



## **APPENDIX A6-17**

### **STUDY 1 - ALTERNATIVE STORAGE SYSTEMS FOR DUAL PURPOSE CANISTERS**

#### **COST DETAILS**

#### **ALTERNATIVE 17 - C-BGV, PILOT, LOW SEISMIC**

#### **LIFE CYCLE COST SUMMARIES**



## Interim Storage Facility

Pilot Storage Facility (5,000 MTU)

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

PILOT Project - C-BGV 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 &amp; Construction</i>	\$784,444,352					\$784,444,352
<i>Operations &amp; Maintenance (40 Year Life)</i>		\$532,376,272				\$532,376,272
<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&amp;D</i>				\$186,798,657		\$186,798,657
<i>Escalation</i>					\$844,967,618	\$844,967,618
<i>Total Costs (40 year Life)</i>						\$2,387,095,588
<i>Present Value</i>						\$1,177,733,055

### *Life Cycle Costs (80 Year Life)*

	Capital	Operations	Transport	Decommissioning	Escalation	Total Costs
<i>Design &amp; Construction</i>	\$784,444,352					\$784,444,352
<i>Operations &amp; Maintenance (80 Year Life)</i>		\$973,159,561				\$973,159,561
<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&amp;D</i>				\$186,798,657		\$186,798,657
<i>Escalation</i>					\$2,674,703,851	\$2,674,703,851
<i>Total Costs (80 Year Life)</i>						\$4,657,615,109
<i>Present Value</i>						\$1,299,211,132



## **APPENDIX A6-17**

### **STUDY 1 - ALTERNATIVE STORAGE SYSTEMS FOR DUAL PURPOSE CANISTERS**

#### **COST DETAILS**

#### **ALTERNATIVE 17 - C-BGV, PILOT, LOW SEISMIC**

#### **CAPITAL COST SUMMARY**



# Interim Storage Facility

Pilot Storage Facility (5,000 MTU)

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

PILOT Project - C-BGV 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-BGV 01			Interim Storage Facility and transportation Project	
	C-BGV 01.01		Pilot ISF Facility	\$469,712,636
		C-BGV 01.01.01	Storage BGV LE s	\$0
		C-BGV 01.01.02	Cask Handling (Transfer) Facility	\$135,175,719
		C-BGV 01.01.03	Horizontal Dry Storage Modules	\$0
		C-BGV 01.01.04	Vertical Dry Storage Module	\$173,397,756
		C-BGV 01.01.05	Storage Cask Fabrication Facility	\$2,000,000
		C-BGV 01.01.06	Cask Maintenance Facility	\$0
		C-BGV 01.01.07	Concrete Batch Plant	\$1,850,000
		C-BGV 01.01.08	Visitor Center/ Auditorium	\$0
		C-BGV 01.01.09	Administration Building	\$3,140,000
		C-BGV 01.01.10	Security	\$24,148,975
		C-BGV 01.01.11	Rail Spur/ Receiving Yard	\$58,752,800
		C-BGV 01.01.12	Utilities	\$18,682,150
		C-BGV 01.01.13	Roads	\$18,212,737
		C-BGV 01.01.14	Parking	\$735,000
		C-BGV 01.01.15	Site Work	\$23,417,500
		C-BGV 01.01.16	Warehouse	\$10,200,000
		C-BGV 01.01.17	Maintenance Facility	\$0
		C-BGV 01.01.18	Waste management Facility	\$0
		C-BGV 01.01.01.xx	(Add Further Breakdown as needed)	\$0
	C-BGV 01.02		Expanded Interim Storage Facility	\$0
		C-BGV 01.02.01	Expanded Storage BGV LE s and Dry Cask Storage Systems	\$0
		C-BGV 01.02.02	Expanded Cask Handling Facility (if required)	\$0
		C-BGV 01.02.03	Horizontal Dry Storage Modules	\$0
		C-BGV 01.02.04	Vertical Dry Storage Casks	\$0
		C-BGV 01.02.05	Storage Cask Fabrication Facility (Expanded)	\$0
		C-BGV 01.02.06	Cask Maintenance Facility (Expanded)	\$0
		C-BGV 01.02.07	Concrete Batch Plant (Expanded if needed)	\$0
		C-BGV 01.02.08	Visitor Center/ Auditorium (expanded if needed)	\$0
		C-BGV 01.02.09	Administration Building (Expanded if needed)	\$0
		C-BGV 01.02.10	Security (Expanded)	\$0
		C-BGV 01.02.11	Rail Spur/ Receiving Yard (Expanded)	\$0
		C-BGV 01.02.12	Utilities Expanded as needed)	\$0
		C-BGV 01.02.13	Roads (Expanded)	\$0
		C-BGV 01.02.14	Parking (Expanded as needed)	\$0
		C-BGV 01.02.15	Site Work (Expanded)	\$0
		C-BGV 01.02.16	Warehouse (Expanded if Needed)	\$0
		C-BGV 01.02.17	Maintenance Facility (Expanded if needed)	\$0
		C-BGV 01.02.18	Waste management Facility (Expanded if needed)	\$0
		C-BGV 01.02.19	Hot Cell / Laboratories	\$0
		C-BGV 01.02.20	Pool Packaging Facility	\$0
		C-BGV 01.02.21	Standardized Storage System	\$0
		C-BGV 01.02.22	Standardized Disposal Canister	\$0
		C-BGV 01.02.23	Canister Repackaging Facility (For Repository	\$0
	C-BGV 01.03		Transportation Equipment	\$0
		C-BGV 01.03.01	Transportation Casks	\$0
		C-BGV 01.03.02	Rail Equipment	\$0
		C-BGV 01.03.03	Rail Maintenance Facility	\$0
		C-BGV 01.03.04	Transportation Systems Services	\$0
	C-BGV 01.04		Pre-Construction Capitalized Costs	\$66,025,000
		C-BGV 01.04.01	Land or Land Leases	\$7,680,000
		C-BGV 01.04.02	Site permits	\$200,000
		C-BGV 01.04.03	Site Licensing	\$6,240,000
		C-BGV 01.04.05	Plant Permits	\$0
		C-BGV 01.04.06	Planning and Alternative Studies	\$750,000



	C-BGV 01.04.07	Research and Development		\$0
	C-BGV 01.04.08	Design		\$23,955,000
	C-BGV 01.04.09	Other Pre-construction Costs		\$17,200,000
	C-BGV 01.04.10	Pre-construction contingencies		\$10,000,000
	C-BGV 01.04.xx	(Add Further Breakdown as needed)		\$0
C-BGV 01.05		Indirect Capitalized Costs	\$63,180,000	
	C-BGV 01.05.01	Project Management		\$2,700,000
	C-BGV 01.05.02	Construction Management		\$3,600,000
	C-BGV 01.05.03	Field indirect services		\$11,880,000
	C-BGV 01.05.04	Design Services in support of Construction		\$5,400,000
	C-BGV 01.05.05	QA/QC		\$12,600,000
	C-BGV 01.05.06	Commissioning and Startup		\$1,200,000
	C-BGV 01.05.07	Home office Engineering support to Construction		\$7,200,000
	C-BGV 01.05.08	Document Control		\$2,700,000
	C-BGV 01.05.09	Project Controls		\$3,600,000
	C-BGV 01.05.10	Construction Testing		\$2,700,000
	C-BGV 01.05.11	Inspections		\$3,600,000
	C-BGV 01.05.12	Startup and Testing		\$3,000,000
	C-BGV 01.05.13	Commissioning		\$3,000,000
C-BGV 01.06		Site Selection	\$0	
	C-BGV 01.06.01	Site Selection		\$0
	C-BGV 01.06.02	Public Information Process		\$0
C-BGV 01.07		Decontamination and Deconstruction	\$0	
	C-BGV 01.07.01	Decommissioning		\$0
	C-BGV 01.07.02	Decontamination		\$0
	C-BGV 01.07.03	Deconstruction		\$0
	C-BGV 01.07.04			\$0
	C-BGV 01.07.05			\$0
C-BGV 01.08		Project Financial Costs	\$80,254,963	
	C-BGV 01.08.01	Contractor Fees		\$47,913,411
	C-BGV 01.08.02	Escalation Costs		\$32,341,552
	C-BGV 01.08.03	Interest Payments		\$0
	C-BGV 01.08.04	Indirect costs to support shipments to repository		\$0
	C-BGV 01.08.05			\$0
	C-BGV 01.08.xx	(Add Further Breakdown as needed)		\$0
C-BGV 01.09		Project Contingencies	\$105,271,753	
	C-BGV 01.09.01	Management Reserve - Contractor Held		\$33,958,630
	C-BGV 01.09.02	Contingency - DOE held		\$71,313,123
C-BGV 01.10		Other Direct Costs	\$0	
	C-BGV 01.10.01	DOE Project Operations		\$0
	C-BGV 01.10.02	DOE TM&E		\$0
	C-BGV 01.10.03	Host site Operational Costs	Miscellaneous	\$0
	C-BGV 01.10.04	Miscellaneous ODC		\$0
C-BGV 01.11		Operational Costs	0	
	C-BGV 01.11.01	Operations Costs		\$0
	C-BGV 01.11.02	Transportation Costs		\$0
	C-BGV 01.11.03	Escalation (Operations/Transportation)		\$0
Project Total				
		(All Direct & indirect Costs, MR, Escalation)	TEC	\$713,131,229
		(TEC plus Contingency, ODCs)	TPC	\$784,444,352
		All Capitol, Operation, Transportation, Escalation	LCC	\$784,444,352



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### STUDY 1 - ALTERNATIVE STORAGE SYSTEMS FOR DUAL PURPOSE CANISTERS

#### COST DETAILS

#### ALTERNATIVE 17 - C-BGV, PILOT, LOW SEISMIC

#### LIFE CYCLE COST – 40 YEAR OPERATING LIFE



# Interim Storage Facility

Pilot Storage Facility (5,000 MTU)

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

PILOT Project - C-BGV 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	\$ 25,073,418	\$ -	\$ -	\$ 41,546,053	\$ 266,619,471	\$ 638,599,492	
10	\$ 577,119,234	\$ 24,539,498	\$ -	\$ -	\$ 124,601,166	\$ 726,259,898	\$ 1,364,859,390	
11		\$ 25,012,938	\$ 12,836,230	\$ -	\$ 8,706,478	\$ 46,555,646	\$ 1,411,415,036	
12	\$ -	\$ 25,012,938	\$ 12,836,230	\$ -	\$ 9,591,036	\$ 47,440,204	\$ 1,458,855,240	
13	\$ -	\$ 25,012,938	\$ 12,836,230	\$ -	\$ 10,492,400	\$ 48,341,568	\$ 1,507,196,808	
14	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 3,322,219	\$ 14,341,801	\$ 1,521,538,609	
15	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 3,594,713	\$ 14,614,296	\$ 1,536,152,905	
16	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 3,872,385	\$ 14,891,967	\$ 1,551,044,872	
17	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 4,155,332	\$ 15,174,915	\$ 1,566,219,787	
18	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 4,443,656	\$ 15,463,238	\$ 1,581,683,025	
19	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 4,737,457	\$ 15,757,040	\$ 1,597,440,064	
20	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 5,036,841	\$ 16,056,423	\$ 1,613,496,487	
21	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 5,341,913	\$ 16,361,495	\$ 1,629,857,983	
22	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 5,652,782	\$ 16,672,364	\$ 1,646,530,347	
23	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 5,969,556	\$ 16,989,139	\$ 1,663,519,485	
24	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 6,292,350	\$ 17,311,932	\$ 1,680,831,417	
25	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 6,621,277	\$ 17,640,859	\$ 1,698,472,276	
26	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 6,956,453	\$ 17,976,035	\$ 1,716,448,312	
27	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 7,297,998	\$ 18,317,580	\$ 1,734,765,892	
28	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 7,646,032	\$ 18,665,614	\$ 1,753,431,506	
29	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 8,000,678	\$ 19,020,261	\$ 1,772,451,767	
30	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 8,362,063	\$ 19,381,646	\$ 1,791,833,412	
31	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 8,730,315	\$ 19,749,897	\$ 1,811,583,309	
32	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 9,105,563	\$ 20,125,145	\$ 1,831,708,454	
33	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 9,487,941	\$ 20,507,523	\$ 1,852,215,977	
34	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 9,877,583	\$ 20,897,166	\$ 1,873,113,142	
35	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 10,274,630	\$ 21,294,212	\$ 1,894,407,354	
36	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 10,679,220	\$ 21,698,802	\$ 1,916,106,156	
37	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 11,091,497	\$ 22,111,079	\$ 1,938,217,235	
38	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 11,511,607	\$ 22,531,190	\$ 1,960,748,425	
39	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 11,939,700	\$ 22,959,282	\$ 1,983,707,707	
40	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 12,375,926	\$ 23,395,509	\$ 2,007,103,215	
41	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 12,820,441	\$ 23,840,023	\$ 2,030,943,238	
42	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 13,273,401	\$ 24,292,984	\$ 2,055,236,222	
43	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 13,734,968	\$ 24,754,550	\$ 2,079,990,772	
44	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 14,205,305	\$ 25,224,887	\$ 2,105,215,659	
45	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 14,684,577	\$ 25,704,160	\$ 2,130,919,819	
46	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 15,172,956	\$ 26,192,539	\$ 2,157,112,357	
47	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 15,670,615	\$ 26,690,197	\$ 2,183,802,554	
48	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 16,177,728	\$ 27,197,311	\$ 2,210,999,865	
49	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 16,694,477	\$ 27,714,060	\$ 2,238,713,924	
50	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 17,221,044	\$ 28,240,627	\$ 2,266,954,551	
51	\$ -	\$ -	\$ -	\$ 42,500,000	\$ 68,487,052	\$ 110,987,052	\$ 2,377,941,603	
52	\$ -	\$ -	\$ -	\$ 26,000,000	\$ 43,188,022	\$ 69,188,022	\$ 2,447,129,625	
53	\$ -	\$ -	\$ -	\$ 39,432,886	\$ 67,494,835	\$ 106,927,721	\$ 2,554,057,346	
54	\$ -	\$ -	\$ -	\$ 39,432,886	\$ 69,526,462	\$ 108,959,348	\$ 2,663,016,693	
55	\$ -	\$ -	\$ -	\$ 39,432,886	\$ 71,596,690	\$ 111,029,575	\$ 2,774,046,269	
56	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 2,774,046,269	
57	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 2,774,046,269	
58	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 2,774,046,269	
59	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 2,774,046,269	
60	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 2,774,046,269	
	Total Design/Const	Total O&M	Total Cask Handling	Total D&D	Total Escalation	Total Annual Expense	Total Cumulative Life Cycle	
	\$ 1,105,007,633	\$ 532,376,272	\$ 38,508,689	\$ 186,798,657	\$ 911,355,018	\$ 2,774,046,269		



