FW) exRCA			29	11	7		129	-	42	218	218	-	-	656				41,735	773	
2a 1 5 17	Generator Hydrogen & CO2 (GH)		-	3	-	-		-	0	3	-	-	3						-	102	
2a 1 5 18	Generator Seal Oil (SO)			7	-	-		-	1	8	-	-	8						-	236	
2a 1 5 19	HVAC Misc Site Structures (HS)			16	-	-		-	2	18	-	-	18						-	530	
2a 1 5 20	Lube Oil (LO)			36	-	-		-	5	42	-	-	42						-	1,188	
2a 1 5 21	Lube Oil Stor & Trans & Purification (OS)			32	-	-		-	5	36	-	-	36						-	1,038	
2a 1 5 22	Main Steam (SG)			1,850	334	182		3,352	-	1,111	5,828	5,828	-	-	16,938				1,091,201	26,710	
2a 1 5 23	Main Steam (SG) RCA			128	35	20		372	-	112	687	687	-	-	1,878				119,516	3,293	
2a 1 5 24	Main Turbine (MT)			370	572	332		6,127	-	1,731	9,133	9,133	-	-	31,043				1,976,452	10,480	
2a 1 5 25	Main Turbine Control Oil (CO)			6	-	-		-	1	6	-	-	6						-	176	
2a 1 5 26	Secondary Chemical Control (SC)			171	-	-		-	26	197	-	-	197						-	5,637	
2a 1 5 27	Stator Cooling (CS)			4	-	-		-	1	5	-	-	5						-	140	
2a 1 5 28	Steam Gen Feedwater Pump Turbine (FT)			184	72	38		701	-	234	1,229	1,229	-	-	3,530				226,098	4,717	
2a 1 5 29	Turbine Cooling Water (TC)			140	-	-		-	21	161	-	-	161						-	4,675	
2a 1 5 30	Turbine Steam Seal & Drain (GS)			109	19	10		184	-	77	400	400	-	-	927				59,477	2,731	
2a 1 5	Totals			6,416	2,279	1,271		23,464	-	7,800	41,229	40,207	1,022		118,566				7,569,015	171,649	
2a 1 6	Scaffolding in support of decommissioning			2,095	18	10		193	-	800	4,017	4,017	-	-	978				62,159	33,761	
2a 1	Subtotal Period 2a Activity Costs			872	30,135	35,935	5,660	57,732	1,021	40,860	172,214	171,655	1,159		278,765	673	224		19,752,720	410,929	5,469
Period 2a Collateral Costs																					
2a 3 1	Process decommissioning water waste			130	-	79	115	171	-	113	628	628	-	-	814	-			48,846	159	
2a 3 2	Process decommissioning chemical flush waste			-	-	-	-	-	-	-	-	-	-	-	-	-			-	-	
2a 3 3	Small tool allowance				701	-	-	-	-	45	346	412	35	-	-	-			-	-	
2a 3	Subtotal Period 2a Collateral Costs			130	301	79	115	171	-	178	974	940	-	-	814				48,846	159	
Period 2a Period Dependent Costs																					
2a 4 1	Decon supplies			148	-	-	-	-	37	185	185	-	-						-	-	
2a 4 2	Insurance			-	-	-	-	1,603	169	1,863	1,863	-	-						-	-	
2a 4 3	Property taxes			-	-	-	-	676	68	744	744	-	-						-	-	
2a 4 4	Health physics supplies			3,021	-	-	-	-	755	3,776	3,776	-	-						-	-	
2a 4 5	Heavy equipment rental				4,332	-	-	-	650	4,982	4,982	-	-						-	-	
2a 4 6	Disposal of DAW generated			-	137	125	-	229	90	581	581	-	-		7,753				155,054	253	
2a 4 7	Plant energy budget			-	-	-	-	-	672	5,154	5,154	-	-						-	-	
2a 4 8	NRC Fees			-	-	-	-	-	738	812	812	-	-						-	-	
2a 4 9	Emergency Planning Fees			-	-	-	-	-	1,709	171	1,880	1,880	-	1,880					-	-	

Table C-2
Palo Verde NGS Unit 2
DECON Decommissioning Cost Estimate
(Thousands of 2019 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic Term Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu Feet	Class A Cu Feet	Class B Cu Feet	Class C Cu Feet	GTCC Cu Feet	Burial/Processed Wt. Lbs.	Craft Manhours	Utility and Contractor Manhours
Period 2a Period-Dependent Costs (Continued)																					
2a 1 10	Spent Fuel Pool O&M	-	-	-	-	-	-	1,680	252	1,932	-	1,932	-	-	-	-	-	-	-	-	-
2a 1 11	Remedial Actions Surveys	-	-	-	-	-	-	2,555	-	2,555	-	-	-	-	-	-	-	-	-	-	-
2a 1 12	Security Staff Cost	-	-	-	-	-	-	17,610	2,646	20,256	-	-	-	-	-	-	-	-	-	-	318,747
2a 1 13	Utility Staff Cost	-	-	-	-	-	-	71,880	10,783	82,672	-	-	-	-	-	-	-	-	-	-	926,515
2a 4	Subtotal Period 2a Period-Dependent Costs	148	7,353	137	125	-	229	103,061	16,367	127,420	123,008	3,812	-	-	7,753	-	-	-	155,054	253	1,245,261
2a 0	TOTAL PERIOD 2a COST	1,151	37,788	36,151	5,900	-	58,132	104,082	17,405	300,009	295,601	3,812	1,194	287,271	671	224	-	-	19,956,620	411,341	1,250,710
PERIOD 2b - Site Decontamination																					
Period 2b Direct Decommissioning Activities																					
Disposal of Plant Systems																					
2b 1 1 1	Chemical & Volume Control (CH)	1,058	2,075	424	209	-	3,865	2,388	10,619	10,619	-	-	-	-	19,442	-	-	-	1,246,683	80,017	-
2b 1 1 2	Chemical Waste (CM)	148	474	66	34	-	625	461	2,007	2,007	-	-	-	-	3,149	-	-	-	201,501	18,804	-
2b 1 1 3	Containment Building (ZC)	-	-	0	0	-	0	0	1	1	-	-	-	-	2	-	-	-	118	16	-
2b 1 1 4	Containment Hydrogen Control (HP)	-	-	92	17	8	149	63	320	320	-	-	-	-	748	-	-	-	48,116	2,154	-
2b 1 1 5	Containment Leakage Test (CL)	-	-	30	12	7	136	44	229	229	-	-	-	-	690	-	-	-	43,834	812	-
2b 1 1 6	Containment Purge (CP)	-	-	31	11	6	114	38	201	201	-	-	-	-	577	-	-	-	36,798	827	-
2b 1 1 7	Domestic Water (DS)	-	-	109	-	-	-	16	125	-	-	-	-	125	-	-	-	-	-	4,075	-
2b 1 1 8	Electrical (Clean)	-	-	988	-	-	-	148	1,136	-	-	-	1,136	-	-	-	-	-	-	30,827	-
2b 1 1 9	Electrical (Clean) RCA	-	-	711	128	78	1,447	570	2,957	2,957	-	-	-	-	7,319	-	-	-	466,835	10,187	-
2b 1 1 10	Electrical (Contaminated)	-	-	1,260	430	275	5,081	2,419	12,465	12,465	-	-	-	-	25,799	-	-	-	1,638,951	97,755	-
2b 1 1 11	Essential Chilled Water (EC)	-	-	16	-	-	-	2	18	-	-	-	-	18	-	-	-	-	-	517	-
2b 1 1 12	Essential Chilled Water (EC) RCA	-	-	168	27	12	217	101	524	524	-	-	-	-	1,082	-	-	-	69,840	7,797	-
2b 1 1 13	Essential Cooling Water (EW)	-	-	57	-	-	-	8	65	-	-	-	-	65	-	-	-	-	-	1,903	-
2b 1 1 14	Essential Cooling Water (EW) RCA	-	-	83	26	14	264	92	479	479	-	-	-	-	1,334	-	-	-	85,125	1,997	-
2b 1 1 15	Essential Spray Pond (SP)	-	-	287	-	-	-	43	330	-	-	-	-	330	-	-	-	-	-	9,865	-
2b 1 1 16	Fire Protection (FP)	-	-	106	-	-	-	16	122	-	-	-	-	122	-	-	-	-	-	1,615	-
2b 1 1 17	Fire Protection (FP) RCA	-	-	627	131	62	1,152	442	2,314	2,314	-	-	-	-	-	-	-	-	371,572	12,003	-
2b 1 1 18	Gaseous Radwaste (GR)	-	-	220	33	14	265	127	650	650	-	-	-	-	1,327	-	-	-	85,625	5,181	-
2b 1 1 19	HVAC Auxiliary Building (HA)	-	-	400	255	114	2,099	660	3,546	3,546	-	-	-	-	10,477	-	-	-	677,114	10,352	-
2b 1 1 20	HVAC - Containment Building (HC)	-	-	421	152	74	1,362	472	2,481	2,481	-	-	-	-	6,829	-	-	-	449,260	9,573	-
2b 1 1 21	HVAC - Control Building (HB)	-	-	8	-	-	-	13	102	-	-	-	-	102	-	-	-	-	-	3,112	-
2b 1 1 22	HVAC - Diesel Generator Building (HD)	-	-	9	-	-	-	1	10	-	-	-	-	10	-	-	-	-	-	295	-
2b 1 1 23	HVAC Radwaste (HR)	-	-	123	35	19	359	127	663	663	-	-	-	-	1,812	-	-	-	115,774	2,861	-
2b 1 1 24	HVAC Turbine Building (HT)	-	-	105	-	-	-	25	190	-	-	-	-	190	-	-	-	-	-	6,722	-
2b 1 1 25	Instrument & Service Air (IA)	-	-	35	-	-	-	5	43	-	-	-	-	41	-	-	-	-	-	1,213	-
2b 1 1 26	Instrument & Service Air (IA) RCA	-	-	718	118	41	767	487	2,022	2,022	-	-	-	-	3,734	-	-	-	244,352	14,791	-
2b 1 1 27	Liquid Radwaste (LR)	451	711	105	49	-	905	652	2,894	2,894	-	-	-	-	4,538	-	-	-	291,979	27,224	-
2b 1 1 28	Normal Chilled Water (WC)	-	-	70	-	-	-	10	80	-	-	-	-	80	-	-	-	-	-	2,102	-
2b 1 1 29	Normal Chilled Water (WC) RCA	-	-	199	38	19	317	163	746	746	-	-	-	61	1,747	-	-	-	112,038	4,562	-
2b 1 1 30	Nuclear Cooling Water (NC)	-	-	53	-	-	-	8	61	-	-	-	-	61	-	-	-	-	-	1,746	-
2b 1 1 31	Nuclear Cooling Water (NC) RCA	-	-	471	218	114	2,111	685	3,601	3,601	-	-	-	-	10,647	-	-	-	680,829	11,451	-
2b 1 1 32	Nuclear Sampling (SS)	-	-	225	26	10	176	104	541	511	-	-	-	-	867	-	-	-	56,786	5,121	-
2b 1 1 33	Only Waste & Nonradioactive Waste (OW)	-	-	552	65	36	653	313	1,619	1,619	-	-	-	-	3,292	-	-	-	210,616	13,291	-
2b 1 1 34	Plant Cooling Water (PW)	-	-	115	-	-	-	17	132	-	-	-	-	132	-	-	-	-	-	3,920	-
2b 1 1 35	Post Accident Sampling	-	-	11	1	1	10	6	27	27	-	-	-	-	60	-	-	-	3,169	275	-
2b 1 1 36	Radiation Monitoring (SQ)	-	-	32	4	2	34	17	89	89	-	-	-	-	167	-	-	-	10,820	782	-
2b 1 1 37	Radioactive Waste Drain (RD)	438	464	62	28	-	514	473	1,971	1,971	-	-	-	-	2,501	-	-	-	165,934	19,457	-
2b 1 1 38	Reactor Coolant (RC)	16	171	17	6	-	118	83	412	412	-	-	-	-	585	-	-	-	38,217	4,444	-
2b 1 1 39	Safety Injection (SI)	-	-	1,050	576	283	5,210	1,819	9,556	9,556	-	-	-	-	26,194	-	-	-	1,083,404	41,385	-
2b 1 1 40	Service Gases (GA) RCA	-	-	202	33	12	222	111	580	580	-	-	-	-	1,097	-	-	-	71,533	4,164	-
2b 1 1 41	Solid Radwaste (SR)	122	211	34	16	-	304	196	883	883	-	-	-	-	1,528	-	-	-	98,132	7,907	-
2b 1 1 42	Decommissioning Crew Set up	-	-	1,428	-	-	514	3,942	-	-	-	-	-	3,942	-	-	-	-	-	81,075	-
2b 1 1	Totals	3,011	30,819	3,035	1,541	-	28,504	13,830	70,766	64,413	-	-	-	6,354	143,437	-	-	-	9,194,956	509,825	-
2b 1 2	Scaffolding in support of decommissioning	-	3,744	23	13	-	241	1,000	5,021	5,021	-	-	-	-	-	-	-	-	77,698	42,204	-
Decommissioning of Site Buildings																					
2b 1 3 1	Auxiliary Building	549	361	66	96	-	634	544	2,248	2,248	-	-	-	-	9,861	-	-	-	488,308	22,050	-
2b 1 3 2	Containment	1,180	1,730	269	482	-	5,479	2,492	11,633	11,633	-	-	-	-	58,640	-	-	-	2,623,131	67,811	-
2b 1 3 3	Holdup Tank & Pump House	343	315	71	25	-	465	378	1,598	1,598	-	-	-	-	2,281	-	-	-	140,929	10,083	-
2b 1 3 4	Radwaste Building	747	293	211	91	-	1,386	828	3,556	3,556	-	-	-	-	8,651	-	-	-	522,790	22,190	-
2b 1 3 5	Refueling Water Storage Tank	471	382	79	28	-	608	471	1,942	1,942	-	-	-	-	2,496	-	-	-	163,942	21,082	-
2b 1 3	Totals	3,292	10,821	607	722	-	8,472	4,713	20,978	20,978	-	-	-	-	81,930	-	-	-	3,948,189	140,226	-

Table C-2
Palo Verde NGS Unit 2
DECON Decommissioning Cost Estimate
(Thousands of 2019 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu Feet	Burial Volumes				Burial/Processed Wt. Lbs	Craft Manhours	Utility and Contractor Manhours
															Class A Cu Feet	Class B Cu Feet	Class C Cu Feet	GTCC Cu Feet			
2b 1 4	Prepare/submit License Termination Plan	-	-	-	-	-	-	133	20	153	163	-	-	-	-	-	-	-	-	-	1,753
2b 1 5	Receive NRC approval of termination plan	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2b 1	Subtotal Period 2b Activity Costs	6,326	27,045	3,755	2,278	-	37,218	133	19,563	96,918	90,565	-	6,354	-	226,591	-	-	-	13,220,840	761,254	1,753
Period 2b Additional Costs																					
2b 2 1	Excavation of Underground Services	-	1,624	-	-	-	-	339	457	2,419	2,419	-	-	-	-	-	-	-	-	10,228	-
2b 2	Subtotal Period 2b Additional Costs	-	1,624	-	-	-	-	339	457	2,419	2,419	-	-	-	-	-	-	-	-	10,228	-
Period 2b Collateral Costs																					
2b 3 1	Process decommissioning water waste	286	-	181	262	-	390	-	298	1,417	1,417	-	-	-	1,856	-	-	-	111,386	362	-
2b 3 2	Process decommissioning chemical flush waste	7	-	215	652	-	855	-	337	2,066	2,066	-	-	-	2,293	-	-	-	244,381	429	-
2b 3 3	Small tool allowance	-	461	-	-	-	-	-	69	530	530	-	-	-	-	-	-	-	-	-	-
2b 3	Subtotal Period 2b Collateral Costs	293	461	396	914	-	1,245	-	704	4,013	4,013	-	-	-	4,150	-	-	-	355,767	791	-
Period 2b Period-Dependent Costs																					
2b 4 1	Decon supplies	1,833	-	-	-	-	-	-	458	2,292	2,292	-	-	-	-	-	-	-	-	-	-
2b 4 2	Insurance	-	-	-	-	-	-	2,480	248	2,728	2,728	-	-	-	-	-	-	-	-	-	-
2b 4 3	Property taxes	-	-	-	-	-	-	990	99	1,089	1,089	-	-	-	-	-	-	-	-	-	-
2b 4 4	Health physics supplies	-	5,056	-	-	-	-	-	1,264	6,319	6,319	-	-	-	-	-	-	-	-	-	-
2b 4 5	Heavy equipment rental	-	6,642	-	-	-	-	-	981	7,523	7,523	-	-	-	-	-	-	-	-	-	-
2b 4 6	Disposal of DAW generated	-	-	191	174	-	320	-	125	811	811	-	-	-	10,826	-	-	-	216,529	353	-
2b 4 7	Plant emergency budget	-	-	-	-	-	-	5,180	777	5,957	5,957	-	-	-	-	-	-	-	-	-	-
2b 4 8	NRC Fees	-	-	-	-	-	-	1,080	108	1,188	1,188	-	-	-	-	-	-	-	-	-	-
2b 4 9	Emergency Planning Fees	-	-	-	-	-	-	2,502	250	2,752	2,752	-	-	-	-	-	-	-	-	-	-
2b 4 10	Spent Fuel Pool O&M	-	-	-	-	-	-	2,460	369	2,829	2,829	-	-	-	-	-	-	-	-	-	-
2b 4 11	Liquid Radioactive Processing Equipment/Services	-	-	-	-	-	-	619	93	712	712	-	-	-	-	-	-	-	-	-	-
2b 4 12	Remedial Action Surveys	-	-	-	-	-	-	1,741	33	3,741	3,741	-	-	-	-	-	-	-	-	-	-
2b 4 13	Security Staff Cost	-	-	-	-	-	-	25,023	3,753	28,777	28,777	-	-	-	-	-	-	-	-	-	451,051
2b 4 14	Utility Staff Cost	-	-	-	-	-	-	72,583	10,887	83,471	83,471	-	-	-	-	-	-	-	-	-	967,642
2b 4	Subtotal Period 2b Period-Dependent Costs	1,833	11,597	191	174	-	320	116,650	19,414	150,189	144,608	5,581	-	-	10,826	-	-	-	216,529	353	1,418,693
2b 0	TOTAL PERIOD 2b COST	8,453	41,326	4,141	3,366	-	38,783	117,131	40,138	253,540	241,605	5,581	6,354	-	241,567	-	-	-	13,793,140	772,626	1,420,446
PERIOD 2d - Decontamination Following Wet Fuel Storage																					
Period 2d Direct Decommissioning Activities																					
2d 1 1	Remove spent fuel racks	310	11	128	37	-	692	-	364	1,553	1,553	-	-	-	3,515	-	-	-	223,325	968	-
Disposal of Plant Systems																					
2d 1 2 1	Electrical Spent Fuel	-	184	31	19	-	348	-	139	720	720	-	-	-	1,766	-	-	-	112,166	4,048	-
2d 1 2 2	Fuel Pool Cooling & Cleanup (PC)	391	391	138	67	-	1,237	-	627	2,855	2,855	-	-	-	6,204	-	-	-	399,088	13,370	-
2d 1 2 3	HVAC - Fuel Building (HF)	-	160	88	40	-	747	-	241	1,276	1,276	-	-	-	3,736	-	-	-	240,970	3,820	-
2d 1 2 4	Sanitary Drainage & Treatment (ST)	-	16	-	-	-	19	-	2	19	19	-	19	-	-	-	-	-	577	-	-
2d 1 2	Totals	391	753	257	126	-	2,132	-	1,010	4,869	4,869	-	19	-	11,706	-	-	-	752,223	21,816	-
Decontamination of Site Buildings																					
2d 1 3 1	Fuel Building	414	493	54	22	-	364	-	430	1,776	1,776	-	-	-	2,151	-	-	-	128,216	22,125	-
2d 1 3	Totals	414	493	54	22	-	364	-	430	1,776	1,776	-	-	-	2,151	-	-	-	128,216	22,125	-
2d 1 4	Scaffolding in support of decommissioning	-	749	5	3	-	48	-	200	1,004	1,004	-	-	-	245	-	-	-	15,540	8,441	-
2d 1	Subtotal Period 2d Activity Costs	1,116	2,025	443	188	-	3,436	-	1,994	9,202	9,183	-	19	-	17,617	-	-	-	1,119,304	51,350	-
Period 2d Additional Costs																					
2d 2 1	Operational Equipment	-	-	21	67	-	911	-	240	1,239	1,239	-	-	-	11,760	-	-	-	294,000	32	-
2d 2	Subtotal Period 2d Additional Costs	-	-	21	67	-	911	-	240	1,239	1,239	-	-	-	11,760	-	-	-	294,000	32	-
Period 2d Collateral Costs																					
2d 3 1	Process decommissioning water waste	74	-	47	68	-	102	-	78	370	370	-	-	-	483	-	-	-	29,108	85	-
2d 3 2	Process decommissioning chemical flush waste	2	-	89	208	-	273	-	107	659	659	-	-	-	732	-	-	-	77,960	137	-
2d 3 3	Small tool allowance	-	18	-	-	-	-	-	6	44	44	-	-	-	-	-	-	-	-	-	-
2d 3 4	Decommissioning Equipment Disposition	-	-	99	56	-	1,042	-	279	1,476	1,476	-	-	-	5,290	-	-	-	136,079	147	-
2d 3	Subtotal Period 2d Collateral Costs	77	38	215	333	-	1,417	-	470	2,548	2,548	-	-	-	6,507	-	-	-	443,147	378	-
Period 2d Period-Dependent Costs																					
2d 4 1	Decon supplies	115	-	-	-	-	-	-	29	144	144	-	-	-	-	-	-	-	-	-	-
2d 4 2	Insurance	-	-	-	-	-	-	400	40	440	440	-	-	-	-	-	-	-	-	-	-
2d 4 3	Property taxes	-	-	-	-	-	-	160	16	176	176	-	-	-	-	-	-	-	-	-	-
2d 4 4	Health physics supplies	-	460	-	-	-	-	-	115	576	576	-	-	-	-	-	-	-	-	-	-
2d 4 5	Heavy equipment rental	-	1,055	-	-	-	-	-	158	1,213	1,213	-	-	-	-	-	-	-	-	-	-

