



APPENDIX A6-5

STUDY 1 - ALTERNATIVE STORAGE SYSTEMS FOR DUAL PURPOSE CANISTERS

COST DETAILS

ALTERNATIVE 5 - C-STD, PILOT, LOW SEISMIC

LIFE CYCLE COST SUMMARIES



Interim Storage Facility

Pilot Storage Facility (5,000 MTU)

Project: C-STD Pilot (5,000 MTU)

PILOT Project - C-STD 60/40 Vertical/Horizontal - Low Seismic

Separate CHB

Annual Escalation Factor 1.90%

Life Cycle Costs (40 Year Life)

	Capital	Operations	Transport	Decommissioning	Escalation	Total Costs
<i>Design & Construction</i>	\$809,051,234					\$809,051,234
<i>Operations & Maintenance (40 Year Life)</i>		\$587,271,913				\$587,271,913
<i>Cask Handling</i>		\$38,508,689				\$38,508,689
<i>Transportation Equipment</i>	\$0					\$0
<i>Transport Operations</i>		\$0	\$0			\$0
<i>Repackaging</i>	\$0	\$0				\$0
<i>Transport to Repository</i>	\$0		\$0			\$0
<i>D&D</i>				\$92,867,444		\$92,867,444
<i>Escalation</i>					\$727,148,574	\$727,148,574
<i>Total Costs (40 year Life)</i>						\$2,254,847,853
<i>Present Value</i>						\$1,269,329,674

Life Cycle Costs (80 Year Life)

	Capital	Operations	Transport	Decommissioning	Escalation	Total Costs
<i>Design & Construction</i>	\$809,051,234					\$809,051,234
<i>Operations & Maintenance (80 Year Life)</i>		\$1,072,964,898				\$1,072,964,898
<i>Cask Handling</i>		\$38,508,689				\$38,508,689
<i>Transportation Equipment</i>	\$0					\$0
<i>Transport Operations</i>		\$0	\$0			\$0
<i>Repackaging</i>	\$0	\$0				\$0
<i>Transport to Repository</i>	\$0		\$0			\$0
<i>D&D</i>				\$92,867,444		\$92,867,444
<i>Escalation</i>					\$2,398,088,082	\$2,398,088,082
<i>Total Costs (80 Year Life)</i>						\$4,411,480,346
<i>Present Value</i>						\$1,480,537,944



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COST DETAILS

ALTERNATIVE 5 - C-STD, PILOT, LOW SEISMIC

CAPITAL COST SUMMARY



Interim Storage Facility

Pilot Storage Facility (5,000 MTU)

Project: C-STD Pilot (5,000 MTU)

PILOT Project - C-STD 60/40 Vertical/Horizontal - Low Seismic

Separate

CHB

Level 3 Cost Summary - First of A kind module

Level 1	Level 2	Level 3	Description	Level 3 Total
C-STD 01			Interim Storage Facility and transportation Project	
	C-STD 01.01		Pilot ISF Facility	\$494,259,814
		C-STD 01.01.01	Storage Pads	\$0
		C-STD 01.01.02	Cask Handling (Transfer) Facility	\$135,175,719
		C-STD 01.01.03	Horizontal Dry Storage Modules	\$105,969,797
		C-STD 01.01.04	Vertical Dry Storage Module	\$93,975,136
		C-STD 01.01.05	Storage Cask Fabrication Facility	\$0
		C-STD 01.01.06	Cask Maintenance Facility	\$0
		C-STD 01.01.07	Concrete Batch Plant	\$1,850,000
		C-STD 01.01.08	Visitor Center/ Auditorium	\$0
		C-STD 01.01.09	Administration Building	\$3,140,000
		C-STD 01.01.10	Security	\$24,148,975
		C-STD 01.01.11	Rail Spur/ Receiving Yard	\$58,752,800
		C-STD 01.01.12	Utilities	\$18,682,150
		C-STD 01.01.13	Roads	\$18,212,737
		C-STD 01.01.14	Parking	\$735,000
		C-STD 01.01.15	Site Work	\$23,417,500
		C-STD 01.01.16	Warehouse	\$10,200,000
		C-STD 01.01.17	Maintenance Facility	\$0
		C-STD 01.01.18	Waste management Facility	\$0
		C-STD 01.01.01.xx	(Add Further Breakdown as needed)	\$0
	C-STD 01.02		Expanded Interim Storage Facility	\$0
		C-STD 01.02.01	Expanded Storage Pads and Dry Cask Storage Systems	\$0
		C-STD 01.02.02	Expanded Cask Handling Facility (if required)	\$0
		C-STD 01.02.03	Horizontal Dry Storage Modules	\$0
		C-STD 01.02.04	Vertical Dry Storage Casks	\$0
		C-STD 01.02.05	Storage Cask Fabrication Facility (Expanded)	\$0
		C-STD 01.02.06	Cask Maintenance Facility (Expanded)	\$0
		C-STD 01.02.07	Concrete Batch Plant (Expanded if needed)	\$0
		C-STD 01.02.08	Visitor Center/ Auditorium (expanded if needed)	\$0
		C-STD 01.02.09	Administration Building (Expanded if needed)	\$0
		C-STD 01.02.10	Security (Expanded)	\$0
		C-STD 01.02.11	Rail Spur/ Receiving Yard (Expanded)	\$0
		C-STD 01.02.12	Utilities Expanded as needed)	\$0
		C-STD 01.02.13	Roads (Expanded)	\$0
		C-STD 01.02.14	Parking (Expanded as needed)	\$0
		C-STD 01.02.15	Site Work (Expanded)	\$0
		C-STD 01.02.16	Warehouse (Expanded if Needed)	\$0
		C-STD 01.02.17	Maintenance Facility (Expanded if needed)	\$0
		C-STD 01.02.18	Waste management Facility (Expanded if needed)	\$0
		C-STD 01.02.19	Hot Cell / Laboratories	\$0
		C-STD 01.02.20	Pool Packaging Facility	\$0
		C-STD 01.02.21	Standardized Storage System	\$0
		C-STD 01.02.22	Standardized Disposal Canister	\$0
		C-STD 01.02.23	Canister Repackaging Facility (For Repository	\$0
	C-STD 01.03		Transportation Equipment	\$0
		C-STD 01.03.01	Transportation Casks	\$0
		C-STD 01.03.02	Rail Equipment	\$0
		C-STD 01.03.03	Rail Maintenance Facility	\$0
		C-STD 01.03.04	Transportation Systems Services	\$0
	C-STD 01.04		Pre-Construction Capitalized Costs	\$60,265,000
		C-STD 01.04.01	Land or Land Leases	\$1,920,000
		C-STD 01.04.02	Site permits	\$200,000
		C-STD 01.04.03	Site Licensing	\$6,240,000
		C-STD 01.04.05	Plant Permits	\$0
		C-STD 01.04.06	Planning and Alternative Studies	\$750,000



	C-STD 01.04.07	Research and Development	\$0
	C-STD 01.04.08	Design	\$23,955,000
	C-STD 01.04.09	Other Pre-construction Costs	\$17,200,000
	C-STD 01.04.10	Pre-construction contingencies	\$10,000,000
	C-STD 01.04.xx	(Add Further Breakdown as needed)	\$0
C-STD 01.05		Indirect Capitalized Costs	\$63,180,000
	C-STD 01.05.01	Project Management	\$2,700,000
	C-STD 01.05.02	Construction Management	\$3,600,000
	C-STD 01.05.03	Field indirect services	\$11,880,000
	C-STD 01.05.04	Design Services in support of Construction	\$5,400,000
	C-STD 01.05.05	QA/QC	\$12,600,000
	C-STD 01.05.06	Commissioning and Startup	\$1,200,000
	C-STD 01.05.07	Home office Engineering support to Construction	\$7,200,000
	C-STD 01.05.08	Document Control	\$2,700,000
	C-STD 01.05.09	Project Controls	\$3,600,000
	C-STD 01.05.10	Construction Testing	\$2,700,000
	C-STD 01.05.11	Inspections	\$3,600,000
	C-STD 01.05.12	Startup and Testing	\$3,000,000
	C-STD 01.05.13	Commissioning	\$3,000,000
C-STD 01.06		Site Selection	\$0
	C-STD 01.06.01	Site Selection	\$0
	C-STD 01.06.02	Public Information Process	\$0
C-STD 01.07		Decontamination and Deconstruction	\$0
	C-STD 01.07.01	Decommissioning	\$0
	C-STD 01.07.02	Decontamination	\$0
	C-STD 01.07.03	Deconstruction	\$0
	C-STD 01.07.04		\$0
	C-STD 01.07.05		\$0
C-STD 01.08		Project Financial Costs	\$82,772,445
	C-STD 01.08.01	Contractor Fees	\$49,416,385
	C-STD 01.08.02	Escalation Costs	\$33,356,060
	C-STD 01.08.03	Interest Payments	\$0
	C-STD 01.08.04	Indirect costs to support shipments to repository	\$0
	C-STD 01.08.05		\$0
	C-STD 01.08.xx	(Add Further Breakdown as needed)	\$0
C-STD 01.09		Project Contingencies	\$108,573,975
	C-STD 01.09.01	Management Reserve - Contractor Held	\$35,023,863
	C-STD 01.09.02	Contingency - DOE held	\$73,550,112
C-STD 01.10		Other Direct Costs	\$0
	C-STD 01.10.01	Other Direct Costs	\$0
	C-STD 01.10.02	DOE Project Operations	\$0
	C-STD 01.10.03	DOE TM&E	\$0
	C-STD 01.10.04	Host site Operational Costs Miscellaneous	\$0
	C-STD 01.10.05	Miscellaneous ODC	\$0
C-STD 01.11		Operational Costs	0
	C-STD 01.11.01	Operations Costs	\$0
	C-STD 01.11.02	Transportation Costs	\$0
	C-STD 01.11.03	Escalation (Operations/Transportation)	\$0
Project Total			
		TEC (All Direct & indirect Costs, MR, Escalation)	\$735,501,122
		TPC (TEC plus Contingency, ODCs)	\$809,051,234
		All Capitol, Operation, Transportation, Escalation	\$809,051,234



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COST DETAILS

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LIFE CYCLE COST – 40 YEAR OPERATING LIFE



Interim Storage Facility

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PILOT Project - C-STD 60/40 Vertical/Horizontal - Low Seismic

Separate CHB

		Annual Escalation				Discount Rate	
40 Year Operating life		1.90%				3.00%	
YEAR	Design/Const	O&M	Cask Handling	D&D	Escalation	Annual Expense	Cumulative
1	\$ 10,000,000	\$ -	\$ -	\$ -	\$ 190,000	\$ 10,190,000	\$ 10,190,000
2	\$ 10,000,000	\$ -	\$ -	\$ -	\$ 383,610	\$ 10,383,610	\$ 20,573,610
3	\$ 20,000,000	\$ -	\$ -	\$ -	\$ 1,161,797	\$ 21,161,797	\$ 41,735,407
4	\$ 20,000,000	\$ -	\$ -	\$ -	\$ 1,563,871	\$ 21,563,871	\$ 63,299,279
5	\$ 20,000,000	\$ -	\$ -	\$ -	\$ 1,973,585	\$ 21,973,585	\$ 85,272,863
6	\$ 20,000,000	\$ -	\$ -	\$ -	\$ 2,391,083	\$ 22,391,083	\$ 107,663,946
7	\$ 27,888,399	\$ -	\$ -	\$ -	\$ 3,927,403	\$ 31,815,802	\$ 139,479,748
8	\$ 200,000,000	\$ -	\$ -	\$ -	\$ 32,500,273	\$ 232,500,273	\$ 371,980,021
9	\$ 200,000,000	\$ 28,996,032	\$ -	\$ -	\$ 42,270,124	\$ 271,266,156	\$ 643,246,177
10	\$ 275,928,994	\$ 26,860,352	\$ -	\$ -	\$ 62,706,487	\$ 365,495,833	\$ 1,008,742,011
11		\$ 27,383,172	\$ 12,836,230	\$ -	\$ 9,251,706	\$ 49,471,107	\$ 1,058,213,118
12	\$ -	\$ 27,383,172	\$ 12,836,230	\$ -	\$ 10,191,657	\$ 50,411,059	\$ 1,108,624,177
13	\$ -	\$ 27,383,172	\$ 12,836,230	\$ -	\$ 11,149,467	\$ 51,368,869	\$ 1,159,993,045
14	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 3,660,707	\$ 15,803,032	\$ 1,175,796,077
15	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 3,960,965	\$ 16,103,289	\$ 1,191,899,367
16	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 4,266,927	\$ 16,409,252	\$ 1,208,308,619
17	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 4,578,703	\$ 16,721,028	\$ 1,225,029,647
18	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 4,896,403	\$ 17,038,727	\$ 1,242,068,374
19	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 5,220,138	\$ 17,362,463	\$ 1,259,430,837
20	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 5,550,025	\$ 17,692,350	\$ 1,277,123,187
21	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 5,886,180	\$ 18,028,505	\$ 1,295,151,691
22	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 6,228,722	\$ 18,371,046	\$ 1,313,522,737
23	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 6,577,771	\$ 18,720,096	\$ 1,332,242,834
24	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 6,933,453	\$ 19,075,778	\$ 1,351,318,611
25	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 7,295,893	\$ 19,438,218	\$ 1,370,756,829
26	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 7,665,219	\$ 19,807,544	\$ 1,390,564,373
27	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 8,041,562	\$ 20,183,887	\$ 1,410,748,260
28	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 8,425,056	\$ 20,567,381	\$ 1,431,315,641
29	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 8,815,837	\$ 20,958,161	\$ 1,452,273,802
30	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 9,214,042	\$ 21,356,366	\$ 1,473,630,168
31	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 9,619,813	\$ 21,762,137	\$ 1,495,392,305
32	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 10,033,293	\$ 22,175,618	\$ 1,517,567,923
33	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 10,454,630	\$ 22,596,955	\$ 1,540,164,878
34	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 10,883,972	\$ 23,026,297	\$ 1,563,191,174
35	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 11,321,472	\$ 23,463,796	\$ 1,586,654,971
36	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 11,767,284	\$ 23,909,608	\$ 1,610,564,579
37	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 12,221,566	\$ 24,363,891	\$ 1,634,928,470
38	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 12,684,480	\$ 24,826,805	\$ 1,659,755,275
39	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 13,156,190	\$ 25,298,514	\$ 1,685,053,789
40	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 13,636,861	\$ 25,779,186	\$ 1,710,832,975
41	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 14,126,666	\$ 26,268,991	\$ 1,737,101,966
42	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 14,625,777	\$ 26,768,101	\$ 1,763,870,067
43	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 15,134,371	\$ 27,276,695	\$ 1,791,146,762
44	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 15,652,628	\$ 27,794,952	\$ 1,818,941,715