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### STUDY 1 - ALTERNATIVE STORAGE SYSTEMS FOR DUAL PURPOSE CANISTERS

#### COST DETAILS

#### ALTERNATIVE 17 - C-BGV, PILOT, LOW SEISMIC

#### LIFE CYCLE COST – 80 YEAR OPERATING LIFE





# Interim Storage Facility

Pilot Storage Facility (5,000 MTU)

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

PILOT Project - C-BGV 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 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
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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	\$ 25,073,418	\$ -	\$ -	\$ 41,546,053	\$266,619,471	\$638,599,492
10	\$ 577,119,234	\$ 24,539,498	\$ -	\$ -	\$ 124,601,166	\$726,259,898	\$1,364,859,390
11		\$ 25,012,938	\$ 12,836,230	\$ -	\$ 8,706,478	\$46,555,646	\$1,411,415,036
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19	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 4,737,457	\$15,757,040	\$1,597,440,064
20	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 5,036,841	\$16,056,423	\$1,613,496,487
21	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 5,341,913	\$16,361,495	\$1,629,857,983
22	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 5,652,782	\$16,672,364	\$1,646,530,347
23	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 5,969,556	\$16,989,139	\$1,663,519,485
24	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 6,292,350	\$17,311,932	\$1,680,831,417
25	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 6,621,277	\$17,640,859	\$1,698,472,276
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36	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 10,679,220	\$21,698,802	\$1,916,106,156
37	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 11,091,497	\$22,111,079	\$1,938,217,235
38	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 11,511,607	\$22,531,190	\$1,960,748,425
39	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 11,939,700	\$22,959,282	\$1,983,707,707
40	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 12,375,926	\$23,395,509	\$2,007,103,215
41	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 12,820,441	\$23,840,023	\$2,030,943,238
42	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 13,273,401	\$24,292,984	\$2,055,236,222
43	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 13,734,968	\$24,754,550	\$2,079,990,772
44	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 14,205,305	\$25,224,887	\$2,105,215,659
45	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 14,684,577	\$25,704,160	\$2,130,919,819
46	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 15,172,956	\$26,192,539	\$2,157,112,357
47	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 15,670,615	\$26,690,197	\$2,183,802,554
48	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 16,177,728	\$27,197,311	\$2,210,999,865
49	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 16,694,477	\$27,714,060	\$2,238,713,924
50	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 17,221,044	\$28,240,627	\$2,266,954,551
51	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 17,757,616	\$28,777,199	\$2,295,731,750
52	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 18,304,383	\$29,323,965	\$2,325,055,715
53	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 18,861,538	\$29,881,121	\$2,354,936,836
54	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 19,429,280	\$30,448,862	\$2,385,385,697
55	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 20,007,808	\$31,027,390	\$2,416,413,088
56	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 20,597,329	\$31,616,911	\$2,448,029,999
57	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 21,198,050	\$32,217,632	\$2,480,247,631
58	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 21,810,185	\$32,829,767	\$2,513,077,398
59	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 22,433,950	\$33,453,533	\$2,546,530,930



60	\$	-	\$ 11,019,582	\$	-	\$	-	\$ 23,069,568	\$34,089,150	\$2,580,620,080
61	\$	-	\$ 11,019,582	\$	-	\$	-	\$ 23,717,261	\$34,736,844	\$2,615,356,924
62	\$	-	\$ 11,019,582	\$	-	\$	-	\$ 24,377,261	\$35,396,844	\$2,650,753,767
63	\$	-	\$ 11,019,582	\$	-	\$	-	\$ 25,049,801	\$36,069,384	\$2,686,823,151
64	\$	-	\$ 11,019,582	\$	-	\$	-	\$ 25,735,120	\$36,754,702	\$2,723,577,853
65		\$0	\$ 11,019,582	\$	-	\$	-	\$ 26,433,459	\$37,453,041	\$2,761,030,894
66		\$0	\$ 11,019,582	\$	-	\$	-	\$ 27,145,067	\$38,164,649	\$2,799,195,543
67		\$0	\$ 11,019,582	\$	-	\$	-	\$ 27,870,195	\$38,889,777	\$2,838,085,321
68		\$0	\$ 11,019,582	\$	-	\$	-	\$ 28,609,101	\$39,628,683	\$2,877,714,004
69		\$0	\$ 11,019,582	\$	-	\$	-	\$ 29,362,046	\$40,381,628	\$2,918,095,632
70		\$0	\$ 11,019,582	\$	-	\$	-	\$ 30,129,297	\$41,148,879	\$2,959,244,511
71		\$0	\$ 11,019,582	\$	-	\$	-	\$ 30,911,126	\$41,930,708	\$3,001,175,219
72		\$0	\$ 11,019,582	\$	-	\$	-	\$ 31,707,809	\$42,727,391	\$3,043,902,610
73		\$0	\$ 11,019,582	\$	-	\$	-	\$ 32,519,629	\$43,539,212	\$3,087,441,822
74		\$0	\$ 11,019,582	\$	-	\$	-	\$ 33,346,874	\$44,366,457	\$3,131,808,278
75		\$0	\$ 11,019,582	\$	-	\$	-	\$ 34,189,837	\$45,209,419	\$3,177,017,698
76		\$0	\$ 11,019,582	\$	-	\$	-	\$ 35,048,816	\$46,068,398	\$3,223,086,096
77		\$0	\$ 11,019,582	\$	-	\$	-	\$ 35,924,116	\$46,943,698	\$3,270,029,794
78		\$0	\$ 11,019,582	\$	-	\$	-	\$ 36,816,046	\$47,835,628	\$3,317,865,422
79		\$0	\$ 11,019,582	\$	-	\$	-	\$ 37,724,923	\$48,744,505	\$3,366,609,927
80		\$0	\$ 11,019,582	\$	-	\$	-	\$ 38,651,068	\$49,670,651	\$3,416,280,578
81		\$0	\$ 11,019,582	\$	-	\$	-	\$ 39,594,811	\$50,614,393	\$3,466,894,971
82		\$0	\$ 11,019,582	\$	-	\$	-	\$ 40,556,484	\$51,576,067	\$3,518,471,038
83		\$0	\$ 11,019,582	\$	-	\$	-	\$ 41,536,430	\$52,556,012	\$3,571,027,049
84		\$0	\$ 11,019,582	\$	-	\$	-	\$ 42,534,994	\$53,554,576	\$3,624,581,625
85		\$0	\$ 11,019,582	\$	-	\$	-	\$ 43,552,531	\$54,572,113	\$3,679,153,738
86		\$0	\$ 11,019,582	\$	-	\$	-	\$ 44,589,401	\$55,608,983	\$3,734,762,722
87		\$0	\$ 11,019,582	\$	-	\$	-	\$ 45,645,972	\$56,665,554	\$3,791,428,275
88		\$0	\$ 11,019,582	\$	-	\$	-	\$ 46,722,617	\$57,742,199	\$3,849,170,475
89		\$0	\$ 11,019,582	\$	-	\$	-	\$ 47,819,719	\$58,839,301	\$3,908,009,776
90		\$0	\$ 11,019,582	\$	-	\$	-	\$ 48,937,666	\$59,957,248	\$3,967,967,024
91				\$	-	\$ 42,500,000	\$	193,134,933	\$235,634,933	\$4,203,601,956
92				\$	-	\$ 26,000,000	\$	120,892,045	\$146,892,045	\$4,350,494,001
93				\$	-	\$ 39,432,886	\$	187,583,743	\$227,016,629	\$4,577,510,630
94				\$	-	\$ 39,432,886	\$	191,897,059	\$231,329,945	\$4,808,840,575
95				\$	-	\$ 39,432,886	\$	196,292,328	\$235,725,214	\$5,044,565,789
96						\$	-	\$	\$0	\$5,044,565,789
97						\$	-	\$	\$0	\$5,044,565,789
98								\$	\$0	\$5,044,565,789
99								\$	\$0	\$5,044,565,789
100								\$	\$0	\$5,044,565,789

Total Design/Const	Total O&M	Total Cask Handling	Total D&D	Total Escalation	Total Life Cycle
\$1,105,007,633	\$973,159,561	\$38,508,689	\$186,798,657	\$2,741,091,250	\$5,044,565,789



## **APPENDIX A6-18**

### **STUDY 1 - ALTERNATIVE STORAGE SYSTEMS FOR DUAL PURPOSE CANISTERS**

#### **COST DETAILS**

#### **ALTERNATIVE 18 - C-BGV, PILOT, HIGH SEISMIC**

#### **LIFE CYCLE COST SUMMARIES**



## Interim Storage Facility

Pilot Storage Facility (5,000 MTU)

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

PILOT Project - C-BGV 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 &amp; Construction</i>	\$852,366,406					\$852,366,406
<i>Operations &amp; Maintenance (40 Year Life)</i>		\$532,376,272				\$532,376,272
<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&amp;D</i>				\$186,798,657		\$186,798,657
<i>Escalation</i>					\$859,034,010	\$859,034,010
<b>Total Costs (40 year Life)</b>						<b>\$2,469,084,034</b>
<b>Present Value</b>						<b>\$1,236,420,779</b>

### Life Cycle Costs (80 Year Life)

	Capital	Operations	Transport	Decommissioning	Escalation	Total Costs
<i>Design &amp; Construction</i>	\$852,366,406					\$852,366,406
<i>Operations &amp; Maintenance (80 Year Life)</i>		\$973,159,561				\$973,159,561
<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&amp;D</i>				\$186,798,657		\$186,798,657
<i>Escalation</i>					\$2,688,770,242	\$2,688,770,242
<b>Total Costs (80 Year Life)</b>						<b>\$4,739,603,555</b>
<b>Present Value</b>						<b>\$1,357,898,856</b>



## **APPENDIX A6-18**

### **STUDY 1 - ALTERNATIVE STORAGE SYSTEMS FOR DUAL PURPOSE CANISTERS**

#### **COST DETAILS**

#### **ALTERNATIVE 18 - C-BGV, PILOT, HIGH SEISMIC**

#### **CAPITAL COST SUMMARY**



# Interim Storage Facility

Pilot Storage Facility (5,000 MTU)