Table C-2
Palo Verde NGS Unit 2
DECON Decommissioning Cost Estimate
(Thousands of 2019 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic Term Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu Feet	Class A Cu Feet	Class B Cu Feet	Class C Cu Feet	CTCC Cu Feet	Burial/Processed Wt, Lbs	Craft Manhours	Utility and Contractor Manhours
Period 2d Period Dependent Costs (Continued)																					
2d 4 6	Disposal of DAW generated	-	-	29	27	-	49	-	19	123	123	-	-	-	1 648	-	-	-	32 963	54	-
2d 4 7	Plant energy budget	-	-	-	-	-	-	446	67	512	512	-	-	-	-	-	-	-	-	-	-
2d 4 8	NRC Fees	-	-	-	-	-	-	165	17	182	182	-	-	-	-	-	-	-	-	-	-
2d 4 9	Emergency Planning Fee	-	-	-	-	-	-	404	40	444	-	444	-	-	-	-	-	-	-	-	-
2d 4 10	Liquid Radiactive Processing Equipment/Service	-	-	-	-	-	-	209	30	239	-	-	-	-	-	-	-	-	-	-	-
2d 4 11	Remedial Actions Surveys	-	-	-	-	-	-	603	-	603	603	-	-	-	-	-	-	-	-	-	-
2d 4 12	Security Staff Cost	-	-	-	-	-	-	1,440	216	1,656	1,656	-	-	-	-	-	-	-	-	-	25 911
2d 4 13	Utility Staff Cost	-	-	-	-	-	-	7,231	1,086	8,316	8,316	-	-	-	-	-	-	-	-	-	98 729
2d 4	Subtotal Period 2d Period Dependent Costs	115	1 616	29	27	-	49	11 048	1 632	14 614	14 171	444	-	-	1 648	-	-	-	32 963	54	124 640
2d 0	TOTAL PERIOD 2d COST	1 307	3,578	707	615	-	5 813	11 048	4,535	27 604	27 141	444	19	37 532	-	-	-	-	1 880 414	53 814	124,640
PERIOD 2e - Delay before License Termination																					
Period 2e Direct Decommissioning Activities																					
Period 2e Additional Costs																					
2e 2 1	License Termination Survey Planning	-	-	-	-	-	-	842	253	1,095	1 095	-	-	-	-	-	-	-	-	-	4,169
2e 2	Subtotal Period 2e Additional Costs	-	-	-	-	-	-	842	253	1,095	1 095	-	-	-	-	-	-	-	-	-	4 169
Period 2e Collateral Costs																					
2e 3	Subtotal Period 2e Collateral Costs	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Period 2e Period Dependent Costs																					
2e 4 1	Insurance	-	-	-	-	-	-	1 326	177	1,458	1 458	-	-	-	-	-	-	-	-	-	-
2e 4 2	Property taxes	-	-	-	-	-	-	529	53	582	582	-	-	-	-	-	-	-	-	-	-
2e 4 3	Health physics supplies	-	-	147	-	-	-	-	37	184	184	-	-	-	-	-	-	-	-	-	-
2e 4 4	Disposal of DAW generated	-	-	3	3	-	5	-	2	12	12	-	-	-	158	-	-	-	3 168	5	-
2e 4 5	Plant energy budget	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2e 4 6	NRC Fees	-	-	-	-	-	-	350	36	394	394	-	-	-	-	-	-	-	-	-	-
2e 4 7	Emergency Planning Fee	-	-	-	-	-	-	925	92	1 017	-	1 017	-	-	-	-	-	-	-	-	-
2e 4 8	Security Staff Cost	-	-	-	-	-	-	4 772	716	5 487	5 487	-	-	-	-	-	-	-	-	-	85 877
2e 4 9	Utility Staff Cost	-	-	-	-	-	-	1 867	280	2 147	2 147	-	-	-	-	-	-	-	-	-	23 136
2e 4	Subtotal Period 2e Period Dependent Costs	-	147	3	3	-	5	9 777	1,348	11,282	10,264	1 017	-	-	158	-	-	-	3,168	5	109,013
2e 0	TOTAL PERIOD 2e COST	-	147	3	3	-	5	10 619	1 601	12 377	11 359	1,017	-	-	158	-	-	-	3 168	5	113,173
PERIOD 2f - License Termination																					
Period 2f Direct Decommissioning Activities																					
2f 1 1	ORISE confirmatory survey	-	-	-	-	-	-	170	51	221	221	-	-	-	-	-	-	-	-	-	-
2f 1 2	Terminate license	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2f 1	Subtotal Period 2f Activity Costs	-	-	-	-	-	-	170	51	221	221	-	-	-	-	-	-	-	-	-	-
Period 2f Additional Costs																					
2f 2 1	License Termination Survey	-	-	-	-	-	-	8 465	2,540	11 005	11 005	-	-	-	-	-	-	-	-	187 642	2 080
2f 2	Subtotal Period 2f Additional Costs	-	-	-	-	-	-	8 465	2 540	11 005	11 005	-	-	-	-	-	-	-	-	187 642	2,080
Period 2f Collateral Costs																					
2f 3 1	Staff relocation expenses	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2f 3	Subtotal Period 2f Collateral Costs	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Period 2f Period Dependent Costs																					
2f 4 1	Insurance	-	-	-	-	-	-	638	64	701	701	-	-	-	-	-	-	-	-	-	-
2f 4 2	Property taxes	-	-	-	-	-	-	253	25	289	289	-	-	-	-	-	-	-	-	-	-
2f 4 3	Health physics supplies	-	-	830	-	-	-	-	210	1 049	1 049	-	-	-	-	-	-	-	-	-	-
2f 4 4	Disposal of DAW generated	-	-	6	5	-	10	-	4	24	24	-	-	-	324	-	-	-	6 482	11	-
2f 4 5	Plant energy budget	-	-	-	-	-	-	355	53	409	409	-	-	-	-	-	-	-	-	-	-
2f 4 6	NRC Fees	-	-	-	-	-	-	249	26	274	274	-	-	-	-	-	-	-	-	-	-
2f 4 7	Security Staff Cost	-	-	-	-	-	-	2,295	344	2,640	2,640	-	-	-	-	-	-	-	-	-	41 310
2f 4 8	Utility Staff Cost	-	-	-	-	-	-	6 004	901	6 904	6 904	-	-	-	-	-	-	-	-	-	77 906
2f 4	Subtotal Period 2f Period Dependent Costs	-	830	6	5	-	10	9 796	1 626	12,282	12,282	-	-	-	324	-	-	-	6 482	11	119 216
2f 0	TOTAL PERIOD 2f COST	-	830	6	5	-	10	18,431	4 216	23 507	23 507	-	-	-	324	-	-	-	6 482	187 652	121 296
PERIOD 2 TOTALS																					
10 911 83,679 41 208 9 889 - 102 743 261 311 107,855 617,636 599,216 10 854 7 566 666 863 673 224 - 35 648 820 1 425 438 3 030 284																					

Table C-2
Palo Verde NGS Unit 2
DECON Decommissioning Cost Estimate
(Thousands of 2019 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	OR Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu Feet	Class A Cu Feet	Class B Cu Feet	Class C Cu Feet	CFCC Cu Feet	Burial/Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
PERIOD 3b - Site Restoration																					
Period 3b Direct Decommissioning Activities																					
Demolition of Remaining Site Buildings																					
3b 1.1.1	Auxiliary Building		1,403	-	-	-	-	-	210	1,614	-	-	1,614	-	-	-	-	-	-	11,728	
3b 1.1.2	Chemical Injection Pump House		5	-	-	-	-	-	1	6	-	-	6	-	-	-	-	-	-	63	
3b 1.1.3	Condensate Storage Tank		108	-	-	-	-	-	16	124	-	-	124	-	-	-	-	-	-	1,787	
3b 1.1.4	Containment		2,618	-	-	-	-	-	303	3,011	-	-	3,011	-	-	-	-	-	-	25,049	
3b 1.1.5	Control Building		648	-	-	-	-	-	97	745	-	-	745	-	-	-	-	-	-	9,292	
3b 1.1.6	Cooling Tower Electrical Equipment		16	-	-	-	-	-	2	18	-	-	18	-	-	-	-	-	-	188	
3b 1.1.7	Cooling Towers		1,085	-	-	-	-	-	163	1,248	-	-	1,248	-	-	-	-	-	-	7,343	
3b 1.1.8	Corridor Building		68	-	-	-	-	-	10	78	-	-	78	-	-	-	-	-	-	922	
3b 1.1.9	Diesel Generator Building		266	-	-	-	-	-	40	306	-	-	306	-	-	-	-	-	-	2,158	
3b 1.1.10	Holdup Tank & Pump House		37	-	-	-	-	-	6	42	-	-	42	-	-	-	-	-	-	266	
3b 1.1.11	Intake Structure, Canals, & Circ. Tunnels		1,351	-	-	-	-	-	203	1,554	-	-	1,554	-	-	-	-	-	-	3,859	
3b 1.1.12	Main Steam Support Structure		181	-	-	-	-	-	27	208	-	-	208	-	-	-	-	-	-	1,700	
3b 1.1.13	Miscellaneous Structures & Foundations		175	-	-	-	-	-	28	201	-	-	201	-	-	-	-	-	-	1,256	
3b 1.1.14	Nuclear Service Spray Ponds		1,080	-	-	-	-	-	167	1,252	-	-	1,252	-	-	-	-	-	-	7,151	
3b 1.1.15	Operations Support Building		117	-	-	-	-	-	18	135	-	-	135	-	-	-	-	-	-	1,730	
3b 1.1.16	Radwaste Building		1,473	-	-	-	-	-	221	1,694	-	-	1,694	-	-	-	-	-	-	21,646	
3b 1.1.17	Refueling Water Storage Tank		70	-	-	-	-	-	10	80	-	-	80	-	-	-	-	-	-	452	
3b 1.1.18	Subsynchronous Resonance Protection		2	-	-	-	-	-	0	3	-	-	3	-	-	-	-	-	-	30	
3b 1.1.19	Switchgear Building		24	-	-	-	-	-	4	28	-	-	28	-	-	-	-	-	-	122	
3b 1.1.20	Transformer Area		69	-	-	-	-	-	10	79	-	-	79	-	-	-	-	-	-	447	
3b 1.1.21	Turbine Building		1,717	-	-	-	-	-	261	1,997	-	-	1,997	-	-	-	-	-	-	37,106	
3b 1.1.22	Turbine Building Pedestal		3,578	-	-	-	-	-	537	4,115	-	-	4,115	-	-	-	-	-	-	59,425	
3b 1.1.23	Turbine Maintenance Facility		15	-	-	-	-	-	2	17	-	-	17	-	-	-	-	-	-	244	
3b 1.1.24	Yard Tunnel		141	-	-	-	-	-	50	380	-	-	380	-	-	-	-	-	-	5,290	
3b 1.1.25	Fuel Building		641	-	-	-	-	-	96	738	-	-	738	-	-	-	-	-	-	6,150	
3b 1.1	Totals		17,108	-	-	-	-	-	2,568	19,674	-	-	19,674	-	-	-	-	-	-	205,587	
Site Closeout Activities																					
3b 1.2	Grade & landscape site		59	-	-	-	-	-	9	68	-	-	68	-	-	-	-	-	-	325	
3b 1.3	Final report to NRC		-	-	-	-	-	-	51	51	58	-	-	-	-	-	-	-	-	-	668
3b 1	Subtotal Period 3b Activity Costs		17,167	-	-	-	-	-	51	2,583	19,800	58	-	19,742	-	-	-	-	-	205,913	668
Period 3b Additional Costs																					
3b 2.1	Concrete Crushing		1,121	-	-	-	-	-	3	169	1,292	-	-	1,292	-	-	-	-	-	5,446	
3b 2.2	Construction Debris		-	-	-	-	-	-	40	6	46	-	-	46	-	-	-	-	-	-	
3b 2	Subtotal Period 3b Additional Costs		1,121	-	-	-	-	-	43	175	1,338	-	-	1,338	-	-	-	-	-	5,446	
Period 3b Collateral Costs																					
3b 3.1	Small tool allowance		122	-	-	-	-	-	18	140	-	-	140	-	-	-	-	-	-	-	
3b 3	Subtotal Period 3b Collateral Costs		122	-	-	-	-	-	18	140	-	-	140	-	-	-	-	-	-	-	
Period 3b Period Dependent Costs																					
3b 4.1	Insurance		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
3b 4.2	Property taxes		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
3b 4.3	Heavy equipment rental		5,609	-	-	-	-	-	690	63	6,528	-	-	6,528	-	-	-	-	-	-	
3b 4.4	Plant energy budget		-	-	-	-	-	-	430	66	505	-	-	505	-	-	-	-	-	-	
3b 4.5	Security Staff Cost		-	-	-	-	-	-	5,077	851	6,528	-	-	6,528	-	-	-	-	-	-	102,164
3b 4.6	Utility Staff Cost		-	-	-	-	-	-	8,019	1,203	9,222	-	-	9,222	-	-	-	-	-	-	104,200
3b 4	Subtotal Period 3b Period Dependent Costs		5,609	-	-	-	-	-	14,705	3,034	23,468	-	-	23,468	-	-	-	-	-	-	206,363
3b 0	TOTAL PERIOD 3b COST		24,079	-	-	-	-	-	14,859	5,809	44,747	58	-	44,689	-	-	-	-	-	211,358	207,031
PERIOD 3c - Fuel Storage Operations/Shipping																					
Period 3c Direct Decommissioning Activities																					
Period 3c Collateral Costs																					
3c 3	Subtotal Period 3c Collateral Costs		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volume				Burial/Processed Wt. Lbs	Craft Manhours	Utility and Contractor Manhours	
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet				
Period 3c Period Dependent Costs																						
3c 4.1	Insurance	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
3c 4.2	Property taxes	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
3c 4.3	Plant energy budget	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
3c 4.4	Utility Staff Cost	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
3c 4	Subtotal Period 3c Period-Dependent Costs	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
3c 0	TOTAL PERIOD 3c COST	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
PERIOD 3d - GTCC Shipping																						
Period 3d Direct Decommissioning Activities																						
Nuclear Steam Supply System Removal																						
3d 1.1.1	Vessel & Internals/GTCC Disposal	-	-	2,581	-	-	25,443	-	4,462	32,486	12,486	-	-	-	-	4,433	905,513	-	-	-		
3d 1.1	Totals	-	-	2,581	-	-	25,443	-	4,462	32,486	12,486	-	-	-	-	4,433	905,513	-	-	-		
3d 1	Subtotal Period 3d Activity Costs	-	-	2,581	-	-	25,443	-	4,462	32,486	12,486	-	-	-	-	4,433	905,513	-	-	-		
Period 3d Collateral Costs																						
3d 3	Subtotal Period 3d Collateral Costs	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
Period 3d Period Dependent Costs																						
3d 4.1	Insurance	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
3d 4.2	Property taxes	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
3d 4.3	Plant energy budget	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
3d 4.4	Utility Staff Cost	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
3d 4	Subtotal Period 3d Period-Dependent Costs	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
3d 0	TOTAL PERIOD 3d COST	-	-	2,581	-	-	25,443	-	4,462	32,486	12,486	-	-	-	-	4,433	905,513	-	-	-		
PERIOD 5 TOTALS																						
		-	24,079	2,581	-	-	25,443	14,859	10,271	77,233	32,945	-	44,589	-	-	4,433	905,513	211,358	207,031	-		
TOTAL COST TO DECOMMISSION		15,179	110,011	43,968	10,340	-	135,429	382,808	137,587	835,323	769,583	13,081	52,657	-	567,906	2,002	224	4,433	56,735,180	3,842,494		
TOTAL COST TO DECOMMISSION WITH 15.72% CONTINGENCY																						
						\$55,323	thousands of 2019 dollars															
TOTAL NRC LICENSE TERMINATION COST IS 13.1% OR						\$769,585	thousands of 2019 dollars															
SPENT FUEL MANAGEMENT COST IS 1.67% OR						\$15,081	thousands of 2019 dollars															
NON-NUCLEAR DEMOLITION COST IS 0.3% OR						\$52,657	thousands of 2019 dollars															
TOTAL LOW-LEVEL RADIOACTIVE WASTE VOLUME BURIED (EXCLUDING GTCC)						570,133	Cubic Feet															
TOTAL GREATER THAN CLASS C RADWASTE VOLUME GENERATED						4,433	Cubic Feet															
TOTAL SCRAP METAL REMOVED						58,046	Tons															
TOTAL CRAFT LABOR REQUIREMENTS						1,651,261	Man-hours															

Exhibit RWK-2
Page 124 of 183

Table C-3
Palo Verde NGS Unit 3
DECON Decommissioning Cost Estimate
(Thousands of 2019 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet	Burial/Processed Wt. Lbs.	Craft Manhours	Utility and Outsource Manhours
PERIOD 1a - Shutdown through Transition																					
Period 1a Direct Decommissioning Activities																					
1a 1.1	Prepare preliminary decommissioning cost	-	-	-	-	-	-	42	0	42	49	-	-	-	-	-	-	-	-	-	556
1a 1.2	Notification of Cessation of Operations	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1a 1.3	Remove fuel & source material	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1a 1.4	Notification of Permanent Defueling	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1a 1.5	Deactivate plant systems & process waste	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1a 1.6	Prepare and submit PSDAR	-	-	-	-	-	-	66	10	75	75	-	-	-	-	-	-	-	-	-	856
1a 1.7	Review plant design & specs	-	-	-	-	-	-	150	22	172	172	-	-	-	-	-	-	-	-	-	1,069
1a 1.8	Perform detailed red survey	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1a 1.9	Estimate by product inventory	-	-	-	-	-	-	33	5	37	37	-	-	-	-	-	-	-	-	-	428
1a 1.10	End product description	-	-	-	-	-	-	33	5	37	37	-	-	-	-	-	-	-	-	-	428
1a 1.11	Detailed by product inventory	-	-	-	-	-	-	42	6	49	49	-	-	-	-	-	-	-	-	-	556
1a 1.12	Define major work sequence	-	-	-	-	-	-	244	17	260	260	-	-	-	-	-	-	-	-	-	4,210
1a 1.13	Perform SGR and IJA	-	-	-	-	-	-	101	15	116	116	-	-	-	-	-	-	-	-	-	1,327
1a 1.14	Prepare/submit Defueled Technical Specifications	-	-	-	-	-	-	244	37	280	280	-	-	-	-	-	-	-	-	-	3,210
1a 1.15	Perform Site-Specific Cost Study	-	-	-	-	-	-	163	24	187	187	-	-	-	-	-	-	-	-	-	2,140
1a 1.16	Prepare/submit Irradiated Fuel Management Plan	-	-	-	-	-	-	33	5	37	37	-	-	-	-	-	-	-	-	-	428
Activity Specifications																					
1a 1.17.1	Plant & temporary facilities	-	-	-	-	-	-	160	24	184	166	-	18	-	-	-	-	-	-	-	2,106
1a 1.17.2	Plant systems	-	-	-	-	-	-	135	20	156	140	-	16	-	-	-	-	-	-	-	1,783
1a 1.17.3	NSSS Decontamination Flush	-	-	-	-	-	-	16	2	19	19	-	-	-	-	-	-	-	-	-	214
1a 1.17.4	Reactor internals	-	-	-	-	-	-	231	35	265	205	-	-	-	-	-	-	-	-	-	7,030
1a 1.17.5	Reactor vessel	-	-	-	-	-	-	211	32	243	241	-	-	-	-	-	-	-	-	-	2,782
1a 1.17.6	Biological shield	-	-	-	-	-	-	16	2	19	10	-	-	-	-	-	-	-	-	-	214
1a 1.17.7	Steam generators	-	-	-	-	-	-	101	15	117	117	-	-	-	-	-	-	-	-	-	1,335
1a 1.17.8	Reinforced concrete	-	-	-	-	-	-	52	8	60	30	-	30	-	-	-	-	-	-	-	685
1a 1.17.9	Main Turbine	-	-	-	-	-	-	13	2	15	-	-	15	-	-	-	-	-	-	-	171
1a 1.17.10	Main Condensers	-	-	-	-	-	-	13	2	15	-	-	15	-	-	-	-	-	-	-	171
1a 1.17.11	Plant structures & buildings	-	-	-	-	-	-	301	15	317	58	-	-	-	-	-	-	-	-	-	1,315
1a 1.17.12	Waste management	-	-	-	-	-	-	150	22	172	172	-	-	-	-	-	-	-	-	-	1,969
1a 1.17.13	Facility & outclosure	-	-	-	-	-	-	29	4	34	17	-	17	-	-	-	-	-	-	-	385
1a 1.17	Total	-	-	-	-	-	-	1,240	184	1,414	1,245	-	169	-	-	-	-	-	-	-	16,180
Planning & Site Preparations																					
1a 1.18	Prepare dewatering sequence	-	-	-	-	-	-	78	12	90	90	-	-	-	-	-	-	-	-	-	1,027
1a 1.19	Plant prep & temp. svcs	-	-	-	-	-	-	3,400	510	3,910	3,910	-	-	-	-	-	-	-	-	-	509
1a 1.20	Design water clean up system	-	-	-	-	-	-	46	7	52	52	-	-	-	-	-	-	-	-	-	-
1a 1.21	Rigging/Cont. Control Equipment/etc.	-	-	-	-	-	-	2,400	360	2,760	2,760	-	-	-	-	-	-	-	-	-	-
1a 1.22	Procure canisters & containers	-	-	-	-	-	-	40	6	46	46	-	-	-	-	-	-	-	-	-	526
1a 1	Subtotal Period 1a Activity Costs	-	-	-	-	-	-	8,341	1,251	9,592	9,424	-	169	-	-	-	-	-	-	-	31,451
Period 1a Additional Costs																					
1a 2.1	Staff Transition	-	-	-	-	-	-	39,281	5,892	45,173	45,173	-	-	-	-	-	-	-	-	-	-
1a 2	Subtotal Period 1a Additional Costs	-	-	-	-	-	-	39,281	5,892	45,173	45,173	-	-	-	-	-	-	-	-	-	-
Period 1a Collateral Costs																					
1a 3	Subtotal Period 1a Collateral Costs	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Period 1a Period-Dependent Costs																					
1a 4.1	Insurance	-	-	-	-	-	-	2,116	232	2,548	2,548	-	-	-	-	-	-	-	-	-	-
1a 4.2	Property taxes	-	-	-	-	-	-	222	22	244	244	-	-	-	-	-	-	-	-	-	-
1a 4.3	Health physics supplies	-	-	-	-	-	-	80	401	481	481	-	-	-	-	-	-	-	-	-	-
1a 4.4	Heavy equipment rental	-	-	-	-	-	-	364	55	419	418	-	-	-	-	-	-	-	-	-	-
1a 4.5	Disposal of DAW generated	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1a 4.6	Plant energy budget	-	-	-	-	-	-	1,547	242	1,779	1,779	-	-	-	-	-	-	-	7,522	12	-
1a 4.7	NRC Fees	-	-	-	-	-	-	371	37	408	408	-	-	-	-	-	-	-	-	-	-
1a 4.8	Emergency Planning Fees	-	-	-	-	-	-	769	77	845	845	-	-	-	-	-	-	-	-	-	-
1a 4.9	Spent Fuel Pool O & M	-	-	-	-	-	-	551	83	614	614	-	-	-	-	-	-	-	-	-	-
1a 4.10	Security Staff Cost	-	-	-	-	-	-	6,340	951	7,291	7,291	-	-	-	-	-	-	-	-	-	115,318
1a 4.11	Utility Staff Cost	-	-	-	-	-	-	17,000	2,550	19,550	19,550	-	-	-	-	-	-	-	-	-	229,871
1a 4	Subtotal Period 1a Period-Dependent Costs	685	7	6	-	11	29,115	4,323	34,146	32,667	32,667	1,479	-	-	376	-	-	-	7,522	12	345,190
1a 0	TOTAL PERIOD 1a COST	685	7	6	-	11	76,737	11,466	88,911	87,263	87,263	1,479	169	-	476	-	-	-	7,522	12	378,641
PERIOD 1b - Decommissioning Preparations																					
Period 1b Direct Decommissioning Activities																					
Detailed Work Procedures																					
1b 1.1.1	Plant systems	-	-	-	-	-	-	154	23	177	150	-	18	-	-	-	-	-	-	-	2,026
1b 1.1.2	NSSS Decontamination Flush	-	-	-	-	-	-	13	5	37	37	-	-	-	-	-	-	-	-	-	428
1b 1.1.3	Reactor internals	-	-	-	-	-	-	81	12	91	83	-	-	-	-	-	-	-	-	-	1,070
1b 1.1.4	Remaining buildings	-	-	-	-	-	-	44	7	50	13	-	38	-	-	-	-	-	-	-	578
1b 1.1.5	CRD cooling assembly	-	-	-	-	-	-	33	5	37	17	-	-	-	-	-	-	-	-	-	428
1b 1.1.6	CRD housings & ICI tubes	-	-	-	-	-	-	11	5	37	37	-	-	-	-	-	-	-	-	-	428