TASK ORDER NO. 16 - GENERIC DESIGN ALTERNATIVES FOR DRY STORAGE OF USED NUCLEAR FUEL THE DEPARTMENT OF ENERGY - OFFICE OF NUCLEAR ENERGY



45	\$	-	\$ 12,142,325	\$	-	\$	-	\$ 16,180,732	\$	28,323,057	\$ 1,847,264,771
46	\$	-	\$ 12,142,325	\$	-	\$	-	\$ 16,718,870	\$	28,861,195	\$ 1,876,125,966
47	\$	-	\$ 12,142,325	\$	-	\$	-	\$ 17,267,233	\$	29,409,557	\$ 1,905,535,523
48	\$	-	\$ 12,142,325	\$	-	\$	-	\$ 17,826,014	\$	29,968,339	\$ 1,935,503,862
49	\$	-	\$ 12,142,325	\$	-	\$	-	\$ 18,395,413	\$	30,537,737	\$ 1,966,041,600
50	\$	-	\$ 12,142,325	\$	-	\$	-	\$ 18,975,630	\$	31,117,954	\$ 1,997,159,554
51	\$	-	\$ -	\$	-	\$ 21,175,000	\$	34,122,666	\$	55,297,666	\$ 2,052,457,220
52	\$	-	\$ -	\$	-	\$ 20,000,000	\$	33,221,556	\$	53,221,556	\$ 2,105,678,776
53	\$	-	\$ -	\$	-	\$ 17,230,815	\$	29,492,921	\$	46,723,736	\$ 2,152,402,512
54	\$	-	\$ -	\$	-	\$ 17,230,815	\$	30,380,672	\$	47,611,487	\$ 2,200,013,999
55	\$	-	\$ -	\$	-	\$ 17,230,815	\$	31,285,291	\$	48,516,105	\$ 2,248,530,104
56	\$	-	\$ -	\$	-	\$ -	\$	-	\$	-	\$ 2,248,530,104
57	\$	-	\$ -	\$	-	\$ -	\$	-	\$	-	\$ 2,248,530,104
58	\$	-	\$ -	\$	-	\$ -	\$	-	\$	-	\$ 2,248,530,104
59	\$	-	\$ -	\$	-	\$ -	\$	-	\$	-	\$ 2,248,530,104
60	\$	-	\$ -	\$	-	\$ -	\$	-	\$	-	\$ 2,248,530,104

		Total	Total		Total	Total	Total		Total
		Design/Const	O&M		D&D	Escalation			Life Cycle
		\$ 803,817,393	\$ 587,271,913	\$ 38,508,689	\$ 92,867,444	\$ 726,064,666			\$ 2,248,530,104



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LIFE CYCLE COST – 80 YEAR OPERATING LIFE



Interim Storage Facility

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Separate CHB

80 Year Operating Life

YEAR	Design/Const	O&M	Cask Handling	D&D	Annual Escalation	Discount Rate	Annual Funding	Cumulative
					1.90%	3.00%		
1	\$ 10,000,000	\$ -	\$ -	\$ -	\$ 190,000		\$10,190,000	\$10,190,000
2	\$ 10,000,000	\$ -	\$ -	\$ -	\$ 383,610		\$10,383,610	\$20,573,610
3	\$ 20,000,000	\$ -	\$ -	\$ -	\$ 1,161,797		\$21,161,797	\$41,735,407
4	\$ 20,000,000	\$ -	\$ -	\$ -	\$ 1,563,871		\$21,563,871	\$63,299,279
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6	\$ 20,000,000	\$ -	\$ -	\$ -	\$ 2,391,083		\$22,391,083	\$107,663,946
7	\$ 27,888,399	\$ -	\$ -	\$ -	\$ 3,927,403		\$31,815,802	\$139,479,748
8	\$ 200,000,000	\$ -	\$ -	\$ -	\$ 32,500,273		\$232,500,273	\$371,980,021
9	\$ 200,000,000	\$ 28,996,032	\$ -	\$ -	\$ 42,270,124		\$271,266,156	\$643,246,177
10	\$ 275,928,994	\$ 26,860,352	\$ -	\$ -	\$ 62,706,487		\$365,495,833	\$1,008,742,011
11		\$ 27,383,172	\$ 12,836,230	\$ -	\$ 9,251,706		\$49,471,107	\$1,058,213,118
12	\$ -	\$ 27,383,172	\$ 12,836,230	\$ -	\$ 10,191,657		\$50,411,059	\$1,108,624,177
13	\$ -	\$ 27,383,172	\$ 12,836,230	\$ -	\$ 11,149,467		\$51,368,869	\$1,159,993,045
14	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 3,660,707		\$15,803,032	\$1,175,796,077
15	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 3,960,965		\$16,103,289	\$1,191,899,367
16	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 4,266,927		\$16,409,252	\$1,208,308,619
17	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 4,578,703		\$16,721,028	\$1,225,029,647
18	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 4,896,403		\$17,038,727	\$1,242,068,374
19	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 5,220,138		\$17,362,463	\$1,259,430,837
20	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 5,550,025		\$17,692,350	\$1,277,123,187
21	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 5,886,180		\$18,028,505	\$1,295,151,691
22	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 6,228,722		\$18,371,046	\$1,313,522,737
23	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 6,577,771		\$18,720,096	\$1,332,242,834
24	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 6,933,453		\$19,075,778	\$1,351,318,611
25	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 7,295,893		\$19,438,218	\$1,370,756,829
26	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 7,665,219		\$19,807,544	\$1,390,564,373
27	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 8,041,562		\$20,183,887	\$1,410,748,260
28	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 8,425,056		\$20,567,381	\$1,431,315,641
29	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 8,815,837		\$20,958,161	\$1,452,273,802
30	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 9,214,042		\$21,356,366	\$1,473,630,168
31	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 9,619,813		\$21,762,137	\$1,495,392,305
32	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 10,033,293		\$22,175,618	\$1,517,567,923
33	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 10,454,630		\$22,596,955	\$1,540,164,878
34	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 10,883,972		\$23,026,297	\$1,563,191,174
35	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 11,321,472		\$23,463,796	\$1,586,654,971
36	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 11,767,284		\$23,909,608	\$1,610,564,579
37	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 12,221,566		\$24,363,891	\$1,634,928,470
38	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 12,684,480		\$24,826,805	\$1,659,755,275
39	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 13,156,190		\$25,298,514	\$1,685,053,789
40	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 13,636,861		\$25,779,186	\$1,710,832,975
41	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 14,126,666		\$26,268,991	\$1,737,101,966
42	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 14,625,777		\$26,768,101	\$1,763,870,067
43	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 15,134,371		\$27,276,695	\$1,791,146,762
44	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 15,652,628		\$27,794,952	\$1,818,941,715
45	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 16,180,732		\$28,323,057	\$1,847,264,771
46	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 16,718,870		\$28,861,195	\$1,876,125,966
47	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 17,267,233		\$29,409,557	\$1,905,535,523
48	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 17,826,014		\$29,968,339	\$1,935,503,862
49	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 18,395,413		\$30,537,737	\$1,966,041,600
50	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 18,975,630		\$31,117,954	\$1,997,159,554
51	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 19,566,871		\$31,709,196	\$2,028,868,750
52	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 20,169,346		\$32,311,670	\$2,061,180,420
53	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 20,783,267		\$32,925,592	\$2,094,106,012
54	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 21,408,854		\$33,551,178	\$2,127,657,190
55	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 22,046,326		\$34,188,651	\$2,161,845,841
56	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 22,695,910		\$34,838,235	\$2,196,684,076
57	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 23,357,837		\$35,500,161	\$2,232,184,237
58	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 24,032,340		\$36,174,665	\$2,268,358,902
59	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 24,719,659		\$36,861,983	\$2,305,220,885



60	\$	-	\$ 12,142,325	\$	-	\$	-	\$ 25,420,036	\$37,562,361	\$2,342,783,246
61	\$	-	\$ 12,142,325	\$	-	\$	-	\$ 26,133,721	\$38,276,046	\$2,381,059,291
62	\$	-	\$ 12,142,325	\$	-	\$	-	\$ 26,860,966	\$39,003,291	\$2,420,062,582
63	\$	-	\$ 12,142,325	\$	-	\$	-	\$ 27,602,028	\$39,744,353	\$2,459,806,935
64	\$	-	\$ 12,142,325	\$	-	\$	-	\$ 28,357,171	\$40,499,496	\$2,500,306,431
65	\$0	\$	\$ 12,142,325	\$	-	\$	-	\$ 29,126,662	\$41,268,986	\$2,541,575,417
66	\$0	\$	\$ 12,142,325	\$	-	\$	-	\$ 29,910,772	\$42,053,097	\$2,583,628,514
67	\$0	\$	\$ 12,142,325	\$	-	\$	-	\$ 30,709,781	\$42,852,106	\$2,626,480,619
68	\$0	\$	\$ 12,142,325	\$	-	\$	-	\$ 31,523,971	\$43,666,296	\$2,670,146,915
69	\$0	\$	\$ 12,142,325	\$	-	\$	-	\$ 32,353,631	\$44,495,955	\$2,714,642,871
70	\$0	\$	\$ 12,142,325	\$	-	\$	-	\$ 33,199,054	\$45,341,379	\$2,759,984,249
71	\$0	\$	\$ 12,142,325	\$	-	\$	-	\$ 34,060,540	\$46,202,865	\$2,806,187,114
72	\$0	\$	\$ 12,142,325	\$	-	\$	-	\$ 34,938,395	\$47,080,719	\$2,853,267,833
73	\$0	\$	\$ 12,142,325	\$	-	\$	-	\$ 35,832,928	\$47,975,253	\$2,901,243,086
74	\$0	\$	\$ 12,142,325	\$	-	\$	-	\$ 36,744,458	\$48,886,783	\$2,950,129,868
75	\$0	\$	\$ 12,142,325	\$	-	\$	-	\$ 37,673,307	\$49,815,631	\$2,999,945,500
76	\$0	\$	\$ 12,142,325	\$	-	\$	-	\$ 38,619,804	\$50,762,128	\$3,050,707,628
77	\$0	\$	\$ 12,142,325	\$	-	\$	-	\$ 39,584,284	\$51,726,609	\$3,102,434,237
78	\$0	\$	\$ 12,142,325	\$	-	\$	-	\$ 40,567,090	\$52,709,415	\$3,155,143,652
79	\$0	\$	\$ 12,142,325	\$	-	\$	-	\$ 41,568,569	\$53,710,893	\$3,208,854,545
80	\$0	\$	\$ 12,142,325	\$	-	\$	-	\$ 42,589,076	\$54,731,400	\$3,263,585,946
81	\$0	\$	\$ 12,142,325	\$	-	\$	-	\$ 43,628,972	\$55,771,297	\$3,319,357,243
82	\$0	\$	\$ 12,142,325	\$	-	\$	-	\$ 44,688,627	\$56,830,952	\$3,376,188,194
83	\$0	\$	\$ 12,142,325	\$	-	\$	-	\$ 45,768,415	\$57,910,740	\$3,434,098,934
84	\$0	\$	\$ 12,142,325	\$	-	\$	-	\$ 46,868,719	\$59,011,044	\$3,493,109,978
85	\$0	\$	\$ 12,142,325	\$	-	\$	-	\$ 47,989,929	\$60,132,254	\$3,553,242,231
86	\$0	\$	\$ 12,142,325	\$	-	\$	-	\$ 49,132,442	\$61,274,766	\$3,614,516,998
87	\$0	\$	\$ 12,142,325	\$	-	\$	-	\$ 50,296,662	\$62,438,987	\$3,676,955,985
88	\$0	\$	\$ 12,142,325	\$	-	\$	-	\$ 51,483,003	\$63,625,328	\$3,740,581,312
89	\$0	\$	\$ 12,142,325	\$	-	\$	-	\$ 52,691,884	\$64,834,209	\$3,805,415,521
90	\$0	\$	\$ 12,142,325	\$	-	\$	-	\$ 53,923,734	\$66,066,059	\$3,871,481,580
91				\$	-	\$ 21,175,000		\$ 96,226,640	\$117,401,640	\$3,988,883,220
92				\$	-	\$ 20,000,000		\$ 92,993,881	\$112,993,881	\$4,101,877,101
93				\$	-	\$ 17,230,815		\$ 81,967,643	\$99,198,458	\$4,201,075,559
94				\$	-	\$ 17,230,815		\$ 83,852,414	\$101,083,228	\$4,302,158,787
95				\$	-	\$ 17,230,815		\$ 85,772,995	\$103,003,810	\$4,405,162,597
96						\$	-	\$	\$0	\$4,405,162,597
97						\$	-	\$	\$0	\$4,405,162,597
98								\$	\$0	\$4,405,162,597
99								\$	\$0	\$4,405,162,597
100								\$	\$0	\$4,405,162,597

Total Design/Const	Total O&M	Total Cask Handling	Total D&D	Total Escalation	Total Life Cycle
\$803,817,393	\$1,072,964,898	\$38,508,689	\$92,867,444	\$2,397,004,174	\$4,405,162,597



APPENDIX A6-6

STUDY 1 - ALTERNATIVE STORAGE SYSTEMS FOR DUAL PURPOSE CANISTERS

COST DETAILS

ALTERNATIVE 6 - C-STD, PILOT, HIGH SEISMIC

LIFE CYCLE COST SUMMARIES



Project: C-STD Pilot (5,000 MTU)
 PILOT Project - C-STD 60/40 Vertical/Horizontal - High Seismic
 Separate CHB
 Annual Escalation Factor 1.90%
 Discount Rate 3.40%