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

PILOT Project - C-BGV 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-BGV LE 01			Interim Storage Facility and transportation Project	
	C-BGV LE 01.01		Pilot ISF Facility	\$521,570,637
		C-BGV LE 01.01.01	Storage BGV LE s	\$0
		C-BGV LE 01.01.02	Cask Handling (Transfer) Facility	\$163,293,960
		C-BGV LE 01.01.03	Horizontal Dry Storage Modules	\$0
		C-BGV LE 01.01.04	Vertical Dry Storage Module	\$197,137,516
		C-BGV LE 01.01.05	Storage Cask Fabrication Facility	\$2,000,000
		C-BGV LE 01.01.06	Cask Maintenance Facility	\$0
		C-BGV LE 01.01.07	Concrete Batch Plant	\$1,850,000
		C-BGV LE 01.01.08	Visitor Center/ Auditorium	\$0
		C-BGV LE 01.01.09	Administration Building	\$3,140,000
		C-BGV LE 01.01.10	Security	\$24,148,975
		C-BGV LE 01.01.11	Rail Spur/ Receiving Yard	\$58,752,800
		C-BGV LE 01.01.12	Utilities	\$18,682,150
		C-BGV LE 01.01.13	Roads	\$18,212,737
		C-BGV LE 01.01.14	Parking	\$735,000
		C-BGV LE 01.01.15	Site Work	\$23,417,500
		C-BGV LE 01.01.16	Warehouse	\$10,200,000
		C-BGV LE 01.01.17	Maintenance Facility	\$0
		C-BGV LE 01.01.18	Waste management Facility	\$0
		C-BGV LE 01.01.01.xx	(Add Further Breakdown as needed)	\$0
	C-BGV LE 01.02		Expanded Interim Storage Facility	\$0
		C-BGV LE 01.02.01	Expanded Storage BGV LE s and Dry Cask Storage Systems	\$0
		C-BGV LE 01.02.02	Expanded Cask Handling Facility (if required)	\$0
		C-BGV LE 01.02.03	Horizontal Dry Storage Modules	\$0
		C-BGV LE 01.02.04	Vertical Dry Storage Casks	\$0
		C-BGV LE 01.02.05	Storage Cask Fabrication Facility (Expanded)	\$0
		C-BGV LE 01.02.06	Cask Maintenance Facility (Expanded)	\$0
		C-BGV LE 01.02.07	Concrete Batch Plant (Expanded if needed)	\$0
		C-BGV LE 01.02.08	Visitor Center/ Auditorium (expanded if needed)	\$0
		C-BGV LE 01.02.09	Administration Building (Expanded if needed)	\$0
		C-BGV LE 01.02.10	Security (Expanded)	\$0
		C-BGV LE 01.02.11	Rail Spur/ Receiving Yard (Expanded)	\$0
		C-BGV LE 01.02.12	Utilities Expanded as needed)	\$0
		C-BGV LE 01.02.13	Roads (Expanded)	\$0
		C-BGV LE 01.02.14	Parking (Expanded as needed)	\$0
		C-BGV LE 01.02.15	Site Work (Expanded)	\$0
		C-BGV LE 01.02.16	Warehouse (Expanded if Needed)	\$0
		C-BGV LE 01.02.17	Maintenance Facility (Expanded if needed)	\$0
		C-BGV LE 01.02.18	Waste management Facility (Expanded if needed)	\$0
		C-BGV LE 01.02.19	Hot Cell / Laboratories	\$0
		C-BGV LE 01.02.20	Pool Packaging Facility	\$0
		C-BGV LE 01.02.21	Standardized Storage System	\$0
		C-BGV LE 01.02.22	Standardized Disposal Canister	\$0
		C-BGV LE 01.02.23	Canister Repackaging Facility (For Repository	\$0
	C-BGV LE 01.03		Transportation Equipment	\$0
		C-BGV LE 01.03.01	Transportation Casks	\$0
		C-BGV LE 01.03.02	Rail Equipment	\$0
		C-BGV LE 01.03.03	Rail Maintenance Facility	\$0
		C-BGV LE 01.03.04	Transportation Systems Services	\$0
	C-BGV LE 01.04		Pre-Construction Capitalized Costs	\$66,025,000
		C-BGV LE 01.04.01	Land or Land Leases	\$7,680,000
		C-BGV LE 01.04.02	Site permits	\$200,000
		C-BGV LE 01.04.03	Site Licensing	\$6,240,000
		C-BGV LE 01.04.05	Plant Permits	\$0
		C-BGV LE 01.04.06	Planning and Alternative Studies	\$750,000
		C-BGV LE 01.04.07	Research and Development	\$0

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



	C-BGV LE 01.04.08	Design		\$23,955,000
	C-BGV LE 01.04.09	Other Pre-construction Costs		\$17,200,000
	C-BGV LE 01.04.10	Pre-construction contingencies		\$10,000,000
	C-BGV LE 01.04.xx	(Add Further Breakdown as needed)		\$0
C-BGV LE 01.05		Indirect Capitalized Costs	\$63,180,000	
	C-BGV LE 01.05.01	Project Management		\$2,700,000
	C-BGV LE 01.05.02	Construction Management		\$3,600,000
	C-BGV LE 01.05.03	Field indirect services		\$11,880,000
	C-BGV LE 01.05.04	Design Services in support of Construction		\$5,400,000
	C-BGV LE 01.05.05	QA/QC		\$12,600,000
	C-BGV LE 01.05.06	Commissioning and Startup		\$1,200,000
	C-BGV LE 01.05.07	Home office Engineering support to Construction		\$7,200,000
	C-BGV LE 01.05.08	Document Control		\$2,700,000
	C-BGV LE 01.05.09	Project Controls		\$3,600,000
	C-BGV LE 01.05.10	Construction Testing		\$2,700,000
	C-BGV LE 01.05.11	Inspections		\$3,600,000
	C-BGV LE 01.05.12	Startup and Testing		\$3,000,000
	C-BGV LE 01.05.13	Commissioning		\$3,000,000
C-BGV LE 01.06		Site Selection	\$0	
	C-BGV LE 01.06.01	Site Selection		\$0
	C-BGV LE 01.06.02	Public Information Process		\$0
C-BGV LE 01.07		Decontamination and Deconstruction	\$0	
	C-BGV LE 01.07.01	Decommissioning		\$0
	C-BGV LE 01.07.02	Decontamination		\$0
	C-BGV LE 01.07.03	Deconstruction		\$0
	C-BGV LE 01.07.04			\$0
	C-BGV LE 01.07.05			\$0
C-BGV LE 01.08		Project Financial Costs	\$87,203,935	
	C-BGV LE 01.08.01	Contractor Fees		\$52,062,051
	C-BGV LE 01.08.02	Escalation Costs		\$35,141,884
	C-BGV LE 01.08.03	Interest Payments		\$0
	C-BGV LE 01.08.04	Indirect costs to support shipments to repository		\$0
	C-BGV LE 01.08.05			\$0
	C-BGV LE 01.08.xx	(Add Further Breakdown as needed)		\$0
C-BGV LE 01.09		Project Contingencies	\$114,386,834	
	C-BGV LE 01.09.01	Management Reserve - Contractor Held		\$36,898,979
	C-BGV LE 01.09.02	Contingency - DOE held		\$77,487,855
C-BGV LE 01.10		Other Direct Costs	\$0	
	C-BGV LE 01.10.01	DOE Project Operations		\$0
	C-BGV LE 01.10.02	DOE TM&E		\$0
	C-BGV LE 01.10.03	DOE TM&E		\$0
	C-BGV LE 01.10.04	Host site Operational Costs      Miscellaneous		\$0
	C-BGV LE 01.10.05	Miscellaneous ODC		\$0
C-BGV LE 01.11		Operational Costs	0	
	C-BGV LE 01.11.01	Operations Costs		\$0
	C-BGV LE 01.11.02	Transportation Costs		\$0
	C-BGV LE 01.11.03	Escalation (Operations/Transportation)		\$0
Project Total				
		TEC (All Direct & indirect Costs, MR, Escalation)		\$774,878,551
		TPC (TEC plus Contingency, ODCs)		\$852,366,406
		LCC All Capitol, Operation, Transportation, Escalation		\$852,366,406



## **APPENDIX A6-18**

### **STUDY 1 - ALTERNATIVE STORAGE SYSTEMS FOR DUAL PURPOSE CANISTERS**

#### **COST DETAILS**

#### **ALTERNATIVE 18 - C-BGV, PILOT, HIGH SEISMIC**

#### **LIFE CYCLE COST – 40 YEAR OPERATING LIFE**





# Interim Storage Facility

Pilot Storage Facility (5,000 MTU)

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

PILOT Project - C-BGV 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	\$ 25,073,418	\$ -	\$ -	\$ 41,546,053	\$ 266,619,471	\$ 638,599,492	
10	\$ 324,478,007	\$ 24,539,498	\$ -	\$ -	\$ 72,280,158	\$ 421,297,663	\$ 1,059,897,155	
11		\$ 25,012,938	\$ 12,836,230	\$ -	\$ 8,706,478	\$ 46,555,646	\$ 1,106,452,802	
12	\$ -	\$ 25,012,938	\$ 12,836,230	\$ -	\$ 9,591,036	\$ 47,440,204	\$ 1,153,893,006	
13	\$ -	\$ 25,012,938	\$ 12,836,230	\$ -	\$ 10,492,400	\$ 48,341,568	\$ 1,202,234,573	
14	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 3,322,219	\$ 14,341,801	\$ 1,216,576,375	
15	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 3,594,713	\$ 14,614,296	\$ 1,231,190,670	
16	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 3,872,385	\$ 14,891,967	\$ 1,246,082,637	
17	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 4,155,332	\$ 15,174,915	\$ 1,261,257,552	
18	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 4,443,656	\$ 15,463,238	\$ 1,276,720,790	
19	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 4,737,457	\$ 15,757,040	\$ 1,292,477,830	
20	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 5,036,841	\$ 16,056,423	\$ 1,308,534,253	
21	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 5,341,913	\$ 16,361,495	\$ 1,324,895,748	
22	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 5,652,782	\$ 16,672,364	\$ 1,341,568,112	
23	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 5,969,556	\$ 16,989,139	\$ 1,358,557,251	
24	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 6,292,350	\$ 17,311,932	\$ 1,375,869,183	
25	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 6,621,277	\$ 17,640,859	\$ 1,393,510,042	
26	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 6,956,453	\$ 17,976,035	\$ 1,411,486,077	
27	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 7,297,998	\$ 18,317,580	\$ 1,429,803,657	
28	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 7,646,032	\$ 18,665,614	\$ 1,448,469,271	
29	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 8,000,678	\$ 19,020,261	\$ 1,467,489,532	
30	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 8,362,063	\$ 19,381,646	\$ 1,486,871,178	
31	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 8,730,315	\$ 19,749,897	\$ 1,506,621,075	
32	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 9,105,563	\$ 20,125,145	\$ 1,526,746,220	
33	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 9,487,941	\$ 20,507,523	\$ 1,547,253,742	
34	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 9,877,583	\$ 20,897,166	\$ 1,568,150,908	
35	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 10,274,630	\$ 21,294,212	\$ 1,589,445,120	
36	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 10,679,220	\$ 21,698,802	\$ 1,611,143,922	
37	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 11,091,497	\$ 22,111,079	\$ 1,633,255,001	
38	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 11,511,607	\$ 22,531,190	\$ 1,655,786,190	
39	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 11,939,700	\$ 22,959,282	\$ 1,678,745,472	
40	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 12,375,926	\$ 23,395,509	\$ 1,702,140,981	
41	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 12,820,441	\$ 23,840,023	\$ 1,725,981,004	
42	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 13,273,401	\$ 24,292,984	\$ 1,750,273,988	
43	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 13,734,968	\$ 24,754,550	\$ 1,775,028,538	
44	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 14,205,305	\$ 25,224,887	\$ 1,800,253,425	
45	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 14,684,577	\$ 25,704,160	\$ 1,825,957,584	
46	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 15,172,956	\$ 26,192,539	\$ 1,852,150,123	
47	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 15,670,615	\$ 26,690,197	\$ 1,878,840,320	
48	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 16,177,728	\$ 27,197,311	\$ 1,906,037,630	
49	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 16,694,477	\$ 27,714,060	\$ 1,933,751,690	
50	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 17,221,044	\$ 28,240,627	\$ 1,961,992,317	
51	\$ -	\$ -	\$ -	\$ 42,500,000	\$ 68,487,052	\$ 110,987,052	\$ 2,072,979,368	
52	\$ -	\$ -	\$ -	\$ 26,000,000	\$ 43,188,022	\$ 69,188,022	\$ 2,142,167,390	
53	\$ -	\$ -	\$ -	\$ 39,432,886	\$ 67,494,835	\$ 106,927,721	\$ 2,249,095,111	
54	\$ -	\$ -	\$ -	\$ 39,432,886	\$ 69,526,462	\$ 108,959,348	\$ 2,358,054,459	
55	\$ -	\$ -	\$ -	\$ 39,432,886	\$ 71,596,690	\$ 111,029,575	\$ 2,469,084,034	
56	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 2,469,084,034	
57	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 2,469,084,034	
58	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 2,469,084,034	
59	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 2,469,084,034	
60	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 2,469,084,034	
Total Design/Const		Total O&M	\$ 38,508,689	Total D&D	Total Escalation	Total Life Cycle		
\$ 852,366,406		\$ 532,376,272		\$ 186,798,657	\$ 859,034,010	\$ 2,469,084,034		