Table C-3
Palo Verde NGS Unit 3
DECON Decommissioning Cost Estimate
(Thousands of 2019 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu Feet	Class A Cu Feet	Class B Cu Feet	Class C Cu Feet	GTCC Cu Feet	Burial / Processed Wt., Lbs	Craft Manhours	Utility and Contractor Manhours
Detailed Work Procedures (Continued)																					
1b 1 1 7	Incore instrumentation	-	-	-	-	-	-	33	5	17	37	-	-	-	-	-	-	-	-	-	428
1b 1 1 8	Reactor vessel	-	-	-	-	-	-	118	18	136	136	-	-	-	-	-	-	-	-	-	1,554
1b 1 1 9	Facility layout	-	-	-	-	-	-	19	6	45	22	-	-	22	-	-	-	-	-	-	514
1b 1 1 10	Mineral shield	-	-	-	-	-	-	15	2	17	17	-	-	22	-	-	-	-	-	-	193
1b 1 1 11	Biological shield	-	-	-	-	-	-	39	6	45	45	-	-	-	-	-	-	-	-	-	514
1b 1 1 12	Steam generators	-	-	-	-	-	-	150	22	172	172	-	-	-	-	-	-	-	-	-	1,969
1b 1 1 13	Reinforced concrete	-	-	-	-	-	-	13	5	37	19	-	-	19	-	-	-	-	-	-	428
1b 1 1 14	Main Turbine	-	-	-	-	-	-	51	8	58	58	-	-	-	-	-	-	-	-	-	668
1b 1 1 15	Main Condensers	-	-	-	-	-	-	51	8	58	58	-	-	-	-	-	-	-	-	-	668
1b 1 1 16	Auxiliary building	-	-	-	-	-	-	89	13	102	92	-	-	10	-	-	-	-	-	-	1,168
1b 1 1 17	Reactor building	-	-	-	-	-	-	89	13	102	92	-	-	10	-	-	-	-	-	-	1,168
1b 1 1	Total	-	-	-	-	-	-	1,081	162	1,243	1,009	-	-	234	-	-	-	-	-	-	14,228
1b 1 2	Deconprimary loop	1,947	-	-	-	-	-	-	523	1,570	1,570	-	-	-	-	-	-	-	-	-	1,067
1b 1	Subtotal Period 1b Activity Costs	1,947	-	-	-	-	-	1,081	686	2,813	2,580	-	-	234	-	-	-	-	-	-	14,228
Period 1b Additional Costs																					
1b 2 1	Spent Fuel Pool Isolation	-	-	-	-	-	-	8,217	1,233	9,449	9,449	-	-	-	-	-	-	-	-	-	13,042
1b 2 2	Site Characterization	-	-	-	-	-	-	2,562	709	3,330	3,330	-	-	-	-	-	-	-	-	-	4,610
1b 2	Subtotal Period 1b Additional Costs	-	-	-	-	-	-	10,779	2,001	12,780	12,780	-	-	-	-	-	-	-	-	-	4,640
Period 1b Collateral Costs																					
1b 3 1	Decon equipment	1,026	-	-	-	-	-	-	154	1,180	1,180	-	-	-	-	-	-	-	-	-	-
1b 3 2	Staff relocation expenses	-	-	-	-	-	-	-	76	352	352	-	-	-	-	-	-	-	-	-	-
1b 3 3	Process decommissioning waste waste	74	-	44	64	-	96	-	76	1,854	9,490	-	-	-	451	-	-	-	27,189	88	-
1b 3 4	Process decommissioning chemical flush waste	4	-	125	178	-	1,130	-	1,854	9,490	9,490	-	-	-	1,329	-	-	-	141,637	249	-
1b 3 5	Small tool allowance	-	-	-	-	-	-	-	0	2	2	-	-	-	-	-	-	-	-	-	-
1b 3 6	Pipe cutting equipment	-	1,200	-	-	-	-	-	180	1,380	1,380	-	-	-	-	-	-	-	-	-	-
1b 3 7	Deconing	2,993	-	-	-	-	-	-	314	2,407	2,407	-	-	-	-	-	-	-	-	-	-
1b 3	Subtotal Period 1b Collateral Costs	3,197	1,201	169	442	-	7,225	-	2,576	14,810	14,810	-	-	-	451	1,329	-	-	168,836	137	-
Period 1b Period Dependent Costs																					
1b 4 1	Decon supplies	25	-	-	-	-	-	-	6	31	31	-	-	-	-	-	-	-	-	-	-
1b 4 2	Insurance	-	-	-	-	-	-	1,172	117	1,290	1,290	-	-	-	-	-	-	-	-	-	-
1b 4 3	Property taxes	-	-	-	-	-	-	112	11	123	123	-	-	-	-	-	-	-	-	-	-
1b 4 4	Health physics supplies	-	182	-	-	-	-	-	40	228	228	-	-	-	-	-	-	-	-	-	-
1b 4 5	Heavy equipment rental	-	184	-	-	-	-	-	28	212	212	-	-	-	-	-	-	-	-	-	-
1b 4 6	Disposal of DAW generated	-	-	4	4	-	7	-	3	17	17	-	-	-	224	-	-	-	4,488	7	-
1b 4 7	Plant energy budget	-	-	-	-	-	-	1,566	235	1,801	1,801	-	-	-	-	-	-	-	-	-	-
1b 4 8	NRC Fees	-	-	-	-	-	-	95	10	105	105	-	-	-	-	-	-	-	-	-	-
1b 4 9	Emergency Planning Fees	-	-	-	-	-	-	388	39	427	427	-	-	-	-	-	-	-	-	-	-
1b 4 10	Spent Fuel Pool O&M	-	-	-	-	-	-	279	42	321	321	-	-	-	-	-	-	-	-	-	-
1b 4 11	Security Staff Cost	-	-	-	-	-	-	7,209	181	3,690	3,690	-	-	-	-	-	-	-	-	-	76,371
1b 4 12	Utility Staff Cost	-	-	-	-	-	-	11,054	1,058	12,713	12,713	-	-	-	-	-	-	-	-	-	149,208
1b 4	Subtotal Period 1b Period Dependent Costs	25	366	5	4	-	7	17,876	2,675	20,956	20,208	748	-	-	224	-	-	-	4,488	7	207,669
1b 0	TOTAL PERIOD 1b COST	1,208	1,568	173	415	-	7,232	29,736	7,938	51,359	50,378	748	234	-	678	1,329	-	-	173,324	11,453	226,538
PERIOD 1 TOTALS																					
PERIOD 2a - Large Component Removal																					
Period 2a Direct Decommissioning Activities																					
Nuclear Steam Supply System Removal																					
2a 1 1 1	Reactor Coolant Piping	142	137	30	17	-	387	-	210	943	943	-	-	-	1,789	-	-	-	124,853	6,164	-
2a 1 1 2	Pressurizer Quench Tank	8	7	1	4	-	44	-	18	84	84	-	-	-	201	-	-	-	14,051	375	-
2a 1 1 3	Reactor Coolant Pumps & Motors	133	70	355	159	-	885	-	395	2,197	2,197	-	-	-	10,617	-	-	-	1,108,000	5,539	100
2a 1 1 4	Pressurizer	32	41	480	98	-	239	-	149	1,039	1,039	-	-	-	2,870	-	-	-	324,870	2,373	625
2a 1 1 5	Steam Generators	210	1,029	8,010	1,201	-	6,762	-	3,536	22,769	22,769	-	-	-	49,515	-	-	-	4,415,357	45,354	958
2a 1 1 6	CRDM/CRS/Service Structure Removal	172	336	414	80	-	1,033	-	462	2,457	2,457	-	-	-	8,222	-	-	-	533,327	10,981	-
2a 1 1 7	Reactor Vessel Internal	113	6,757	19,204	1,018	-	8,190	511	14,351	50,141	50,143	-	-	-	2,370	673	224	-	365,755	41,357	1,893
2a 1 1 8	Reactor Vessel	102	8,117	3,899	882	-	3,621	511	9,221	26,953	26,951	-	-	-	17,963	-	-	-	1,269,528	43,357	1,893
2a 1 1	Total	872	18,495	12,414	1,680	-	21,161	1,021	28,342	105,985	105,985	-	-	-	93,585	673	224	-	7,955,740	157,799	5,469
Removal of Major Equipment																					
2a 1 2	Main Turbine/Generator	-	119	-	-	-	-	-	18	137	137	-	-	137	-	-	-	-	-	-	3,424
2a 1 3	Main Condensers	-	1,281	1,223	699	-	12,914	-	1,776	19,893	19,893	-	-	-	65,575	-	-	-	4,165,812	35,411	-
Cascading Costs from Clean Building Demolition																					
2a 1 4 1	Auxiliary Building	-	156	-	-	-	-	-	23	179	179	-	-	-	-	-	-	-	-	-	1,303
2a 1 4 2	Containment	-	408	-	-	-	-	-	61	470	470	-	-	-	-	-	-	-	-	-	4,270
2a 1 4 3	Main Steam Support Structure	-	31	-	-	-	-	-	6	36	36	-	-	-	-	-	-	-	-	-	274
2a 1 4 4	Radiation Building	-	164	-	-	-	-	-	25	188	188	-	-	-	-	-	-	-	-	-	2,404
2a 1 4 5	Fuel Building	-	82	-	-	-	-	-	12	95	95	-	-	-	-	-	-	-	-	-	717
2a 1 4	Total	-	842	-	-	-	-	-	126	968	968	-	-	-	-	-	-	-	-	-	8,967

Table C-3
Palo Verde NGS Unit 3
DECON Decommissioning Cost Estimate
(Thousands of 2019 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic Term Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu Feet	Class A Cu Feet	Class B Cu Feet	Class C Cu Feet	GTCC Cu Feet	Burial/Processed Wt, Lbs	Craft Manhours	Utility and Construction Manhours
Disposal of Plant Systems																					
2a 1 5 1	Auxiliary Feedwater (AF)		39		-		-	-	6	45			45						-	1,309	
2a 1 5 2	Auxiliary Steam (AS)		44				-	-	7	51			51						-	1,500	
2a 1 5 3	Auxiliary Steam (AS) RCA		168	96	17		313		126	660	660					1,569			100,880	3,888	
2a 1 5 4	Auxiliary Steam - Common (AS)		269				-	-	40	309			309						-	9,211	
2a 1 5 5	CT Makeup & Blowdown (TB)		18	3	2		37		14	74	74					185			11,785	451	
2a 1 5 6	CT Makeup & Blowdown Common (TB)		2,210	1,210	764		14,101		4,318	22,631	22,631					71,516			4,548,807	60,430	
2a 1 5 7	Chemical Production (CC)		17						2	19			19						-	630	
2a 1 5 8	Chemical Production Common (CC)		166						25	191			191						-	5,381	
2a 1 5 9	Chlorine Injection (CI)		56						8	64			64						-	1,820	
2a 1 5 10	Chlorine Injection Common (CI)		62						9	72			72						-	2,189	
2a 1 5 11	Circulating Water (CW)		107						16	124			124						-	3,545	
2a 1 5 12	Condensate (CD)		191						29	219			219						-	6,510	
2a 1 5 13	Condensate Storage & Transfer (CT)		248	33	17		307		145	749	749					1,542			99,005	6,046	
2a 1 5 14	Condenser Air Removal (AR)		39						6	45			45						-	1,316	
2a 1 5 15	Demineralized Water (DW)		64						10	73			73						-	2,085	
2a 1 5 16	Demineralized Water Common (DW)		118						18	135			135						-	3,754	
2a 1 5 17	Diesel Fuel Oil & Trane Common (DF)		22						3	25			25						-	861	
2a 1 5 18	Diesel Fuel Oil & Transfer (DF)		49						7	56			56						-	1,492	
2a 1 5 19	Diesel Generator (DG)		58						9	67			67						-	1,862	
2a 1 5 20	FW Heater Exhaust Steam & Drains (E.D)		442						60	508			508						-	14,838	
2a 1 5 21	Feedwater (FW)		93						14	107			107						-	3,094	
2a 1 5 22	Feedwater (FW) RCA		21	12	7		129		40	209	209					656			41,735	541	
2a 1 5 23	Generator Hydrogen & CO2 (GH)		3						0	3			3						-	102	
2a 1 5 24	Generator Seal Oil (SO)		7						1	8			8						-	226	
2a 1 5 25	HVAC - Misc Site Structures (HS)		15						2	18			18						-	523	
2a 1 5 26	HVAC - Miscellaneous Common (HS)		11						2	13			13						-	345	
2a 1 5 27	Lube Oil (LO)		36						5	42			42						-	1,188	
2a 1 5 28	Lube Oil Stor & Trane & Purification (OS)		32						5	36			36						-	1,038	
2a 1 5 29	Main Steam (SG)		233						35	268			268						-	8,072	
2a 1 5 30	Main Steam (SG) - RCA		94	17	20		372		123	617	617					1,878			119,916	2,297	
2a 1 5 31	Main Turbine (MT)		370	572	332		6,127		1,731	9,133	9,133					11,043			1,976,462	10,489	
2a 1 5 32	Main Turbine Control Oil (CO)		6						1	6			6						-	176	
2a 1 5 33	Secondary Chemical Control (SC)		171						26	197			197						-	5,637	
2a 1 5 34	Sewage Treatment Plant		4						1	5			5						-	131	
2a 1 5 35	Stator Cooling (CS)		4						1	5			5						-	179	
2a 1 5 36	Steam Gen Feedwater Pump Turbine (PT)		184	72	38		701		234	1,229	1,229					4,530			226,098	4,717	
2a 1 5 37	Turbine Cooling Water (TC)		140						21	161			161						-	4,675	
2a 1 5 38	Turbine Steam Seal & Drain (GS)		100	19	10		184		77	400	400					927			69,477	2,731	
2a 1 5	Totals		5,931	2,915	1,205		22,271		7,183	38,606	35,731		2,875			112,847			7,184,165	175,268	
2a 1 6	Scaffolding in support of decommissioning		3,250	20	11		210		871	4,372	4,372					1,068			67,817	36,748	
2a 1	Subtotal Period 2a Activity Costs		872	29,926	35,673	5,596	56,557	1,021	49,316	169,961	166,949		3,012			273,075	671	224	19,473,550	417,558	5,469
Period 2a Collateral Costs																					
2a 3 1	Process decommissioning water waste		130	80	115		171		133	630	630					816			48,973	159	
2a 3 2	Process decommissioning chemical flush waste																		-		
2a 3 3	Small tool allowance		300						46	346	311		35						-		
2a 3	Subtotal Period 2a Collateral Costs		130	300	80	115	171		178	975	941		35			816			48,973	159	
Period 2a Period-Dependent Costs																					
2a 4 1	Decon supplies		148						37	185	185								-		
2a 4 2	Insurance						1,693		169	1,863	1,863								-		
2a 4 3	Property taxes						676		68	744	744								-		
2a 4 4	Health physics supplies		3,654						763	3,817	3,817								-		
2a 4 5	Heavy equipment rental		4,432						650	4,982	4,982								-		
2a 4 6	Disposal of DAW generated			126	115		211		81	514	534					7,132			142,635	233	
2a 4 7	Plant energy budget							4,481	672	5,154	5,154								-		
2a 4 8	NRC Fees							553	55	608	608								-		
2a 4 9	Emergency Planning Fees							1,709	171	1,880		1,880							-		
2a 4 10	Spent Fuel Pool O&M							1,680	252	1,932		1,932							-		
2a 4 11	Remedial Actions Surveys							2,555		2,555	2,555								-		
2a 4 12	Security Staff Cost							17,706	2,656	20,362	20,362								-	119,808	
2a 4 13	Utility Staff Cost							72,379	10,857	83,236	83,236								-	931,102	
2a 4	Subtotal Period 2a Period-Dependent Costs		148	7,986	126	115	211	101,433	16,413	127,852	124,040	3,812				7,132			142,615	233	1,256,179
2a 0	TOTAL PERIOD 2a COST		1,151	37,612	35,878	5,826	56,930	104,454	56,927	298,788	291,930	3,812	3,046			281,023	673	224	19,565,160	417,949	1,256,179