<i>Life Cycle Costs (40 Year Life)</i>	Capital	Operations	Transport	Decommissioning	Escalation	Total Costs
<i>Design & Construction</i>	\$892,297,051					\$892,297,051
<i>Operations & Maintenance (40 Year Life)</i>		\$573,923,753				\$573,923,753
<i>Cask Handling</i>		\$38,508,689				\$38,508,689
<i>Transportation Equipment</i>	\$0					\$0
<i>Transport Operations</i>		\$0	\$0			\$0
<i>Repackaging</i>	\$0	\$0				\$0
<i>Transport to Repository</i>	\$0		\$0			\$0
<i>D&D</i>				\$105,181,959		\$105,181,959
<i>Escalation</i>					\$762,720,508	\$762,720,508
<i>Total Costs (40 year Life)</i>						\$2,372,631,958
<i>Present Value</i>						\$1,259,884,758

<i>Life Cycle Costs (80 Year Life)</i>	Capital	Operations	Transport	Decommissioning	Escalation	Total Costs
<i>Design & Construction</i>	\$892,297,051					\$892,297,051
<i>Operations & Maintenance (80 Year Life)</i>		\$1,059,616,738				\$1,059,616,738
<i>Cask Handling</i>		\$38,508,689				\$38,508,689
<i>Transportation Equipment</i>	\$0					\$0
<i>Transport Operations</i>		\$0	\$0			\$0
<i>Repackaging</i>	\$0	\$0				\$0
<i>Transport to Repository</i>	\$0		\$0			\$0
<i>D&D</i>				\$105,181,959		\$105,181,959
<i>Escalation</i>					\$2,471,879,702	\$2,471,879,702
<i>Total Costs (80 Year Life)</i>						\$4,567,484,138
<i>Present Value</i>						\$1,414,260,349



APPENDIX A6-6

STUDY 1 - ALTERNATIVE STORAGE SYSTEMS FOR DUAL PURPOSE CANISTERS

COST DETAILS

ALTERNATIVE 6 - C-STD, PILOT, HIGH SEISMIC

CAPITAL COST SUMMARY



Interim Storage Facility

Pilot Storage Facility (5,000 MTU)

Project: C-STD Pilot (5,000 MTU)

PILOT Project - C-STD 60/40 Vertical/Horizontal - High Seismic

Separate CHB

Level 3 Cost Summary - First of A kind module

TASK ORDER NO. 16 - GENERIC DESIGN ALTERNATIVES FOR DRY STORAGE OF USED NUCLEAR FUEL THE DEPARTMENT OF ENERGY - OFFICE OF NUCLEAR ENERGY

Level 1	Level 2	Level 3	Description	Level 3 Total
C-STD LE 01			Interim Storage Facility and transportation Project	
	C-STD LE 01.01		Pilot ISF Facility	\$552,057,398
		C-STD LE 01.01.01	Storage STDs	\$0
		C-STD LE 01.01.02	Cask Handling (Transfer) Facility	\$163,293,960
		C-STD LE 01.01.03	Horizontal Dry Storage Modules	\$123,041,942
		C-STD LE 01.01.04	Vertical Dry Storage Module	\$106,582,334
		C-STD LE 01.01.05	Storage Cask Fabrication Facility	\$0
		C-STD LE 01.01.06	Cask Maintenance Facility	\$0
		C-STD LE 01.01.07	Concrete Batch Plant	\$1,850,000
		C-STD LE 01.01.08	Visitor Center/ Auditorium	\$0
		C-STD LE 01.01.09	Administration Building	\$3,140,000
		C-STD LE 01.01.10	Security	\$24,148,975
		C-STD LE 01.01.11	Rail Spur/ Receiving Yard	\$58,752,800
		C-STD LE 01.01.12	Utilities	\$18,682,150
		C-STD LE 01.01.13	Roads	\$18,212,737
		C-STD LE 01.01.14	Parking	\$735,000
		C-STD LE 01.01.15	Site Work	\$23,417,500
		C-STD LE 01.01.16	Warehouse	\$10,200,000
		C-STD LE 01.01.17	Maintenance Facility	\$0
		C-STD LE 01.01.18	Waste management Facility	\$0
		C-STD LE 01.01.xx	(Add Further Breakdown as needed)	\$0
	C-STD LE 01.02		Expanded Interim Storage Facility	\$0
		C-STD LE 01.02.01	Expanded Storage STDs and Dry Cask Storage Systems	\$0
		C-STD LE 01.02.02	Expanded Cask Handling Facility (if required)	\$0
		C-STD LE 01.02.03	Horizontal Dry Storage Modules	\$0
		C-STD LE 01.02.04	Vertical Dry Storage Casks	\$0
		C-STD LE 01.02.05	Storage Cask Fabrication Facility (Expanded)	\$0
		C-STD LE 01.02.06	Cask Maintenance Facility (Expanded)	\$0
		C-STD LE 01.02.07	Concrete Batch Plant (Expanded if needed)	\$0
		C-STD LE 01.02.08	Visitor Center/ Auditorium (expanded if needed)	\$0
		C-STD LE 01.02.09	Administration Building (Expanded if needed)	\$0
		C-STD LE 01.02.10	Security (Expanded)	\$0
		C-STD LE 01.02.11	Rail Spur/ Receiving Yard (Expanded)	\$0
		C-STD LE 01.02.12	Utilities Expanded as needed)	\$0
		C-STD LE 01.02.13	Roads (Expanded)	\$0
		C-STD LE 01.02.14	Parking (Expanded as needed)	\$0
		C-STD LE 01.02.15	Site Work (Expanded)	\$0
		C-STD LE 01.02.16	Warehouse (Expanded if Needed)	\$0
		C-STD LE 01.02.17	Maintenance Facility (Expanded if needed)	\$0
		C-STD LE 01.02.18	Waste management Facility (Expanded if needed)	\$0
		C-STD LE 01.02.19	Hot Cell / Laboratories	\$0
		C-STD LE 01.02.20	Pool Packaging Facility	\$0
		C-STD LE 01.02.21	Standardized Storage System	\$0
		C-STD LE 01.02.22	Standardized Disposal Canister	\$0
		C-STD LE 01.02.23	Canister Repackaging Facility (For Repository	\$0
	C-STD LE 01.03		Transportation Equipment	\$0
		C-STD LE 01.03.01	Transportation Casks	\$0
		C-STD LE 01.03.02	Rail Equipment	\$0
		C-STD LE 01.03.03	Rail Maintenance Facility	\$0
		C-STD LE 01.03.04	Transportation Systems Services	\$0
	C-STD LE 01.04		Pre-Construction Capitalized Costs	\$66,025,000
		C-STD LE 01.04.01	Land or Land Leases	\$7,680,000
		C-STD LE 01.04.02	Site permits	\$200,000
		C-STD LE 01.04.03	Site Licensing	\$6,240,000
		C-STD LE 01.04.05	Plant Permits	\$0
		C-STD LE 01.04.06	Planning and Alternative Studies	\$750,000



	C-STD LE 01.04.07	Research and Development		\$0
	C-STD LE 01.04.08	Design		\$23,955,000
	C-STD LE 01.04.09	Other Pre-construction Costs		\$17,200,000
	C-STD LE 01.04.10	Pre-construction contingencies		\$10,000,000
	C-STD LE 01.04.xx	(Add Further Breakdown as needed)		\$0
C-STD LE 01.05		Indirect Capitalized Costs	\$63,180,000	
	C-STD LE 01.05.01	Project Management		\$2,700,000
	C-STD LE 01.05.02	Construction Management		\$3,600,000
	C-STD LE 01.05.03	Field indirect services		\$11,880,000
	C-STD LE 01.05.04	Design Services in support of Construction		\$5,400,000
	C-STD LE 01.05.05	QA/QC		\$12,600,000
	C-STD LE 01.05.06	Commissioning and Startup		\$1,200,000
	C-STD LE 01.05.07	Home office Engineering support to Construction		\$7,200,000
	C-STD LE 01.05.08	Document Control		\$2,700,000
	C-STD LE 01.05.09	Project Controls		\$3,600,000
	C-STD LE 01.05.10	Construction Testing		\$2,700,000
	C-STD LE 01.05.11	Inspections		\$3,600,000
	C-STD LE 01.05.12	Startup and Testing		\$3,000,000
	C-STD LE 01.05.13	Commissioning		\$3,000,000
C-STD LE 01.06		Site Selection	\$0	
	C-STD LE 01.06.01	Site Selection		\$0
	C-STD LE 01.06.02	Public Information Process		\$0
C-STD LE 01.07		Decontamination and Deconstruction	\$0	
	C-STD LE 01.07.01	Decommissioning		\$0
	C-STD LE 01.07.02	Decontamination		\$0
	C-STD LE 01.07.03	Deconstruction		\$0
	C-STD LE 01.07.04			\$0
	C-STD LE 01.07.05			\$0
C-STD LE 01.08		Project Financial Costs	\$91,289,161	
	C-STD LE 01.08.01	Contractor Fees		\$54,500,992
	C-STD LE 01.08.02	Escalation Costs		\$36,788,169
	C-STD LE 01.08.03	Interest Payments		\$0
	C-STD LE 01.08.04	Indirect costs to support shipments to repository		\$0
	C-STD LE 01.08.05			\$0
	C-STD LE 01.08.xx	(Add Further Breakdown as needed)		\$0
C-STD LE 01.09		Project Contingencies	\$119,745,492	
	C-STD LE 01.09.01	Management Reserve - Contractor Held		\$38,627,578
	C-STD LE 01.09.02	Contingency - DOE held		\$81,117,914
C-STD LE 01.10		Other Direct Costs	\$0	
	C-STD LE 01.10.01	DOE Project Operations		\$0
	C-STD LE 01.10.02	DOE TM&E		\$0
	C-STD LE 01.10.03	DOE TM&E		\$0
	C-STD LE 01.10.04	Host site Operational Costs Miscellaneous		\$0
	C-STD LE 01.10.05	Miscellaneous ODC		\$0
C-STD LE 01.11		Operational Costs	0	
	C-STD LE 01.11.01	Operations Costs		\$0
	C-STD LE 01.11.02	Transportation Costs		\$0
	C-STD LE 01.11.03	Escalation (Operations/Transportation)		\$0
Project Total				
		TEC (All Direct & indirect Costs, MR, Escalation)		\$811,179,137
		TPC (TEC plus Contingency, ODCs)		\$892,297,051
		LCC All Capitol, Operation, Transportation, Escalation		\$892,297,051



APPENDIX A6-6

STUDY 1 - ALTERNATIVE STORAGE SYSTEMS FOR DUAL PURPOSE CANISTERS

COST DETAILS

ALTERNATIVE 6 - C-STD, PILOT, HIGH SEISMIC

LIFE CYCLE COST – 40 YEAR OPERATING LIFE



Interim Storage Facility

Pilot Storage Facility (5,000 MTU)

Project: C-STD Pilot (5,000 MTU)