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



## **APPENDIX A6-18**

### **STUDY 1 - ALTERNATIVE STORAGE SYSTEMS FOR DUAL PURPOSE CANISTERS**

#### **COST DETAILS**

#### **ALTERNATIVE 18 - C-BGV, PILOT, HIGH SEISMIC**

#### **LIFE CYCLE COST – 80 YEAR OPERATING LIFE**



# Interim Storage Facility

Pilot Storage Facility (5,000 MTU)

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

PILOT Project - C-BGV 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 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	\$ 25,073,418	\$ -	\$ -	\$ 41,546,053	\$266,619,471	\$638,599,492
10	\$ 324,478,007	\$ 24,539,498	\$ -	\$ -	\$ 72,280,158	\$421,297,663	\$1,059,897,155
11	\$ -	\$ 25,012,938	\$ 12,836,230	\$ -	\$ 8,706,478	\$46,555,646	\$1,106,452,802
12	\$ -	\$ 25,012,938	\$ 12,836,230	\$ -	\$ 9,591,036	\$47,440,204	\$1,153,893,006
13	\$ -	\$ 25,012,938	\$ 12,836,230	\$ -	\$ 10,492,400	\$48,341,568	\$1,202,234,573
14	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 3,322,219	\$14,341,801	\$1,216,576,375
15	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 3,594,713	\$14,614,296	\$1,231,190,670
16	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 3,872,385	\$14,891,967	\$1,246,082,637
17	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 4,155,332	\$15,174,915	\$1,261,257,552
18	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 4,443,656	\$15,463,238	\$1,276,720,790
19	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 4,737,457	\$15,757,040	\$1,292,477,830
20	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 5,036,841	\$16,056,423	\$1,308,534,253
21	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 5,341,913	\$16,361,495	\$1,324,895,748
22	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 5,652,782	\$16,672,364	\$1,341,568,112
23	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 5,969,556	\$16,989,139	\$1,358,557,251
24	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 6,292,350	\$17,311,932	\$1,375,869,183
25	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 6,621,277	\$17,640,859	\$1,393,510,042
26	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 6,956,453	\$17,976,035	\$1,411,486,077
27	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 7,297,998	\$18,317,580	\$1,429,803,657
28	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 7,646,032	\$18,665,614	\$1,448,469,271
29	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 8,000,678	\$19,020,261	\$1,467,489,532
30	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 8,362,063	\$19,381,646	\$1,486,871,178
31	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 8,730,315	\$19,749,897	\$1,506,621,075
32	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 9,105,563	\$20,125,145	\$1,526,746,220
33	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 9,487,941	\$20,507,523	\$1,547,253,742
34	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 9,877,583	\$20,897,166	\$1,568,150,908
35	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 10,274,630	\$21,294,212	\$1,589,445,120
36	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 10,679,220	\$21,698,802	\$1,611,143,922
37	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 11,091,497	\$22,111,079	\$1,633,255,001
38	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 11,511,607	\$22,531,190	\$1,655,786,190
39	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 11,939,700	\$22,959,282	\$1,678,745,472
40	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 12,375,926	\$23,395,509	\$1,702,140,981
41	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 12,820,441	\$23,840,023	\$1,725,981,004
42	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 13,273,401	\$24,292,984	\$1,750,273,988
43	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 13,734,968	\$24,754,550	\$1,775,028,538
44	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 14,205,305	\$25,224,887	\$1,800,253,425
45	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 14,684,577	\$25,704,160	\$1,825,957,584
46	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 15,172,956	\$26,192,539	\$1,852,150,123
47	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 15,670,615	\$26,690,197	\$1,878,840,320
48	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 16,177,728	\$27,197,311	\$1,906,037,630
49	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 16,694,477	\$27,714,060	\$1,933,751,690
50	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 17,221,044	\$28,240,627	\$1,961,992,317
51	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 17,757,616	\$28,777,199	\$1,990,769,515
52	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 18,304,383	\$29,323,965	\$2,020,093,480
53	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 18,861,538	\$29,881,121	\$2,049,974,601
54	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 19,429,280	\$30,448,862	\$2,080,423,463
55	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 20,007,808	\$31,027,390	\$2,111,450,853
56	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 20,597,329	\$31,616,911	\$2,143,067,764
57	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 21,198,050	\$32,217,632	\$2,175,285,396
58	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 21,810,185	\$32,829,767	\$2,208,115,163



59	\$	-	\$ 11,019,582	\$	-	\$	-	\$ 22,433,950	\$33,453,533	\$2,241,568,696
60	\$	-	\$ 11,019,582	\$	-	\$	-	\$ 23,069,568	\$34,089,150	\$2,275,657,846
61	\$	-	\$ 11,019,582	\$	-	\$	-	\$ 23,717,261	\$34,736,844	\$2,310,394,689
62	\$	-	\$ 11,019,582	\$	-	\$	-	\$ 24,377,261	\$35,396,844	\$2,345,791,533
63	\$	-	\$ 11,019,582	\$	-	\$	-	\$ 25,049,801	\$36,069,384	\$2,381,860,916
64	\$	-	\$ 11,019,582	\$	-	\$	-	\$ 25,735,120	\$36,754,702	\$2,418,615,618
65		\$0	\$ 11,019,582	\$	-	\$	-	\$ 26,433,459	\$37,453,041	\$2,456,068,660
66		\$0	\$ 11,019,582	\$	-	\$	-	\$ 27,145,067	\$38,164,649	\$2,494,233,309
67		\$0	\$ 11,019,582	\$	-	\$	-	\$ 27,870,195	\$38,889,777	\$2,533,123,086
68		\$0	\$ 11,019,582	\$	-	\$	-	\$ 28,609,101	\$39,628,683	\$2,572,751,769
69		\$0	\$ 11,019,582	\$	-	\$	-	\$ 29,362,046	\$40,381,628	\$2,613,133,398
70		\$0	\$ 11,019,582	\$	-	\$	-	\$ 30,129,297	\$41,148,879	\$2,654,282,277
71		\$0	\$ 11,019,582	\$	-	\$	-	\$ 30,911,126	\$41,930,708	\$2,696,212,984
72		\$0	\$ 11,019,582	\$	-	\$	-	\$ 31,707,809	\$42,727,391	\$2,738,940,376
73		\$0	\$ 11,019,582	\$	-	\$	-	\$ 32,519,629	\$43,539,212	\$2,782,479,587
74		\$0	\$ 11,019,582	\$	-	\$	-	\$ 33,346,874	\$44,366,457	\$2,826,846,044
75		\$0	\$ 11,019,582	\$	-	\$	-	\$ 34,189,837	\$45,209,419	\$2,872,055,463
76		\$0	\$ 11,019,582	\$	-	\$	-	\$ 35,048,816	\$46,068,398	\$2,918,123,862
77		\$0	\$ 11,019,582	\$	-	\$	-	\$ 35,924,116	\$46,943,698	\$2,965,067,560
78		\$0	\$ 11,019,582	\$	-	\$	-	\$ 36,816,046	\$47,835,628	\$3,012,903,188
79		\$0	\$ 11,019,582	\$	-	\$	-	\$ 37,724,923	\$48,744,505	\$3,061,647,693
80		\$0	\$ 11,019,582	\$	-	\$	-	\$ 38,651,068	\$49,670,651	\$3,111,318,344
81		\$0	\$ 11,019,582	\$	-	\$	-	\$ 39,594,811	\$50,614,393	\$3,161,932,737
82		\$0	\$ 11,019,582	\$	-	\$	-	\$ 40,556,484	\$51,576,067	\$3,213,508,803
83		\$0	\$ 11,019,582	\$	-	\$	-	\$ 41,536,430	\$52,556,012	\$3,266,064,815
84		\$0	\$ 11,019,582	\$	-	\$	-	\$ 42,534,994	\$53,554,576	\$3,319,619,391
85		\$0	\$ 11,019,582	\$	-	\$	-	\$ 43,552,531	\$54,572,113	\$3,374,191,504
86		\$0	\$ 11,019,582	\$	-	\$	-	\$ 44,589,401	\$55,608,983	\$3,429,800,487
87		\$0	\$ 11,019,582	\$	-	\$	-	\$ 45,645,972	\$56,665,554	\$3,486,466,041
88		\$0	\$ 11,019,582	\$	-	\$	-	\$ 46,722,617	\$57,742,199	\$3,544,208,240
89		\$0	\$ 11,019,582	\$	-	\$	-	\$ 47,819,719	\$58,839,301	\$3,603,047,541
90		\$0	\$ 11,019,582	\$	-	\$	-	\$ 48,937,666	\$59,957,248	\$3,663,004,789
91				\$	-	\$ 42,500,000	\$	193,134,933	\$235,634,933	\$3,898,639,722
92				\$	-	\$ 26,000,000	\$	120,892,045	\$146,892,045	\$4,045,531,767
93				\$	-	\$ 39,432,886	\$	187,583,743	\$227,016,629	\$4,272,548,396
94				\$	-	\$ 39,432,886	\$	191,897,059	\$231,329,945	\$4,503,878,341
95				\$	-	\$ 39,432,886	\$	196,292,328	\$235,725,214	\$4,739,603,555
96						\$	-	\$	\$0	\$4,739,603,555
97						\$	-	\$	\$0	\$4,739,603,555
98								\$	\$0	\$4,739,603,555
99								\$	\$0	\$4,739,603,555
100								\$	\$0	\$4,739,603,555

Total Design/Const	Total O&M	Total Cask Handling	Total D&D	Total Escalation	Total Life Cycle
\$852,366,406	\$973,159,561	\$38,508,689	\$186,798,657	\$2,688,770,242	\$4,739,603,555



## APPENDIX A6-19

### STUDY 1 - ALTERNATIVE STORAGE SYSTEMS FOR DUAL PURPOSE CANISTERS

#### COST DETAILS

#### ALTERNATIVE 19 - C-BGV, EXPANDED, LOW SEISMIC

#### LIFE CYCLE COST SUMMARIES



## Interim Storage Facility

Expanded Storage Facility (10,000 MTU)

Project: C-BGV Pilot (10,000 MTU)

Expanded Project - C-BGV 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 &amp; Construction</i>	\$1,055,127,425					\$1,055,127,425
<i>Operations &amp; Maintenance (40 Year Life)</i>		\$532,376,272				\$532,376,272
<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&amp;D</i>				\$232,088,625		\$232,088,625
<i>Escalation</i>					\$992,027,528	\$992,027,528
<i>Total Costs (40 year Life)</i>						\$2,888,637,228
<i>Present Value</i>						\$1,463,309,163

### Life Cycle Costs (80 Year Life)

	Capital	Operations	Transport	Decommissioning	Escalation	Total Costs
<i>Design &amp; Construction</i>	\$1,055,127,425					\$1,055,127,425
<i>Operations &amp; Maintenance (80 Year Life)</i>		\$973,159,561				\$973,159,561
<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&amp;D</i>				\$232,088,625		\$232,088,625
<i>Escalation</i>					\$2,960,716,843	\$2,960,716,843
<i>Total Costs (80 Year Life)</i>						\$5,298,109,831
<i>Present Value</i>						\$1,575,597,115



## **APPENDIX A6-19**

### **STUDY 1 - ALTERNATIVE STORAGE SYSTEMS FOR DUAL PURPOSE CANISTERS**

#### **COST DETAILS**

#### **ALTERNATIVE 19 - C-BGV, EXPANDED, LOW SEISMIC**

#### **CAPITAL COST SUMMARY**



# Interim Storage Facility

Expanded Storage Facility (10,000 MTU)

Project: C-BGV Pilot (10,000 MTU)