Table C-3
Palo Verde NGS Unit 3
DECON Decommissioning Cost Estimate
(Thousands of 2019 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	Lie Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu Feet	Class A Cu Feet	Class B Cu Feet	Class C Cu Feet	GTCC Cu Feet	Burial/Processed Wt. Lbs.	Craft Manhours	Utility and Contractor Manhours
PERIOD 2b - Site Decontamination																					
Period 2b Direct Decommissioning Activities																					
Deposits of Plant Systems																					
2b 1 1	Chemical & Volume Control (CH)		1,658	2,075	421	200	-	1,865	2,388	10,619	10,619	-	-	-	10,442	-	-	-	1,246,683	80,047	-
2b 1 2	Chemical Waste (CM)		348	474	66	11	-	625	461	2,007	2,007	-	-	-	3,149	-	-	-	201,501	18,894	-
2b 1 3	Chemical Waste - Common (CM)		190	185	24	15	-	211	218	911	911	-	-	-	1,374	-	-	-	87,388	6,706	-
2b 1 4	Containment Building (CB)		-	-	-	0	-	0	0	1	1	-	-	-	2	-	-	-	118	15	-
2b 1 5	Containment Hydrogen Control (HP)		-	92	17	8	-	149	65	329	329	-	-	-	748	-	-	-	48,116	2,154	-
2b 1 6	Containment Leakage Test (CL)		-	30	12	7	-	136	44	220	220	-	-	-	690	-	-	-	43,831	812	-
2b 1 7	Containment Purge (CP)		-	31	11	6	-	114	38	201	201	-	-	-	577	-	-	-	36,798	827	-
2b 1 8	Domestic Water (DS)		-	109	-	-	-	-	16	125	-	-	-	125	-	-	-	-	1,075	-	-
2b 1 9	Domestic Water - Common (DS)		-	249	-	-	-	-	17	286	-	-	-	286	-	-	-	-	8,284	-	-
2b 1 10	Electrical (Clean)		-	389	-	-	-	-	148	1,116	-	-	-	1,136	-	-	-	-	30,827	-	-
2b 1 11	Electrical (Clean) - Common		-	232	-	-	-	-	15	266	-	-	-	266	-	-	-	-	7,220	-	-
2b 1 12	Electrical (Clean) - Common - RCA		-	160	25	15	-	280	115	596	596	-	-	-	1,424	-	-	-	90,479	1,446	-
2b 1 13	Electrical (Clean) - RCA		-	734	128	78	-	1,447	570	2,957	2,957	-	-	-	7,349	-	-	-	466,835	10,187	-
2b 1 14	Electrical (Contaminated)		-	4,200	430	276	-	5,081	2,410	12,465	12,465	-	-	-	25,799	-	-	-	1,638,951	97,785	-
2b 1 15	Essential Chilled Water (EC)		-	16	-	-	-	-	2	18	-	-	-	18	-	-	-	-	547	-	-
2b 1 16	Essential Chilled Water (EC) RCA		-	168	27	12	-	217	101	524	524	-	-	-	1,082	-	-	-	69,840	1,797	-
2b 1 17	Essential Cooling Water (EW)		-	57	-	-	-	-	9	65	-	-	-	65	-	-	-	-	1,917	-	-
2b 1 18	Essential Cooling Water (EW) RCA		-	83	26	14	-	264	92	478	478	-	-	-	1,334	-	-	-	85,125	1,997	-
2b 1 19	Essential Spray Pond (SP)		-	287	-	-	-	-	41	110	-	-	-	330	-	-	-	-	9,865	-	-
2b 1 20	Fire Protection (FP)		-	106	-	-	-	-	16	122	-	-	-	122	-	-	-	-	3,645	-	-
2b 1 21	Fire Protection (FP) - RCA		-	527	131	62	-	1,152	442	2,314	2,314	-	-	-	5,785	-	-	-	371,572	12,001	-
2b 1 22	Fire Protection - Common (FP) - RCA		-	1,037	142	203	-	1,742	1,259	6,583	6,583	-	-	-	18,977	-	-	-	1,207,115	23,642	-
2b 1 23	Gaseous Radwaste (GR)		-	220	33	14	-	265	127	689	689	-	-	-	1,927	-	-	-	85,625	1,112	-
2b 1 24	HVAC - Ancillary Building (HN)		-	8	-	-	-	-	1	9	-	-	-	9	-	-	-	-	248	-	-
2b 1 25	HVAC - Auxiliary Building (HA)		-	409	255	114	-	2,099	609	7,546	3,546	-	-	-	10,477	-	-	-	677,114	10,152	-
2b 1 26	HVAC - Containment Building (HC)		-	421	152	74	-	1,362	472	2,481	2,481	-	-	-	8,829	-	-	-	479,260	9,573	-
2b 1 27	HVAC - Control Building (HD)		-	88	-	-	-	-	11	162	-	-	-	162	-	-	-	-	1,112	-	-
2b 1 28	HVAC - Diesel Generator Building (HD)		-	9	-	-	-	-	1	10	-	-	-	10	-	-	-	-	295	-	-
2b 1 29	HVAC - Radwaste (HR)		-	123	15	19	-	359	127	663	663	-	-	-	1,812	-	-	-	115,774	2,861	-
2b 1 30	HVAC - Turbine Building (HT)		-	165	-	-	-	-	25	190	-	-	-	190	-	-	-	-	6,322	-	-
2b 1 31	Instrument & Service Air (IA)		-	35	-	-	-	-	5	41	-	-	-	41	-	-	-	-	1,211	-	-
2b 1 32	Instrument & Service Air (IA) - RCA		-	719	118	41	-	757	387	2,022	2,022	-	-	-	3,714	-	-	-	244,352	14,791	-
2b 1 33	Liquid Radwaste (LR)		451	731	105	19	-	905	652	2,894	2,894	-	-	-	4,538	-	-	-	291,979	27,224	-
2b 1 34	Normal Chilled Water (WC)		-	70	-	-	-	-	10	80	-	-	-	80	-	-	-	-	2,362	-	-
2b 1 35	Normal Chilled Water (WC) - RCA		-	199	38	19	-	347	143	746	746	-	-	-	1,747	-	-	-	112,038	4,662	-
2b 1 36	Nuclear Cooling Water (NC)		-	53	-	-	-	-	8	61	-	-	-	61	-	-	-	-	1,746	-	-
2b 1 37	Nuclear Cooling Water (NC) - RCA		-	473	218	114	-	2,111	685	3,601	3,601	-	-	-	10,647	-	-	-	680,829	11,451	-
2b 1 38	Nuclear Sampling (SS)		-	225	25	10	-	176	104	541	541	-	-	-	807	-	-	-	56,786	5,121	-
2b 1 39	Oil Waste & Nonradioactive Waste (OW)		-	435	87	13	-	986	172	1,934	1,934	-	-	-	4,999	-	-	-	318,195	10,186	-
2b 1 40	Oil Waste & Nonradioactive Waste (OW) - RCA		-	562	65	35	-	651	311	1,619	1,619	-	-	-	1,292	-	-	-	13,291	1,329	-
2b 1 41	Plant Cooling Water (PW)		-	115	-	-	-	-	17	132	-	-	-	132	-	-	-	-	7,929	-	-
2b 1 42	Post Accident Sampling		-	11	-	1	-	10	5	27	27	-	-	-	50	-	-	-	1,169	275	-
2b 1 43	Radiation Monitoring (SQ)		-	42	4	2	-	34	17	89	89	-	-	-	167	-	-	-	10,820	782	-
2b 1 44	Radioactive Waste Drain (RD)		438	464	52	28	-	514	473	1,971	1,971	-	-	-	2,501	-	-	-	165,934	19,457	-
2b 1 45	Radioactive Waste Drain - Common (RD)		-	13	16	2	-	17	15	65	65	-	-	-	86	-	-	-	5,531	670	-
2b 1 46	Reactor Coolant (RC)		-	16	17	6	-	118	83	412	412	-	-	-	585	-	-	-	38,217	4,444	-
2b 1 47	Safety Injection (SI)		-	1,619	676	283	-	5,219	1,819	9,556	9,556	-	-	-	26,194	-	-	-	1,683,405	41,186	-
2b 1 48	Service Gases (GA) - RCA		-	202	31	12	-	222	111	580	580	-	-	-	1,097	-	-	-	71,533	4,164	-
2b 1 49	Solid Radwaste (SR)		122	211	34	16	-	304	156	383	383	-	-	-	1,528	-	-	-	98,112	7,907	-
2b 1 50	Decommissioning Crew Set up		-	3,722	-	-	-	-	566	4,318	-	-	-	4,318	-	-	-	-	91,492	-	-
2b 1	Totals		3,246	23,486	3,514	1,830	-	33,801	15,935	81,813	74,502	-	7,312	-	170,297	-	-	-	10,901,620	638,879	-
2b 1 2	Scaffolding in support of decommissioning		-	4,074	25	14	-	263	1,089	5,465	5,465	-	-	-	1,335	-	-	-	84,796	45,935	-
Decontamination of Site Buildings																					
2b 1 1	Auxiliary Building		549	361	65	96	-	634	544	2,248	2,248	-	-	-	9,861	-	-	-	488,398	22,059	-
2b 1 2	Containment		1,180	1,730	209	482	-	5,479	2,492	11,633	11,633	-	-	-	58,640	-	-	-	2,623,111	67,811	-
2b 1 3	Dry Active Waste Processing & Storage		-	86	36	4	-	18	64	240	240	-	-	-	1,208	-	-	-	57,060	1,029	-
2b 1 4	Holdup Tank & Pump House		343	315	73	25	-	455	178	1,598	1,598	-	-	-	2,281	-	-	-	149,929	10,083	-
2b 1 5	Hot Instrument Calibration Facility		-	1	0	0	-	1	2	8	8	-	-	-	39	-	-	-	1,830	97	-
2b 1 6	LLRW Storage Facility		110	51	7	17	-	64	92	352	352	-	-	-	1,765	-	-	-	82,181	4,250	-
2b 1 7	Outage Support Facility		361	157	16	61	-	166	270	1,020	1,020	-	-	-	5,248	-	-	-	247,920	12,687	-
2b 1 8	Radwaste Building		747	233	21	91	-	1,086	828	3,556	3,556	-	-	-	8,651	-	-	-	622,720	22,190	-
2b 1 9	Refueling Water Storage Tank		473	182	79	28	-	508	471	1,942	1,942	-	-	-	2,496	-	-	-	163,942	21,082	-
2b 1 3	Totals		1,861	7,329	723	802	-	8,742	5,141	22,597	22,597	-	-	-	90,190	-	-	-	4,137,180	163,288	-
2b 1 4	Prepare/submit License Termination Plan		-	-	-	-	-	113	20	163	163	-	-	-	-	-	-	-	-	-	1,751
2b 1 5	Receive NRC approval of termination plan		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2b 1	Subtotal Period 2b Activity Costs		7,107	70,888	4,253	2,646	-	42,806	22,185	110,028	102,717	-	7,112	-	261,822	-	-	-	15,325,600	854,101	1,751

Table C-3
Palo Verde NGS Unit 3
DECON Decommissioning Cost Estimate
(Thousands of 2019 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Cys	Other Costs	Total Contingency	Total Costs	NRC Lic Term Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu Feet	Class A Cu Feet	Class B Cu Feet	Class C Cu Feet	GTCC Cu Feet	Burial/Processed Wt. Lbs.	Craft Manhours	Utility and Contractor Manhours
Period 2b Additional Costs																					
2b 2.1	Excavation of Underground Services	-	1,624	-	-	-	-	339	457	2,419	2,419	-	-	-	-	-	-	-	-	10,228	-
2b 2	Subtotal Period 2b Additional Costs	-	1,624	-	-	-	-	339	457	2,419	2,419	-	-	-	-	-	-	-	-	10,228	-
Period 2b Collateral Costs																					
2b 3.1	Process decommissioning water waste	296	-	187	270	-	402	-	308	1,463	1,463	-	-	-	1,916	-	-	-	114,934	173	-
2b 3.2	Process decommissioning chemical flush waste	8	-	244	740	-	970	-	382	2,344	2,344	-	-	-	2,602	-	-	-	277,267	487	-
2b 3.3	Small tool allowance	-	514	-	-	-	-	77	501	591	-	-	-	-	-	-	-	-	-	-	-
2b 3	Subtotal Period 2b Collateral Costs	303	514	431	1,010	-	1,373	-	767	4,397	4,397	-	-	-	4,518	-	-	-	392,201	860	-
Period 2b Period Dependent Costs																					
2b 4.1	Decon supplies	2,367	-	-	-	-	-	-	592	2,958	2,958	-	-	-	-	-	-	-	-	-	-
2b 4.2	Insurance	-	-	-	-	-	-	2,480	248	2,728	2,728	-	-	-	-	-	-	-	-	-	-
2b 4.3	Property taxes	-	-	-	-	-	-	990	99	1,089	1,089	-	-	-	-	-	-	-	-	-	-
2b 4.4	Health physics supplies	-	5,631	-	-	-	-	-	1,408	7,038	7,038	-	-	-	-	-	-	-	-	-	-
2b 4.5	Heavy equipment rental	-	6,542	-	-	-	-	-	981	7,523	7,523	-	-	-	-	-	-	-	-	-	-
2b 4.6	Disposal of DAW generated	-	-	213	194	-	357	-	140	904	904	-	-	12,074	-	-	-	-	241,479	394	-
2b 4.7	Plant energy budget	-	-	-	-	-	-	5,180	771	5,957	5,957	-	-	-	-	-	-	-	-	-	-
2b 4.8	NRC Fees	-	-	-	-	-	-	809	81	890	890	-	-	-	-	-	-	-	-	-	-
2b 4.9	Emergency Planning Fees	-	-	-	-	-	-	2,502	250	2,752	-	2,752	-	-	-	-	-	-	-	-	-
2b 4.10	Spent Fuel Pool O&M	-	-	-	-	-	-	2,460	369	2,829	-	2,829	-	-	-	-	-	-	-	-	-
2b 4.11	Liquid Radwaste Processing Equipment/Services	-	-	-	-	-	-	610	93	712	712	-	-	-	-	-	-	-	-	-	-
2b 4.12	Remedial Actions Surveys	-	-	-	-	-	-	3,741	-	3,741	3,741	-	-	-	-	-	-	-	-	-	-
2b 4.13	Security Staff Cost	-	-	-	-	-	-	25,161	3,773	28,924	28,924	-	-	-	-	-	-	-	-	-	453,111
2b 4.14	Utility Staff Cost	-	-	-	-	-	-	101,861	15,279	117,141	117,141	-	-	-	-	-	-	-	-	-	1,907,708
2b 4	Subtotal Period 2b Period Dependent Costs	2,367	12,172	213	194	-	357	145,795	24,089	185,187	179,606	5,581	-	12,074	-	-	-	-	241,479	394	1,760,818
2b 0	TOTAL PERIOD 2b COST	9,777	45,158	4,906	1,851	-	44,536	146,267	47,497	302,032	289,139	5,581	7,112	278,414	-	-	-	-	15,959,280	865,583	1,762,571
PERIOD 2d - Decontamination Following Wet Fuel Storage																					
Period 2d Direct Decommissioning Activities																					
2d 1.1	Remove spent fuel racks	710	31	128	37	-	892	-	354	1,553	1,553	-	-	-	3,515	-	-	-	223,325	968	-
Disposal of Plant Systems																					
2d 1.2.1	Electrical Spent Fuel	-	184	71	19	-	348	-	139	720	720	-	-	-	1,766	-	-	-	112,166	4,948	-
2d 1.2.2	Fire Protection - Common (FP)	-	205	-	-	-	-	-	31	236	-	-	236	-	-	-	-	-	-	7,001	-
2d 1.2.3	Fuel Pool Cooling & Cleanup (PC)	391	393	138	67	-	1,237	-	627	2,855	2,855	-	-	-	6,204	-	-	-	399,088	13,370	-
2d 1.2.4	HVAC - Fuel Building (FB)	-	159	88	49	-	747	-	241	1,276	1,276	-	-	-	3,736	-	-	-	240,970	3,820	-
2d 1.2.5	Sanitary Drain & Treatment - Common (ST)	-	245	-	-	-	-	-	37	282	-	-	282	-	-	-	-	-	-	8,002	-
2d 1.2.6	Sanitary Drainage & Treatment (ST)	-	16	-	-	-	-	-	2	19	-	-	19	-	-	-	-	-	-	577	-
2d 1.2	Totals	391	1,203	257	126	-	2,332	-	1,077	5,386	4,850	-	536	-	11,706	-	-	-	752,223	36,819	-
Decontamination of Site Buildings																					
2d 1.3.1	Fuel Building	414	493	54	22	-	1,044	-	430	1,776	1,776	-	-	-	2,151	-	-	-	128,216	22,125	-
2d 1.3	Totals	414	493	54	22	-	1,044	-	430	1,776	1,776	-	-	-	2,151	-	-	-	128,216	22,125	-
2d 1.4	Scaffolding in support of decommissioning	-	815	5	7	-	53	-	218	1,091	1,091	-	-	-	267	-	-	-	16,959	9,187	-
2d 1	Subtotal Period 2d Activity Costs	1,115	2,541	441	189	-	3,441	-	2,079	9,808	9,272	-	536	-	17,640	-	-	-	1,120,723	69,099	-
Period 2d Additional Costs																					
2d 2.1	Operational Equipment	-	-	21	67	-	911	-	240	1,239	1,239	-	-	-	11,760	-	-	-	294,000	32	-
2d 2.2	License Termination Survey Planning	-	-	-	-	-	-	842	253	1,095	1,095	-	-	-	-	-	-	-	-	-	4,160
2d 2	Subtotal Period 2d Additional Costs	-	-	21	67	-	911	842	493	2,334	2,334	-	-	-	11,760	-	-	-	294,000	32	4,160
Period 2d Collateral Costs																					
2d 3.1	Process decommissioning water waste	75	-	48	69	-	183	-	76	372	372	-	-	-	488	-	-	-	29,322	95	-
2d 3.2	Process decommissioning chemical flush waste	2	-	69	288	-	273	-	107	659	659	-	-	-	732	-	-	-	77,960	137	-
2d 3.3	Small tool allowance	-	46	-	-	-	-	-	7	51	51	-	-	-	-	-	-	-	-	-	-
2d 3.4	Decommissioning Equipment Disposition	-	-	99	86	-	1,042	-	279	1,476	1,476	-	-	-	5,200	-	-	-	336,070	147	-
2d 3	Subtotal Period 2d Collateral Costs	77	46	215	333	-	1,417	-	471	2,560	2,560	-	-	-	6,511	-	-	-	443,361	379	-
Period 2d Period Dependent Costs																					
2d 4.1	Decon supplies	115	-	-	-	-	-	-	29	144	144	-	-	-	-	-	-	-	-	-	-
2d 4.2	Insurance	-	-	-	-	-	-	400	40	440	440	-	-	-	-	-	-	-	-	-	-
2d 4.3	Property taxes	-	-	-	-	-	-	160	16	176	176	-	-	-	-	-	-	-	-	-	-
2d 4.4	Health physics supplies	-	554	-	-	-	-	-	139	693	693	-	-	-	-	-	-	-	-	-	-
2d 4.5	Heavy equipment rental	-	1,055	-	-	-	-	-	158	1,213	1,213	-	-	-	-	-	-	-	-	-	-
2d 4.6	Disposal of DAW generated	-	-	31	28	-	52	-	20	131	131	-	-	1,754	-	-	-	-	35,078	57	-
2d 4.7	Plant energy budget	-	-	-	-	-	-	446	67	512	512	-	-	-	-	-	-	-	-	-	-
2d 4.8	NRC Fees	-	-	-	-	-	-	124	72	126	126	-	-	-	-	-	-	-	-	-	-
2d 4.9	Liquid Radwaste Processing Equipment/Services	-	-	-	-	-	-	200	30	230	230	-	-	-	-	-	-	-	-	-	-

Table C-3
Palo Verde NGS Unit 3
DECON Decommissioning Cost Estimate
(Thousands of 2019 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	OTCC Cu. Feet	Burial/Processed Wt. Lbs	Craft Manhours	Utility and Contractor Manhours
Period 2d Period Dependent Costs(Continued)																					
2d4 10	Remedial Actions Surveys	-	-	-	-	-	603	-	603	603	-	-	-	-	-	-	-	-	-	25,911	
2d4 11	Security Staff Cost	-	-	-	-	-	1,440	216	1,656	1,656	-	-	-	-	-	-	-	-	-	147,096	
2d4 12	Utility Staff Cost	-	-	-	-	-	11,945	1,792	13,736	13,736	-	-	-	-	-	-	-	-	-	173,007	
2d4	Subtotal Period 2d Period Dependent Costs	115	1,609	11	28	-	52	15,316	2,519	19,671	-	-	-	1,751	-	-	-	-	35,078	57	
2d0	TOTAL PERIOD 2d COST	1,308	4,197	710	617	-	5,821	16,159	5,562	34,371	33,837	-	536	37,664	-	-	-	-	1,893,162	69,567	177,167
PERIOD 2f - License Termination																					
Period 2f Direct Decommissioning Activities																					
2f 1 1	ORISE confirmatory survey	-	-	-	-	-	170	51	221	221	-	-	-	-	-	-	-	-	-	-	
2f 1 2	Terminate license	-	-	-	-	-	170	51	221	221	-	-	-	-	-	-	-	-	-	-	
2f 1	Subtotal Period 2f Activity Costs	-	-	-	-	-	170	51	221	221	-	-	-	-	-	-	-	-	-	-	
Period 2f Additional Costs																					
2f 2 1	License Termination Survey	-	-	-	-	-	9,931	2,979	12,910	12,910	-	-	-	-	-	-	-	-	-	222,262	2,080
2f 2	Subtotal Period 2f Additional Costs	-	-	-	-	-	9,931	2,979	12,910	12,910	-	-	-	-	-	-	-	-	-	222,262	2,080
Period 2f Collateral Costs																					
2f 3 1	Staff relocation expenses	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
2f 3	Subtotal Period 2f Collateral Costs	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Period 2f Period Dependent Costs																					
2f 4 1	Insurance	-	-	-	-	-	638	64	701	701	-	-	-	-	-	-	-	-	-	-	
2f 4 2	Property taxes	-	-	-	-	-	255	25	280	280	-	-	-	-	-	-	-	-	-	-	
2f 4 3	Health physics supplies	-	965	-	-	-	-	241	1,207	1,207	-	-	-	-	-	-	-	-	-	-	
2f 4 4	Disposal of DAW generated	-	-	6	6	-	11	4	27	27	-	-	-	362	-	-	-	-	7,237	12	
2f 4 5	Plant energy budget	-	-	-	-	-	355	53	408	408	-	-	-	-	-	-	-	-	-	-	
2f 4 6	NRC Fees	-	-	-	-	-	181	18	199	199	-	-	-	-	-	-	-	-	-	-	
2f 4 7	Security Staff Cost	-	-	-	-	-	2,295	344	2,640	2,640	-	-	-	-	-	-	-	-	-	41,310	
2f 4 8	Utility Staff Cost	-	-	-	-	-	12,209	1,811	14,040	14,040	-	-	-	-	-	-	-	-	-	143,093	
2f 4	Subtotal Period 2f Period Dependent Costs	-	965	6	6	-	11	15,532	2,582	18,502	19,502	-	-	362	-	-	-	-	7,237	12	
2f 0	TOTAL PERIOD 2f COST	-	965	6	6	-	11	26,033	5,612	32,634	32,634	-	-	362	-	-	-	-	7,237	222,214	186,482
PERIOD 2 TOTALS																					
		12,236	87,972	41,560	10,380	-	107,307	292,913	115,958	667,827	647,539	9,993	10,895	507,462	673	224	-	-	37,424,830	1,575,314	1,182,599
PERIOD 3b - Site Restoration																					
Period 3b Direct Decommissioning Activities																					
Demolition of Remaining Site Buildings																					
3b 1 1 1	Administrative Bldg A	-	284	-	-	-	-	43	320	320	-	-	320	-	-	-	-	-	-	4,334	
3b 1 1 2	Administrative Bldg B	-	275	-	-	-	-	41	316	316	-	-	316	-	-	-	-	-	-	4,211	
3b 1 1 3	Administrative Bldg D	-	84	-	-	-	-	13	97	97	-	-	97	-	-	-	-	-	-	550	
3b 1 1 4	Administrative Bldg E	-	247	-	-	-	-	37	284	284	-	-	284	-	-	-	-	-	-	3,453	
3b 1 1 5	Administrative Bldg F	-	202	-	-	-	-	44	336	336	-	-	336	-	-	-	-	-	-	3,955	
3b 1 1 6	Auxiliary Boiler Foundations	-	15	-	-	-	-	2	17	17	-	-	17	-	-	-	-	-	-	108	
3b 1 1 7	Auxiliary Building	-	1,403	-	-	-	-	210	1,614	1,614	-	-	1,614	-	-	-	-	-	-	11,728	
3b 1 1 8	Calibration Lab	-	6	-	-	-	-	1	7	7	-	-	7	-	-	-	-	-	-	18	
3b 1 1 9	Chemical Injection Pump House	-	5	-	-	-	-	1	6	6	-	-	6	-	-	-	-	-	-	63	
3b 1 1 10	Chemical Storage Building	-	72	-	-	-	-	11	82	82	-	-	82	-	-	-	-	-	-	1,148	
3b 1 1 11	Condensate Storage Tank	-	106	-	-	-	-	16	121	121	-	-	121	-	-	-	-	-	-	1,787	
3b 1 1 12	Containment	-	2,618	-	-	-	-	359	3,011	3,011	-	-	3,011	-	-	-	-	-	-	25,043	
3b 1 1 13	Control Building	-	648	-	-	-	-	97	745	745	-	-	745	-	-	-	-	-	-	9,292	
3b 1 1 14	Cooling Tower Electrical Equipment	-	15	-	-	-	-	2	18	18	-	-	18	-	-	-	-	-	-	185	
3b 1 1 15	Cooling Towers	-	1,085	-	-	-	-	163	1,248	1,248	-	-	1,248	-	-	-	-	-	-	7,343	
3b 1 1 16	Corridor Building	-	68	-	-	-	-	10	78	78	-	-	78	-	-	-	-	-	-	922	
3b 1 1 17	Diesel Generator Building	-	202	-	-	-	-	40	306	306	-	-	306	-	-	-	-	-	-	2,158	
3b 1 1 18	Dry Active Waste Processing & Storage	-	65	-	-	-	-	10	75	75	-	-	75	-	-	-	-	-	-	1,338	
3b 1 1 19	Energy Information Center	-	51	-	-	-	-	8	59	59	-	-	59	-	-	-	-	-	-	1,007	
3b 1 1 20	Fire Pumphouse	-	19	-	-	-	-	3	21	21	-	-	21	-	-	-	-	-	-	231	
3b 1 1 21	Flex Buildings	-	328	-	-	-	-	49	378	378	-	-	378	-	-	-	-	-	-	5,014	
3b 1 1 22	Holdup Tank & Pump House	-	37	-	-	-	-	6	42	42	-	-	42	-	-	-	-	-	-	265	
3b 1 1 23	Hot Instrument Calibration Facility	-	9	-	-	-	-	1	10	10	-	-	10	-	-	-	-	-	-	57	
3b 1 1 24	Intake Structure, Canals & Circ. Tunnels	-	1,351	-	-	-	-	201	1,554	1,554	-	-	1,554	-	-	-	-	-	-	3,859	
3b 1 1 25	LLRW Storage Facility	-	162	-	-	-	-	24	187	187	-	-	187	-	-	-	-	-	-	1,056	
3b 1 1 26	Main Steam Support Structure	-	181	-	-	-	-	27	209	209	-	-	209	-	-	-	-	-	-	1,700	
3b 1 1 27	Miscellaneous Structures & Foundations	-	1,849	-	-	-	-	277	2,127	2,127	-	-	2,127	-	-	-	-	-	-	17,010	
3b 1 1 28	North Admin Annex Building	-	149	-	-	-	-	22	172	172	-	-	172	-	-	-	-	-	-	2,005	
3b 1 1 29	Nuclear Service Spray Ponds	-	1,089	-	-	-	-	163	1,252	1,252	-	-	1,252	-	-	-	-	-	-	7,151	
3b 1 1 30	Operations Support Building	-	117	-	-	-	-	18	135	135	-	-	135	-	-	-	-	-	-	1,730	
3b 1 1 31	Outage Support Facility	-	815	-	-	-	-	122	937	937	-	-	937	-	-	-	-	-	-	8,774	
3b 1 1 32	Protected Area Security Blast Wall	-	2,251	-	-	-	-	488	3,739	3,739	-	-	3,739	-	-	-	-	-	-	29,990	
3b 1 1 33	Radwaste Building	-	1,473	-	-	-	-	221	1,694	1,694	-	-	1,694	-	-	-	-	-	-	21,636	