PILOT Project - C-STD 60/40 Vertical/Horizontal - High Seismic

Separate CHB

40 Year Operating life							Annual Escalation	Discount Rate
							1.90%	3.40%
YEAR	Design/Const	O&M	Cask Handling	D&D	Escalation	Annual Expense	Cumulative	
1	\$ 10,000,000	\$ -	\$ -	\$ -	\$ 190,000	\$ 10,190,000	\$ 10,190,000	
2	\$ 10,000,000	\$ -	\$ -	\$ -	\$ 383,610	\$ 10,383,610	\$ 20,573,610	
3	\$ 20,000,000	\$ -	\$ -	\$ -	\$ 1,161,797	\$ 21,161,797	\$ 41,735,407	
4	\$ 20,000,000	\$ -	\$ -	\$ -	\$ 1,563,871	\$ 21,563,871	\$ 63,299,279	
5	\$ 20,000,000	\$ -	\$ -	\$ -	\$ 1,973,585	\$ 21,973,585	\$ 85,272,863	
6	\$ 20,000,000	\$ -	\$ -	\$ -	\$ 2,391,083	\$ 22,391,083	\$ 107,663,946	
7	\$ 27,888,399	\$ -	\$ -	\$ -	\$ 3,927,403	\$ 31,815,802	\$ 139,479,748	
8	\$ 200,000,000	\$ -	\$ -	\$ -	\$ 32,500,273	\$ 232,500,273	\$ 371,980,021	
9	\$ 200,000,000	\$ 28,996,032	\$ -	\$ -	\$ 42,270,124	\$ 271,266,156	\$ 643,246,177	
10	\$ 364,408,652	\$ 26,860,352	\$ -	\$ -	\$ 81,030,277	\$ 472,299,281	\$ 1,115,545,458	
11		\$ 22,933,786	\$ 12,836,230	\$ -	\$ 8,228,209	\$ 43,998,224	\$ 1,159,543,683	
12		\$ 22,933,786	\$ 12,836,230	\$ -	\$ 9,064,175	\$ 44,834,191	\$ 1,204,377,874	
13		\$ 22,933,786	\$ 12,836,230	\$ -	\$ 9,916,025	\$ 45,686,040	\$ 1,250,063,914	
14		\$ 11,643,328	\$ -	\$ -	\$ 3,510,268	\$ 15,153,596	\$ 1,265,217,510	
15		\$ 11,643,328	\$ -	\$ -	\$ 3,798,186	\$ 15,441,514	\$ 1,280,659,024	
16		\$ 11,643,328	\$ -	\$ -	\$ 4,091,575	\$ 15,734,903	\$ 1,296,393,928	
17		\$ 11,643,328	\$ -	\$ -	\$ 4,390,538	\$ 16,033,866	\$ 1,312,427,794	
18		\$ 11,643,328	\$ -	\$ -	\$ 4,695,182	\$ 16,338,510	\$ 1,328,766,304	
19		\$ 11,643,328	\$ -	\$ -	\$ 5,005,614	\$ 16,648,942	\$ 1,345,415,245	
20		\$ 11,643,328	\$ -	\$ -	\$ 5,321,943	\$ 16,965,271	\$ 1,362,380,517	
21		\$ 11,643,328	\$ -	\$ -	\$ 5,644,284	\$ 17,287,612	\$ 1,379,668,128	
22		\$ 11,643,328	\$ -	\$ -	\$ 5,972,748	\$ 17,616,076	\$ 1,397,284,204	
23		\$ 11,643,328	\$ -	\$ -	\$ 6,307,454	\$ 17,950,782	\$ 1,415,234,986	
24		\$ 11,643,328	\$ -	\$ -	\$ 6,648,518	\$ 18,291,846	\$ 1,433,526,833	
25		\$ 11,643,328	\$ -	\$ -	\$ 6,996,064	\$ 18,639,392	\$ 1,452,166,224	
26		\$ 11,643,328	\$ -	\$ -	\$ 7,350,212	\$ 18,993,540	\$ 1,471,159,764	
27		\$ 11,643,328	\$ -	\$ -	\$ 7,711,089	\$ 19,354,417	\$ 1,490,514,181	
28		\$ 11,643,328	\$ -	\$ -	\$ 8,078,823	\$ 19,722,151	\$ 1,510,236,333	
29		\$ 11,643,328	\$ -	\$ -	\$ 8,453,544	\$ 20,096,872	\$ 1,530,333,205	
30		\$ 11,643,328	\$ -	\$ -	\$ 8,835,385	\$ 20,478,713	\$ 1,550,811,917	
31		\$ 11,643,328	\$ -	\$ -	\$ 9,224,480	\$ 20,867,808	\$ 1,571,679,726	
32		\$ 11,643,328	\$ -	\$ -	\$ 9,620,969	\$ 21,264,297	\$ 1,592,944,022	
33		\$ 11,643,328	\$ -	\$ -	\$ 10,024,990	\$ 21,668,318	\$ 1,614,612,340	
34		\$ 11,643,328	\$ -	\$ -	\$ 10,436,688	\$ 22,080,016	\$ 1,636,692,356	
35		\$ 11,643,328	\$ -	\$ -	\$ 10,856,209	\$ 22,499,537	\$ 1,659,191,893	
36		\$ 11,643,328	\$ -	\$ -	\$ 11,283,700	\$ 22,927,028	\$ 1,682,118,921	
37		\$ 11,643,328	\$ -	\$ -	\$ 11,719,313	\$ 23,362,641	\$ 1,705,481,562	
38		\$ 11,643,328	\$ -	\$ -	\$ 12,163,203	\$ 23,806,531	\$ 1,729,288,093	
39		\$ 11,643,328	\$ -	\$ -	\$ 12,615,528	\$ 24,258,856	\$ 1,753,546,949	
40		\$ 11,643,328	\$ -	\$ -	\$ 13,076,446	\$ 24,719,774	\$ 1,778,266,723	
41		\$ 11,643,328	\$ -	\$ -	\$ 13,546,121	\$ 25,189,449	\$ 1,803,456,172	
42		\$ 11,643,328	\$ -	\$ -	\$ 14,024,721	\$ 25,668,049	\$ 1,829,124,221	
43		\$ 11,643,328	\$ -	\$ -	\$ 14,512,414	\$ 26,155,742	\$ 1,855,279,963	
44		\$ 11,643,328	\$ -	\$ -	\$ 15,009,373	\$ 26,652,701	\$ 1,881,932,664	
45		\$ 11,643,328	\$ -	\$ -	\$ 15,515,774	\$ 27,159,102	\$ 1,909,091,767	
46		\$ 11,643,328	\$ -	\$ -	\$ 16,031,797	\$ 27,675,125	\$ 1,936,766,892	
47		\$ 11,643,328	\$ -	\$ -	\$ 16,557,625	\$ 28,200,953	\$ 1,964,967,845	
48		\$ 11,643,328	\$ -	\$ -	\$ 17,093,443	\$ 28,736,771	\$ 1,993,704,615	
49		\$ 11,643,328	\$ -	\$ -	\$ 17,639,441	\$ 29,282,769	\$ 2,022,987,385	
50		\$ 11,643,328	\$ -	\$ -	\$ 18,195,814	\$ 29,839,142	\$ 2,052,826,527	
51		\$ -	\$ -	\$ 21,175,000	\$ 34,122,666	\$ 55,297,666	\$ 2,108,124,193	
52		\$ -	\$ -	\$ 20,000,000	\$ 33,221,556	\$ 53,221,556	\$ 2,161,345,749	
53		\$ -	\$ -	\$ 21,335,653	\$ 36,518,920	\$ 57,854,573	\$ 2,219,200,321	
54		\$ -	\$ -	\$ 21,335,653	\$ 37,618,157	\$ 58,953,810	\$ 2,278,154,131	
55		\$ -	\$ -	\$ 21,335,653	\$ 38,738,279	\$ 60,073,932	\$ 2,338,228,063	
56		\$ -	\$ -	\$ -	\$ -	\$ -	\$ 2,338,228,063	
57		\$ -	\$ -	\$ -	\$ -	\$ -	\$ 2,338,228,063	
58		\$ -	\$ -	\$ -	\$ -	\$ -	\$ 2,338,228,063	
59		\$ -	\$ -	\$ -	\$ -	\$ -	\$ 2,338,228,063	
60		\$ -	\$ -	\$ -	\$ -	\$ -	\$ 2,338,228,063	
	Total Design/Const	Total O&M	Total Cask Handling	Total D&D	Total Escalation	Total Annual Expense	Total Cumulative	
	\$ 892,297,051	\$ 555,460,877	\$ 38,508,689	\$ 105,181,959	\$ 746,779,488	\$ 2,338,228,063	\$ 2,338,228,063	

TASK ORDER NO. 16 - GENERIC DESIGN ALTERNATIVES FOR DRY STORAGE OF USED NUCLEAR FUEL THE DEPARTMENT OF ENERGY - OFFICE OF NUCLEAR ENERGY



APPENDIX A6-6

STUDY 1 - ALTERNATIVE STORAGE SYSTEMS FOR DUAL PURPOSE CANISTERS

COST DETAILS

ALTERNATIVE 6 - C-STD, PILOT, HIGH SEISMIC

LIFE CYCLE COST – 80 YEAR OPERATING LIFE



Interim Storage Facility

Pilot Storage Facility (5,000 MTU)

Project: C-STD Pilot (5,000 MTU)

PILOT Project - C-STD 60/40 Vertical/Horizontal - High Seismic

Separate CHB

80 Year Operating Life

Annual Escalation
1.90%

Discount Rate
3.40%

YEAR	Design/Const	O&M	Cask Handling	D&D	Escalation	Annual Funding	Cumulative
1	\$ 10,000,000	\$ -	\$ -	\$ -	\$ 190,000	\$10,190,000	\$10,190,000
2	\$ 10,000,000	\$ -	\$ -	\$ -	\$ 383,610	\$10,383,610	\$20,573,610
3	\$ 20,000,000	\$ -	\$ -	\$ -	\$ 1,161,797	\$21,161,797	\$41,735,407
4	\$ 20,000,000	\$ -	\$ -	\$ -	\$ 1,563,871	\$21,563,871	\$63,299,279
5	\$ 20,000,000	\$ -	\$ -	\$ -	\$ 1,973,585	\$21,973,585	\$85,272,863
6	\$ 20,000,000	\$ -	\$ -	\$ -	\$ 2,391,083	\$22,391,083	\$107,663,946
7	\$ 27,888,399	\$ -	\$ -	\$ -	\$ 3,927,403	\$31,815,802	\$139,479,748
8	\$ 200,000,000	\$ -	\$ -	\$ -	\$ 32,500,273	\$232,500,273	\$371,980,021
9	\$ 200,000,000	\$ 28,996,032	\$ -	\$ -	\$ 42,270,124	\$271,266,156	\$643,246,177
10	\$ 364,408,652	\$ 26,860,352	\$ -	\$ -	\$ 81,030,277	\$472,299,281	\$1,115,545,458
11	\$ -	\$ 22,933,786	\$ 12,836,230	\$ -	\$ 8,228,209	\$43,998,224	\$1,159,543,683
12	\$ -	\$ 22,933,786	\$ 12,836,230	\$ -	\$ 9,064,175	\$44,834,191	\$1,204,377,874
13	\$ -	\$ 22,933,786	\$ 12,836,230	\$ -	\$ 9,916,025	\$45,686,040	\$1,250,063,914
14	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 3,660,707	\$15,803,032	\$1,265,866,946
15	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 3,960,965	\$16,103,289	\$1,281,970,235
16	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 4,266,927	\$16,409,252	\$1,298,379,487
17	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 4,578,703	\$16,721,028	\$1,315,100,515
18	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 4,896,403	\$17,038,727	\$1,332,139,242
19	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 5,220,138	\$17,362,463	\$1,349,501,705
20	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 5,550,025	\$17,692,350	\$1,367,194,055
21	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 5,886,180	\$18,028,505	\$1,385,222,560
22	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 6,228,722	\$18,371,046	\$1,403,593,606
23	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 6,577,771	\$18,720,096	\$1,422,313,702
24	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 6,933,453	\$19,075,778	\$1,441,389,480
25	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 7,295,893	\$19,438,218	\$1,460,827,697
26	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 7,665,219	\$19,807,544	\$1,480,635,241
27	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 8,041,562	\$20,183,887	\$1,500,819,128
28	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 8,425,056	\$20,567,381	\$1,521,386,509
29	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 8,815,837	\$20,958,161	\$1,542,344,670
30	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 9,214,042	\$21,356,366	\$1,563,701,036
31	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 9,619,813	\$21,762,137	\$1,585,463,174
32	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 10,033,293	\$22,175,618	\$1,607,638,791
33	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 10,454,630	\$22,596,955	\$1,630,235,746
34	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 10,883,972	\$23,026,297	\$1,653,262,043
35	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 11,321,472	\$23,463,796	\$1,676,725,839
36	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 11,767,284	\$23,909,608	\$1,700,635,447
37	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 12,221,566	\$24,363,891	\$1,724,999,338
38	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 12,684,480	\$24,826,805	\$1,749,826,143
39	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 13,156,190	\$25,298,514	\$1,775,124,658
40	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 13,636,861	\$25,779,186	\$1,800,903,844
41	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 14,126,666	\$26,268,991	\$1,827,172,834
42	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 14,625,777	\$26,768,101	\$1,853,940,935
43	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 15,134,371	\$27,276,695	\$1,881,217,631
44	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 15,652,628	\$27,794,952	\$1,909,012,583
45	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 16,180,732	\$28,323,057	\$1,937,335,640
46	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 16,718,870	\$28,861,195	\$1,966,196,834
47	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 17,267,233	\$29,409,557	\$1,995,606,392
48	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 17,826,014	\$29,968,339	\$2,025,574,731
49	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 18,395,413	\$30,537,737	\$2,056,112,468
50	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 18,975,630	\$31,117,954	\$2,087,230,422
51	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 19,566,871	\$31,709,196	\$2,118,939,618
52	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 20,169,346	\$32,311,670	\$2,151,251,288
53	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 20,783,267	\$32,925,592	\$2,184,176,880
54	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 21,408,854	\$33,551,178	\$2,217,728,058
55	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 22,046,326	\$34,188,651	\$2,251,916,709
56	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 22,695,910	\$34,838,235	\$2,286,754,944
57	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 23,357,837	\$35,500,161	\$2,322,255,105
58	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 24,032,340	\$36,174,665	\$2,358,429,770



59	\$	-	\$ 12,142,325	\$	-	\$	-	\$ 24,719,659	\$36,861,983	\$2,395,291,753
60	\$	-	\$ 12,142,325	\$	-	\$	-	\$ 25,420,036	\$37,562,361	\$2,432,854,114
61	\$	-	\$ 12,142,325	\$	-	\$	-	\$ 26,133,721	\$38,276,046	\$2,471,130,160
62	\$	-	\$ 12,142,325	\$	-	\$	-	\$ 26,860,966	\$39,003,291	\$2,510,133,450
63	\$	-	\$ 12,142,325	\$	-	\$	-	\$ 27,602,028	\$39,744,353	\$2,549,877,803
64	\$	-	\$ 12,142,325	\$	-	\$	-	\$ 28,357,171	\$40,499,496	\$2,590,377,299
65		\$0	\$ 12,142,325	\$	-	\$	-	\$ 29,126,662	\$41,268,986	\$2,631,646,285
66		\$0	\$ 12,142,325	\$	-	\$	-	\$ 29,910,772	\$42,053,097	\$2,673,699,382
67		\$0	\$ 12,142,325	\$	-	\$	-	\$ 30,709,781	\$42,852,106	\$2,716,551,488
68		\$0	\$ 12,142,325	\$	-	\$	-	\$ 31,523,971	\$43,666,296	\$2,760,217,784
69		\$0	\$ 12,142,325	\$	-	\$	-	\$ 32,353,631	\$44,495,955	\$2,804,713,739
70		\$0	\$ 12,142,325	\$	-	\$	-	\$ 33,199,054	\$45,341,379	\$2,850,055,117
71		\$0	\$ 12,142,325	\$	-	\$	-	\$ 34,060,540	\$46,202,865	\$2,896,257,982
72		\$0	\$ 12,142,325	\$	-	\$	-	\$ 34,938,395	\$47,080,719	\$2,943,338,701
73		\$0	\$ 12,142,325	\$	-	\$	-	\$ 35,832,928	\$47,975,253	\$2,991,313,954
74		\$0	\$ 12,142,325	\$	-	\$	-	\$ 36,744,458	\$48,886,783	\$3,040,200,737
75		\$0	\$ 12,142,325	\$	-	\$	-	\$ 37,673,307	\$49,815,631	\$3,090,016,368
76		\$0	\$ 12,142,325	\$	-	\$	-	\$ 38,619,804	\$50,762,128	\$3,140,778,497
77		\$0	\$ 12,142,325	\$	-	\$	-	\$ 39,584,284	\$51,726,609	\$3,192,505,106
78		\$0	\$ 12,142,325	\$	-	\$	-	\$ 40,567,090	\$52,709,415	\$3,245,214,520
79		\$0	\$ 12,142,325	\$	-	\$	-	\$ 41,568,569	\$53,710,893	\$3,298,925,414
80		\$0	\$ 12,142,325	\$	-	\$	-	\$ 42,589,076	\$54,731,400	\$3,353,656,814
81		\$0	\$ 12,142,325	\$	-	\$	-	\$ 43,628,972	\$55,771,297	\$3,409,428,111
82		\$0	\$ 12,142,325	\$	-	\$	-	\$ 44,688,627	\$56,830,952	\$3,466,259,063
83		\$0	\$ 12,142,325	\$	-	\$	-	\$ 45,768,415	\$57,910,740	\$3,524,169,802
84		\$0	\$ 12,142,325	\$	-	\$	-	\$ 46,868,719	\$59,011,044	\$3,583,180,846
85		\$0	\$ 12,142,325	\$	-	\$	-	\$ 47,989,929	\$60,132,254	\$3,643,313,100
86		\$0	\$ 12,142,325	\$	-	\$	-	\$ 49,132,442	\$61,274,766	\$3,704,587,866
87		\$0	\$ 12,142,325	\$	-	\$	-	\$ 50,296,662	\$62,438,987	\$3,767,026,853
88		\$0	\$ 12,142,325	\$	-	\$	-	\$ 51,483,003	\$63,625,328	\$3,830,652,181
89		\$0	\$ 12,142,325	\$	-	\$	-	\$ 52,691,884	\$64,834,209	\$3,895,486,390
90		\$0	\$ 12,142,325	\$	-	\$	-	\$ 53,923,734	\$66,066,059	\$3,961,552,448
91				\$	-	\$ 21,175,000	\$	96,226,640	\$117,401,640	\$4,078,954,088
92				\$	-	\$ 20,000,000	\$	92,993,881	\$112,993,881	\$4,191,947,969
93				\$	-	\$ 21,335,653	\$	101,494,516	\$122,830,169	\$4,314,778,138
94				\$	-	\$ 21,335,653	\$	103,828,290	\$125,163,942	\$4,439,942,081
95				\$	-	\$ 21,335,653	\$	106,206,404	\$127,542,057	\$4,567,484,138
96						\$	-	\$	\$0	\$4,567,484,138
97						\$	-	\$	\$0	\$4,567,484,138
98								\$	\$0	\$4,567,484,138
99								\$	\$0	\$4,567,484,138
100								\$	\$0	\$4,567,484,138