Expanded Project - C-BGV 60/40 Vertical/Horizontal - Low 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-BGV EX 01			<b>Interim Storage Facility and transportation Project</b>	
	C-BGV EX 01.01		<b>Pilot ISF Facility</b>	<b>\$471,712,636</b>
		C-BGV EX 01.01.01	Storage BGVs	\$0
		C-BGV EX 01.01.02	Cask Handling (Transfer) Facility	\$135,175,719
		C-BGV EX 01.01.03	Horizontal Dry Storage Modules	\$0
		C-BGV EX 01.01.04	Vertical Dry Storage Module	\$175,397,756
		C-BGV EX 01.01.05	Storage Cask Fabrication Facility	\$2,000,000
		C-BGV EX 01.01.06	Cask Maintenance Facility	\$0
		C-BGV EX 01.01.07	Concrete Batch Plant	\$1,850,000
		C-BGV EX 01.01.08	Visitor Center/ Auditorium	\$0
		C-BGV EX 01.01.09	Administration Building	\$3,140,000
		C-BGV EX 01.01.10	Security	\$24,148,975
		C-BGV EX 01.01.11	Rail Spur/ Receiving Yard	\$58,752,800
		C-BGV EX 01.01.12	Utilities	\$18,682,150
		C-BGV EX 01.01.13	Roads	\$18,212,737
		C-BGV EX 01.01.14	Parking	\$735,000
		C-BGV EX 01.01.15	Site Work	\$23,417,500
		C-BGV EX 01.01.16	Warehouse	\$10,200,000
		C-BGV EX 01.01.17	Maintenance Facility	\$0
		C-BGV EX 01.01.18	Waste management Facility	\$0
		C-BGV EX 01.01.01.xx	(Add Further Breakdown as needed)	\$0
	C-BGV EX 01.02		<b>Expanded Interim Storage Facility</b>	<b>\$204,664,585</b>
		C-BGV EX 01.02.01	Expanded Storage BGVs and Dry Cask Storage Systems	\$0
		C-BGV EX 01.02.02	Expanded Cask Handling Facility (if required)	\$0
		C-BGV EX 01.02.03	Horizontal Dry Storage Modules	\$0
		C-BGV EX 01.02.04	Vertical Dry Storage Casks	\$177,397,756
		C-BGV EX 01.02.05	Storage Cask Fabrication Facility (Expanded)	\$0
		C-BGV EX 01.02.06	Cask Maintenance Facility (Expanded)	\$0
		C-BGV EX 01.02.07	Concrete Batch Plant (Expanded if needed)	\$1,850,000
		C-BGV EX 01.02.08	Visitor Center/ Auditorium (expanded if needed)	\$745,000
		C-BGV EX 01.02.09	Administration Building (Expanded if needed)	\$0
		C-BGV EX 01.02.10	Security (Expanded)	\$10,074,488
		C-BGV EX 01.02.11	Rail Spur/ Receiving Yard (Expanded)	\$0
		C-BGV EX 01.02.12	Utilities Expanded as needed)	\$3,624,200
		C-BGV EX 01.02.13	Roads (Expanded)	\$83,142
		C-BGV EX 01.02.14	Parking (Expanded as needed)	\$0
		C-BGV EX 01.02.15	Site Work (Expanded)	\$10,890,000
		C-BGV EX 01.02.16	Warehouse (Expanded if Needed)	\$0
		C-BGV EX 01.02.17	Maintenance Facility (Expanded if needed)	\$0
		C-BGV EX 01.02.18	Waste management Facility (Expanded if needed)	\$0
		C-BGV EX 01.02.19	Hot Cell / Laboratories	\$0
		C-BGV EX 01.02.20	Pool Packaging Facility	\$0
		C-BGV EX 01.02.21	Standardized Storage System	\$0
		C-BGV EX 01.02.22	Standardized Disposal Canister	\$0
		C-BGV EX 01.02.23	Canister Repackaging Facility (For Repository	\$0
	C-BGV EX 01.03		<b>Transportation Equipment</b>	<b>\$0</b>
		C-BGV EX 01.03.01	Transportation Casks	\$0
		C-BGV EX 01.03.02	Rail Equipment	\$0
		C-BGV EX 01.03.03	Rail Maintenance Facility	\$0
		C-BGV EX 01.03.04	Transportation Systems Services	\$0
	C-BGV EX 01.04		<b>Pre-Construction Capitalized Costs</b>	<b>\$66,025,000</b>
		C-BGV EX 01.04.01	Land or Land Leases	\$7,680,000
		C-BGV EX 01.04.02	Site permits	\$200,000
		C-BGV EX 01.04.03	Site Licensing	\$6,240,000
		C-BGV EX 01.04.05	Plant Permits	\$0
		C-BGV EX 01.04.06	Planning and Alternative Studies	\$750,000





	C-BGV EX 01.04.07	Research and Development	\$0
	C-BGV EX 01.04.08	Design	\$23,955,000
	C-BGV EX 01.04.09	Other Pre-construction Costs	\$17,200,000
	C-BGV EX 01.04.10	Pre-construction contingencies	\$10,000,000
	C-BGV EX 01.04.xx	(Add Further Breakdown as needed)	\$0
<b>C-BGV EX 01.05</b>		<b>Indirect Capitalized Costs</b>	<b>\$63,180,000</b>
	C-BGV EX 01.05.01	Project Management	\$2,700,000
	C-BGV EX 01.05.02	Construction Management	\$3,600,000
	C-BGV EX 01.05.03	Field indirect services	\$11,880,000
	C-BGV EX 01.05.04	Design Services in support of Construction	\$5,400,000
	C-BGV EX 01.05.05	QA/QC	\$12,600,000
	C-BGV EX 01.05.06	Commissioning and Startup	\$1,200,000
	C-BGV EX 01.05.07	Home office Engineering support to Construction	\$7,200,000
	C-BGV EX 01.05.08	Document Control	\$2,700,000
	C-BGV EX 01.05.09	Project Controls	\$3,600,000
	C-BGV EX 01.05.10	Construction Testing	\$2,700,000
	C-BGV EX 01.05.11	Inspections	\$3,600,000
	C-BGV EX 01.05.12	Startup and Testing	\$3,000,000
	C-BGV EX 01.05.13	Commissioning	\$3,000,000
<b>C-BGV EX 01.06</b>		<b>Site Selection</b>	<b>\$0</b>
	C-BGV EX 01.06.01	Site Selection	\$0
	C-BGV EX 01.06.02	Public Information Process	\$0
<b>C-BGV EX 01.07</b>		<b>Decontamination and Deconstruction</b>	<b>\$0</b>
	C-BGV EX 01.07.01	Decommissioning	\$0
	C-BGV EX 01.07.02	Decontamination	\$0
	C-BGV EX 01.07.03	Deconstruction	\$0
	C-BGV EX 01.07.04		\$0
	C-BGV EX 01.07.05		\$0
<b>C-BGV EX 01.08</b>		<b>Project Financial Costs</b>	<b>\$107,948,018</b>
	C-BGV EX 01.08.01	Contractor Fees	\$64,446,578
	C-BGV EX 01.08.02	Escalation Costs	\$43,501,440
	C-BGV EX 01.08.03	Interest Payments	\$0
	C-BGV EX 01.08.04	Indirect costs to support shipments to repository	\$0
	C-BGV EX 01.08.05		\$0
	C-BGV EX 01.08.xx	(Add Further Breakdown as needed)	\$0
<b>C-BGV EX 01.09</b>		<b>Project Contingencies</b>	<b>\$141,597,187</b>
	C-BGV EX 01.09.01	Management Reserve - Contractor Held	\$45,676,512
	C-BGV EX 01.09.02	Contingency - DOE held	\$95,920,675
<b>C-BGV EX 01.10</b>		<b>Other Direct Costs</b>	<b>\$0</b>
	C-BGV EX 01.10.01	DOE Project Operations	\$0
	C-BGV EX 01.10.02	DOE TM&E	\$0
	C-BGV EX 01.10.03	Host site Operational Costs	\$0
	C-BGV EX 01.10.04	Miscellaneous	\$0
	C-BGV EX 01.10.05	Miscellaneous ODC	\$0
<b>C-BGV EX 01.11</b>		<b>Operational Costs</b>	<b>0</b>
	C-BGV EX 01.11.01	Operations Costs	\$0
	C-BGV EX 01.11.02	Transportation Costs	\$0
	C-BGV EX 01.11.03	Escalation (Operations/Transportation)	\$0
<b>Project Total</b>			
		(All Direct & indirect Costs, MR, Escalation)	TEC \$959,206,750
		(TEC plus Contingency, ODCs)	TPC \$1,055,127,425
		All Capitol, Operation, Transportation, Escalation	LCC \$1,055,127,425



## APPENDIX A6-19

# STUDY 1 - ALTERNATIVE STORAGE SYSTEMS FOR DUAL PURPOSE CANISTERS

## COST DETAILS

### ALTERNATIVE 19 - C-BGV, EXPANDED, LOW SEISMIC

### LIFE CYCLE COST – 40 YEAR OPERATING LIFE



# Interim Storage Facility

Expanded Storage Facility (10,000 MTU)

Project: C-BGV Pilot (10,000 MTU)

Expanded Project - C-BGV 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	\$ 25,073,418	\$ -	\$ -	\$ 41,546,053	\$ 266,619,471	\$ 638,599,492
10	\$ 527,239,026	\$ 24,539,498	\$ -	\$ -	\$ 114,271,170	\$ 666,049,694	\$ 1,304,649,187
11		\$ 25,012,938	\$ 12,836,230	\$ -	\$ 8,706,478	\$ 46,555,646	\$ 1,351,204,833
12	\$ -	\$ 25,012,938	\$ 12,836,230	\$ -	\$ 9,591,036	\$ 47,440,204	\$ 1,398,645,037
13	\$ -	\$ 25,012,938	\$ 12,836,230	\$ -	\$ 10,492,400	\$ 48,341,568	\$ 1,446,986,604
14	\$ -	\$ 11,019,582	\$ 12,836,230	\$ -	\$ 7,192,127	\$ 31,047,939	\$ 1,478,034,543
15	\$ -	\$ 11,019,582	\$ 12,836,230	\$ -	\$ 7,782,038	\$ 31,637,850	\$ 1,509,672,393
16	\$ -	\$ 11,019,582	\$ 12,836,230	\$ -	\$ 8,383,157	\$ 32,238,969	\$ 1,541,911,362
17	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 4,155,332	\$ 15,174,915	\$ 1,557,086,277
18	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 4,443,656	\$ 15,463,238	\$ 1,572,549,515
19	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 4,737,457	\$ 15,757,040	\$ 1,588,306,554
20	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 5,036,841	\$ 16,056,423	\$ 1,604,362,978
21	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 5,341,913	\$ 16,361,495	\$ 1,620,724,473
22	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 5,652,782	\$ 16,672,364	\$ 1,637,396,837
23	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 5,969,556	\$ 16,989,139	\$ 1,654,385,976
24	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 6,292,350	\$ 17,311,932	\$ 1,671,697,908
25	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 6,621,277	\$ 17,640,859	\$ 1,689,338,767
26	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 6,956,453	\$ 17,976,035	\$ 1,707,314,802
27	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 7,297,998	\$ 18,317,580	\$ 1,725,632,382
28	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 7,646,032	\$ 18,665,614	\$ 1,744,297,996
29	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 8,000,678	\$ 19,020,261	\$ 1,763,318,257
30	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 8,362,063	\$ 19,381,646	\$ 1,782,699,903
31	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 8,730,315	\$ 19,749,897	\$ 1,802,449,799
32	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 9,105,563	\$ 20,125,145	\$ 1,822,574,944
33	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 9,487,941	\$ 20,507,523	\$ 1,843,082,467
34	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 9,877,583	\$ 20,897,166	\$ 1,863,979,633
35	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 10,274,630	\$ 21,294,212	\$ 1,885,273,845
36	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 10,679,220	\$ 21,698,802	\$ 1,906,972,646
37	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 11,091,497	\$ 22,111,079	\$ 1,929,083,725
38	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 11,511,607	\$ 22,531,190	\$ 1,951,614,915
39	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 11,939,700	\$ 22,959,282	\$ 1,974,574,197
40	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 12,375,926	\$ 23,395,509	\$ 1,997,969,706
41	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 12,820,441	\$ 23,840,023	\$ 2,021,809,729
42	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 13,273,401	\$ 24,292,984	\$ 2,046,102,712
43	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 13,734,968	\$ 24,754,550	\$ 2,070,857,263
44	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 14,205,305	\$ 25,224,887	\$ 2,096,082,149
45	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 14,684,577	\$ 25,704,160	\$ 2,121,786,309
46	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 15,172,956	\$ 26,192,539	\$ 2,147,978,848
47	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 15,670,615	\$ 26,690,197	\$ 2,174,669,045
48	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 16,177,728	\$ 27,197,311	\$ 2,201,866,355
49	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 16,694,477	\$ 27,714,060	\$ 2,229,580,415
50	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 17,221,044	\$ 28,240,627	\$ 2,257,821,041
51	\$ -	\$ -	\$ -	\$ 42,500,000	\$ 68,487,052	\$ 110,987,052	\$ 2,368,808,093
52	\$ -	\$ -	\$ -	\$ 40,000,000	\$ 66,443,111	\$ 106,443,111	\$ 2,475,251,204
53	\$ -	\$ -	\$ -	\$ 49,862,875	\$ 85,347,205	\$ 135,210,080	\$ 2,610,461,284
54	\$ -	\$ -	\$ -	\$ 49,862,875	\$ 87,916,196	\$ 137,779,071	\$ 2,748,240,355
55	\$ -	\$ -	\$ -	\$ 49,862,875	\$ 90,533,998	\$ 140,396,874	\$ 2,888,637,228
56	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 2,888,637,228
57	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 2,888,637,228
58	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 2,888,637,228
59	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 2,888,637,228
60	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 2,888,637,228
	Total Design/Const	Total O&M	Total Cask Handling	Total D&D	Total Escalation	Total Annual Expense	Total Cumulative
	\$ 1,055,127,425	\$ 532,376,272	\$ 77,017,378	\$ 232,088,625	\$ 992,027,528	\$ 2,888,637,228	\$ 2,888,637,228