Table C-3
Palo Verde NGS Unit 3
DECON Decommissioning Cost Estimate
(Thousands of 2019 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet	Burial/Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
Demolition of Remaining Site Buildings (Continued)																					
3b 1 1 34	Refueling Water Storage Tank	-	70	-	-	-	-	-	10	80	-	-	80	-	-	-	-	-	-	452	-
3b 1 1 35	Retention Tanks	-	163	-	-	-	-	-	24	188	-	-	188	-	-	-	-	-	-	1,211	-
3b 1 1 36	SG Voltage Regulator Building	-	28	-	-	-	-	-	4	32	-	-	32	-	-	-	-	-	-	261	-
3b 1 1 37	Security Headquarters and Guard House	-	45	-	-	-	-	-	7	51	-	-	51	-	-	-	-	-	-	473	-
3b 1 1 38	Service Building	-	135	-	-	-	-	-	20	155	-	-	155	-	-	-	-	-	-	2,614	-
3b 1 1 39	Sewage Treatment Plant	-	4	-	-	-	-	-	1	5	-	-	5	-	-	-	-	-	-	39	-
3b 1 1 40	Site Fencing & Paving & Railroad	-	1,705	-	-	-	-	-	256	1,960	-	-	1,960	-	-	-	-	-	-	29,521	-
3b 1 1 41	Spare Turbine Rotor Laydown Pads	-	1	-	-	-	-	-	1	6	-	-	6	-	-	-	-	-	-	26	-
3b 1 1 42	Station Blackout Gas Turbine Generator	-	17	-	-	-	-	-	2	19	-	-	19	-	-	-	-	-	-	107	-
3b 1 1 43	Subsynchronous Resonance Protection	-	2	-	-	-	-	-	0	2	-	-	2	-	-	-	-	-	-	30	-
3b 1 1 44	Switchgear Building	-	24	-	-	-	-	-	4	28	-	-	28	-	-	-	-	-	-	322	-
3b 1 1 45	Technical Support Center	-	228	-	-	-	-	-	34	262	-	-	262	-	-	-	-	-	-	1,540	-
3b 1 1 46	Transformer Area	-	69	-	-	-	-	-	10	79	-	-	79	-	-	-	-	-	-	447	-
3b 1 1 47	Turbine Building	-	1,737	-	-	-	-	-	261	1,997	-	-	1,997	-	-	-	-	-	-	17,106	-
3b 1 1 48	Turbine Building Pedestal	-	3,578	-	-	-	-	-	537	4,115	-	-	4,115	-	-	-	-	-	-	59,425	-
3b 1 1 49	Turbine Maintenance Facility	-	15	-	-	-	-	-	2	17	-	-	17	-	-	-	-	-	-	244	-
3b 1 1 50	Vehicle Maintenance Facility	-	60	-	-	-	-	-	0	60	-	-	60	-	-	-	-	-	-	1,188	-
3b 1 1 51	WRP Train 7	-	2	-	-	-	-	-	0	3	-	-	3	-	-	-	-	-	-	22	-
3b 1 1 52	Waste Furniture Storage Building #64	-	100	-	-	-	-	-	15	115	-	-	115	-	-	-	-	-	-	1,096	-
3b 1 1 53	Warehouse	-	924	-	-	-	-	-	139	1,062	-	-	1,062	-	-	-	-	-	-	16,547	-
3b 1 1 54	Warehouse - Office Facility	-	665	-	-	-	-	-	100	765	-	-	765	-	-	-	-	-	-	7,170	-
3b 1 1 55	Yard Tunnels	-	331	-	-	-	-	-	50	380	-	-	380	-	-	-	-	-	-	5,290	-
3b 1 1 56	Fuel Building	-	757	-	-	-	-	-	114	871	-	-	871	-	-	-	-	-	-	6,910	-
3b 1 1	Total	-	29,100	-	-	-	-	-	4,365	33,465	-	-	33,465	-	-	-	-	-	-	142,762	-
Site Closeout Activities																					
3b 1 2	Remove Rubble	-	4,235	-	-	-	-	-	635	4,870	-	-	4,870	-	-	-	-	-	-	26,159	-
3b 1 3	Grade & landscape site	-	59	-	-	-	-	-	8	68	-	-	68	-	-	-	-	-	-	325	-
3b 1 4	Final report to NRC	-	-	-	-	-	-	51	8	58	58	-	-	-	-	-	-	-	-	-	668
3b 1	Subtotal Period 3b Activity Costs	-	33,394	-	-	-	-	51	5,917	38,462	58	-	38,404	-	-	-	-	-	-	469,247	668
Period 3b Additional Costs																					
3b 2 1	Concrete Crushing	-	2,252	-	-	-	-	6	339	2,596	-	-	2,596	-	-	-	-	-	-	10,940	-
3b 2 2	Construction Debris	-	-	-	-	-	-	2,820	423	3,243	-	-	3,243	-	-	-	-	-	-	-	-
3b 2 3	Firing Range Closure	-	221	-	-	-	-	225	67	614	-	-	614	-	-	-	-	-	-	1,848	-
3b 2	Subtotal Period 3b Additional Costs	-	2,473	-	-	-	-	3,061	829	6,353	-	-	6,353	-	-	-	-	-	-	12,788	-
Period 3b Collateral Costs																					
3b 3 1	Small tool allowance	-	217	-	-	-	-	-	33	250	-	-	250	-	-	-	-	-	-	-	-
3b 3	Subtotal Period 3b Collateral Costs	-	217	-	-	-	-	-	33	250	-	-	250	-	-	-	-	-	-	-	-
Period 3b Period Dependent Costs																					
3b 4 1	Insurance	-	-	-	-	-	-	630	-	630	-	-	-	-	-	-	-	-	-	-	-
3b 4 2	Property taxes	-	-	-	-	-	-	-	63	693	-	-	-	-	-	-	-	-	-	-	-
3b 4 3	Heavy equipment rental	-	5,669	-	-	-	-	-	850	6,520	-	-	6,520	-	-	-	-	-	-	-	-
3b 4 4	Plant energy budget	-	-	-	-	-	-	449	66	505	-	-	-	-	-	-	-	-	-	-	-
3b 4 5	Security Staff Cost	-	-	-	-	-	-	5,677	851	6,528	-	-	6,528	-	-	-	-	-	-	-	102,164
3b 4 6	Utility Staff Cost	-	-	-	-	-	-	21,204	3,181	24,385	-	-	24,385	-	-	-	-	-	-	-	248,703
3b 4	Subtotal Period 3b Period Dependent Costs	-	5,669	-	-	-	-	27,950	5,911	38,631	-	-	38,631	-	-	-	-	-	-	-	150,866
3b 0	TOTAL PERIOD 3b COST	-	41,754	-	-	-	-	51,052	10,889	83,695	68	-	83,637	-	-	-	-	-	-	382,035	351,634
PERIOD 3c - Fuel Storage Operations/Shipping																					
Period 3c Direct Decommissioning Activities																					
Period 3c Collateral Costs																					
3c 3	Subtotal Period 3c Collateral Costs	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Period 3c Period Dependent Costs																					
3c 4 1	Insurance	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3c 4 2	Property taxes	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3c 4 3	Plant energy budget	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3c 4 4	Utility Staff Cost	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3c 4	Subtotal Period 3c Period Dependent Costs	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3c 0	TOTAL PERIOD 3c COST	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PERIOD 3d - GTCC Shipping																					
Period 3d Direct Decommissioning Activities																					
Nuclear Steam Supply System Removal																					
3d 1 1 1	Vessel & Internals GTCC Disposal	-	-	2,581	-	-	25,443	-	4,462	32,486	32,486	-	-	-	-	-	-	4,433	905,513	-	-
3d 1 1	Total	-	-	2,581	-	-	25,443	-	4,462	32,486	32,486	-	-	-	-	-	-	4,433	905,513	-	-
3d 1	Subtotal Period 3d Activity Costs	-	-	2,581	-	-	25,443	-	4,462	32,486	32,486	-	-	-	-	-	-	4,433	905,513	-	-

Table C-3
Palo Verde NGS Unit 3
DECON Decommissioning Cost Estimate
(Thousands of 2019 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu Feet	Burial Volumes				GTCC Cu Feet	Burial/ Processed Wt. Lbs	Craft Manhours	Utility and Construction Manhours
															Class A Cu Feet	Class B Cu Feet	Class C Cu Feet					
Period 3d Collateral Costs																						
3d 3	Subtotal Period 3d Collateral Costs	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Period 3d Period-Dependent Costs																						
3d 4 1	Insurance	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3d 4 2	Property taxes	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3d 4 3	Plant energy budget	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3d 4 4	Utility Staff Cost	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3d 4	Subtotal Period 3d Period-Dependent Costs	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3d 0	TOTAL PERIOD 3d COST			2,581			25,443		4,462	32,486	32,486							4,433	905,513			
PERIOD 3 TOTALS			41,764	2,581			25,443	21,052	15,351	116,181	32,545		83,637					4,433	905,513	182,035	351,534	
TOTAL COST TO DECOMMISSION		16,605	131,978	44,261	10,761		139,994	470,437	160,353	924,279	817,726	11,620	94,934		688,616	2,002	224	4,433	18,611,190	1,971,814	4,339,311	

TOTAL COST TO DECOMMISSION WITH 15.43% CONTINGENCY	\$924,279	thousands of 2019 dollars
TOTAL NRC LICENSE TERMINATION COST IS 88.47% OR	\$917,726	thousands of 2019 dollars
SPENT FUEL MANAGEMENT COST IS 1.28% OR	\$11,620	thousands of 2019 dollars
NON-NUCLEAR DEMOLITION COST IS 10.27% OR	\$94,934	thousands of 2019 dollars
TOTAL LOW-LEVEL RADIOACTIVE WASTE VOLUME BURIED (EXCLUDING GTCC)	600,743	Cubic Feet
TOTAL GREATER THAN CLASS C RADWASTE VOLUME GENERATED	4,433	Cubic Feet
TOTAL SCRAP METAL REMOVED	77,858	Tons
TOTAL CRAFT LABOR REQUIREMENTS	1,971,814	Man-hours

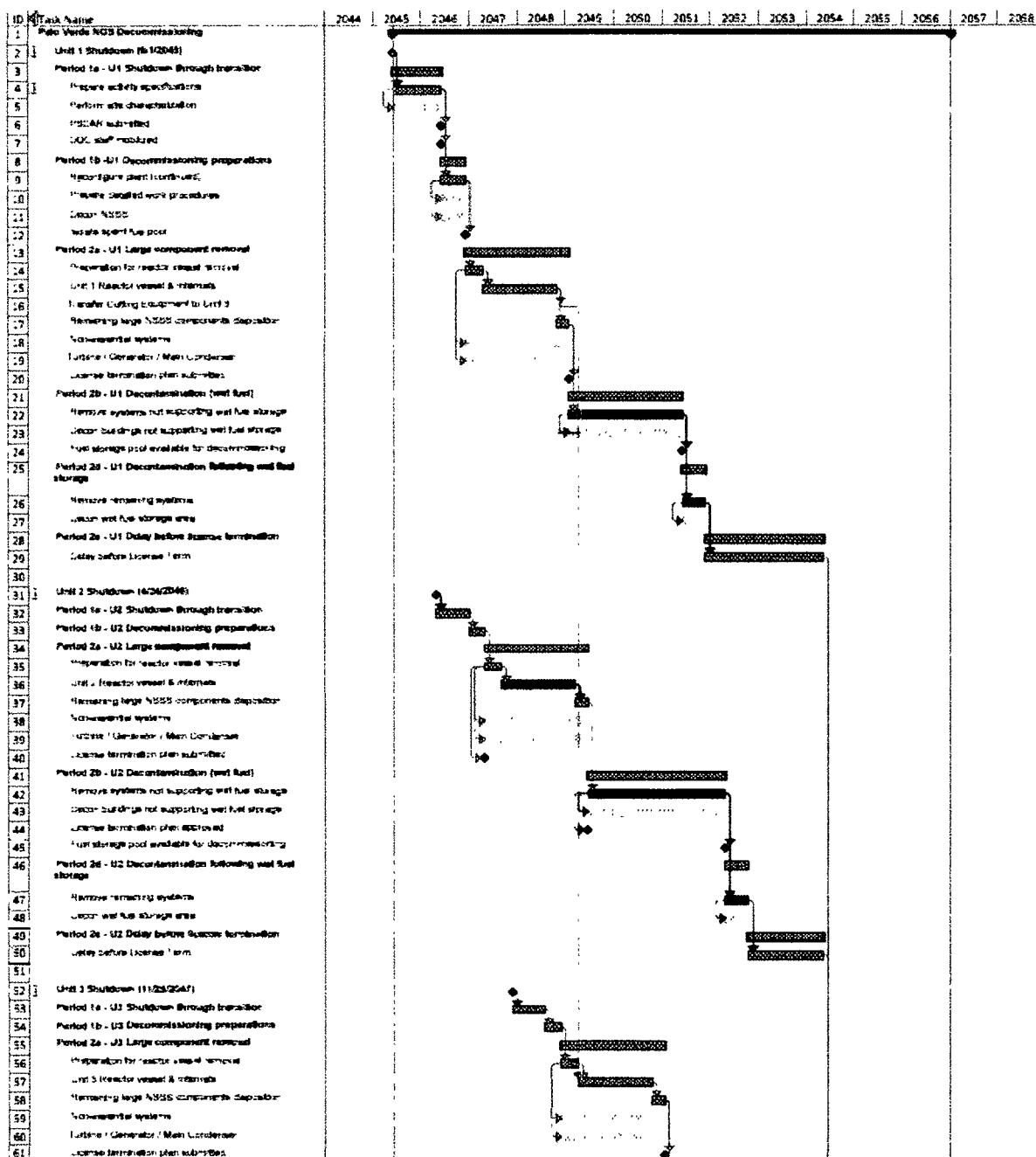
End Notes
n/a - indicates that the activity not charged as decommissioning expense
a - indicates that the activity performed by decommissioning staff
0 - indicates that the value is less than 0.5 but is non zero
A cell containing " " indicates a zero value

APPENDIX D
DECOMMISSIONING SCHEDULE

**Palo Verde Nuclear Generating Station
2019 Decommissioning Cost Study**

**Document A04-1761-001, Rev. 1
Appendix D, Page 134 of 183**

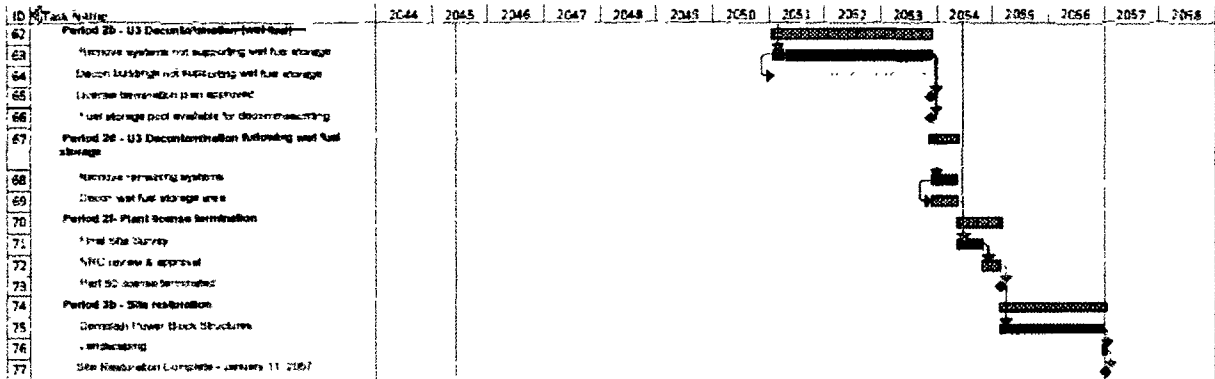
DECOMMISSIONING SCHEDULE



**Palo Verde Nuclear Generating Station
2019 Decommissioning Cost Study**

**Document A04-1761-001, Rev. 1
Appendix D, Page 135 of 183**

**DECOMMISSIONING SCHEDULE
(continued)**



APPENDIX E
UNIT COST FACTOR DEVELOPMENT

***Palo Verde Nuclear Generating Station
2019 Decommissioning Cost Study***

***Document A04-1761-001, Rev. 1
Appendix E, Page 137 of 183***

APPENDIX E

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 packing area.

2. CALCULATIONS

Activity Description	Critical Duration (minutes)

Install contamination controls, remove insulation, and mount pipe cutters	60
Disconnect inlet and outlet lines, cap openings	60
Rig for removal	30
Unbolt from mounts	30
Remove contamination controls	15
Remove heat exchanger, wrap in plastic, and send to packing area	<u>60</u>
Critical Duration	255

Work Adjustments (Work Difficulty Factors)

+ Respiratory Protection (50% of Critical Duration)	128
+ Radiation/ALARA (37.08333% of Critical Duration)	<u>95</u>
Adjusted Work Duration	478
+ Protective Clothing (30% of Adjusted Work Duration)	<u>143</u>
Productive Work Duration	621
+ Work break adjustment (8.33 % of Productive Work Duration)	<u>52</u>
Total Work Duration	673

***** Total Work Duration = 673 minutes or 11.217 hours *****

**Palo Verde Nuclear Generating Station
2019 Decommissioning Cost Study**

**Document A04-1761-001, Rev. 1
Appendix E, Page 138 of 183**

**APPENDIX E
(continued)**

3. LABOR REQUIRED

Crew	Number	Duration (hours)	Rate (\$/hr)	Cost
Laborers	3.00	11.217	\$20.78	\$698.93
Craftsmen	2.00	11.217	\$40.68	\$912.62
Foreman	1.00	11.217	\$43.95	\$492.99
General Foreman	0.25	11.217	\$47.02	\$131.86
Fire Watch	0.05	11.217	\$20.77	\$11.65
Health Physics Technician	1.00	11.217	\$60.55	<u>\$679.19</u>
Total labor cost				\$2,927.24

4. EQUIPMENT & CONSUMABLES COSTS

Equipment Costs	none
Consumables/Materials Costs	
-Gas torch consumables 1 @ \$19.49/hour x 1 hour {1}	\$19.49
-Blotting paper 50 @ \$0.61/sq. ft {2}	\$30.50
-Tarpaulin 7.5 mils 50 @ \$0.47/sq. ft {3}	<u>\$23.50</u>
Subtotal cost of equipment and materials	\$73.49
Overhead & sales tax on equipment and materials @ 16.300%	<u>\$11.98</u>
Total costs, equipment & material	\$85.47
TOTAL COST: Removal of contaminated heat exchanger <3000 pounds:	\$3,012.71
Total labor cost:	\$2,927.24
Total equipment/material costs:	\$85.47
Total craft labor man-hours required per unit:	81.884

**APPENDIX E
(continued)**

5. NOTES AND REFERENCES

- Work difficulty factors were developed in conjunction with the AIF (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. R.S. Means (2019) Division 01 54 33, Section 40-6360, page 734
 2. www.mcmaster.com online catalog (7193T88)
 3. R.S. Means (2019) Division 01 56, Section 13.60-0600, page 22
- Material and consumable costs were adjusted using the regional indices for Phoenix, Arizona

APPENDIX F

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

**Palo Verde Nuclear Generating Station
2019 Decommissioning Cost Study**

**Document A04-1761-001, Rev. 1
Appendix F, Page 141 of 183**

APPENDIX F

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

Unit Cost Factor	Cost/Unit (\$)
Removal of clean instrument and sampling tubing, \$/linear foot	0.27
Removal of clean pipe 0.25 to 2 inches diameter, \$/linear foot	2.71
Removal of clean pipe >2 to 4 inches diameter, \$/linear foot	4.11
Removal of clean pipe >4 to 8 inches diameter, \$/linear foot	8.67
Removal of clean pipe >8 to 14 inches diameter, \$/linear foot	16.01
Removal of clean pipe >14 to 20 inches diameter, \$/linear foot	21.01
Removal of clean pipe >20 to 36 inches diameter, \$/linear foot	30.86
Removal of clean pipe >36 inches diameter, \$/linear foot	36.59
Removal of clean valve >2 to 4 inches	56.86
Removal of clean valve >4 to 8 inches	86.74
Removal of clean valve >8 to 14 inches	160.14
Removal of clean valve >14 to 20 inches	210.07
Removal of clean valve >20 to 36 inches	308.63
Removal of clean valve >36 inches	365.88
Removal of clean pipe hanger for small bore piping	21.13
Removal of clean pipe hanger for large bore piping	66.87
Removal of clean pump, <300 pound	150.24
Removal of clean pump, 300-1000 pound	427.54
Removal of clean pump, 1000-10,000 pound	1,641.76
Removal of clean pump, >10,000 pound	3,188.62
Removal of clean pump motor, 300-1000 pound	175.93
Removal of clean pump motor, 1000-10,000 pound	678.14
Removal of clean pump motor, >10,000 pound	1,525.83
Removal of clean heat exchanger <3000 pound	891.06
Removal of clean heat exchanger >3000 pound	2,261.74
Removal of clean feedwater heater/deaerator	6,308.94
Removal of clean moisture separator/reheater	12,881.23
Removal of clean tank, <300 gallons	192.78
Removal of clean tank, 300-3000 gallon	600.45
Removal of clean tank, >3000 gallons, \$/square foot surface area	5.30