Total Design/Const	Total O&M	Total Cask Handling	Total D&D	Total Escalation	Total Life Cycle
\$892,297,051	\$1,059,616,738	\$38,508,689	\$105,181,959	\$2,471,879,702	\$4,567,484,138

TASK ORDER NO. 16 - GENERIC DESIGN ALTERNATIVES FOR DRY STORAGE OF USED NUCLEAR FUEL THE DEPARTMENT OF ENERGY - OFFICE OF NUCLEAR ENERGY



APPENDIX A6-7

STUDY 1 - ALTERNATIVE STORAGE SYSTEMS FOR DUAL PURPOSE CANISTERS

COST DETAILS

ALTERNATIVE 7 - C-STD, EXPANDED, LOW SEISMIC

LIFE CYCLE COST SUMMARIES



Interim Storage Facility

Expanded Storage Facility (10,000 MTU)

Project: C-STD Expanded (10,000 MTU)

Expanded Project - C-STD 60/40 Vertical/Horizontal - Low Seismic

Separate CHB

Annual Escalation Factor 1.90%

Discount Rate 3.40%

Life Cycle Costs (40 Year Life)

	Capital	Operations	Transport	Decommissioning	Escalation	Total Costs
<i>Design & Construction</i>	\$1,153,181,855					\$1,153,181,855
<i>Operations & Maintenance (40 Year Life)</i>		\$587,271,913				\$587,271,913
<i>Cask Handling</i>		\$77,017,378				\$77,017,378
<i>Transportation Equipment</i>	\$0					\$0
<i>Transport Operations</i>		\$0	\$0			\$0
<i>Repackaging</i>	\$0	\$0				\$0
<i>Transport to Repository</i>	\$0		\$0			\$0
<i>D&D</i>				\$163,700,287		\$163,700,287
<i>Escalation</i>					\$935,257,337	\$935,257,337
<i>Total Costs (40 year Life)</i>						\$2,916,428,769
<i>Present Value</i>						\$1,554,102,012

Life Cycle Costs (80 Year Life)

	Capital	Operations	Transport	Decommissioning	Escalation	Total Costs
<i>Design & Construction</i>	\$1,153,181,855					\$1,153,181,855
<i>Operations & Maintenance (80 Year Life)</i>		\$1,072,964,898				\$1,072,964,898
<i>Cask Handling</i>		\$77,017,378				\$77,017,378
<i>Transportation Equipment</i>	\$0					\$0
<i>Transport Operations</i>		\$0	\$0			\$0
<i>Repackaging</i>	\$0	\$0				\$0
<i>Transport to Repository</i>	\$0		\$0			\$0
<i>D&D</i>				\$163,700,287		\$163,700,287
<i>Escalation</i>					\$2,825,316,883	\$2,825,316,883
<i>Total Costs (80 Year Life)</i>						\$5,292,181,300
<i>Present Value</i>						\$1,696,673,641



APPENDIX A6-7

STUDY 1 - ALTERNATIVE STORAGE SYSTEMS FOR DUAL PURPOSE CANISTERS

COST DETAILS

ALTERNATIVE 7 - C-STD, EXPANDED, LOW SEISMIC

CAPITAL COST SUMMARY



Interim Storage Facility

Expanded Storage Facility (10,000 MTU)

Project: C-STD Expanded (10,000 MTU)
 Expanded Project - C-STD 60/40 Vertical/Horizontal - Low Seismic
 Separate CHB

Level 3 Cost Summary - First of A kind module

Level 1	Level 2	Level 3	Description	Level 3 Total
C-STD EX 01			Interim Storage Facility and transportation Project	
	C-STD EX 01.01		Pilot ISF Facility	\$509,394,563
		C-STD EX 01.01.01	Storage STDs	\$0
		C-STD EX 01.01.02	Cask Handling (Transfer) Facility	\$135,175,719
		C-STD EX 01.01.03	Horizontal Dry Storage Modules	\$117,986,923
		C-STD EX 01.01.04	Vertical Dry Storage Module	\$97,092,759
		C-STD EX 01.01.05	Storage Cask Fabrication Facility	\$0
		C-STD EX 01.01.06	Cask Maintenance Facility	\$0
		C-STD EX 01.01.07	Concrete Batch Plant	\$1,850,000
		C-STD EX 01.01.08	Visitor Center/ Auditorium	\$0
		C-STD EX 01.01.09	Administration Building	\$3,140,000
		C-STD EX 01.01.10	Security	\$24,148,975
		C-STD EX 01.01.11	Rail Spur/ Receiving Yard	\$58,752,800
		C-STD EX 01.01.12	Utilities	\$18,682,150
		C-STD EX 01.01.13	Roads	\$18,212,737
		C-STD EX 01.01.14	Parking	\$735,000
		C-STD EX 01.01.15	Site Work	\$23,417,500
		C-STD EX 01.01.16	Warehouse	\$10,200,000
		C-STD EX 01.01.17	Maintenance Facility	\$0
		C-STD EX 01.01.18	Waste management Facility	\$0
		C-STD EX 01.01.01.xx	(Add Further Breakdown as needed)	\$0
	C-STD EX 01.02		Expanded Interim Storage Facility	\$241,846,512
		C-STD EX 01.02.01	Expanded Storage STDs and Dry Cask Storage Systems	\$0
		C-STD EX 01.02.02	Expanded Cask Handling Facility (if required)	\$0
		C-STD EX 01.02.03	Horizontal Dry Storage Modules	\$117,986,923
		C-STD EX 01.02.04	Vertical Dry Storage Casks	\$96,592,759
		C-STD EX 01.02.05	Storage Cask Fabrication Facility (Expanded)	\$0
		C-STD EX 01.02.06	Cask Maintenance Facility (Expanded)	\$0
		C-STD EX 01.02.07	Concrete Batch Plant (Expanded if needed)	\$1,850,000
		C-STD EX 01.02.08	Visitor Center/ Auditorium (expanded if needed)	\$745,000
		C-STD EX 01.02.09	Administration Building (Expanded if needed)	\$0
		C-STD EX 01.02.10	Security (Expanded)	\$10,074,488
		C-STD EX 01.02.11	Rail Spur/ Receiving Yard (Expanded)	\$0
		C-STD EX 01.02.12	Utilities Expanded as needed)	\$3,624,200
		C-STD EX 01.02.13	Roads (Expanded)	\$83,142
		C-STD EX 01.02.14	Parking (Expanded as needed)	\$0
		C-STD EX 01.02.15	Site Work (Expanded)	\$10,890,000
		C-STD EX 01.02.16	Warehouse (Expanded if Needed)	\$0
		C-STD EX 01.02.17	Maintenance Facility (Expanded if needed)	\$0
		C-STD EX 01.02.18	Waste management Facility (Expanded if needed)	\$0
		C-STD EX 01.02.19	Hot Cell / Laboratories	\$0
		C-STD EX 01.02.20	Pool Packaging Facility	\$0
		C-STD EX 01.02.21	Standardized Storage System	\$0
		C-STD EX 01.02.22	Standardized Disposal Canister	\$0
		C-STD EX 01.02.23	Canister Repackaging Facility (For Repository	\$0
	C-STD EX 01.03		Transportation Equipment	\$0
		C-STD EX 01.03.01	Transportation Casks	\$0
		C-STD EX 01.03.02	Rail Equipment	\$0
		C-STD EX 01.03.03	Rail Maintenance Facility	\$0
		C-STD EX 01.03.04	Transportation Systems Services	\$0
	C-STD EX 01.04		Pre-Construction Capitalized Costs	\$66,025,000
		C-STD EX 01.04.01	Land or Land Leases	\$7,680,000
		C-STD EX 01.04.02	Site permits	\$200,000
		C-STD EX 01.04.03	Site Licensing	\$6,240,000
		C-STD EX 01.04.05	Plant Permits	\$0
		C-STD EX 01.04.06	Planning and Alternative Studies	\$750,000

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	C-STD EX 01.04.07	Research and Development		\$0
	C-STD EX 01.04.08	Design		\$23,955,000
	C-STD EX 01.04.09	Other Pre-construction Costs		\$17,200,000
	C-STD EX 01.04.10	Pre-construction contingencies		\$10,000,000
	C-STD EX 01.04.xx	(Add Further Breakdown as needed)		\$0
	C-STD EX 01.05	Indirect Capitalized Costs	\$63,180,000	
	C-STD EX 01.05.01	Project Management		\$2,700,000
	C-STD EX 01.05.02	Construction Management		\$3,600,000
	C-STD EX 01.05.03	Field indirect services		\$11,880,000
	C-STD EX 01.05.04	Design Services in support of Construction		\$5,400,000
	C-STD EX 01.05.05	QA/QC		\$12,600,000
	C-STD EX 01.05.06	Commissioning and Startup		\$1,200,000
	C-STD EX 01.05.07	Home office Engineering support to Construction		\$7,200,000
	C-STD EX 01.05.08	Document Control		\$2,700,000
	C-STD EX 01.05.09	Project Controls		\$3,600,000
	C-STD EX 01.05.10	Construction Testing		\$2,700,000
	C-STD EX 01.05.11	Inspections		\$3,600,000
	C-STD EX 01.05.12	Startup and Testing		\$3,000,000
	C-STD EX 01.05.13	Commissioning		\$3,000,000
	C-STD EX 01.06	Site Selection	\$0	
	C-STD EX 01.06.01	Site Selection		\$0
	C-STD EX 01.06.02	Public Information Process		\$0
	C-STD EX 01.07	Decontamination and Deconstruction	\$0	
	C-STD EX 01.07.01	Decommissioning		\$0
	C-STD EX 01.07.02	Decontamination		\$0
	C-STD EX 01.07.03	Deconstruction		\$0
	C-STD EX 01.07.04			\$0
	C-STD EX 01.07.05			\$0
	C-STD EX 01.08	Project Financial Costs	\$117,979,774	
	C-STD EX 01.08.01	Contractor Fees		\$70,435,686
	C-STD EX 01.08.02	Escalation Costs		\$47,544,088
	C-STD EX 01.08.03	Interest Payments		\$0
	C-STD EX 01.08.04	Indirect costs to support shipments to repository		\$0
	C-STD EX 01.08.05			\$0
	C-STD EX 01.08.xx	(Add Further Breakdown as needed)		\$0
	C-STD EX 01.09	Project Contingencies	\$154,756,006	
	C-STD EX 01.09.01	Management Reserve - Contractor Held		\$49,921,292
	C-STD EX 01.09.02	Contingency - DOE held		\$104,834,714
	C-STD EX 01.10	Other Direct Costs	\$0	
	C-STD EX 01.10.01	DOE Project Operations		\$0
	C-STD EX 01.10.02	DOE TM&E		\$0
	C-STD EX 01.10.03	DOE TM&E		\$0
	C-STD EX 01.10.04	Host site Operational Costs Miscellaneous		\$0
	C-STD EX 01.10.05	Miscellaneous ODC		\$0
	C-STD EX 01.11	Operational Costs	0	
	C-STD EX 01.11.01	Operations Costs		\$0
	C-STD EX 01.11.02	Transportation Costs		\$0
	C-STD EX 01.11.03	Escalation (Operations/Transportation)		\$0
Project Total				
		TEC (All Direct & indirect Costs, MR, Escalation)		\$1,048,347,141
		TPC (TEC plus Contingency, ODCs)		\$1,153,181,855
		LCC All Capitol, Operation, Transportation, Escalation		\$1,153,181,855



APPENDIX A6-7

STUDY 1 - ALTERNATIVE STORAGE SYSTEMS FOR DUAL PURPOSE CANISTERS

COST DETAILS

ALTERNATIVE 7 - C-STD, EXPANDED, LOW SEISMIC

LIFE CYCLE COST – 40 YEAR OPERATING LIFE



Interim Storage Facility

Expanded Storage Facility (10,000 MTU)

Project: C-STD Expanded (10,000 MTU)