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



## APPENDIX A6-19

### STUDY 1 - ALTERNATIVE STORAGE SYSTEMS FOR DUAL PURPOSE CANISTERS

#### COST DETAILS

#### ALTERNATIVE 19 - C-BGV, EXPANDED, LOW SEISMIC

#### LIFE CYCLE COST – 80 YEAR OPERATING LIFE



# Interim Storage Facility

Expanded Storage Facility (10,000 MTU)

Project: C-BGV Pilot (10,000 MTU)

Expanded Project - C-BGV 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	\$ 25,073,418	\$ -	\$ -	\$ 41,546,053	\$266,619,471	\$638,599,492
10	\$ 527,239,026	\$ 24,539,498	\$ -	\$ -	\$ 114,271,170	\$666,049,694	\$1,304,649,187
11	\$ -	\$ 25,012,938	\$ 12,836,230	\$ -	\$ 8,706,478	\$46,555,646	\$1,351,204,833
12	\$ -	\$ 25,012,938	\$ 12,836,230	\$ -	\$ 9,591,036	\$47,440,204	\$1,398,645,037
13	\$ -	\$ 25,012,938	\$ 12,836,230	\$ -	\$ 10,492,400	\$48,341,568	\$1,446,986,604
14	\$ -	\$ 11,019,582	\$ 12,836,230	\$ -	\$ 7,192,127	\$31,047,939	\$1,478,034,543
15	\$ -	\$ 11,019,582	\$ 12,836,230	\$ -	\$ 7,782,038	\$31,637,850	\$1,509,672,393
16	\$ -	\$ 11,019,582	\$ 12,836,230	\$ -	\$ 8,383,157	\$32,238,969	\$1,541,911,362
17	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 4,155,332	\$15,174,915	\$1,557,086,277
18	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 4,443,656	\$15,463,238	\$1,572,549,515
19	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 4,737,457	\$15,757,040	\$1,588,306,554
20	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 5,036,841	\$16,056,423	\$1,604,362,978
21	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 5,341,913	\$16,361,495	\$1,620,724,473
22	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 5,652,782	\$16,672,364	\$1,637,396,837
23	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 5,969,556	\$16,989,139	\$1,654,385,976
24	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 6,292,350	\$17,311,932	\$1,671,697,908
25	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 6,621,277	\$17,640,859	\$1,689,338,767
26	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 6,956,453	\$17,976,035	\$1,707,314,802
27	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 7,297,998	\$18,317,580	\$1,725,632,382
28	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 7,646,032	\$18,665,614	\$1,744,297,996
29	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 8,000,678	\$19,020,261	\$1,763,318,257
30	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 8,362,063	\$19,381,646	\$1,782,699,903
31	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 8,730,315	\$19,749,897	\$1,802,449,799
32	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 9,105,563	\$20,125,145	\$1,822,574,944
33	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 9,487,941	\$20,507,523	\$1,843,082,467
34	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 9,877,583	\$20,897,166	\$1,863,979,633
35	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 10,274,630	\$21,294,212	\$1,885,273,845
36	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 10,679,220	\$21,698,802	\$1,906,972,646
37	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 11,091,497	\$22,111,079	\$1,929,083,725
38	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 11,511,607	\$22,531,190	\$1,951,614,915
39	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 11,939,700	\$22,959,282	\$1,974,574,197
40	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 12,375,926	\$23,395,509	\$1,997,969,706
41	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 12,820,441	\$23,840,023	\$2,021,809,729
42	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 13,273,401	\$24,292,984	\$2,046,102,712
43	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 13,734,968	\$24,754,550	\$2,070,857,263
44	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 14,205,305	\$25,224,887	\$2,096,082,149
45	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 14,684,577	\$25,704,160	\$2,121,786,309
46	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 15,172,956	\$26,192,539	\$2,147,978,848
47	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 15,670,615	\$26,690,197	\$2,174,669,045
48	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 16,177,728	\$27,197,311	\$2,201,866,355
49	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 16,694,477	\$27,714,060	\$2,229,580,415
50	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 17,221,044	\$28,240,627	\$2,257,821,041
51	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 17,757,616	\$28,777,199	\$2,286,598,240
52	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 18,304,383	\$29,323,965	\$2,315,922,205
53	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 18,861,538	\$29,881,121	\$2,345,803,326
54	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 19,429,280	\$30,448,862	\$2,376,252,188
55	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 20,007,808	\$31,027,390	\$2,407,279,578
56	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 20,597,329	\$31,616,911	\$2,438,896,489
57	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 21,198,050	\$32,217,632	\$2,471,114,121
58	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 21,810,185	\$32,829,767	\$2,503,943,888
59	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 22,433,950	\$33,453,533	\$2,537,397,421
60	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 23,069,568	\$34,089,150	\$2,571,486,570
61	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 23,717,261	\$34,736,844	\$2,606,223,414



62	\$	-	\$ 11,019,582	\$	-	\$	-	\$	24,377,261	\$35,396,844	\$2,641,620,258
63	\$	-	\$ 11,019,582	\$	-	\$	-	\$	25,049,801	\$36,069,384	\$2,677,689,641
64	\$	-	\$ 11,019,582	\$	-	\$	-	\$	25,735,120	\$36,754,702	\$2,714,444,343
65	\$	\$0	\$ 11,019,582	\$	-	\$	-	\$	26,433,459	\$37,453,041	\$2,751,897,385
66	\$	\$0	\$ 11,019,582	\$	-	\$	-	\$	27,145,067	\$38,164,649	\$2,790,062,034
67	\$	\$0	\$ 11,019,582	\$	-	\$	-	\$	27,870,195	\$38,889,777	\$2,828,951,811
68	\$	\$0	\$ 11,019,582	\$	-	\$	-	\$	28,609,101	\$39,628,683	\$2,868,580,494
69	\$	\$0	\$ 11,019,582	\$	-	\$	-	\$	29,362,046	\$40,381,628	\$2,908,962,122
70	\$	\$0	\$ 11,019,582	\$	-	\$	-	\$	30,129,297	\$41,148,879	\$2,950,111,001
71	\$	\$0	\$ 11,019,582	\$	-	\$	-	\$	30,911,126	\$41,930,708	\$2,992,041,709
72	\$	\$0	\$ 11,019,582	\$	-	\$	-	\$	31,707,809	\$42,727,391	\$3,034,769,100
73	\$	\$0	\$ 11,019,582	\$	-	\$	-	\$	32,519,629	\$43,539,212	\$3,078,308,312
74	\$	\$0	\$ 11,019,582	\$	-	\$	-	\$	33,346,874	\$44,366,457	\$3,122,674,769
75	\$	\$0	\$ 11,019,582	\$	-	\$	-	\$	34,189,837	\$45,209,419	\$3,167,884,188
76	\$	\$0	\$ 11,019,582	\$	-	\$	-	\$	35,048,816	\$46,068,398	\$3,213,952,587
77	\$	\$0	\$ 11,019,582	\$	-	\$	-	\$	35,924,116	\$46,943,698	\$3,260,896,284
78	\$	\$0	\$ 11,019,582	\$	-	\$	-	\$	36,816,046	\$47,835,628	\$3,308,731,913
79	\$	\$0	\$ 11,019,582	\$	-	\$	-	\$	37,724,923	\$48,744,505	\$3,357,476,418
80	\$	\$0	\$ 11,019,582	\$	-	\$	-	\$	38,651,068	\$49,670,651	\$3,407,147,068
81	\$	\$0	\$ 11,019,582	\$	-	\$	-	\$	39,594,811	\$50,614,393	\$3,457,761,461
82	\$	\$0	\$ 11,019,582	\$	-	\$	-	\$	40,556,484	\$51,576,067	\$3,509,337,528
83	\$	\$0	\$ 11,019,582	\$	-	\$	-	\$	41,536,430	\$52,556,012	\$3,561,893,540
84	\$	\$0	\$ 11,019,582	\$	-	\$	-	\$	42,534,994	\$53,554,576	\$3,615,448,116
85	\$	\$0	\$ 11,019,582	\$	-	\$	-	\$	43,552,531	\$54,572,113	\$3,670,020,229
86	\$	\$0	\$ 11,019,582	\$	-	\$	-	\$	44,589,401	\$55,608,983	\$3,725,629,212
87	\$	\$0	\$ 11,019,582	\$	-	\$	-	\$	45,645,972	\$56,665,554	\$3,782,294,766
88	\$	\$0	\$ 11,019,582	\$	-	\$	-	\$	46,722,617	\$57,742,199	\$3,840,036,965
89	\$	\$0	\$ 11,019,582	\$	-	\$	-	\$	47,819,719	\$58,839,301	\$3,898,876,266
90	\$	\$0	\$ 11,019,582	\$	-	\$	-	\$	48,937,666	\$59,957,248	\$3,958,833,514
91				\$	-	\$	42,500,000	\$	193,134,933	\$235,634,933	\$4,194,468,447
92				\$	-	\$	40,000,000	\$	185,987,761	\$225,987,761	\$4,420,456,208
93				\$	-	\$	49,862,875	\$	237,199,603	\$287,062,478	\$4,707,518,685
94				\$	-	\$	49,862,875	\$	242,653,790	\$292,516,665	\$5,000,035,350
95				\$	-	\$	49,862,875	\$	248,211,606	\$298,074,481	\$5,298,109,831
96						\$	-	\$	-	\$0	\$5,298,109,831
97						\$	-	\$	-	\$0	\$5,298,109,831
98								\$	-	\$0	\$5,298,109,831
99								\$	-	\$0	\$5,298,109,831
100								\$	-	\$0	\$5,298,109,831

Total Design/Const	\$1,055,127,425	Total O&M	\$973,159,561	Total Cask Handling	\$77,017,378	Total D&D	\$232,088,625	Total Escalation	\$2,960,716,843	Total Life Cycle	\$5,298,109,831
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## **APPENDIX A6-20**

### **STUDY 1 - ALTERNATIVE STORAGE SYSTEMS FOR DUAL PURPOSE CANISTERS**

#### **COST DETAILS**

#### **ALTERNATIVE 20 - C-BGV, EXPANDED, HIGH SEISMIC**

#### **LIFE CYCLE COST SUMMARIES**



## Interim Storage Facility

Expanded Storage Facility (10,000 MTU)

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

Expanded Project - C-BGV 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 &amp; Construction</i>	\$1,143,664,945					\$1,143,664,945
<i>Operations &amp; Maintenance (40 Year Life)</i>		\$532,376,272				\$532,376,272
<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&amp;D</i>				\$246,626,036		\$246,626,036
<i>Escalation</i>					\$1,035,999,816	\$1,035,999,816
<i>Total Costs (40 year Life)</i>						\$3,035,684,448
<i>Present Value</i>						\$1,546,413,698