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

Unit Cost Factor	Cost/Unit (\$)
Removal of clean electrical equipment, <300 pound	78.92
Removal of clean electrical equipment, 300-1000 pound	286.43
Removal of clean electrical equipment, 1000-10,000 pound	572.86
Removal of clean electrical equipment, >10,000 pound	1,393.12
Removal of clean electrical transformer < 30 tons	967.51
Removal of clean electrical transformer > 30 tons	2,786.24
Removal of clean standby diesel generator, <100 kW	988.22
Removal of clean standby diesel generator, 100 kW to 1 MW	2,205.77
Removal of clean standby diesel generator, >1 MW	4,566.39
Removal of clean electrical cable tray, \$/linear foot	7.60
Removal of clean electrical conduit, \$/linear foot	3.33
Removal of clean mechanical equipment, <300 pound	78.92
Removal of clean mechanical equipment, 300-1000 pound	286.43
Removal of clean mechanical equipment, 1000-10,000 pound	572.86
Removal of clean mechanical equipment, >10,000 pound	1,393.12
Removal of clean HVAC equipment, <300 pound	95.44
Removal of clean HVAC equipment, 300-1000 pound	344.17
Removal of clean HVAC equipment, 1000-10,000 pound	685.93
Removal of clean HVAC equipment, >10,000 pound	1,393.12
Removal of clean HVAC ductwork, \$/pound	0.28
Removal of contaminated instrument and sampling tubing, \$/linear foot	1.12
Removal of contaminated pipe 0.25 to 2 inches diameter, \$/linear foot	16.77
Removal of contaminated pipe >2 to 4 inches diameter, \$/linear foot	26.87
Removal of contaminated pipe >4 to 8 inches diameter, \$/linear foot	45.27
Removal of contaminated pipe >8 to 14 inches diameter, \$/linear foot	83.31
Removal of contaminated pipe >14 to 20 inches diameter, \$/linear foot	99.09
Removal of contaminated pipe >20 to 36 inches diameter, \$/linear foot	134.87
Removal of contaminated pipe >36 inches diameter, \$/linear foot	158.27
Removal of contaminated valve >2 to 4 inches	334.31
Removal of contaminated valve >4 to 8 inches	396.32

**Palo Verde Nuclear Generating Station
2019 Decommissioning Cost Study**

**Document A04-1761-001, Rev. 1
Appendix F, Page 143 of 183**

APPENDIX F

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

Unit Cost Factor	Cost/Unit (\$)
Removal of contaminated valve >8 to 14 inches	770.33
Removal of contaminated valve >14 to 20 inches	972.89
Removal of contaminated valve >20 to 36 inches	1,285.94
Removal of contaminated valve >36 inches	1,519.93
Removal of contaminated pipe hanger for small bore piping	111.24
Removal of contaminated pipe hanger for large bore piping	339.35
Removal of contaminated pump, <300 pound	713.07
Removal of contaminated pump, 300-1000 pound	1,630.72
Removal of contaminated pump, 1000-10,000 pound	4,844.88
Removal of contaminated pump, >10,000 pound	11,796.29
Removal of contaminated pump motor, 300-1000 pound	724.22
Removal of contaminated pump motor, 1000-10,000 pound	2,005.65
Removal of contaminated pump motor, >10,000 pound	4,503.23
Removal of contaminated heat exchanger <3000 pound	3,012.71
Removal of contaminated heat exchanger >3000 pound	8,835.79
Removal of contaminated tank, <300 gallons	1,192.65
Removal of contaminated tank, >300 gallons, \$/square foot	22.34
Removal of contaminated electrical equipment, <300 pound	536.98
Removal of contaminated electrical equipment, 300-1000 pound	1,308.32
Removal of contaminated electrical equipment, 1000-10,000 pound	2,521.76
Removal of contaminated electrical equipment, >10,000 pound	4,976.78
Removal of contaminated electrical cable tray, \$/linear foot	25.99
Removal of contaminated electrical conduit, \$/linear foot	13.79
Removal of contaminated mechanical equipment, <300 pound	596.68
Removal of contaminated mechanical equipment, 300-1000 pound	1,442.28
Removal of contaminated mechanical equipment, 1000-10,000 pound	2,775.33
Removal of contaminated mechanical equipment, >10,000 pound	4,976.78
Removal of contaminated HVAC equipment, <300 pound	596.68
Removal of contaminated HVAC equipment, 300-1000 pound	1,442.28
Removal of contaminated HVAC equipment, 1000-10,000 pound	2,775.33

APPENDIX F

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

Unit Cost Factor	Cost/Unit (\$)
Removal of contaminated HVAC equipment, >10,000 pound	4,976.78
Removal of contaminated HVAC ductwork, \$/pound	1.71
Removal/plasma arc cut of contaminated thin metal components, \$/linear in.	2.74
Additional decontamination of surface by washing, \$/square foot	5.56
Additional decontamination of surfaces by hydrolasing, \$/square foot	27.18
Decontamination rig hook up and flush, \$/ 250 foot length	4,979.27
Chemical flush of components/systems, \$/gallon	20.23
Removal of clean standard reinforced concrete, \$/cubic yard	61.96
Removal of grade slab concrete, \$/cubic yard	70.42
Removal of clean concrete floors, \$/cubic yard	293.58
Removal of sections of clean concrete floors, \$/cubic yard	852.26
Removal of clean heavily rein concrete w/#9 rebar, \$/cubic yard	89.23
Removal of contaminated heavily rein concrete w/#9 rebar, \$/cubic yard	1,616.80
Removal of clean heavily rein concrete w/#18 rebar, \$/cubic yard	120.89
Removal of contaminated heavily rein concrete w/#18 rebar, \$/cubic yard	2,135.15
Removal heavily rein concrete w/#18 rebar & steel embedments, \$/cubic yard	341.16
Removal of below-grade suspended floors, \$/cubic yard	169.36
Removal of clean monolithic concrete structures, \$/cubic yard	661.04
Removal of contaminated monolithic concrete structures, \$/cubic yard	1,598.97
Removal of clean foundation concrete, \$/cubic yard	523.51
Removal of contaminated foundation concrete, \$/cubic yard	1,490.51
Explosive demolition of bulk concrete, \$/cubic yard	38.36
Removal of clean hollow masonry block wall, \$/cubic yard	21.60
Removal of contaminated hollow masonry block wall, \$/cubic yard	57.81
Removal of clean solid masonry block wall, \$/cubic yard	21.60
Removal of contaminated solid masonry block wall, \$/cubic yard	57.81
Backfill of below-grade voids, \$/cubic yard	28.49
Removal of subterranean tunnels/voids, \$/linear foot	78.21
Placement of concrete for below-grade voids, \$/cubic yard	131.85
Excavation of clean material, \$/cubic yard	2.54

APPENDIX F

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

Unit Cost Factor	Cost/Unit (\$)
Excavation of contaminated material, \$/cubic yard	35.14
Removal of clean concrete rubble (tipping fee included), \$/cubic yard	22.18
Removal of contaminated concrete rubble, \$/cubic yard	21.49
Removal of building by volume, \$/cubic foot	0.24
Removal of clean building metal siding, \$/square foot	0.89
Removal of contaminated building metal siding, \$/square foot	3.63
Removal of standard asphalt roofing, \$/square foot	1.25
Removal of transite panels, \$/square foot	1.46
Scarifying contaminated concrete surfaces (drill & spall), \$/square foot	10.32
Scabbling contaminated concrete floors, \$/square foot	5.72
Scabbling contaminated concrete walls, \$/square foot	14.70
Scabbling contaminated ceilings, \$/square foot	50.08
Scabbling structural steel, \$/square foot	4.94
Removal of clean overhead crane/monorail < 10 ton capacity	422.44
Removal of contaminated overhead crane/monorail < 10 ton capacity	1,390.90
Removal of clean overhead crane/monorail >10-50 ton capacity	1,013.87
Removal of contaminated overhead crane/monorail >10-50 ton capacity	3,337.56
Removal of polar crane > 50 ton capacity	4,308.89
Removal of gantry crane > 50 ton capacity	15,556.49
Removal of structural steel, \$/pound	0.14
Removal of clean steel floor grating, \$/square foot	3.49
Removal of contaminated steel floor grating, \$/square foot	11.03
Removal of clean free standing steel liner, \$/square foot	7.95
Removal of contaminated free standing steel liner, \$/square foot	25.98
Removal of clean concrete-anchored steel liner, \$/square foot	3.97
Removal of contaminated concrete-anchored steel liner, \$/square foot	30.30
Placement of scaffolding in clean areas, \$/square foot	14.37
Placement of scaffolding in contaminated areas, \$/square foot	22.03
Landscaping with topsoil, \$/acre	21,951.61
Cost of CPC B-88 LSA box & preparation for use	1,965.10

APPENDIX F

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

Unit Cost Factor	Cost/Unit (\$)
Cost of CPC B-25 LSA box & preparation for use	1,587.36
Cost of CPC B-12V 12 gauge LSA box & preparation for use	1,515.77
Cost of CPC B-144 LSA box & preparation for use	10,114.94
Cost of LSA drum & preparation for use	198.67
Cost of cask liner for CNSI 8 120A cask (resins)	11,710.61
Cost of cask liner for CNSI 8 120A cask (filters)	8,283.95
Decontamination of surfaces with vacuuming, \$/square foot	0.58

APPENDIX G

STORED STEAM GENERATORS & STORAGE FACILITY, DECON DECOMMISSIONING COST ESTIMATE

Table G
Palo Verde Nuclear Generating Station - Stored Steam Generators & Storage Facility
DECON Decommissioning Cost Estimate
(Thousands of 2019 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	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes Class A Cu. Feet	Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
1	Review plant dwgs & specs	-	-	-	-	-	-	35	5	40	40	-	-	-	-	-	460
2	Define major work sequence	-	-	-	-	-	-	57	9	66	66	-	-	-	-	-	750
Activity Specifications																	
3	Steam generators	-	-	-	-	-	-	24	4	27	27	-	-	-	-	-	312
4	Reinforced concrete	-	-	-	-	-	-	12	2	14	14	-	-	-	-	-	160
5	Plant structures & buildings	-	-	-	-	-	-	24	4	27	-	27	-	-	-	-	312
6	Facility & site closeout	-	-	-	-	-	-	7	1	8	-	8	-	-	-	-	90
Planning & Site Preparations																	
7	Prepare dismantling sequence	-	-	-	-	-	-	18	3	21	21	-	-	-	-	-	240
8	Plant prep & temp. svces	-	-	-	-	-	-	340	51	391	391	-	-	-	-	-	-
Detailed Work Procedures																	
9	Remaining buildings	-	-	-	-	-	-	10	2	12	12	-	-	-	-	-	135
10	Facility closeout	-	-	-	-	-	-	9	1	10	10	-	-	-	-	-	120
11	Steam generators	-	-	-	-	-	-	35	5	40	40	-	-	-	-	-	460
12	Reinforced concrete	-	-	-	-	-	-	8	1	9	9	-	-	-	-	-	100
Nuclear Steam Supply System Removal																	
13	Retired Steam Generator Units	-	-	24,089	3,603	-	20,155	-	7,988	55,835	55,835	-	-	146,958	13,246,071	107,355	2,875
Demolition of Remaining Site Buildings																	
14.1	Steam Generator Storage Facility	-	164	-	-	-	-	-	25	189	-	189	-	-	-	1,087	-
14	Totals	-	164	-	-	-	-	-	25	189	-	189	-	-	-	1,087	-
Site Closeout Activities																	
15	Remove Rubble	-	59	-	-	-	-	-	9	68	-	68	-	-	-	325	-
16	Concrete Crushing	-	26	-	-	-	-	9	5	40	-	40	-	-	-	125	-
17	Small tool allowance	-	242	-	-	-	-	-	36	278	-	278	-	-	-	-	-
TOTAL COST TO DECOMMISSION																	
		-	490	24,089	3,603	-	20,155	587	8,150	57,074	56,465	609	-	146,958	13,246,071	108,893	6,014

TOTAL COST TO DECOMMISSION WITH 16.66 % CONTINGENCY:	\$57,074 thousands of 2019 dollars
TOTAL NRC LICENSE TERMINATION COST	\$56,465 thousands of 2019 dollars
NON-NUCLEAR DEMOLITION COST	\$609 thousands of 2019 dollars
TOTAL SCRAP METAL REMOVED:	222 tons
TOTAL CRAFT LABOR REQUIREMENTS:	108,893 man-hours

APPENDIX H

**WATER RECLAMATION FACILITY,
DECON DECOMMISSIONING COST ESTIMATE**

Table H
Palo Verde Nuclear Generating Station - Water Reclamation Facility
DECON Decommissioning Cost Estimate
(Thousands of 2019 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs	Craft Manhours	Utility and Contractor Manhours
															Class A	Class B	Class C	GTCC			
1	Operations Shutdown	-	-	-	-	-	-	1,178		1,178	-	-	1,178	-	-	-	-	-	-	-	-
2	Review plant dwgs & specs	-	-	-	-	-	-	35	5	40	-	-	40	-	-	-	-	-	-	-	460
3	Define major work sequence	-	-	-	-	-	-	57	9	66	-	-	66	-	-	-	-	-	-	-	750
Activity Specifications																					
4	Plant & temporary facilities	-	-	-	-	-	-	37	6	43	-	-	43	-	-	-	-	-	-	-	492
5	Plant systems	-	-	-	-	-	-	32	5	36	-	-	36	-	-	-	-	-	-	-	417
6	Reinforced concrete	-	-	-	-	-	-	12	2	14	-	-	14	-	-	-	-	-	-	-	160
7	Plant structures & buildings	-	-	-	-	-	-	24	4	27	-	-	27	-	-	-	-	-	-	-	312
8	Facility & site closeout	-	-	-	-	-	-	7	1	8	-	-	8	-	-	-	-	-	-	-	90
Planning & Site Preparations																					
9	Prepare dismantling sequence	-	-	-	-	-	-	18	3	21	-	-	21	-	-	-	-	-	-	-	240
10	Plant prep & temp svces	-	-	-	-	-	-	340	51	391	-	-	391	-	-	-	-	-	-	-	-
Detailed Work Procedures																					
11	Plant systems	-	-	-	-	-	-	36	5	41	-	-	41	-	-	-	-	-	-	-	473
12	Remaining buildings	-	-	-	-	-	-	10	2	12	-	-	12	-	-	-	-	-	-	-	135
13	Facility closeout	-	-	-	-	-	-	9	1	10	-	-	10	-	-	-	-	-	-	-	120
14	Reinforced concrete	-	-	-	-	-	-	8	1	9	-	-	9	-	-	-	-	-	-	-	100
Disposal of Plant Systems																					
15 1	Chlorination	-	3	-	-	-	-	-	0	3	-	-	3	-	-	-	-	-	-	81	-
15 2	Clarifier Feed Sump	-	22	-	-	-	-	-	3	25	-	-	25	-	-	-	-	-	-	674	-
15 3	Classification Centrifuge	-	2	-	-	-	-	-	0	2	-	-	2	-	-	-	-	-	-	53	-
15 4	Dewatering Centrifuge	-	3	-	-	-	-	-	0	4	-	-	4	-	-	-	-	-	-	101	-
15 5	Domestic Water	-	2	-	-	-	-	-	0	2	-	-	2	-	-	-	-	-	-	55	-
15 6	Fire Protection	-	2	-	-	-	-	-	0	2	-	-	2	-	-	-	-	-	-	68	-
15 7	First Stage Thickeners	-	111	-	-	-	-	-	17	128	-	-	128	-	-	-	-	-	-	3,214	-
15 8	Fuel Oil	-	37	-	-	-	-	-	6	43	-	-	43	-	-	-	-	-	-	1,076	-
15 9	Gravity Filters	-	1	-	-	-	-	-	0	1	-	-	1	-	-	-	-	-	-	33	-
15 10	LPC	-	9	-	-	-	-	-	1	11	-	-	11	-	-	-	-	-	-	278	-
15 11	Lime	-	192	-	-	-	-	-	29	221	-	-	221	-	-	-	-	-	-	5,643	-
15 12	Lime Recalcination	-	6	-	-	-	-	-	1	7	-	-	7	-	-	-	-	-	-	193	-
15 13	Polymer	-	21	-	-	-	-	-	3	24	-	-	24	-	-	-	-	-	-	625	-
15 14	Process Water	-	22	-	-	-	-	-	3	25	-	-	25	-	-	-	-	-	-	674	-
15 15	Pure Carbon Dioxide	-	35	-	-	-	-	-	5	40	-	-	40	-	-	-	-	-	-	1,008	-
15 16	Second Stage Thickeners	-	38	-	-	-	-	-	6	44	-	-	44	-	-	-	-	-	-	1,098	-
15 17	Soda Ash	-	130	-	-	-	-	-	19	149	-	-	149	-	-	-	-	-	-	3,790	-
15 18	Solids Contact Clarifiers	-	90	-	-	-	-	-	13	103	-	-	103	-	-	-	-	-	-	2,788	-
15 19	Spent Washwater Pump Station	-	13	-	-	-	-	-	2	15	-	-	15	-	-	-	-	-	-	405	-
15 20	Spent Washwater Thickeners	-	178	-	-	-	-	-	27	204	-	-	204	-	-	-	-	-	-	5,155	-
15 21	Stack Gas CO2	-	7	-	-	-	-	-	1	8	-	-	8	-	-	-	-	-	-	213	-
15 22	Sulfuric Acid	-	19	-	-	-	-	-	3	22	-	-	22	-	-	-	-	-	-	544	-
15 23	Supply	-	29	-	-	-	-	-	4	33	-	-	33	-	-	-	-	-	-	892	-
15 24	Tracking Filters	-	993	-	-	-	-	-	149	1,141	-	-	1,141	-	-	-	-	-	-	28,757	-
15 25	Waste Centrifuge	-	1	-	-	-	-	-	0	1	-	-	1	-	-	-	-	-	-	37	-
15 26	Waste Thickeners	-	71	-	-	-	-	-	14	81	-	-	81	-	-	-	-	-	-	2,071	-
16	Totals	-	2,035	-	-	-	-	-	305	2,340	-	-	2,340	-	-	-	-	-	-	59,524	-

Table H
Palo Verde Nuclear Generating Station - Water Reclamation Facility
DECON Decommissioning Cost Estimate
(Thousands of 2019 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet	Burial/Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
16	Scaffolding in support of decommissioning	-	215	-	-	-	-	-	32	247	-	-	247	-	-	-	-	-	-	8,660	-
17	Small tool allowance	-	22	-	-	-	-	-	3	26	-	-	26	-	-	-	-	-	-	682	-
Demolition of Remaining Site Buildings																					
18.1	1st & 2nd Stage Solids Contact Clarifier	-	487	-	-	-	-	-	73	560	-	-	560	-	-	-	-	-	-	3,704	-
18.2	1st & 2nd Stage Thickeners	-	54	-	-	-	-	-	8	62	-	-	62	-	-	-	-	-	-	458	-
18.3	Air Compressor	-	10	-	-	-	-	-	2	12	-	-	12	-	-	-	-	-	-	129	-
Demolition of Remaining Site Buildings (continued)																					
18.4	Carbon Dioxide Tank	-	8	-	-	-	-	-	1	10	-	-	10	-	-	-	-	-	-	63	-
18.6	Chemical Feed Area	-	35	-	-	-	-	-	5	40	-	-	40	-	-	-	-	-	-	369	-
18.6	Chemical Production Building	-	100	-	-	-	-	-	15	115	-	-	115	-	-	-	-	-	-	1,724	-
18.7	Chlorine Building	-	6	-	-	-	-	-	1	6	-	-	6	-	-	-	-	-	-	83	-
18.8	Clarifier & Thickener Walkway	-	105	-	-	-	-	-	16	121	-	-	121	-	-	-	-	-	-	2,250	-
18.9	Classification & Dewatering Centrifuge	-	46	-	-	-	-	-	7	53	-	-	53	-	-	-	-	-	-	733	-
18.10	Diesel Fuel Tanks	-	2	-	-	-	-	-	0	2	-	-	2	-	-	-	-	-	-	12	-
18.11	Electrical Building	-	16	-	-	-	-	-	2	17	-	-	17	-	-	-	-	-	-	220	-
18.12	Electrical Equipment Bldg & Foundation	-	84	-	-	-	-	-	13	96	-	-	96	-	-	-	-	-	-	933	-
18.13	Filters & Clarifiers Pump Station	-	32	-	-	-	-	-	5	37	-	-	37	-	-	-	-	-	-	401	-
18.14	Gravity Filters	-	155	-	-	-	-	-	23	179	-	-	179	-	-	-	-	-	-	1,618	-
18.15	I & C Shop	-	15	-	-	-	-	-	2	17	-	-	17	-	-	-	-	-	-	220	-
18.16	LPG Storage Tank	-	9	-	-	-	-	-	1	10	-	-	10	-	-	-	-	-	-	62	-
18.17	Lime Storage	-	79	-	-	-	-	-	12	91	-	-	91	-	-	-	-	-	-	773	-
18.18	Operations Building	-	143	-	-	-	-	-	22	165	-	-	165	-	-	-	-	-	-	2,516	-
18.19	Piping	-	546	-	-	-	-	-	82	628	-	-	628	-	-	-	-	-	-	1,333	-
18.20	Recalcinating Furnace Area	-	68	-	-	-	-	-	10	78	-	-	78	-	-	-	-	-	-	1,275	-
18.21	Soda Ash Unloading & Storage	-	18	-	-	-	-	-	3	21	-	-	21	-	-	-	-	-	-	140	-
18.22	Spent Washwater Thickeners	-	223	-	-	-	-	-	33	257	-	-	257	-	-	-	-	-	-	1,999	-
18.23	Sulfuric Acid Building	-	25	-	-	-	-	-	4	29	-	-	29	-	-	-	-	-	-	457	-
18.24	TSD/MSC/DDC Building	-	33	-	-	-	-	-	5	39	-	-	39	-	-	-	-	-	-	521	-
18.25	Trickling Filter Walkways	-	4	-	-	-	-	-	1	5	-	-	5	-	-	-	-	-	-	96	-
18.26	Trickling Filters	-	576	-	-	-	-	-	86	662	-	-	662	-	-	-	-	-	-	4,666	-
18.27	WRF Warehouse	-	95	-	-	-	-	-	14	109	-	-	109	-	-	-	-	-	-	1,680	-
18.28	Waste Centrifuges	-	47	-	-	-	-	-	7	54	-	-	54	-	-	-	-	-	-	740	-
18.29	Waste Thickeners	-	26	-	-	-	-	-	4	30	-	-	30	-	-	-	-	-	-	260	-
18	Totals	-	3,047	-	-	-	-	-	457	3,504	-	-	3,504	-	-	-	-	-	-	29,335	-
Site Closeout Activities																					
19	Concrete Crushing	-	221	-	-	-	-	10	35	265	-	-	265	-	-	-	-	-	-	1,073	-
20	Backfill Site	-	2,311	-	-	-	-	-	347	2,658	-	-	2,658	-	-	-	-	-	-	4,868	-
21	Grade & landscape site	-	59	-	-	-	-	-	9	68	-	-	68	-	-	-	-	-	-	325	-
22	Small tool allowance	-	20	-	-	-	-	-	3	23	-	-	23	-	-	-	-	-	-	-	-
TOTAL COST TO DECOMMISSION		-	7,930	-	-	-	-	1,812	1,285	11,027	-	-	11,027	-	-	-	-	-	-	104,458	3,749

TOTAL COST TO DECOMMISSION WITH 18.19 % CONTINGENCY:	\$11,027 thousands of 2019 dollars
TOTAL SCRAP METAL REMOVED	10,416 tons
TOTAL CRAFT LABOR REQUIREMENTS	104,458 man-hours