Expanded Project - C-STD 60/40 Vertical/Horizontal - Low Seismic
Separate CHB

40 Year Operating life							Annual Escalation	Discount Rate
							1.90%	3.40%
YEAR	Design/Const	O&M	Cask Handling	D&D	Escalation	Annual Expense	Cumulative	
1	\$ 10,000,000	\$ -	\$ -	\$ -	\$ 190,000	\$ 10,190,000	\$ 10,190,000	
2	\$ 10,000,000	\$ -	\$ -	\$ -	\$ 383,610	\$ 10,383,610	\$ 20,573,610	
3	\$ 20,000,000	\$ -	\$ -	\$ -	\$ 1,161,797	\$ 21,161,797	\$ 41,735,407	
4	\$ 20,000,000	\$ -	\$ -	\$ -	\$ 1,563,871	\$ 21,563,871	\$ 63,299,279	
5	\$ 20,000,000	\$ -	\$ -	\$ -	\$ 1,973,585	\$ 21,973,585	\$ 85,272,863	
6	\$ 20,000,000	\$ -	\$ -	\$ -	\$ 2,391,083	\$ 22,391,083	\$ 107,663,946	
7	\$ 27,888,399	\$ -	\$ -	\$ -	\$ 3,927,403	\$ 31,815,802	\$ 139,479,748	
8	\$ 200,000,000	\$ -	\$ -	\$ -	\$ 32,500,273	\$ 232,500,273	\$ 371,980,021	
9	\$ 200,000,000	\$ 22,503,661	\$ -	\$ -	\$ 41,071,704	\$ 263,575,365	\$ 635,555,387	
10	\$ 625,293,456	\$ 22,503,661	\$ -	\$ -	\$ 134,156,244	\$ 781,953,361	\$ 1,417,508,748	
11		\$ 22,933,786	\$ 12,836,230	\$ -	\$ 8,228,209	\$ 43,998,224	\$ 1,461,506,972	
12	\$ -	\$ 22,933,786	\$ 12,836,230	\$ -	\$ 9,064,175	\$ 44,834,191	\$ 1,506,341,163	
13	\$ -	\$ 22,933,786	\$ 12,836,230	\$ -	\$ 9,916,025	\$ 45,686,040	\$ 1,552,027,203	
14	\$ -	\$ 11,643,328	\$ 12,836,230	\$ -	\$ 7,380,176	\$ 31,859,734	\$ 1,583,886,937	
15	\$ -	\$ 11,643,328	\$ 12,836,230	\$ -	\$ 7,985,511	\$ 32,465,069	\$ 1,616,352,006	
16	\$ -	\$ 11,643,328	\$ 12,836,230	\$ -	\$ 8,602,347	\$ 33,081,905	\$ 1,649,433,911	
17	\$ -	\$ 11,643,328	\$ -	\$ -	\$ 4,390,538	\$ 16,033,866	\$ 1,665,467,777	
18	\$ -	\$ 11,643,328	\$ -	\$ -	\$ 4,695,182	\$ 16,338,510	\$ 1,681,806,287	
19	\$ -	\$ 11,643,328	\$ -	\$ -	\$ 5,005,614	\$ 16,648,942	\$ 1,698,455,228	
20	\$ -	\$ 11,643,328	\$ -	\$ -	\$ 5,321,943	\$ 16,965,271	\$ 1,715,420,500	
21	\$ -	\$ 11,643,328	\$ -	\$ -	\$ 5,644,284	\$ 17,287,612	\$ 1,732,708,111	
22	\$ -	\$ 11,643,328	\$ -	\$ -	\$ 5,972,748	\$ 17,616,076	\$ 1,750,324,188	
23	\$ -	\$ 11,643,328	\$ -	\$ -	\$ 6,307,454	\$ 17,950,782	\$ 1,768,274,969	
24	\$ -	\$ 11,643,328	\$ -	\$ -	\$ 6,648,518	\$ 18,291,846	\$ 1,786,566,816	
25	\$ -	\$ 11,643,328	\$ -	\$ -	\$ 6,996,064	\$ 18,639,392	\$ 1,805,206,207	
26	\$ -	\$ 11,643,328	\$ -	\$ -	\$ 7,350,212	\$ 18,993,540	\$ 1,824,199,747	
27	\$ -	\$ 11,643,328	\$ -	\$ -	\$ 7,711,089	\$ 19,354,417	\$ 1,843,554,164	
28	\$ -	\$ 11,643,328	\$ -	\$ -	\$ 8,078,823	\$ 19,722,151	\$ 1,863,276,316	
29	\$ -	\$ 11,643,328	\$ -	\$ -	\$ 8,453,544	\$ 20,096,872	\$ 1,883,373,188	
30	\$ -	\$ 11,643,328	\$ -	\$ -	\$ 8,835,385	\$ 20,478,713	\$ 1,903,851,900	
31	\$ -	\$ 11,643,328	\$ -	\$ -	\$ 9,224,480	\$ 20,867,808	\$ 1,924,719,709	
32	\$ -	\$ 11,643,328	\$ -	\$ -	\$ 9,620,969	\$ 21,264,297	\$ 1,945,984,005	
33	\$ -	\$ 11,643,328	\$ -	\$ -	\$ 10,024,990	\$ 21,668,318	\$ 1,967,652,323	
34	\$ -	\$ 11,643,328	\$ -	\$ -	\$ 10,436,688	\$ 22,080,016	\$ 1,989,732,339	
35	\$ -	\$ 11,643,328	\$ -	\$ -	\$ 10,856,209	\$ 22,499,537	\$ 2,012,231,876	
36	\$ -	\$ 11,643,328	\$ -	\$ -	\$ 11,283,700	\$ 22,927,028	\$ 2,035,158,904	
37	\$ -	\$ 11,643,328	\$ -	\$ -	\$ 11,719,313	\$ 23,362,641	\$ 2,058,521,545	
38	\$ -	\$ 11,643,328	\$ -	\$ -	\$ 12,163,203	\$ 23,806,531	\$ 2,082,328,076	
39	\$ -	\$ 11,643,328	\$ -	\$ -	\$ 12,615,528	\$ 24,258,856	\$ 2,106,586,932	
40	\$ -	\$ 11,643,328	\$ -	\$ -	\$ 13,076,446	\$ 24,719,774	\$ 2,131,306,706	
41	\$ -	\$ 11,643,328	\$ -	\$ -	\$ 13,546,121	\$ 25,189,449	\$ 2,156,496,155	
42	\$ -	\$ 11,643,328	\$ -	\$ -	\$ 14,024,721	\$ 25,668,049	\$ 2,182,164,204	
43	\$ -	\$ 11,643,328	\$ -	\$ -	\$ 14,512,414	\$ 26,155,742	\$ 2,208,319,946	
44	\$ -	\$ 11,643,328	\$ -	\$ -	\$ 15,009,373	\$ 26,652,701	\$ 2,234,972,647	
45	\$ -	\$ 11,643,328	\$ -	\$ -	\$ 15,515,774	\$ 27,159,102	\$ 2,262,131,750	
46	\$ -	\$ 11,643,328	\$ -	\$ -	\$ 16,031,797	\$ 27,675,125	\$ 2,289,806,875	
47	\$ -	\$ 11,643,328	\$ -	\$ -	\$ 16,557,625	\$ 28,200,953	\$ 2,318,007,828	
48	\$ -	\$ 11,643,328	\$ -	\$ -	\$ 17,093,443	\$ 28,736,771	\$ 2,346,744,598	
49	\$ -	\$ 11,643,328	\$ -	\$ -	\$ 17,639,441	\$ 29,282,769	\$ 2,376,027,368	
50	\$ -	\$ 11,643,328	\$ -	\$ -	\$ 18,195,814	\$ 29,839,142	\$ 2,405,866,510	
51	\$ -	\$ -	\$ -	\$ 21,175,000	\$ 34,122,666	\$ 55,297,666	\$ 2,461,164,176	
52	\$ -	\$ -	\$ -	\$ 26,250,000	\$ 43,603,292	\$ 69,853,292	\$ 2,531,017,468	
53	\$ -	\$ -	\$ -	\$ 38,758,429	\$ 66,340,410	\$ 105,098,839	\$ 2,636,116,307	
54	\$ -	\$ -	\$ -	\$ 38,758,429	\$ 68,337,288	\$ 107,095,717	\$ 2,743,212,023	
55	\$ -	\$ -	\$ -	\$ 38,758,429	\$ 70,372,106	\$ 109,130,535	\$ 2,852,342,558	
56	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 2,852,342,558	
57	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 2,852,342,558	
58	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 2,852,342,558	
59	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 2,852,342,558	
60	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 2,852,342,558	
	Total Design/Const	Total O&M	Total Cask Handling	Total D&D	Total Escalation		Total Life Cycle	
	\$ 1,153,181,855	\$ 544,611,815	\$ 77,017,378	\$ 163,700,287	\$ 913,831,224		\$ 2,852,342,558	

TASK ORDER NO. 16 - GENERIC DESIGN ALTERNATIVES FOR DRY STORAGE OF USED NUCLEAR FUEL THE DEPARTMENT OF ENERGY - OFFICE OF NUCLEAR ENERGY



APPENDIX A6-7

STUDY 1 - ALTERNATIVE STORAGE SYSTEMS FOR DUAL PURPOSE CANISTERS

COST DETAILS

ALTERNATIVE 7 - C-STD, EXPANDED, LOW SEISMIC

LIFE CYCLE COST – 80 YEAR OPERATING LIFE



Interim Storage Facility

Expanded Storage Facility (10,000 MTU)

Project: C-STD Expanded (10,000 MTU)

Expanded Project - C-STD 60/40 Vertical/Horizontal - Low Seismic

Separate CHB

80 Year Operating Life

Annual Escalation
1.90%

Discount Rate
3.40%

YEAR	Design/Const	O&M	Cask Handling	D&D	Escalation	Annual Funding	Cumulative
1	\$ 10,000,000	\$ -	\$ -	\$ -	\$ 190,000	\$10,190,000	\$10,190,000
2	\$ 10,000,000	\$ -	\$ -	\$ -	\$ 383,610	\$10,383,610	\$20,573,610
3	\$ 20,000,000	\$ -	\$ -	\$ -	\$ 1,161,797	\$21,161,797	\$41,735,407
4	\$ 20,000,000	\$ -	\$ -	\$ -	\$ 1,563,871	\$21,563,871	\$63,299,279
5	\$ 20,000,000	\$ -	\$ -	\$ -	\$ 1,973,585	\$21,973,585	\$85,272,863
6	\$ 20,000,000	\$ -	\$ -	\$ -	\$ 2,391,083	\$22,391,083	\$107,663,946
7	\$ 27,888,399	\$ -	\$ -	\$ -	\$ 3,927,403	\$31,815,802	\$139,479,748
8	\$ 200,000,000	\$ -	\$ -	\$ -	\$ 32,500,273	\$232,500,273	\$371,980,021
9	\$ 200,000,000	\$ 28,996,032	\$ -	\$ -	\$ 42,270,124	\$271,266,156	\$643,246,177
10	\$ 625,293,456	\$ 26,860,352	\$ -	\$ -	\$ 135,058,498	\$787,212,306	\$1,430,458,483
11		\$ 27,383,172	\$ 12,836,230	\$ -	\$ 9,251,706	\$49,471,107	\$1,479,929,591
12		\$ 27,383,172	\$ 12,836,230	\$ -	\$ 10,191,657	\$50,411,059	\$1,530,340,650
13		\$ 27,383,172	\$ 12,836,230	\$ -	\$ 11,149,467	\$51,368,869	\$1,581,709,518
14		\$ 12,142,325	\$ 12,836,230	\$ -	\$ 7,530,615	\$32,509,169	\$1,614,218,688
15		\$ 12,142,325	\$ 12,836,230	\$ -	\$ 8,148,289	\$33,126,844	\$1,647,345,531
16		\$ 12,142,325	\$ 12,836,230	\$ -	\$ 8,777,699	\$33,756,254	\$1,681,101,785
17		\$ 12,142,325	\$ -	\$ -	\$ 4,578,703	\$16,721,028	\$1,697,822,813
18		\$ 12,142,325	\$ -	\$ -	\$ 4,896,403	\$17,038,727	\$1,714,861,540
19		\$ 12,142,325	\$ -	\$ -	\$ 5,220,138	\$17,362,463	\$1,732,224,003
20		\$ 12,142,325	\$ -	\$ -	\$ 5,550,025	\$17,692,350	\$1,749,916,353
21		\$ 12,142,325	\$ -	\$ -	\$ 5,886,180	\$18,028,505	\$1,767,944,858
22		\$ 12,142,325	\$ -	\$ -	\$ 6,228,722	\$18,371,046	\$1,786,315,904
23		\$ 12,142,325	\$ -	\$ -	\$ 6,577,771	\$18,720,096	\$1,805,036,000
24		\$ 12,142,325	\$ -	\$ -	\$ 6,933,453	\$19,075,778	\$1,824,111,777
25		\$ 12,142,325	\$ -	\$ -	\$ 7,295,893	\$19,438,218	\$1,843,549,995
26		\$ 12,142,325	\$ -	\$ -	\$ 7,665,219	\$19,807,544	\$1,863,357,539
27		\$ 12,142,325	\$ -	\$ -	\$ 8,041,562	\$20,183,887	\$1,883,541,426
28		\$ 12,142,325	\$ -	\$ -	\$ 8,425,056	\$20,567,381	\$1,904,108,807
29		\$ 12,142,325	\$ -	\$ -	\$ 8,815,837	\$20,958,161	\$1,925,066,968
30		\$ 12,142,325	\$ -	\$ -	\$ 9,214,042	\$21,356,366	\$1,946,423,334
31		\$ 12,142,325	\$ -	\$ -	\$ 9,619,813	\$21,762,137	\$1,968,185,471
32		\$ 12,142,325	\$ -	\$ -	\$ 10,033,293	\$22,175,618	\$1,990,361,089
33		\$ 12,142,325	\$ -	\$ -	\$ 10,454,630	\$22,596,955	\$2,012,958,044
34		\$ 12,142,325	\$ -	\$ -	\$ 10,883,972	\$23,026,297	\$2,035,984,340
35		\$ 12,142,325	\$ -	\$ -	\$ 11,321,472	\$23,463,796	\$2,059,448,137
36		\$ 12,142,325	\$ -	\$ -	\$ 11,767,284	\$23,909,608	\$2,083,357,745
37		\$ 12,142,325	\$ -	\$ -	\$ 12,221,566	\$24,363,891	\$2,107,721,636
38		\$ 12,142,325	\$ -	\$ -	\$ 12,684,480	\$24,826,805	\$2,132,548,441
39		\$ 12,142,325	\$ -	\$ -	\$ 13,156,190	\$25,298,514	\$2,157,846,955
40		\$ 12,142,325	\$ -	\$ -	\$ 13,636,861	\$25,779,186	\$2,183,626,141
41		\$ 12,142,325	\$ -	\$ -	\$ 14,126,666	\$26,268,991	\$2,209,895,132
42		\$ 12,142,325	\$ -	\$ -	\$ 14,625,777	\$26,768,101	\$2,236,663,233
43		\$ 12,142,325	\$ -	\$ -	\$ 15,134,371	\$27,276,695	\$2,263,939,929
44		\$ 12,142,325	\$ -	\$ -	\$ 15,652,628	\$27,794,952	\$2,291,734,881
45		\$ 12,142,325	\$ -	\$ -	\$ 16,180,732	\$28,323,057	\$2,320,057,938
46		\$ 12,142,325	\$ -	\$ -	\$ 16,718,870	\$28,861,195	\$2,348,919,132
47		\$ 12,142,325	\$ -	\$ -	\$ 17,267,233	\$29,409,557	\$2,378,328,690
48		\$ 12,142,325	\$ -	\$ -	\$ 17,826,014	\$29,968,339	\$2,408,297,029
49		\$ 12,142,325	\$ -	\$ -	\$ 18,395,413	\$30,537,737	\$2,438,834,766
50		\$ 12,142,325	\$ -	\$ -	\$ 18,975,630	\$31,117,954	\$2,469,952,720
51		\$ 12,142,325	\$ -	\$ -	\$ 19,566,871	\$31,709,196	\$2,501,661,916
52		\$ 12,142,325	\$ -	\$ -	\$ 20,169,346	\$32,311,670	\$2,533,973,586
53		\$ 12,142,325	\$ -	\$ -	\$ 20,783,267	\$32,925,592	\$2,566,899,178
54		\$ 12,142,325	\$ -	\$ -	\$ 21,408,854	\$33,551,178	\$2,600,450,356
55		\$ 12,142,325	\$ -	\$ -	\$ 22,046,326	\$34,188,651	\$2,634,639,007
56		\$ 12,142,325	\$ -	\$ -	\$ 22,695,910	\$34,838,235	\$2,669,477,242
57		\$ 12,142,325	\$ -	\$ -	\$ 23,357,837	\$35,500,161	\$2,704,977,403
58		\$ 12,142,325	\$ -	\$ -	\$ 24,032,340	\$36,174,665	\$2,741,152,068
59		\$ 12,142,325	\$ -	\$ -	\$ 24,719,659	\$36,861,983	\$2,778,014,051
60		\$ 12,142,325	\$ -	\$ -	\$ 25,420,036	\$37,562,361	\$2,815,576,412
61		\$ 12,142,325	\$ -	\$ -	\$ 26,133,721	\$38,276,046	\$2,853,852,457