### *Life Cycle Costs (80 Year Life)*

	Capital	Operations	Transport	Decommissioning	Escalation	Total Costs
<i>Design &amp; Construction</i>	\$1,143,664,945					\$1,143,664,945
<i>Operations &amp; Maintenance (80 Year Life)</i>		\$973,159,561				\$973,159,561
<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&amp;D</i>				\$246,626,036		\$246,626,036
<i>Escalation</i>					\$3,049,807,860	\$3,049,807,860
<i>Total Costs (80 Year Life)</i>						\$5,490,275,780
<i>Present Value</i>						\$1,655,778,489





## **APPENDIX A6-20**

### **STUDY 1 - ALTERNATIVE STORAGE SYSTEMS FOR DUAL PURPOSE CANISTERS**

#### **COST DETAILS**

#### **ALTERNATIVE 20 - C-BGV, EXPANDED, HIGH SEISMIC**

#### **CAPITAL COST SUMMARY**



# Interim Storage Facility

Expanded Storage Facility (10,000 MTU)

Project: C-BGV Expanded (10,000 MTU)  
 Expanded Project - C-BGV 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-BGV LE EX 01			Interim Storage Facility and transportation Project	
	C-BGV LE EX 01.01		Pilot ISF Facility	\$519,570,637
		C-BGV LE EX 01.01.01	Storage BGVs	\$0
		C-BGV LE EX 01.01.02	Cask Handling (Transfer) Facility	\$163,293,960
		C-BGV LE EX 01.01.03	Horizontal Dry Storage Modules	\$0
		C-BGV LE EX 01.01.04	Vertical Dry Storage Module	\$197,137,516
		C-BGV LE EX 01.01.05	Storage Cask Fabrication Facility	\$0
		C-BGV LE EX 01.01.06	Cask Maintenance Facility	\$0
		C-BGV LE EX 01.01.07	Concrete Batch Plant	\$1,850,000
		C-BGV LE EX 01.01.08	Visitor Center/ Auditorium	\$0
		C-BGV LE EX 01.01.09	Administration Building	\$3,140,000
		C-BGV LE EX 01.01.10	Security	\$24,148,975
		C-BGV LE EX 01.01.11	Rail Spur/ Receiving Yard	\$58,752,800
		C-BGV LE EX 01.01.12	Utilities	\$18,682,150
		C-BGV LE EX 01.01.13	Roads	\$18,212,737
		C-BGV LE EX 01.01.14	Parking	\$735,000
		C-BGV LE EX 01.01.15	Site Work	\$23,417,500
		C-BGV LE EX 01.01.16	Warehouse	\$10,200,000
		C-BGV LE EX 01.01.17	Maintenance Facility	\$0
		C-BGV LE EX 01.01.18	Waste management Facility	\$0
		C-BGV LE EX 01.01.01.xx	(Add Further Breakdown as needed)	\$0
	C-BGV LE EX 01.02		Expanded Interim Storage Facility	\$224,404,345
		C-BGV LE EX 01.02.01	Expanded Storage BGVs and Dry Cask Storage Systems	\$0
		C-BGV LE EX 01.02.02	Expanded Cask Handling Facility (if required)	\$0
		C-BGV LE EX 01.02.03	Horizontal Dry Storage Modules	\$0
		C-BGV LE EX 01.02.04	Vertical Dry Storage Casks	\$197,137,516
		C-BGV LE EX 01.02.05	Storage Cask Fabrication Facility (Expanded)	\$0
		C-BGV LE EX 01.02.06	Cask Maintenance Facility (Expanded)	\$0
		C-BGV LE EX 01.02.07	Concrete Batch Plant (Expanded if needed)	\$1,850,000
		C-BGV LE EX 01.02.08	Visitor Center/ Auditorium (expanded if needed)	\$745,000
		C-BGV LE EX 01.02.09	Administration Building (Expanded if needed)	\$0
		C-BGV LE EX 01.02.10	Security (Expanded)	\$10,074,488
		C-BGV LE EX 01.02.11	Rail Spur/ Receiving Yard (Expanded)	\$0
		C-BGV LE EX 01.02.12	Utilities Expanded as needed)	\$3,624,200
		C-BGV LE EX 01.02.13	Roads (Expanded)	\$83,142
		C-BGV LE EX 01.02.14	Parking (Expanded as needed)	\$0
		C-BGV LE EX 01.02.15	Site Work (Expanded)	\$10,890,000
		C-BGV LE EX 01.02.16	Warehouse (Expanded if Needed)	\$0
		C-BGV LE EX 01.02.17	Maintenance Facility (Expanded if needed)	\$0
		C-BGV LE EX 01.02.18	Waste management Facility (Expanded if needed)	\$0
		C-BGV LE EX 01.02.19	Hot Cell / Laboratories	\$0
		C-BGV LE EX 01.02.20	Pool Packaging Facility	\$0
		C-BGV LE EX 01.02.21	Standardized Storage System	\$0
		C-BGV LE EX 01.02.22	Standardized Disposal Canister	\$0
		C-BGV LE EX 01.02.23	Canister Repackaging Facility (For Repository)	\$0
	C-BGV LE EX 01.03		Transportation Equipment	\$0
		C-BGV LE EX 01.03.01	Transportation Casks	\$0
		C-BGV LE EX 01.03.02	Rail Equipment	\$0
		C-BGV LE EX 01.03.03	Rail Maintenance Facility	\$0
		C-BGV LE EX 01.03.04	Transportation Systems Services	\$0
	C-BGV LE EX 01.04		Pre-Construction Capitalized Costs	\$66,025,000
		C-BGV LE EX 01.04.01	Land or Land Leases	\$7,680,000
		C-BGV LE EX 01.04.02	Site permits	\$200,000
		C-BGV LE EX 01.04.03	Site Licensing	\$6,240,000
		C-BGV LE EX 01.04.05	Plant Permits	\$0
		C-BGV LE EX 01.04.06	Planning and Alternative Studies	\$750,000
		C-BGV LE EX 01.04.07	Research and Development	\$0
		C-BGV LE EX 01.04.08	Design	\$23,955,000
		C-BGV LE EX 01.04.09	Other Pre-construction Costs	\$17,200,000
		C-BGV 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-BGV LE EX 01.04.xx	(Add Further Breakdown as needed)		\$0
	C-BGV LE EX 01.05	Indirect Capitalized Costs	\$63,180,000	
	C-BGV LE EX 01.05.01	Project Management		\$2,700,000
	C-BGV LE EX 01.05.02	Construction Management		\$3,600,000
	C-BGV LE EX 01.05.03	Field indirect services		\$11,880,000
	C-BGV LE EX 01.05.04	Design Services in support of Construction		\$5,400,000
	C-BGV LE EX 01.05.05	QA/QC		\$12,600,000
	C-BGV LE EX 01.05.06	Commissioning and Startup		\$1,200,000
	C-BGV LE EX 01.05.07	Home office Engineering support to Construction		\$7,200,000
	C-BGV LE EX 01.05.08	Document Control		\$2,700,000
	C-BGV LE EX 01.05.09	Project Controls		\$3,600,000
	C-BGV LE EX 01.05.10	Construction Testing		\$2,700,000
	C-BGV LE EX 01.05.11	Inspections		\$3,600,000
	C-BGV LE EX 01.05.12	Startup and Testing		\$3,000,000
	C-BGV LE EX 01.05.13	Commissioning		\$3,000,000
	C-BGV LE EX 01.06	Site Selection	\$0	
	C-BGV LE EX 01.06.01	Site Selection		\$0
	C-BGV LE EX 01.06.02	Public Information Process		\$0
	C-BGV LE EX 01.07	Decontamination and Deconstruction	\$0	
	C-BGV LE EX 01.07.01	Decommissioning		\$0
	C-BGV LE EX 01.07.02	Decontamination		\$0
	C-BGV LE EX 01.07.03	Deconstruction		\$0
	C-BGV LE EX 01.07.04			\$0
	C-BGV LE EX 01.07.05			\$0
	C-BGV LE EX 01.08	Project Financial Costs	\$117,006,118	
	C-BGV LE EX 01.08.01	Contractor Fees		\$69,854,399
	C-BGV LE EX 01.08.02	Escalation Costs		\$47,151,719
	C-BGV LE EX 01.08.03	Interest Payments		\$0
	C-BGV LE EX 01.08.04	Indirect costs to support shipments to repository		\$0
	C-BGV LE EX 01.08.05			\$0
	C-BGV LE EX 01.08.xx	(Add Further Breakdown as needed)		\$0
	C-BGV LE EX 01.09	Project Contingencies	\$153,478,845	
	C-BGV LE EX 01.09.01	Management Reserve - Contractor Held		\$49,509,305
	C-BGV LE EX 01.09.02	Contingency - DOE held		\$103,969,540
	C-BGV LE EX 01.10			
	C-BGV LE EX 01.10.01	Other Direct Costs	\$0	
	C-BGV LE EX 01.10.02	DOE Project Operations		\$0
	C-BGV LE EX 01.10.03	DOE TM&E		\$0
	C-BGV LE EX 01.10.04	Host site Operational Costs	Miscellaneous	\$0
	C-BGV LE EX 01.10.05	Miscellaneous ODC		\$0
	C-BGV LE EX 01.11	Operational Costs	0	
	C-BGV LE EX 01.11.01	Operations Costs		\$0
	C-BGV LE EX 01.11.02	Transportation Costs		\$0
	C-BGV LE EX 01.11.03	Escalation (Operations/Transportation)		\$0
Project Total				
		(All Direct & indirect Costs, MR, Escalation)	TEC	\$1,039,695,405
		(TEC plus Contingency, ODCs)	TPC	\$1,143,664,945
		All Capitol, Operation, Transportation, Escalation	LCC	\$1,143,664,945



## APPENDIX A6-20

### STUDY 1 - ALTERNATIVE STORAGE SYSTEMS FOR DUAL PURPOSE CANISTERS

#### COST DETAILS

#### ALTERNATIVE 20 - C-BGV, EXPANDED, HIGH SEISMIC

#### LIFE CYCLE COST – 40 YEAR OPERATING LIFE



# Interim Storage Facility

Expanded Storage Facility (10,000 MTU)