***Palo Verde Nuclear Generating Station
2019 Decommissioning Cost Study***

***Document A04-1761-001, Rev. 1
Appendix I, Page 152 of 183***

APPENDIX I

WATER RECLAMATION SUPPLY SYSTEM PIPELINE & STRUCTURES, DECON DECOMMISSIONING COST ESTIMATE

Table I
Palo Verde Nuclear Generating Station - Water Reclamation Supply System Pipeline & Structures
DECON Decommissioning Cost Estimate
(Thousands of 2019 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic Term Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu Feet	Class A Cu Feet	Class B Cu Feet	Class C Cu Feet	GTCC Cu Feet	Burial / Processed Wt., Lbs	Craft Manhours	Utility and Contractor Manhours
1	Review plant dwgs & specs	-	-	-	-	-	-	35	5	40	-	-	40	-	-	-	-	-	-	-	460
2	Define major work sequence	-	-	-	-	-	-	57	9	66	-	-	66	-	-	-	-	-	-	-	750
Activity Specifications																					
3	Plant & temporary facilities	-	-	-	-	-	-	37	6	43	-	-	43	-	-	-	-	-	-	-	492
4	Plant systems	-	-	-	-	-	-	32	6	36	-	-	36	-	-	-	-	-	-	-	417
5	Reinforced concrete	-	-	-	-	-	-	12	2	14	-	-	14	-	-	-	-	-	-	-	160
6	Plant structures & buildings	-	-	-	-	-	-	24	4	27	-	-	27	-	-	-	-	-	-	-	312
7	Facility & site closeout	-	-	-	-	-	-	7	1	8	-	-	8	-	-	-	-	-	-	-	90
Planning & Site Preparations																					
8	Prepare dismantling sequence	-	-	-	-	-	-	18	3	21	-	-	21	-	-	-	-	-	-	-	240
9	Plant prep & temp evces	-	-	-	-	-	-	340	61	391	-	-	391	-	-	-	-	-	-	-	-
Detailed Work Procedures																					
10	Plant systems	-	-	-	-	-	-	36	5	41	-	-	41	-	-	-	-	-	-	-	473
11	Remaining buildings	-	-	-	-	-	-	10	2	12	-	-	12	-	-	-	-	-	-	-	135
12	Facility closeout	-	-	-	-	-	-	9	1	10	-	-	10	-	-	-	-	-	-	-	120
13	Reinforced concrete	-	-	-	-	-	-	8	1	9	-	-	9	-	-	-	-	-	-	-	100
Disposal of Plant Systems																					
14.1	91st Avenue Meter Vault Components	-	3	-	-	-	-	-	0.5	4	-	-	4	-	-	-	-	-	-	110	-
14.2	Chemical Waste	-	3	-	-	-	-	-	0.4	3	-	-	3	-	-	-	-	-	-	82	-
14.3	Fire Protection	-	0.2	-	-	-	-	-	0.02	0.2	-	-	0.2	-	-	-	-	-	-	5	-
14.4	HVAC Misc Site Structures	-	5	-	-	-	-	-	1	6	-	-	6	-	-	-	-	-	-	166	-
14	Totals	-	12	-	-	-	-	-	2	13	-	-	13	-	-	-	-	-	-	363	-
15	Scaffolding in support of decommissioning	-	48	-	-	-	-	-	7	55	-	-	55	-	-	-	-	-	-	1,921	-
16	Small tool allowance	-	0.12	-	-	-	-	-	0.017	0.133	-	-	0.133	-	-	-	-	-	-	-	-
Demolition of Remaining Site Buildings																					
17.1	91st Avenue Meter Vault	-	34	-	-	-	-	-	5	40	-	-	40	-	-	-	-	-	-	176	-
17.2	91st Avenue Interface	-	34	-	-	-	-	-	5	39	-	-	39	-	-	-	-	-	-	406	-
17.3	BIC Interface	-	7	-	-	-	-	-	1	8	-	-	8	-	-	-	-	-	-	60	-
17.4	Buckeye Isolation Valve Structure	-	6	-	-	-	-	-	1	6	-	-	6	-	-	-	-	-	-	51	-
17.5	Hasayampa Isolation Valve Structure	-	4	-	-	-	-	-	1	4	-	-	4	-	-	-	-	-	-	24	-
17.6	Hasayampa Pumping Station	-	141	-	-	-	-	-	21	162	-	-	162	-	-	-	-	-	-	1,223	-
17.7	Influent Shutoff Valve Structure	-	3	-	-	-	-	-	0	4	-	-	4	-	-	-	-	-	-	37	-
17.8	Piping	-	45,623	-	-	-	-	-	6,843	52,467	-	-	52,467	-	-	-	-	-	-	111,544	-
17.9	RID Sump Structures	-	5	-	-	-	-	-	1	6	-	-	6	-	-	-	-	-	-	66	-
17.10	Tolleon Interface Structures	-	5	-	-	-	-	-	1	6	-	-	6	-	-	-	-	-	-	89	-
17	Totals	-	45,861	-	-	-	-	-	6,879	52,740	-	-	52,740	-	-	-	-	-	-	113,676	-
Site Closeout Activities																					
18	Backfill Site	-	355	-	-	-	-	-	53	408	-	-	408	-	-	-	-	-	-	747	-
19	Concrete Crushing	-	21	-	-	-	-	1	3	25	-	-	25	-	-	-	-	-	-	102	-
20	Small tool allowance	-	56	-	-	-	-	-	8	64	-	-	64	-	-	-	-	-	-	-	-
TOTAL COST TO DECOMMISSION																					
TOTAL COST TO DECOMMISSION WITH 15 % CONTINGENCY																					
TOTAL SCRAP METAL REMOVED:																					
TOTAL CRAFT LABOR REQUIREMENTS:																					

TOTAL COST TO DECOMMISSION WITH 15 % CONTINGENCY	\$64,024 thousands of 2019 dollars
TOTAL SCRAP METAL REMOVED:	503 tons
TOTAL CRAFT LABOR REQUIREMENTS:	116,809 man-hours

APPENDIX J
**EVAPORATION PONDS,
DECON DECOMMISSIONING COSTS**

Table J
Palo Verde Nuclear Generating Station - Evaporation Ponds
DECON Decommissioning Cost Estimate
(Thousands of 2019 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Other Costs	Total Contingency	Total Costs ¹	NRC Lic Term Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu Feet	Class A Cu Feet	Class B Cu Feet	Class C Cu Feet	GTCC Cu Feet	Burial / Processed Wt, Lbs	Craft Manhours	Utility and Contractor Manhours
1	Subtitle D Permitted Landfill (On Site)																		
1.1	Total Direct Cost					12,316	2,463	14,779			14,779								
1.2	Engineering					307	61	368											
1.3	Construction Quality Assurance					920	184	1,104			1,104								
1.4	Construction Mobilization and Demobilization @ 3%					365	74	443			443								
1.5	AFS Management Personnel Costs @ 10%					1,232	246	1,478			1,478								
1.6	Other Construction Items @ 15%					1,847	360	2,217			2,217								
	Total Subtitle D Permitted Landfill					16,991	3,398	20,389			20,389								
2	Evaporation Pond #1																		
2.1	Excavation, Hauling and Disposal of sludge/sediment					3,192	638	3,831			3,831								
2.2	Removal of Composite Liner System					3,269	654	3,923			3,923								
2.3	Removal of Inflow Piping System					19	4	22			22								
2.4	Cut Down Sumps, Soil Backfill					26	6	32			32								
2.5	Haul and Disposal of Composite Liner System and Inflow Piping System					1,367	273	1,641			1,641								
2.6	Confirmation Sampling					66	13	79			79								
2.7	Fill Pond Area in with Embankment Material, Regrade and Compact					3,069	614	3,682			3,682								
2.8	Revegetation					1,188	238	1,425			1,425								
2.9	Grouting of LCRS pipes					25	6	30			30								
2.10	Disposal of Concrete Structures					14	3	16			16								
	Subtotal Direct Activities					12,235	2,447	14,683			14,683								
2.11	Construction Mobilization and Demobilization @ 3%					367	73	440			440								
2.12	AFS Management Personnel Costs @ 10%					1,224	245	1,468			1,468								
	Total Evaporation Pond #1					13,826	2,765	16,591			16,591								
3	Evaporation Pond #2																		
3.1	Excavation, Hauling and Disposal of sludge/sediment					2,980	596	3,576			3,576								
3.2	Removal of Composite Liner System					2,397	590	3,596			3,596								
3.3	Removal of Inflow Piping System					19	4	22			22								
3.4	Cut Down Sumps, Soil Backfill					53	11	64			64								
3.5	Haul and Disposal of Composite Liner System and Inflow Piping System					1,262	252	1,515			1,515								
3.6	Confirmation Sampling					66	13	79			79								
3.7	Fill Pond Area in with Embankment Material, Regrade and Compact					2,772	554	3,326			3,326								
3.8	Revegetation					1,089	218	1,307			1,307								
3.9	Grouting of LCRS pipes					53	11	64			64								
3.10	Disposal of Concrete Structures					24	6	29			29								
	Subtotal Direct Activities					11,314	2,263	13,577			13,577								
3.11	Construction Mobilization and Demobilization @ 3%					339	68	407			407								
3.12	AFS Management Personnel Costs @ 10%					1,131	226	1,358			1,358								
	Total Evaporation Pond #2					12,785	2,557	15,342			15,342								
4	Evaporation Pond #3																		
4.1	Excavation, Hauling and Disposal of sludge/sediment					2,381	476	2,858			2,858								
4.2	Removal of Composite Liner System					1,834	207	1,241			1,241								
4.3	Removal of Inflow Piping System					-	-	-			-								
4.4	Cut Down Sumps, Soil Backfill					53	11	64			64								
4.5	Haul and Disposal of Composite Liner System and Inflow Piping System					455	91	546			546								
4.6	Confirmation Sampling					66	13	79			79								
4.7	Fill Pond Area in with Embankment Material, Regrade and Compact					5,160	1,032	6,191			6,191								
4.8	Revegetation					873	175	1,048			1,048								
4.9	Grouting of LCRS pipes					52	10	62			62								
4.10	Disposal of Concrete Structures					19	4	23			23								
	Subtotal Direct Activities					10,893	2,019	12,912			12,912								
4.11	Construction Mobilization and Demobilization @ 3%					303	61	363			363								

Table J
Palo Verde Nuclear Generating Station - Evaporation Ponds
DECON Decommissioning Cost Estimate
(Thousands of 2019 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Other Costs	Total Contingency	Total Costs ¹	NRC Lic Term Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu Feet	Class A Cu Feet	Class B Cu Feet	Class C Cu Feet	GTCC Cu Feet	Burial Volumes Wt. Lbs	Burial/Processed Manhours	Craft Manhours	Utility and Contractor Manhours
4.12	AFS Management Personnel Costs @ 10%					1,009	202	1,211			1,211									
	Total Evaporation Pond #3					11,405	2,281	13,686			13,686									
	TOTAL COST TO DECOMMISSION					55,007	11,001	66,009			66,009									
TOTAL COST TO DECOMMISSION WITH 20% CONTINGENCY						\$85,009														
TOTAL NRC LICENSE TERMINATION COST						\$0														
NON-NUCLEAR DEMOLITION COST						\$85,009														

Note 1: The Evaporation Pond closure and Subtitle D Permitted Landfill cost estimates were provided by APSC. TLG assumes that the costs provided for development of the permitted landfill and closure of the Evaporation Ponds to be all-inclusive. TLG escalated the Evaporation Pond closure costs from 2007 & 2009 \$'s, to 2019 dollars. The Subtitle D Permitted Landfill costs were provided based upon waste volumes after 60 years of plant operation. Direct costs were reduced by 33% to reflect 40 years of operation.

APPENDIX K
**MAKE-UP WATER RESERVOIR,
DECON DECOMMISSIONING COSTS**

Table K
Palo Verde Nuclear Generating Station - Make-up Water Reservoir
DECON Decommissioning Cost Estimate
(Thousands of 2019 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Other Costs	Total Contingency	Total Costs ¹	NRC Lic. Term Costs	Spent Fuel Management Costs	Site Restoration Costs
1	80 Acre Make-up Water Reservoir										
1 1	Excavation, Hauling and Disposal of sludge/sediment					1,158	232	1,389			1,389
1 2	Removal of Composite Liner System					79	16	95			95
1 3	Cut Down Sumps, Soil Backfill					159	32	191			191
1 4	Haul and Disposal of Composite Liner System and Inflow Piping System					159	32	191			191
1 5	Confirmation Sampling					40	8	48			48
1 6	Revegetation					434	87	521			521
1 7	Restoration of 36" Red Hawk Make-Up Water Line ²					891	178	1,069			1,069
	Subtotal Direct Activities					2,919	584	3,503			3,503
1 8	Construction Mobilization and Demobilization @ 3%					88	18	105			105
1 9	APS Management Personnel Costs @ 10%					292	58	350			350
	Total 80 Acre Make-up Water Reservoir					3,298	660	3,958			3,958
2	45 Acre Make-up Water Reservoir										
2 1	Excavation, Hauling and Disposal of sludge/sediment					302	60	363			363
2 2	Removal of Composite Liner System					196	39	235			235
2 3	Cut Down Sumps, Soil Backfill					71	14	85			85
2 4	Haul and Disposal of Composite Liner System and Inflow Piping System					101	20	121			121
2 5	Confirmation Sampling					21	4	26			26
2 6	Revegetation					128	26	153			153
	Subtotal Direct Activities					819	164	983	-	-	983
2 7	Construction Mobilization and Demobilization @ 3%					25	5	29			29
2 8	APS Management Personnel Costs @ 10%					82	16	98			98
	Total 45 Acre Make-up Water Reservoir					925	185	1,110			1,110
TOTAL COST TO DECOMMISSION						4,224	845	5,069	-	-	5,069

TOTAL COST TO DECOMMISSION WITH 20% CONTINGENCY:	\$5,069
TOTAL NRC LICENSE TERMINATION COST	\$0
NON-NUCLEAR DEMOLITION COST	\$5,069

Note 1 The Make-up Water Reservoir closure cost estimates with the exception of line #1 7 were provided by APSC. TLG escalated these costs to 2019 dollars.
Note 2 TLG estimated the closure cost of the 36" makeup water line from the Red Hawk pipeline to the Make-up Water Reservoirs.

APPENDIX L

**ISFSI
DECON DECOMMISSIONING COSTS**

Table L
Palo Verde Nuclear Generating Station - ISFSI
DECON Decommissioning Cost Estimate
(Thousands of 2019 Dollars)

Activity Index	Activity Description	Decom Cost	Removal Cost	Packaging Costs	Transport Costs	Off Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu Feet	Class A Cu Feet	Class B Cu Feet	Class C Cu Feet	GTCC Cu Feet	Burial Volumes Wt., Lbs	Burial / Processed Manhours	Craft Manhours	Utility and Contractor Manhours
Start	ISFSI Operations / Spent Fuel Transfer (Unit 1, 2, & 3 Shutdown - End of Spent Fuel Transfer to DOE)																					
	Unit 1 - June 1, 2045																					
	Unit 2 - April 24, 2046																					
	Unit 3 - November 28, 2047																					
Finish	December 31, 2088																					
	ISFSI Operations Collateral / Period Dependent Costs																					
	Spent Fuel Transfer from Pool to DOE Transport Vehicle		-	-	-	-	-	20,448	3,067	23,515	-	23,515	-									
	Spent Fuel Transfer from ISFSI to DOE Transport Vehicle			-	-	-	-	85,163	12,773	97,926	-	97,926	-									
	Total ISFSI Operations / Spent Fuel Transfer Costs							105,600	15,840	121,440	-	121,440	-									
	Radiological ISFSI License Termination																					
	ISFSI Planning	-	-	-	-	-	-	780	195	975	-	975	-									1,672
	ISFSI Decontamination	-	182	317	2,452	-	3,484	-	1,609	8,045	-	8,045	-		38,624	-	-	-		4,150,679	2,128	-
	ISFSI License Termination	-	-	-	-	-	-	4,178	1,045	5,223	-	5,223	-		-	-	-	-		-	34,303	-
	NRC and NRC Contractor	-	-	-	-	-	-	481	120	602	-	602	-		-	-	-	-		-	-	1,153
	ISFSI Insurance	-	-	-	-	-	-	98	25	123	-	123	-		-	-	-	-		-	-	-
	ISFSI Property Taxes	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-	-		-	-	-
	Plant Energy Budget	-	-	-	-	-	-	96	24	120	-	120	-		-	-	-	-		-	-	-
	ISFSI Security (Industrial)	-	-	-	-	-	-	165	41	206	-	206	-		-	-	-	-		-	-	5,999
	ISFSI Overnight Staff	-	-	-	-	-	-	444	111	554	-	554	-		-	-	-	-		-	-	4,551
	TOTAL Radiological ISFSI License Termination COST	-	182	317	2,452	-	3,484	6,242	3,170	15,848	-	15,848	-		38,624	-	-	-		4,150,679	36,431	13,374
	Non-Radiological ISFSI Demolition and Site Restoration																					
	Direct Demolition / Site Restoration activities																					
	Demolition of Remaining Site Buildings & Site Closure (including, rail track, paving, buildings, storage casks liners, and ISFSI pad)		5,806	-	-	-	-	1,551	1,103.61	8,461	-	8,461	-								49,146	160
	ISFSI Demolition / Site Restoration Period Dependent Collateral Costs																					
	Security Staff Costs	-	-	-	-	-	-	65	10	75	-	75	-									2,384
	Utility Staff Cost	-	-	-	-	-	-	148	22	170	-	170	-									1,479
	Subtotal Period Dependent Costs	-	-	-	-	-	-	213	32	245	-	245	-									3,863
	TOTAL Non-Radiological ISFSI Demolition and Site Restoration Cost	-	5,806	-	-	-	-	1,764	1,136	8,706	-	8,706	-								49,146	4,023
	TOTAL COST TO DECOMMISSION		5,989	317	2,452		3,484	113,507	20,145	145,994	-	145,994			38,624					4,150,679	85,577	17,397
	TOTAL COST TO OPERATE AND DECOMMISSION ISFSI WITH 16% CONTINGENCY							\$145,994		thousands of 2019 dollars												
	TOTAL CRAFT LABOR REQUIREMENTS							85,577		Man-hours												

End Notes
 nk - 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

*Palo Verde Nuclear Generating Station
2019 Decommissioning Cost Study*

*Document A04-1761-001, Rev. 1
Appendix M, Page 161 of 183*

APPENDIX M

STORED REACTOR CLOSURE HEADS & STORAGE FACILITY, DECON DECOMMISSIONING COSTS

Table M
Palo Verde Nuclear Generating Station - Stored Reactor Closure Heads & Storage Facility
DECON Decommissioning Cost Estimate
(Thousands of 2019 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	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes Class A Cu. Feet	Burial/Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
1	Review plant dwgs & specs.	-	-	-	-	-	-	35	5	40	40	-	-	-	-	-	460
2	Define major work sequence	-	-	-	-	-	-	57	9	66	66	-	-	-	-	-	750
Activity Specifications																	
3	Reactor Vessel	-	-	-	-	-	-	49	7	57	57	-	-	-	-	-	650
4	Reinforced concrete	-	-	-	-	-	-	12	2	14	7	7	-	-	-	-	160
5	Plant structures & buildings	-	-	-	-	-	-	24	4	27	14	14	-	-	-	-	312
6	Facility & site closeout	-	-	-	-	-	-	7	1	8	4	4	-	-	-	-	90
Planning & Site Preparations																	
7	Prepare dismantling sequence	-	-	-	-	-	-	18	3	21	21	-	-	-	-	-	240
8	Plant prep. & temp svces	-	-	-	-	-	-	340	51	391	391	-	-	-	-	-	-
Detailed Work Procedures																	
9	Remaining buildings	-	-	-	-	-	-	10	2	12	3	9	-	-	-	-	135
10	Facility closeout	-	-	-	-	-	-	9	1	10	5	5	-	-	-	-	120
11	Reactor Vessel	-	-	-	-	-	-	28	4	32	32	-	-	-	-	-	363
12	Reinforced concrete	-	-	-	-	-	-	8	1	9	4	4	-	-	-	-	100
Nuclear Steam Supply System Removal																	
13	Retired Reactor Closure Heads	-	-	502	1,763	-	1,638	-	724	4,628	4,628	-	-	15,216	924,428	6,295	6,000
Demolition of Remaining Site Buildings																	
14.1	Rx Closure Head Storage Facility	-	46	-	-	-	-	-	7	53	-	53	-	-	-	304	-
14	Totals	-	46	-	-	-	-	-	7	53	-	53	-	-	-	304	-
Site Closeout Activities																	
15	Remove Rubble	-	18	-	-	-	-	-	3	20	-	20	-	-	-	108	-
16	Concrete Crushing	-	7	-	-	-	-	3	1	11	11	-	-	-	-	35	-
17	Small tool allowance	-	5	-	-	-	-	-	1	6	6	1	-	-	-	-	-
TOTAL COST TO DECOMMISSION		-	76	502	1,763	-	1,638	599	826	5,405	5,288	117	-	15,216	924,428	6,742	9,380

TOTAL COST TO DECOMMISSION WITH 18 % CONTINGENCY:	\$ 5,405 thousands of 2019 dollars
TOTAL NRC LICENSE TERMINATION COST	\$ 5,288 thousands of 2019 dollars
NON-NUCLEAR DEMOLITION COST	\$ 117 thousands of 2019 dollars
TOTAL CRAFT LABOR REQUIREMENTS:	6,742 man-hours

APPENDIX N

SCHEDULE OF ANNUAL EXPENDITURES - CONSOLIDATED

<u>Table</u>	<u>Page</u>
N-1 Schedule of Palo Verde Annual Expenditures, Unit 1	164
N-2 Schedule of Palo Verde Annual Expenditures, Unit 2	166
N-3 Schedule of Palo Verde Annual Expenditures, Unit 3	168

**Palo Verde Nuclear Generating Station
2019 Decommissioning Cost Study**

**Document A04-1761-001, Rev. 1
Appendix N, Page 164 of 183**

**TABLE N-1
SCHEDULE OF ANNUAL EXPENDITURES
UNIT 1 - CONSOLIDATED (INCLUDES SITE FACILITIES)
(thousands, 2019 dollars)**

Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2040	363	0	0	0	0	363
2041	619	0	0	0	0	619
2042	619	0	0	0	0	619
2043	3,501	0	0	0	0	3,501
2044	5,550	0	0	0	0	5,550
2045	64,958	4,703	1,567	13	4,408	75,649
2046	85,370	17,386	4,000	15,949	22,996	145,702
2047	68,416	33,330	2,539	32,335	9,005	145,624
2048	69,802	31,005	2,515	27,402	7,941	138,665
2049	55,741	14,983	2,004	19,646	6,992	99,366
2050	55,875	15,386	2,004	19,646	6,992	99,903
2051	38,996	11,618	1,347	15,448	6,030	73,438
2052	9,142	2,335	0	4	2,307	13,788
2053	9,128	2,335	0	4	2,301	13,767
2054	22,537	3,056	332	11	2,034	27,971
2055	15,525	10,921	305	2	603	27,357
2056	12,899	11,030	268	0	394	24,591
2057	570	878	8	0	12	1,468
2058	161	483	0	0	0	644
2059	188	564	0	0	0	752
2060	188	564	0	0	0	752
2061	188	564	0	0	0	752
2062	188	564	0	0	0	752
2063	188	564	0	0	0	752
2064	188	564	0	0	0	752
2065	188	564	0	0	0	752
2066	161	483	0	0	0	644
2067	188	564	0	0	0	752
2068	188	564	0	0	0	752
2069	188	564	0	0	0	752
2070	188	564	0	0	0	752
2071	188	564	0	0	0	752
2072	188	564	0	0	0	752

**Palo Verde Nuclear Generating Station
2019 Decommissioning Cost Study**

**Document A04-1761-001, Rev. 1
Appendix N, Page 165 of 183**

TABLE N-1 (continued)
SCHEDULE OF ANNUAL EXPENDITURES
UNIT 1 – CONSOLIDATED (INCLUDES SITE FACILITIES)
(thousands, 2019 dollars)

Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2073	188	564	0	0	0	752
2074	161	483	0	0	0	644
2075	188	564	0	0	0	752
2076	188	564	0	0	0	752
2077	188	564	0	0	0	752
2078	188	564	0	0	0	752
2079	188	564	0	0	0	752
2080	188	564	0	0	0	752
2081	188	564	0	0	0	752
2082	161	483	0	0	0	644
2083	188	564	0	0	0	752
2084	188	564	0	0	0	752
2085	188	564	0	0	0	752
2086	188	564	0	0	0	752
2087	188	564	0	0	0	752
2088	188	564	0	0	0	752
2089	188	564	0	0	0	752
2090	161	483	0	0	0	644
2091	188	564	0	0	0	752
2092	188	564	0	0	0	752
2093	188	564	0	0	0	752
2094	188	564	0	0	0	752
2095	107	322	0	0	0	429
2096	322	966	0	0	0	1,288
2097	161	3,710	0	0	29,260	33,131
2098	1,974	2,861	0	1,452	1,898	8,185
2099	0	0	0	0	0	0
Total	528,998	187,281	16,889	131,910	103,173	968,251

Note: One third of the decommissioning cost of each of the Site Facilities (Stored Steam Generators and Storage Facility, Water Reclamation Facility, Water Reclamation Supply System Pipeline & Structures, Evaporation Ponds, Make-up Water Reservoir, Stored Reactor Closure Heads & Storage Facility, and ISFSI) has been allocated to each unit's cash flow.