APPENDIX A6-8

STUDY 1 - ALTERNATIVE STORAGE SYSTEMS FOR DUAL PURPOSE CANISTERS

COST DETAILS

ALTERNATIVE 8 - C-STD, EXPANDED, HIGH SEISMIC

LIFE CYCLE COST SUMMARIES



Interim Storage Facility

Expanded Storage Facility (10,000 MTU)

Project: C-STD Expanded (10,000 MTU)

Expanded Project - C-STD 60/40 Vertical/Horizontal - High Seismic

Separate CHB

Annual Escalation Factor 1.90%

Discount Rate 3.40%

Life Cycle Costs (40 Year Life)

	Capital	Operations	Transport	Decommissioning	Escalation	Total Costs
<i>Design & Construction</i>	\$1,228,765,314					\$1,228,765,314
<i>Operations & Maintenance (40 Year Life)</i>		\$587,271,913				\$587,271,913
<i>Cask Handling</i>		\$77,017,378				\$77,017,378
<i>Transportation Equipment</i>	\$0					\$0
<i>Transport Operations</i>		\$0	\$0			\$0
<i>Repackaging</i>	\$0	\$0				\$0
<i>Transport to Repository</i>	\$0		\$0			\$0
<i>D&D</i>				\$182,186,741		\$182,186,741
<i>Escalation</i>					\$982,538,098	\$982,538,098
<i>Total Costs (40 year Life)</i>						\$3,057,779,442
<i>Present Value</i>						\$1,627,935,317

Life Cycle Costs (80 Year Life)

	Capital	Operations	Transport	Decommissioning	Escalation	Total Costs
<i>Design & Construction</i>	\$1,228,765,314					\$1,228,765,314
<i>Operations & Maintenance (80 Year Life)</i>		\$1,072,964,898				\$1,072,964,898
<i>Cask Handling</i>		\$77,017,378				\$77,017,378
<i>Transportation Equipment</i>	\$0					\$0
<i>Transport Operations</i>		\$0	\$0			\$0
<i>Repackaging</i>	\$0	\$0				\$0
<i>Transport to Repository</i>	\$0		\$0			\$0
<i>D&D</i>				\$182,186,741		\$182,186,741
<i>Escalation</i>					\$2,928,880,119	\$2,928,880,119
<i>Total Costs (80 Year Life)</i>						\$5,489,814,449
<i>Present Value</i>						\$1,766,733,204



APPENDIX A6-8

STUDY 1 - ALTERNATIVE STORAGE SYSTEMS FOR DUAL PURPOSE CANISTERS

COST DETAILS

ALTERNATIVE 8 - C-STD, EXPANDED, HIGH SEISMIC

CAPITAL COST SUMMARY



Interim Storage Facility

Expanded Storage Facility (10,000 MTU)

Project: C-STD Expanded (10,000 MTU)
 Expanded Project - C-STD 60/40 Vertical/Horizontal - High Seismic
 Separate CHB

Level 3 Cost Summary - First of A kind module

Level 1	Level 2	Level 3	Description	Level 3 Total
C-STD LE EX 01			Interim Storage Facility and transportation Project	
	C-STD LE EX 01.01		Pilot ISF Facility	\$552,057,398
		C-STD LE EX 01.01.01	Storage STDs	\$0
		C-STD LE EX 01.01.02	Cask Handling (Transfer) Facility	\$163,293,960
		C-STD LE EX 01.01.03	Horizontal Dry Storage Modules	\$123,041,942
		C-STD LE EX 01.01.04	Vertical Dry Storage Module	\$106,582,334
		C-STD LE EX 01.01.05	Storage Cask Fabrication Facility	\$0
		C-STD LE EX 01.01.06	Cask Maintenance Facility	\$0
		C-STD LE EX 01.01.07	Concrete Batch Plant	\$1,850,000
		C-STD LE EX 01.01.08	Visitor Center/ Auditorium	\$0
		C-STD LE EX 01.01.09	Administration Building	\$3,140,000
		C-STD LE EX 01.01.10	Security	\$24,148,975
		C-STD LE EX 01.01.11	Rail Spur/ Receiving Yard	\$58,752,800
		C-STD LE EX 01.01.12	Utilities	\$18,682,150
		C-STD LE EX 01.01.13	Roads	\$18,212,737
		C-STD LE EX 01.01.14	Parking	\$735,000
		C-STD LE EX 01.01.15	Site Work	\$23,417,500
		C-STD LE EX 01.01.16	Warehouse	\$10,200,000
		C-STD LE EX 01.01.17	Maintenance Facility	\$0
		C-STD LE EX 01.01.18	Waste management Facility	\$0
		C-STD LE EX 01.01.01.xx	(Add Further Breakdown as needed)	\$0
	C-STD LE EX 01.02		Expanded Interim Storage Facility	\$256,891,105
		C-STD LE EX 01.02.01	Expanded Storage STDs and Dry Cask Storage Systems	\$0
		C-STD LE EX 01.02.02	Expanded Cask Handling Facility (if required)	\$0
		C-STD LE EX 01.02.03	Horizontal Dry Storage Modules	\$123,041,942
		C-STD LE EX 01.02.04	Vertical Dry Storage Casks	\$106,582,334
		C-STD LE EX 01.02.05	Storage Cask Fabrication Facility (Expanded)	\$0
		C-STD LE EX 01.02.06	Cask Maintenance Facility (Expanded)	\$0
		C-STD LE EX 01.02.07	Concrete Batch Plant (Expanded if needed)	\$1,850,000
		C-STD LE EX 01.02.08	Visitor Center/ Auditorium (expanded if needed)	\$745,000
		C-STD LE EX 01.02.09	Administration Building (Expanded if needed)	\$0
		C-STD LE EX 01.02.10	Security (Expanded)	\$10,074,488
		C-STD LE EX 01.02.11	Rail Spur/ Receiving Yard (Expanded)	\$0
		C-STD LE EX 01.02.12	Utilities Expanded as needed)	\$3,624,200
		C-STD LE EX 01.02.13	Roads (Expanded)	\$83,142
		C-STD LE EX 01.02.14	Parking (Expanded as needed)	\$0
		C-STD LE EX 01.02.15	Site Work (Expanded)	\$10,890,000
		C-STD LE EX 01.02.16	Warehouse (Expanded if Needed)	\$0
		C-STD LE EX 01.02.17	Maintenance Facility (Expanded if needed)	\$0
		C-STD LE EX 01.02.18	Waste management Facility (Expanded if needed)	\$0
		C-STD LE EX 01.02.19	Hot Cell / Laboratories	\$0
		C-STD LE EX 01.02.20	Pool Packaging Facility	\$0
		C-STD LE EX 01.02.21	Standardized Storage System	\$0
		C-STD LE EX 01.02.22	Standardized Disposal Canister	\$0
		C-STD LE EX 01.02.23	Canister Repackaging Facility (For Repository	\$0
	C-STD LE EX 01.03		Transportation Equipment	\$0
		C-STD LE EX 01.03.01	Transportation Casks	\$0
		C-STD LE EX 01.03.02	Rail Equipment	\$0
		C-STD LE EX 01.03.03	Rail Maintenance Facility	\$0
		C-STD LE EX 01.03.04	Transportation Systems Services	\$0
	C-STD LE EX 01.04		Pre-Construction Capitalized Costs	\$66,025,000
		C-STD LE EX 01.04.01	Land or Land Leases	\$7,680,000
		C-STD LE EX 01.04.02	Site permits	\$200,000
		C-STD LE EX 01.04.03	Site Licensing	\$6,240,000
		C-STD LE EX 01.04.05	Plant Permits	\$0
		C-STD LE EX 01.04.06	Planning and Alternative Studies	\$750,000
		C-STD LE EX 01.04.07	Research and Development	\$0
		C-STD LE EX 01.04.08	Design	\$23,955,000
		C-STD LE EX 01.04.09	Other Pre-construction Costs	\$17,200,000
		C-STD LE EX 01.04.10	Pre-construction contingencies	\$10,000,000

TASK ORDER NO. 16 - GENERIC DESIGN ALTERNATIVES FOR DRY STORAGE OF USED NUCLEAR FUEL THE DEPARTMENT OF ENERGY - OFFICE OF NUCLEAR ENERGY



	C-STD LE EX 01.04.xx	(Add Further Breakdown as needed)		\$0
	C-STD LE EX 01.05	Indirect Capitalized Costs	\$63,180,000	
	C-STD LE EX 01.05.01	Project Management		\$2,700,000
	C-STD LE EX 01.05.02	Construction Management		\$3,600,000
	C-STD LE EX 01.05.03	Field indirect services		\$11,880,000
	C-STD LE EX 01.05.04	Design Services in support of Construction		\$5,400,000
	C-STD LE EX 01.05.05	QA/QC		\$12,600,000
	C-STD LE EX 01.05.06	Commissioning and Startup		\$1,200,000
	C-STD LE EX 01.05.07	Home office Engineering support to Construction		\$7,200,000
	C-STD LE EX 01.05.08	Document Control		\$2,700,000
	C-STD LE EX 01.05.09	Project Controls		\$3,600,000
	C-STD LE EX 01.05.10	Construction Testing		\$2,700,000
	C-STD LE EX 01.05.11	Inspections		\$3,600,000
	C-STD LE EX 01.05.12	Startup and Testing		\$3,000,000
	C-STD LE EX 01.05.13	Commissioning		\$3,000,000
	C-STD LE EX 01.06	Site Selection	\$0	
	C-STD LE EX 01.06.01	Site Selection		\$0
	C-STD LE EX 01.06.02	Public Information Process		\$0
	C-STD LE EX 01.07	Decontamination and Deconstruction	\$0	
	C-STD LE EX 01.07.01	Decommissioning		\$0
	C-STD LE EX 01.07.02	Decontamination		\$0
	C-STD LE EX 01.07.03	Deconstruction		\$0
	C-STD LE EX 01.07.04			\$0
	C-STD LE EX 01.07.05			\$0
	C-STD LE EX 01.08	Project Financial Costs	\$125,712,569	
	C-STD LE EX 01.08.01	Contractor Fees		\$75,052,280
	C-STD LE EX 01.08.02	Escalation Costs		\$50,660,289
	C-STD LE EX 01.08.03	Interest Payments		\$0
	C-STD LE EX 01.08.04	Indirect costs to support shipments to repository		\$0
	C-STD LE EX 01.08.05			\$0
	C-STD LE EX 01.08.xx	(Add Further Breakdown as needed)		\$0
	C-STD LE EX 01.09	Project Contingencies	\$164,899,241	
	C-STD LE EX 01.09.01	Management Reserve - Contractor Held		\$53,193,304
	C-STD LE EX 01.09.02	Contingency - DOE held		\$111,705,938
	C-STD LE EX 01.10	Other Direct Costs	\$0	
	C-STD LE EX 01.10.01	DOE Project Operations		\$0
	C-STD LE EX 01.10.02	DOE TM&E		\$0
	C-STD LE EX 01.10.03	DOE TM&E		\$0
	C-STD LE EX 01.10.04	Host site Operational Costs	Miscellaneous	\$0
	C-STD LE EX 01.10.05	Miscellaneous ODC		\$0
	C-STD LE EX 01.11	Operational Costs	0	
	C-STD LE EX 01.11.01	Operations Costs		\$0
	C-STD LE EX 01.11.02	Transportation Costs		\$0
	C-STD LE EX 01.11.03	Escalation (Operations/Transportation)		\$0
Project Total				
		(All Direct & indirect Costs, MR, Escalation)	TEC	\$1,117,059,376
		(TEC plus Contingency, ODCs)	TPC	\$1,228,765,314
		All Capitol, Operation, Transportation, Escalation	LCC	\$1,228,765,314