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

Expanded Project - C-BGV 60/40 Vertical/Horizontal - High Seismic  
Separate CHB

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

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	\$ 25,073,418	\$ -	\$ -	\$ 41,546,053	\$ 266,619,471	\$ 638,599,492
10	\$ 615,776,546	\$ 24,539,498	\$ -	\$ -	\$ 132,606,944	\$ 772,922,988	\$ 1,411,522,480
11		\$ 25,012,938	\$ 12,836,230	\$ -	\$ 8,706,478	\$ 46,555,646	\$ 1,458,078,127
12	\$ -	\$ 25,012,938	\$ 12,836,230	\$ -	\$ 9,591,036	\$ 47,440,204	\$ 1,505,518,330
13	\$ -	\$ 25,012,938	\$ 12,836,230	\$ -	\$ 10,492,400	\$ 48,341,568	\$ 1,553,859,898
14	\$ -	\$ 11,019,582	\$ 12,836,230	\$ -	\$ 7,192,127	\$ 31,047,939	\$ 1,584,907,837
15	\$ -	\$ 11,019,582	\$ 12,836,230	\$ -	\$ 7,782,038	\$ 31,637,850	\$ 1,616,545,687
16	\$ -	\$ 11,019,582	\$ 12,836,230	\$ -	\$ 8,383,157	\$ 32,238,969	\$ 1,648,784,656
17	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 4,155,332	\$ 15,174,915	\$ 1,663,959,570
18	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 4,443,656	\$ 15,463,238	\$ 1,679,422,808
19	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 4,737,457	\$ 15,757,040	\$ 1,695,179,848
20	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 5,036,841	\$ 16,056,423	\$ 1,711,236,271
21	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 5,341,913	\$ 16,361,495	\$ 1,727,597,767
22	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 5,652,782	\$ 16,672,364	\$ 1,744,270,130
23	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 5,969,556	\$ 16,989,139	\$ 1,761,259,269
24	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 6,292,350	\$ 17,311,932	\$ 1,778,571,201
25	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 6,621,277	\$ 17,640,859	\$ 1,796,212,060
26	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 6,956,453	\$ 17,976,035	\$ 1,814,188,096
27	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 7,297,998	\$ 18,317,580	\$ 1,832,505,676
28	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 7,646,032	\$ 18,665,614	\$ 1,851,171,290
29	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 8,000,678	\$ 19,020,261	\$ 1,870,191,550
30	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 8,362,063	\$ 19,381,646	\$ 1,889,573,196
31	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 8,730,315	\$ 19,749,897	\$ 1,909,323,093
32	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 9,105,563	\$ 20,125,145	\$ 1,929,448,238
33	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 9,487,941	\$ 20,507,523	\$ 1,949,955,761
34	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 9,877,583	\$ 20,897,166	\$ 1,970,852,926
35	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 10,274,630	\$ 21,294,212	\$ 1,992,147,138
36	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 10,679,220	\$ 21,698,802	\$ 2,013,845,940
37	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 11,091,497	\$ 22,111,079	\$ 2,035,957,019
38	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 11,511,607	\$ 22,531,190	\$ 2,058,488,209
39	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 11,939,700	\$ 22,959,282	\$ 2,081,447,491
40	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 12,375,926	\$ 23,395,509	\$ 2,104,842,999
41	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 12,820,441	\$ 23,840,023	\$ 2,128,683,022
42	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 13,273,401	\$ 24,292,984	\$ 2,152,976,006
43	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 13,734,968	\$ 24,754,550	\$ 2,177,730,556
44	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 14,205,305	\$ 25,224,887	\$ 2,202,955,443
45	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 14,684,577	\$ 25,704,160	\$ 2,228,659,603
46	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 15,172,956	\$ 26,192,539	\$ 2,254,852,141
47	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 15,670,615	\$ 26,690,197	\$ 2,281,542,338
48	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 16,177,728	\$ 27,197,311	\$ 2,308,739,649
49	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 16,694,477	\$ 27,714,060	\$ 2,336,453,708
50	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 17,221,044	\$ 28,240,627	\$ 2,364,694,335
51	\$ -	\$ -	\$ -	\$ 42,500,000	\$ 68,487,052	\$ 110,987,052	\$ 2,475,681,386
52	\$ -	\$ -	\$ -	\$ 40,000,000	\$ 66,443,111	\$ 106,443,111	\$ 2,582,124,498
53	\$ -	\$ -	\$ -	\$ 54,708,679	\$ 93,641,467	\$ 148,350,146	\$ 2,730,474,643
54	\$ -	\$ -	\$ -	\$ 54,708,679	\$ 96,460,120	\$ 151,168,799	\$ 2,881,643,442
55	\$ -	\$ -	\$ -	\$ 54,708,679	\$ 99,332,327	\$ 154,041,006	\$ 3,035,684,448
56	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 3,035,684,448
57	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 3,035,684,448
58	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 3,035,684,448
59	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 3,035,684,448
60	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 3,035,684,448
	<b>Total Design/Const</b>	<b>Total O&amp;M</b>	<b>Total Cask Handling</b>	<b>Total D&amp;D</b>	<b>Total Escalation</b>		<b>Total Life Cycle</b>
	\$ 1,143,664,945	\$ 532,376,272	\$ 77,017,378	\$ 246,626,036	\$ 1,035,999,816		\$ 3,035,684,448



## APPENDIX A6-20

### STUDY 1 - ALTERNATIVE STORAGE SYSTEMS FOR DUAL PURPOSE CANISTERS

#### COST DETAILS

#### ALTERNATIVE 20 - C-BGV, EXPANDED, HIGH SEISMIC

#### LIFE CYCLE COST – 80 YEAR OPERATING LIFE



# Interim Storage Facility

Expanded Storage Facility (10,000 MTU)

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

Expanded Project - C-BGV 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 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	\$ 25,073,418	\$ -	\$ -	\$ 41,546,053	\$266,619,471	\$638,599,492
10	\$ 615,776,546	\$ 24,539,498	\$ -	\$ -	\$ 132,606,944	\$772,922,988	\$1,411,522,480
11		\$ 25,012,938	\$ 12,836,230	\$ -	\$ 8,706,478	\$46,555,646	\$1,458,078,127
12	\$ -	\$ 25,012,938	\$ 12,836,230	\$ -	\$ 9,591,036	\$47,440,204	\$1,505,518,330
13	\$ -	\$ 25,012,938	\$ 12,836,230	\$ -	\$ 10,492,400	\$48,341,568	\$1,553,859,898
14	\$ -	\$ 11,019,582	\$ 12,836,230	\$ -	\$ 7,192,127	\$31,047,939	\$1,584,907,837
15	\$ -	\$ 11,019,582	\$ 12,836,230	\$ -	\$ 7,782,038	\$31,637,850	\$1,616,545,687
16	\$ -	\$ 11,019,582	\$ 12,836,230	\$ -	\$ 8,383,157	\$32,238,969	\$1,648,784,656
17	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 4,155,332	\$15,174,915	\$1,663,959,570
18	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 4,443,656	\$15,463,238	\$1,679,422,808
19	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 4,737,457	\$15,757,040	\$1,695,179,848
20	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 5,036,841	\$16,056,423	\$1,711,236,271
21	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 5,341,913	\$16,361,495	\$1,727,597,767
22	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 5,652,782	\$16,672,364	\$1,744,270,130
23	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 5,969,556	\$16,989,139	\$1,761,259,269
24	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 6,292,350	\$17,311,932	\$1,778,571,201
25	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 6,621,277	\$17,640,859	\$1,796,212,060
26	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 6,956,453	\$17,976,035	\$1,814,188,096
27	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 7,297,998	\$18,317,580	\$1,832,505,676
28	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 7,646,032	\$18,665,614	\$1,851,171,290
29	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 8,000,678	\$19,020,261	\$1,870,191,550
30	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 8,362,063	\$19,381,646	\$1,889,573,196
31	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 8,730,315	\$19,749,897	\$1,909,323,093
32	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 9,105,563	\$20,125,145	\$1,929,448,238
33	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 9,487,941	\$20,507,523	\$1,949,955,761
34	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 9,877,583	\$20,897,166	\$1,970,852,926
35	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 10,274,630	\$21,294,212	\$1,992,147,138
36	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 10,679,220	\$21,698,802	\$2,013,845,940
37	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 11,091,497	\$22,111,079	\$2,035,957,019
38	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 11,511,607	\$22,531,190	\$2,058,488,209
39	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 11,939,700	\$22,959,282	\$2,081,447,491
40	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 12,375,926	\$23,395,509	\$2,104,842,999
41	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 12,820,441	\$23,840,023	\$2,128,683,022
42	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 13,273,401	\$24,292,984	\$2,152,976,006
43	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 13,734,968	\$24,754,550	\$2,177,730,556
44	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 14,205,305	\$25,224,887	\$2,202,955,443
45	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 14,684,577	\$25,704,160	\$2,228,659,603
46	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 15,172,956	\$26,192,539	\$2,254,852,141
47	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 15,670,615	\$26,690,197	\$2,281,542,338
48	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 16,177,728	\$27,197,311	\$2,308,739,649
49	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 16,694,477	\$27,714,060	\$2,336,453,708
50	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 17,221,044	\$28,240,627	\$2,364,694,335
51	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 17,757,616	\$28,777,199	\$2,393,471,533
52	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 18,304,383	\$29,323,965	\$2,422,795,499
53	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 18,861,538	\$29,881,121	\$2,452,676,619
54	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 19,429,280	\$30,448,862	\$2,483,125,481
55	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 20,007,808	\$31,027,390	\$2,514,152,872
56	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 20,597,329	\$31,616,911	\$2,545,769,782
57	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 21,198,050	\$32,217,632	\$2,577,987,415
58	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 21,810,185	\$32,829,767	\$2,610,817,182
59	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 22,433,950	\$33,453,533	\$2,644,270,714
60	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 23,069,568	\$34,089,150	\$2,678,359,864
61	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 23,717,261	\$34,736,844	\$2,713,096,708
62	\$ -	\$ 11,019,582	\$ -	\$ -	\$ 24,377,261	\$35,396,844	\$2,748,493,551



63	\$	-	\$ 11,019,582	\$	-	\$	-	\$ 25,049,801	\$36,069,384	\$2,784,562,935
64	\$	-	\$ 11,019,582	\$	-	\$	-	\$ 25,735,120	\$36,754,702	\$2,821,317,637
65		\$0	\$ 11,019,582	\$	-	\$	-	\$ 26,433,459	\$37,453,041	\$2,858,770,678
66		\$0	\$ 11,019,582	\$	-	\$	-	\$ 27,145,067	\$38,164,649	\$2,896,935,327
67		\$0	\$ 11,019,582	\$	-	\$	-	\$ 27,870,195	\$38,889,777	\$2,935,825,105
68		\$0	\$ 11,019,582	\$	-	\$	-	\$ 28,609,101	\$39,628,683	\$2,975,453,788
69		\$0	\$ 11,019,582	\$	-	\$	-	\$ 29,362,046	\$40,381,628	\$3,015,835,416
70		\$0	\$ 11,019,582	\$	-	\$	-	\$ 30,129,297	\$41,148,879	\$3,056,984,295
71		\$0	\$ 11,019,582	\$	-	\$	-	\$ 30,911,126	\$41,930,708	\$3,098,915,003
72		\$0	\$ 11,019,582	\$	-	\$	-	\$ 31,707,809	\$42,727,391	\$3,141,642,394
73		\$0	\$ 11,019,582	\$	-	\$	-	\$ 32,519,629	\$43,539,212	\$3,185,181,606
74		\$0	\$ 11,019,582	\$	-	\$	-	\$ 33,346,874	\$44,366,457	\$3,229,548,062
75		\$0	\$ 11,019,582	\$	-	\$	-	\$ 34,189,837	\$45,209,419	\$3,274,757,482
76		\$0	\$ 11,019,582	\$	-	\$	-	\$ 35,048,816	\$46,068,398	\$3,320,825,880
77		\$0	\$ 11,019,582	\$	-	\$	-	\$ 35,924,116	\$46,943,698	\$3,367,769,578
78		\$0	\$ 11,019,582	\$	-	\$	-	\$ 36,816,046	\$47,835,628	\$3,415,605,206
79		\$0	\$ 11,019,582	\$	-	\$	-	\$ 37,724,923	\$48,744,505	\$3,464,349,711
80		\$0	\$ 11,019,582	\$	-	\$	-	\$ 38,651,068	\$49,670,651	\$3,514,020,362
81		\$0	\$ 11,019,582	\$	-	\$	-	\$ 39,594,811	\$50,614,393	\$3,564,634,755
82		\$0	\$ 11,019,582	\$	-	\$	-	\$ 40,556,484	\$51,576,067	\$3,616,210,822
83		\$0	\$ 11,019,582	\$	-	\$	-	\$ 41,536,430	\$52,556,012	\$3,668,766,833
84		\$0	\$ 11,019,582	\$	-	\$	-	\$ 42,534,994	\$53,554,576	\$3,722,321,409
85		\$0	\$ 11,019,582	\$	-	\$	-	\$ 43,552,531	\$54,572,113	\$3,776,893,522
86		\$0	\$ 11,019,582	\$	-	\$	-	\$ 44,589,401	\$55,608,983	\$3,832,502,505
87		\$0	\$ 11,019,582	\$	-	\$	-	\$ 45,645,972	\$56,665,554	\$3,889,168,059
88		\$0	\$ 11,019,582	\$	-	\$	-	\$ 46,722,617	\$57,742,199	\$3,946,910,259
89		\$0	\$ 11,019,582	\$	-	\$	-	\$ 47,819,719	\$58,839,301	\$4,005,749,560
90		\$0	\$ 11,019,582	\$	-	\$	-	\$ 48,937,666	\$59,957,248	\$4,065,706,807
91				\$	-	\$ 42,500,000	\$	193,134,933	\$235,634,933	\$4,301,341,740
92				\$	-	\$ 40,000,000	\$	185,987,761	\$225,987,761	\$4,527,329,501
93				\$	-	\$ 54,708,679	\$	260,251,275	\$314,959,953	\$4,842,289,455
94				\$	-	\$ 54,708,679	\$	266,235,514	\$320,944,193	\$5,163,233,647
95				\$	-	\$ 54,708,679	\$	272,333,454	\$327,042,132	\$5,490,275,780
96					\$	-	\$	-	\$0	\$5,490,275,780
97					\$	-	\$	-	\$0	\$5,490,275,780
98							\$	-	\$0	\$5,490,275,780
99							\$	-	\$0	\$5,490,275,780
100							\$	-	\$0	\$5,490,275,780
		Total	Total	Total	Total	Total	Total	Total	Total	Total
		Design/Const	O&M	Cask Handling	D&D	Escalation				Life Cycle
		\$1,143,664,945	\$973,159,561	\$77,017,378	\$246,626,036	\$3,049,807,860				\$5,490,275,780

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