**Palo Verde Nuclear Generating Station
2019 Decommissioning Cost Study**

**Document A04-1761-001, Rev. 1
Appendix N, Page 166 of 183**

**TABLE N-2
SCHEDULE OF ANNUAL EXPENDITURES
UNIT 2 – CONSOLIDATED (INCLUDES SITE FACILITIES)
(thousands, 2019 dollars)**

Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2040	0	0	0	0	0	0
2041	0	0	0	0	0	0
2042	0	0	0	0	0	0
2043	0	0	0	0	0	0
2044	0	0	0	0	0	0
2045	4,422	3,561	0	0	0	7,983
2046	83,551	5,504	1,911	5,216	6,756	102,937
2047	67,864	33,083	3,415	38,533	18,074	160,969
2048	73,437	33,398	2,545	37,350	8,278	155,009
2049	60,003	20,019	2,186	23,422	7,092	112,721
2050	53,377	13,746	2,004	16,309	6,493	91,929
2051	53,243	13,344	2,004	16,309	6,493	91,392
2052	33,419	9,800	1,138	12,361	5,268	61,986
2053	9,324	2,387	0	4	2,174	13,889
2054	22,611	3,076	332	11	1,849	27,879
2055	15,479	10,879	305	2	572	27,237
2056	12,845	10,980	268	0	394	24,487
2057	568	877	8	0	12	1,465
2058	161	483	0	0	0	644
2059	188	564	0	0	0	752
2060	188	564	0	0	0	752
2061	188	564	0	0	0	752
2062	188	564	0	0	0	752
2063	188	564	0	0	0	752
2064	188	564	0	0	0	752
2065	188	564	0	0	0	752
2066	161	483	0	0	0	644
2067	188	564	0	0	0	752
2068	188	564	0	0	0	752
2069	188	564	0	0	0	752
2070	188	564	0	0	0	752
2071	188	564	0	0	0	752
2072	188	564	0	0	0	752

**Palo Verde Nuclear Generating Station
2019 Decommissioning Cost Study**

**Document A04-1761-001, Rev. 1
Appendix N, Page 167 of 183**

TABLE N-2 (continued)
SCHEDULE OF ANNUAL EXPENDITURES
UNIT 2 – CONSOLIDATED (INCLUDES SITE FACILITIES)
(thousands, 2019 dollars)

Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2073	188	564	0	0	0	752
2074	161	483	0	0	0	644
2075	188	564	0	0	0	752
2076	188	564	0	0	0	752
2077	188	564	0	0	0	752
2078	188	564	0	0	0	752
2079	188	564	0	0	0	752
2080	188	564	0	0	0	752
2081	188	564	0	0	0	752
2082	161	483	0	0	0	644
2083	188	564	0	0	0	752
2084	188	564	0	0	0	752
2085	188	564	0	0	0	752
2086	188	564	0	0	0	752
2087	188	564	0	0	0	752
2088	188	564	0	0	0	752
2089	188	564	0	0	0	752
2090	161	483	0	0	0	644
2091	188	564	0	0	0	752
2092	188	564	0	0	0	752
2093	188	564	0	0	0	752
2094	188	564	0	0	0	
2095	107	322	0	0	0	429
2096	322	966	0	0	0	1,288
2097	161	3,710	0	0	29,260	33,131
2098	1,974	2,861	0	1,452	1,898	8,185
2099	0	0	0	0	0	0
Total	499,527	188,968	16,117	150,967	94,611	950,190

Note: One third of the decommissioning cost of each of the Site Facilities (Stored Steam Generators and Storage Facility, Water Reclamation Facility, Water Reclamation Supply System Pipeline & Structures, Evaporation Ponds, Make-up Water Reservoir, Stored Reactor Closure Heads & Storage Facility, and ISFSI) has been allocated to each unit's cash flow.

**Palo Verde Nuclear Generating Station
2019 Decommissioning Cost Study**

**Document A04-1761-001, Rev. 1
Appendix N, Page 168 of 183**

**TABLE N-3
SCHEDULE OF ANNUAL EXPENDITURES
UNIT 3 – CONSOLIDATED (INCLUDES SITE FACILITIES)
(thousands, 2019 dollars)**

Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2040	0	0	0	0	0	0
2041	0	0	0	0	0	0
2042	0	0	0	0	0	0
2043	0	0	0	0	0	0
2044	0	0	0	0	0	0
2045	4,422	3,561	0	0	0	7,983
2046	1,170	3,382	0	4,540	1,029	10,120
2047	14,362	4,127	271	4,542	1,742	25,044
2048	99,435	15,406	3,566	12,753	17,022	148,182
2049	73,336	32,776	2,539	36,513	8,114	153,277
2050	72,943	31,873	2,500	35,246	8,004	150,567
2051	65,937	14,457	2,004	18,728	6,580	107,705
2052	66,107	14,491	2,010	18,779	6,598	107,984
2053	63,831	14,167	1,909	18,368	6,398	104,673
2054	43,519	6,685	736	5,749	2,775	59,466
2055	26,892	17,279	305	2	2,127	46,606
2056	24,221	18,429	268	0	2,229	45,146
2057	910	1,101	8	0	67	2,086
2058	161	483	0	0	0	644
2059	188	564	0	0	0	752
2060	188	564	0	0	0	752
2061	188	564	0	0	0	752
2062	188	564	0	0	0	752
2063	188	564	0	0	0	752
2064	188	564	0	0	0	752
2065	188	564	0	0	0	752
2066	161	483	0	0	0	644
2067	188	564	0	0	0	752
2068	188	564	0	0	0	752
2069	188	564	0	0	0	752
2070	188	564	0	0	0	752
2071	188	564	0	0	0	752
2072	188	564	0	0	0	752

**Palo Verde Nuclear Generating Station
2019 Decommissioning Cost Study**

**Document A04-1761-001, Rev. 1
Appendix N, Page 169 of 183**

TABLE N-3 (continued)
SCHEDULE OF ANNUAL EXPENDITURES
UNIT 3 – CONSOLIDATED (INCLUDES SITE FACILITIES)
(thousands, 2019 dollars)

Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2073	188	564	0	0	0	752
2074	161	483	0	0	0	644
2075	188	564	0	0	0	752
2076	188	564	0	0	0	752
2077	188	564	0	0	0	752
2078	188	564	0	0	0	752
2079	188	564	0	0	0	752
2080	188	564	0	0	0	752
2081	188	564	0	0	0	752
2082	161	483	0	0	0	644
2083	188	564	0	0	0	752
2084	188	564	0	0	0	752
2085	188	564	0	0	0	752
2086	188	564	0	0	0	752
2087	188	564	0	0	0	752
2088	188	564	0	0	0	752
2089	188	564	0	0	0	752
2090	161	483	0	0	0	644
2091	188	564	0	0	0	752
2092	188	564	0	0	0	752
2093	188	564	0	0	0	752
2094	188	564	0	0	0	752
2095	107	322	0	0	0	429
2096	322	966	0	0	0	1,288
2097	161	3,710	0	0	29,260	33,131
2098	1,974	2,861	0	1,452	1,898	8,185
2099	0	0	0	0	0	0
Total	566,467	206,047	16,117	156,673	93,842	1,039,146

Note: One third of the decommissioning cost of each of the Site Facilities (Stored Steam Generators and Storage Facility, Water Reclamation Facility, Water Reclamation Supply System Pipeline & Structures, Evaporation Ponds, Make-up Water Reservoir, Stored Reactor Closure Heads & Storage Facility, and ISFSI) has been allocated to each unit's cash flow.

APPENDIX O

SCHEDULE OF ANNUAL EXPENDITURES CONSOLIDATED 25% CONTINGENCY*

<u>Table</u>	<u>Page</u>
O-1 Schedule of Palo Verde Annual Expenditures, Unit 1 – 25% contingency...	171
O-2 Schedule of Palo Verde Annual Expenditures, Unit 2 – 25% contingency...	173
O-3 Schedule of Palo Verde Annual Expenditures, Unit 3 – 25% contingency...	175

- * Calculated with 25% contingency as required to comply with the California Public Utility Commission as detailed in “Technical Position Paper for Establishing an Appropriate Contingency Factor for Inclusion in the Decommissioning Revenue Requirements”, Study Number: DECON-POS-H002, Revision A, Status: Preliminary

**Palo Verde Nuclear Generating Station
2019 Decommissioning Cost Study**

**Document A04-1761-001, Rev. 1
Appendix O, Page 171 of 183**

**TABLE O-1
SCHEDULE OF ANNUAL EXPENDITURES - 25% CONTINGENCY
UNIT 1 – CONSOLIDATED (INCLUDES SITE FACILITIES)
(thousands, 2019 dollars)**

Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2040	377	0	0	0	0	377
2041	643	0	0	0	0	643
2042	643	0	0	0	0	643
2043	3,633	0	0	0	0	3,633
2044	5,759	0	0	0	0	5,759
2045	67,435	4,908	1,626	14	4,531	78,513
2046	88,903	18,640	4,151	16,642	23,844	152,179
2047	71,835	35,742	2,634	34,283	9,339	153,834
2048	73,290	33,006	2,610	29,305	8,183	146,394
2049	58,347	15,779	2,080	20,782	7,176	104,163
2050	58,492	16,216	2,080	20,782	7,176	104,746
2051	40,872	12,240	1,398	16,341	6,183	77,035
2052	9,651	2,483	0	4	2,368	14,506
2053	9,636	2,482	0	4	2,361	14,484
2054	23,800	3,240	345	12	2,088	29,485
2055	16,200	11,430	317	2	619	28,576
2056	13,395	11,474	278	0	404	25,551
2057	601	939	8	0	12	1,560
2058	175	525	0	0	0	700
2059	204	613	0	0	0	817
2060	204	613	0	0	0	817
2061	204	613	0	0	0	817
2062	204	613	0	0	0	817
2063	204	613	0	0	0	817
2064	204	613	0	0	0	817
2065	204	613	0	0	0	817
2066	175	525	0	0	0	700
2067	204	613	0	0	0	817
2068	204	613	0	0	0	817
2069	204	613	0	0	0	817
2070	204	613	0	0	0	817
2071	204	613	0	0	0	817
2072	204	613	0	0	0	817

**Palo Verde Nuclear Generating Station
2019 Decommissioning Cost Study**

**Document A04-1761-001, Rev. 1
Appendix O, Page 172 of 183**

TABLE O-1 (continued)
SCHEDULE OF ANNUAL EXPENDITURES - 25% CONTINGENCY
UNIT 1 – CONSOLIDATED (INCLUDES SITE FACILITIES)
(thousands, 2019 dollars)

Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2073	204	613	0	0	0	817
2074	175	525	0	0	0	700
2075	204	613	0	0	0	817
2076	204	613	0	0	0	817
2077	204	613	0	0	0	817
2078	204	613	0	0	0	817
2079	204	613	0	0	0	817
2080	204	613	0	0	0	817
2081	204	613	0	0	0	817
2082	175	525	0	0	0	700
2083	204	613	0	0	0	817
2084	204	613	0	0	0	817
2085	204	613	0	0	0	817
2086	204	613	0	0	0	817
2087	204	613	0	0	0	817
2088	204	613	0	0	0	817
2089	204	613	0	0	0	817
2090	175	525	0	0	0	700
2091	204	613	0	0	0	817
2092	204	613	0	0	0	817
2093	204	613	0	0	0	817
2094	204	613	0	0	0	817
2095	117	350	0	0	0	466
2096	350	1,050	0	0	0	1,401
2097	175	3,938	0	0	30,363	34,477
2098	2,096	2,940	0	1,452	1,950	8,437
2099	0	0	0	0	0	0
Total	553,669	199,091	17,526	139,621	106,598	1,016,504

Note: One third of the decommissioning cost of each of the Site Facilities (Stored Steam Generators and Storage Facility, Water Reclamation Facility, Water Reclamation Supply System Pipeline & Structures, Evaporation Ponds, Make-up Water Reservoir, Stored Reactor Closure Heads & Storage Facility, and ISFSI) has been allocated to each unit's cash flow.

**Palo Verde Nuclear Generating Station
2019 Decommissioning Cost Study**

**Document A04-1761-001, Rev. 1
Appendix O, Page 173 of 183**

TABLE O-2
SCHEDULE OF ANNUAL EXPENDITURES - 25% CONTINGENCY
UNIT 2 – CONSOLIDATED (INCLUDES SITE FACILITIES)
(thousands, 2019 dollars)

Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2040	0	0	0	0	0	0
2041	0	0	0	0	0	0
2042	0	0	0	0	0	0
2043	0	0	0	0	0	0
2044	0	0	0	0	0	0
2045	4,616	3,715	0	0	0	8,331
2046	86,591	6,054	1,977	5,256	6,999	106,878
2047	70,902	35,236	3,534	40,572	18,705	168,949
2048	76,879	35,385	2,634	39,663	8,517	163,078
2049	62,679	21,120	2,262	24,783	7,275	118,120
2050	55,681	14,445	2,074	17,182	6,648	96,031
2051	55,535	14,007	2,074	17,182	6,648	95,447
2052	34,935	10,299	1,178	13,023	5,391	64,826
2053	9,830	2,537	0	4	2,227	14,597
2054	23,808	3,256	344	12	1,894	29,313
2055	16,114	11,360	316	2	586	28,379
2056	13,303	11,393	277	0	403	25,378
2057	598	937	8	0	12	1,555
2058	175	525	0	0	0	700
2059	204	613	0	0	0	817
2060	204	613	0	0	0	817
2061	204	613	0	0	0	817
2062	204	613	0	0	0	817
2063	204	613	0	0	0	817
2064	204	613	0	0	0	817
2065	204	613	0	0	0	817
2066	175	525	0	0	0	700
2067	204	613	0	0	0	817
2068	204	613	0	0	0	817
2069	204	613	0	0	0	817
2070	204	613	0	0	0	817
2071	204	613	0	0	0	817
2072	204	613	0	0	0	817

**Palo Verde Nuclear Generating Station
2019 Decommissioning Cost Study**

**Document A04-1761-001, Rev. 1
Appendix O, Page 174 of 183**

TABLE O-2 (continued)
SCHEDULE OF ANNUAL EXPENDITURES - 25% CONTINGENCY
UNIT 2 - CONSOLIDATED (INCLUDES SITE FACILITIES)
(thousands, 2019 dollars)

Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2073	204	613	0	0	0	817
2074	175	525	0	0	0	700
2075	204	613	0	0	0	817
2076	204	613	0	0	0	817
2077	204	613	0	0	0	817
2078	204	613	0	0	0	817
2079	204	613	0	0	0	817
2080	204	613	0	0	0	817
2081	204	613	0	0	0	817
2082	175	525	0	0	0	700
2083	204	613	0	0	0	817
2084	204	613	0	0	0	817
2085	204	613	0	0	0	817
2086	204	613	0	0	0	817
2087	204	613	0	0	0	817
2088	204	613	0	0	0	817
2089	204	613	0	0	0	817
2090	175	525	0	0	0	700
2091	204	613	0	0	0	817
2092	204	613	0	0	0	817
2093	204	613	0	0	0	817
2094	204	613	0	0	0	817
2095	117	350	0	0	0	467
2096	350	1,050	0	0	0	1,401
2097	175	3,925	0	0	30,282	34,382
2098	2,096	2,940	0	1,452	1,950	8,437
2099	0	0	0	0	0	0
Total	521,620	200,243	16,680	159,131	97,537	995,212

Note: One third of the decommissioning cost of each of the Site Facilities (Stored Steam Generators and Storage Facility, Water Reclamation Facility, Water Reclamation Supply System Pipeline & Structures, Evaporation Ponds, Make-up Water Reservoir, Stored Reactor Closure Heads & Storage Facility, and ISFSI) has been allocated to each unit's cash flow.

**Palo Verde Nuclear Generating Station
2019 Decommissioning Cost Study**

**Document A04-1761-001, Rev. 1
Appendix O, Page 175 of 183**

**TABLE O-3
SCHEDULE OF ANNUAL EXPENDITURES - 25% CONTINGENCY
UNIT 3 – CONSOLIDATED (INCLUDES SITE FACILITIES)
(thousands, 2019 dollars)**

Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2040	0	0	0	0	0	0
2041	0	0	0	0	0	0
2042	0	0	0	0	0	0
2043	0	0	0	0	0	0
2044	0	0	0	0	0	0
2045	4,616	3,715	0	0	0	8,331
2046	1,328	3,841	0	4,545	1,118	10,832
2047	15,023	4,644	281	4,547	1,851	26,346
2048	103,452	16,275	3,700	13,518	17,592	154,538
2049	76,970	34,849	2,633	38,942	8,365	161,759
2050	76,539	33,888	2,594	37,578	8,250	158,850
2051	68,877	15,219	2,079	19,802	6,751	112,727
2052	69,054	15,254	2,085	19,857	6,769	113,018
2053	66,688	14,915	1,981	19,422	6,563	109,568
2054	45,703	7,057	764	6,079	2,844	62,446
2055	28,005	18,023	317	3	2,201	48,548
2056	25,136	19,147	278	0	2,308	46,869
2057	954	1,170	8	0	69	2,201
2058	175	525	0	0	0	700
2059	204	613	0	0	0	817
2060	204	613	0	0	0	817
2061	204	613	0	0	0	817
2062	204	613	0	0	0	817
2063	204	613	0	0	0	817
2064	204	613	0	0	0	817
2065	204	613	0	0	0	817
2066	175	525	0	0	0	700
2067	204	613	0	0	0	817
2068	204	613	0	0	0	817
2069	204	613	0	0	0	817
2070	204	613	0	0	0	817
2071	204	613	0	0	0	817
2072	204	613	0	0	0	817

**Palo Verde Nuclear Generating Station
2019 Decommissioning Cost Study**

**Document A04-1761-001, Rev. 1
Appendix O, Page 176 of 183**

TABLE O-3 (continued)
SCHEDULE OF ANNUAL EXPENDITURES - 25% CONTINGENCY
UNIT 3 – CONSOLIDATED (INCLUDES SITE FACILITIES)
(thousands, 2019 dollars)

Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2073	204	613	0	0	0	817
2074	175	525	0	0	0	700
2075	204	613	0	0	0	817
2076	204	613	0	0	0	817
2077	204	613	0	0	0	817
2078	204	613	0	0	0	817
2079	204	613	0	0	0	817
2080	204	613	0	0	0	817
2081	204	613	0	0	0	817
2082	175	525	0	0	0	700
2083	204	613	0	0	0	817
2084	204	613	0	0	0	817
2085	204	613	0	0	0	817
2086	204	613	0	0	0	817
2087	204	613	0	0	0	817
2088	204	613	0	0	0	817
2089	204	613	0	0	0	817
2090	175	525	0	0	0	700
2091	204	613	0	0	0	817
2092	204	613	0	0	0	817
2093	204	613	0	0	0	817
2094	204	613	0	0	0	817
2095	117	350	0	0	0	467
2096	350	1,050	0	0	0	1,401
2097	175	3,937	0	0	30,355	34,467
2098	2,096	2,940	0	1,452	1,950	8,437
2099	0	0	0	0	0	0
Total	592,492	218,509	16,720	165,743	96,985	1,090,449

Note:

One third of the decommissioning cost of each of the Site Facilities (Stored Steam Generators and Storage Facility, Water Reclamation Facility, Water Reclamation Supply System Pipeline & Structures, Evaporation Ponds, Make-up Water Reservoir, Stored Reactor Closure Heads & Storage Facility, and ISFSI) has been allocated to each unit's cash flow.

TLG Services, Inc.

APPENDIX P
SCHEDULE OF ANNUAL EXPENDITURES
CONSOLIDATED
10% CONTINGENCY*

<u>Table</u>	<u>Page</u>
P-1 Schedule of Palo Verde Annual Expenditures, Unit 1 – 10% contingency...	178
P-2 Schedule of Palo Verde Annual Expenditures, Unit 2 – 10% contingency...	180
P-3 Schedule of Palo Verde Annual Expenditures, Unit 3 – 10% contingency...	182

* Calculated with 10% contingency as required to comply with the
Public Utility Commission of Texas' Substantive Rule
§25.231(b)(1)(F)(i)