APPENDIX A6-8

STUDY 1 - ALTERNATIVE STORAGE SYSTEMS FOR DUAL PURPOSE CANISTERS

COST DETAILS

ALTERNATIVE 8 - C-STD, EXPANDED, HIGH SEISMIC

LIFE CYCLE COST – 40 YEAR OPERATING LIFE



Interim Storage Facility

Expanded Storage Facility (10,000 MTU)

Project: C-STD Expanded (10,000 MTU)
 Expanded Project - C-STD 60/40 Vertical/Horizontal - High Seismic
 Separate CHB

40 Year Operating life		Annual Escalation		Discount Rate			
		1.90%		3.40%			
YEAR	Design/Const	O&M	Cask Handling	D&D	Escalation	Annual Expense	Cumulative
1	\$ 10,000,000	\$ -	\$ -	\$ -	\$ 190,000	\$ 10,190,000	\$ 10,190,000
2	\$ 10,000,000	\$ -	\$ -	\$ -	\$ 383,610	\$ 10,383,610	\$ 20,573,610
3	\$ 20,000,000	\$ -	\$ -	\$ -	\$ 1,161,797	\$ 21,161,797	\$ 41,735,407
4	\$ 20,000,000	\$ -	\$ -	\$ -	\$ 1,563,871	\$ 21,563,871	\$ 63,299,279
5	\$ 20,000,000	\$ -	\$ -	\$ -	\$ 1,973,585	\$ 21,973,585	\$ 85,272,863
6	\$ 20,000,000	\$ -	\$ -	\$ -	\$ 2,391,083	\$ 22,391,083	\$ 107,663,946
7	\$ 27,888,399	\$ -	\$ -	\$ -	\$ 3,927,403	\$ 31,815,802	\$ 139,479,748
8	\$ 200,000,000	\$ -	\$ -	\$ -	\$ 32,500,273	\$ 232,500,273	\$ 371,980,021
9	\$ 200,000,000	\$ 28,996,032	\$ -	\$ -	\$ 42,270,124	\$ 271,266,156	\$ 643,246,177
10	\$ 700,876,915	\$ 26,860,352	\$ -	\$ -	\$ 150,711,536	\$ 878,448,803	\$ 1,521,694,980
11		\$ 27,383,172	\$ 12,836,230	\$ -	\$ 9,251,706	\$ 49,471,107	\$ 1,571,166,088
12	\$ -	\$ 27,383,172	\$ 12,836,230	\$ -	\$ 10,191,657	\$ 50,411,059	\$ 1,621,577,146
13	\$ -	\$ 27,383,172	\$ 12,836,230	\$ -	\$ 11,149,467	\$ 51,368,869	\$ 1,672,946,015
14	\$ -	\$ 12,142,325	\$ 12,836,230	\$ -	\$ 7,530,615	\$ 32,509,169	\$ 1,705,455,184
15	\$ -	\$ 12,142,325	\$ 12,836,230	\$ -	\$ 8,148,289	\$ 33,126,844	\$ 1,738,582,028
16	\$ -	\$ 12,142,325	\$ 12,836,230	\$ -	\$ 8,777,699	\$ 33,756,254	\$ 1,772,338,282
17	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 4,578,703	\$ 16,721,028	\$ 1,789,059,309
18	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 4,896,403	\$ 17,038,727	\$ 1,806,098,037
19	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 5,220,138	\$ 17,362,463	\$ 1,823,460,500
20	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 5,550,025	\$ 17,692,350	\$ 1,841,152,850
21	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 5,886,180	\$ 18,028,505	\$ 1,859,181,354
22	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 6,228,722	\$ 18,371,046	\$ 1,877,552,400
23	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 6,577,771	\$ 18,720,096	\$ 1,896,272,496
24	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 6,933,453	\$ 19,075,778	\$ 1,915,348,274
25	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 7,295,893	\$ 19,438,218	\$ 1,934,786,492
26	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 7,665,219	\$ 19,807,544	\$ 1,954,594,036
27	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 8,041,562	\$ 20,183,887	\$ 1,974,777,923
28	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 8,425,056	\$ 20,567,381	\$ 1,995,345,304
29	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 8,815,837	\$ 20,958,161	\$ 2,016,303,465
30	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 9,214,042	\$ 21,356,366	\$ 2,037,659,831
31	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 9,619,813	\$ 21,762,137	\$ 2,059,421,968
32	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 10,033,293	\$ 22,175,618	\$ 2,081,597,586
33	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 10,454,630	\$ 22,596,955	\$ 2,104,194,541
34	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 10,883,972	\$ 23,026,297	\$ 2,127,220,837
35	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 11,321,472	\$ 23,463,796	\$ 2,150,684,634
36	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 11,767,284	\$ 23,909,608	\$ 2,174,594,242
37	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 12,221,566	\$ 24,363,891	\$ 2,198,958,133
38	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 12,684,480	\$ 24,826,805	\$ 2,223,784,938
39	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 13,156,190	\$ 25,298,514	\$ 2,249,083,452
40	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 13,636,861	\$ 25,779,186	\$ 2,274,862,638
41	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 14,126,666	\$ 26,268,991	\$ 2,301,131,629
42	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 14,625,777	\$ 26,768,101	\$ 2,327,899,730
43	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 15,134,371	\$ 27,276,695	\$ 2,355,176,425
44	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 15,652,628	\$ 27,794,952	\$ 2,382,971,378
45	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 16,180,732	\$ 28,323,057	\$ 2,411,294,434
46	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 16,718,870	\$ 28,861,195	\$ 2,440,155,629
47	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 17,267,233	\$ 29,409,557	\$ 2,469,565,186
48	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 17,826,014	\$ 29,968,339	\$ 2,499,533,525
49	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 18,395,413	\$ 30,537,737	\$ 2,530,071,263
50	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 18,975,630	\$ 31,117,954	\$ 2,561,189,217
51	\$ -	\$ -	\$ -	\$ 21,175,000	\$ 34,122,666	\$ 55,297,666	\$ 2,616,486,883
52	\$ -	\$ -	\$ -	\$ 35,750,000	\$ 59,383,531	\$ 95,133,531	\$ 2,711,620,414
53	\$ -	\$ -	\$ -	\$ 41,753,914	\$ 71,467,596	\$ 113,221,510	\$ 2,824,841,924
54	\$ -	\$ -	\$ -	\$ 41,753,914	\$ 73,618,805	\$ 115,372,719	\$ 2,940,214,642
55	\$ -	\$ -	\$ -	\$ 41,753,914	\$ 75,810,886	\$ 117,564,800	\$ 3,057,779,442
56	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 3,057,779,442
57	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 3,057,779,442
58	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 3,057,779,442
59	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 3,057,779,442
60	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 3,057,779,442
	Total Design/Const	Total O&M	Total Cask Handling	Total D&D	Total Escalation	Total Annual Expense	Total Cumulative
	\$ 1,228,765,314	\$ 587,271,913	\$ 77,017,378	\$ 182,186,741	\$ 982,538,098	\$ -	\$ 3,057,779,442

TASK ORDER NO. 16 - GENERIC DESIGN ALTERNATIVES FOR DRY STORAGE OF USED NUCLEAR FUEL THE DEPARTMENT OF ENERGY - OFFICE OF NUCLEAR ENERGY



APPENDIX A6-8

STUDY 1 - ALTERNATIVE STORAGE SYSTEMS FOR DUAL PURPOSE CANISTERS

COST DETAILS

ALTERNATIVE 8 - C-STD, EXPANDED, HIGH SEISMIC

LIFE CYCLE COST – 80 YEAR OPERATING LIFE



Interim Storage Facility

Expanded Storage Facility (10,000 MTU)

Project: C-STD Expanded (10,000 MTU)

Expanded Project - C-STD 60/40 Vertical/Horizontal - High Seismic

Separate CHB

80 Year Operating Life

Annual Escalation
1.90%

Discount Rate
3.40%

YEAR	Design/Const	O&M	Cask Handling	D&D	Escalation	Annual Funding	Cumulative
1	\$ 10,000,000	\$ -	\$ -	\$ -	\$ 190,000	\$10,190,000	\$10,190,000
2	\$ 10,000,000	\$ -	\$ -	\$ -	\$ 383,610	\$10,383,610	\$20,573,610
3	\$ 20,000,000	\$ -	\$ -	\$ -	\$ 1,161,797	\$21,161,797	\$41,735,407
4	\$ 20,000,000	\$ -	\$ -	\$ -	\$ 1,563,871	\$21,563,871	\$63,299,279
5	\$ 20,000,000	\$ -	\$ -	\$ -	\$ 1,973,585	\$21,973,585	\$85,272,863
6	\$ 20,000,000	\$ -	\$ -	\$ -	\$ 2,391,083	\$22,391,083	\$107,663,946
7	\$ 27,888,399	\$ -	\$ -	\$ -	\$ 3,927,403	\$31,815,802	\$139,479,748
8	\$ 200,000,000	\$ -	\$ -	\$ -	\$ 32,500,273	\$232,500,273	\$371,980,021
9	\$ 200,000,000	\$ 28,996,032	\$ -	\$ -	\$ 42,270,124	\$271,266,156	\$643,246,177
10	\$ 700,876,915	\$ 26,860,352	\$ -	\$ -	\$ 150,711,536	\$878,448,803	\$1,521,694,980
11		\$ 27,383,172	\$ 12,836,230	\$ -	\$ 9,251,706	\$49,471,107	\$1,571,166,088
12	\$ -	\$ 27,383,172	\$ 12,836,230	\$ -	\$ 10,191,657	\$50,411,059	\$1,621,577,146
13	\$ -	\$ 27,383,172	\$ 12,836,230	\$ -	\$ 11,149,467	\$51,368,869	\$1,672,946,015
14	\$ -	\$ 12,142,325	\$ 12,836,230	\$ -	\$ 7,530,615	\$32,509,169	\$1,705,455,184
15	\$ -	\$ 12,142,325	\$ 12,836,230	\$ -	\$ 8,148,289	\$33,126,844	\$1,738,582,028
16	\$ -	\$ 12,142,325	\$ 12,836,230	\$ -	\$ 8,777,699	\$33,756,254	\$1,772,338,282
17	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 4,578,703	\$16,721,028	\$1,789,059,309
18	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 4,896,403	\$17,038,727	\$1,806,098,037
19	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 5,220,138	\$17,362,463	\$1,823,460,500
20	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 5,550,025	\$17,692,350	\$1,841,152,850
21	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 5,886,180	\$18,028,505	\$1,859,181,354
22	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 6,228,722	\$18,371,046	\$1,877,552,400
23	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 6,577,771	\$18,720,096	\$1,896,272,496
24	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 6,933,453	\$19,075,778	\$1,915,348,274
25	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 7,295,893	\$19,438,218	\$1,934,786,492
26	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 7,665,219	\$19,807,544	\$1,954,594,036
27	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 8,041,562	\$20,183,887	\$1,974,777,923
28	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 8,425,056	\$20,567,381	\$1,995,345,304
29	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 8,815,837	\$20,958,161	\$2,016,303,465
30	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 9,214,042	\$21,356,366	\$2,037,659,831
31	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 9,619,813	\$21,762,137	\$2,059,421,968
32	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 10,033,293	\$22,175,618	\$2,081,597,586
33	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 10,454,630	\$22,596,955	\$2,104,194,541
34	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 10,883,972	\$23,026,297	\$2,127,220,837
35	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 11,321,472	\$23,463,796	\$2,150,684,634
36	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 11,767,284	\$23,909,608	\$2,174,594,242
37	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 12,221,566	\$24,363,891	\$2,198,958,133
38	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 12,684,480	\$24,826,805	\$2,223,784,938
39	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 13,156,190	\$25,298,514	\$2,249,083,452
40	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 13,636,861	\$25,779,186	\$2,274,862,638
41	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 14,126,666	\$26,268,991	\$2,301,131,629
42	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 14,625,777	\$26,768,101	\$2,327,899,730
43	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 15,134,371	\$27,276,695	\$2,355,176,425
44	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 15,652,628	\$27,794,952	\$2,382,971,378
45	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 16,180,732	\$28,323,057	\$2,411,294,434
46	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 16,718,870	\$28,861,195	\$2,440,155,629
47	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 17,267,233	\$29,409,557	\$2,469,565,186
48	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 17,826,014	\$29,968,339	\$2,499,533,525
49	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 18,395,413	\$30,537,737	\$2,530,071,263
50	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 18,975,630	\$31,117,954	\$2,561,189,217
51	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 19,566,871	\$31,709,196	\$2,592,898,413
52	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 20,169,346	\$32,311,670	\$2,625,210,083
53	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 20,783,267	\$32,925,592	\$2,658,135,675
54	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 21,408,854	\$33,551,178	\$2,691,686,853
55	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 22,046,326	\$34,188,651	\$2,725,875,504
56	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 22,695,910	\$34,838,235	\$2,760,713,739
57	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 23,357,837	\$35,500,161	\$2,796,213,900
58	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 24,032,340	\$36,174,665	\$2,832,388,565
59	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 24,719,659	\$36,861,983	\$2,869,250,548
60	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 25,420,036	\$37,562,361	\$2,906,812,908
61	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 26,133,721	\$38,276,046	\$2,945,088,954
62	\$ -	\$ 12,142,325	\$ -	\$ -	\$ 26,860,966	\$39,003,291	\$2,984,092,245

