

STUDY 1 - ALTERNATIVE STORAGE SYSTEMS FOR DUAL PURPOSE CANISTERS

COST DETAILS

ALTERNATIVE 9 - C-UGS, PILOT, LOW SEISMIC

LIFE CYCLE COST SUMMARIES



Total Costs

\$793,179,460

Escalation

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

Interim Storage Facility

Pilot Storage Facility (5,000 MTU)

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

Life Cycle Costs (40 Year Life)

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

Separate CHB

Design & Construction

Annual Escalation Factor 1.90% Discount Rate 3.40%

Capital

\$793,179,460

| Operations & Maintenance (40 Year Life) Cask Handling | , , , | <i>\$532,356,575</i> \$38,508,689 | | | | \$532,356,575 \$38,508,689 |
|---|----------------------|--------------------------------------|-----------|-----------------|-----------------|-------------------------------|
| Transportation Equipment | \$0 | , , , | | | | \$0 |
| Transport Operations | 7 - | \$0 | \$0 | | | <i>\$0</i> |
| Repackaging | \$0 | \$0 | *- | | | <i>\$0</i> |
| Transport to Repository | \$0 | 7 - | \$0 | | | \$0 |
| D&D | 4.0 | | 40 | \$117,623,149 | | \$117,623,149 |
| Escalation | | | | ¥==*,0=0,= .0 | \$731,553,669 | \$731,553,669 |
| Total Costs (40 year Life) | | | | | | \$2,213,221,541 |
| Present Value | | | | | | \$1,152,323,692 |
| Life Cycle Costs (80 Year Life) | Capital | Operations | Transport | Decommissioning | Escalation | Total Costs |
| Design & Construction | <i>\$793,179,460</i> | · | • | _ | | \$793,179,460 |
| Operations & Maintenance (80 Year Life) | | \$978,129,829 | | | | \$978,129,829 |
| Cask Handling | | \$38,508,689 | | | | \$38,508,689 |
| Transportation Equipment | \$0 | | | | | \$0 |
| Transport Operations | | \$0 | \$0 | | | \$0 |
| Repackaging | \$0 | \$0 | | | | \$0 |
| Transport to Repository | \$0 | | \$0 | | | \$0 |
| D&D | | | | \$117,623,149 | | \$117,623,149 |
| Escalation | | | | | \$2,365,192,495 | \$2,365,192,495 |
| Total Costs (80 Year Life) | | | | | | \$4,292,633,622 |
| Present Value | | | | | | \$1,289,745,530 |
| | | | | | | |

Operations

Transport Decommissioning



STUDY 1 - ALTERNATIVE STORAGE SYSTEMS FOR DUAL PURPOSE CANISTERS

COST DETAILS

ALTERNATIVE 9 - C-UGS, PILOT, LOW SEISMIC

CAPITAL COST SUMMARY

\$750,000



Interim Storage Facility

Pilot Storage Facility (5,000 MTU)

Project: C-UGS Pilot (5,000 MTU)
PILOT Project - C-UGS 60/40 Vertical/Horizontal - Low Seismic Separate
CHB

Level 3 Cost Summary - First of A kind module

| Lovel 1 | Lovel 2 | Lovel 2 | Description | | | Lovel 2 Total |
|----------|-------------|----------------|-------------|---|---------------|---------------|
| Level 1 | Level 2 | | Description | so Facility and two new outstien Duniant | | Level 3 Total |
| C-UGS 01 | C-UGS 01.01 | | _ | ge Facility and transportation Project SF Facility | \$485,377,127 | |
| | C-0G5 01.01 | | PHOLE | or racilly | \$465,377,127 | |
| | | C-UGS 01.01.0 | 01 | Storage Pads | | \$0 |
| | | C-UGS 01.01.0 | | Cask Handling (Transfer) Facility | | \$135,175,719 |
| | | C-UGS 01.01.0 | | Horizontal Dry Storage Modules | | \$0 |
| | | C-UGS 01.01.0 | | Vertical Dry Storage Module | | \$191,062,247 |
| | | C-UGS 01.01.0 | | Storage Cask Fabrication Facility | | \$0 |
| | | C-UGS 01.01.0 | | Cask Maintenance Facility | | \$0 |
| | | C-UGS 01.01.0 | | Concrete Batch Plant | | \$1,850,000 |
| | | C-UGS 01.01.0 | | Visitor Center/ Auditorium | | \$0 |
| | | C-UGS 01.01.0 | | Administration Building | | \$3,140,000 |
| | | C-UGS 01.01.1 | | Security | | \$24,148,975 |
| | | C-UGS 01.01.1 | | Rail Spur/ Receiving Yard | | \$58,752,800 |
| | | C-UGS 01.01.1 | 12 | Utilities | | \$18,682,150 |
| | | C-UGS 01.01.1 | 13 | Roads | | \$18,212,737 |
| | | C-UGS 01.01.1 | L4 | Parking | | \$735,000 |
| | | C-UGS 01.01.1 | 15 | Site Work | | \$23,417,500 |
| | | C-UGS 01.01.1 | 16 | Warehouse | | \$10,200,000 |
| | | C-UGS 01.01.1 | L7 | Maintenance Facility | | \$0 |
| | | C-UGS 01.01.1 | 18 | Waste management Facility | | \$0 |
| | | C-UGS 01.01.0 |)1.xx | (Add Further Breakdown as needed) | | \$0 |
| | | | | | | |
| | C-UGS 01.02 | | Expan | ded Interim Storage Facility | \$0 | |
| | | C-UGS 01.02.0 | • | Expanded Storage Pads and Dry Cask Storage Sys | tems | \$0 |
| | | C-UGS 01.02.0 |)2 | Expanded Cask Handling Facility (if required) | | \$0 |
| | | C-UGS 01.02.0 |)3 | Horizontal Dry Storage Modules | | \$0 |
| | | C-UGS 01.02.0 |)4 | Vertical Dry Storage Casks | | \$0 |
| | | C-UGS 01.02.0 |)5 | Storage Cask Fabrication Facility (Expanded) | | \$0 |
| | | C-UGS 01.02.0 | 06 | Cask Maintenance Facility (Expanded) | | \$0 |
| | | C-UGS 01.02.0 |)7 | Concrete Batch Plant (Expanded if needed) | | \$0 |
| | | C-UGS 01.02.0 | 08 | Visitor Center/ Auditorium (expanded if needed) | | \$0 |
| | | C-UGS 01.02.0 |)9 | Administration Building (Expanded if needed) | | \$0 |
| | | C-UGS 01.02.1 | LO | Security (Expanded) | | \$0 |
| | | C-UGS 01.02.1 | l1 | Rail Spur/ Receiving Yard (Expanded) | | \$0 |
| | | C-UGS 01.02.1 | 12 | Utilities Expanded as needed) | | \$0 |
| | | C-UGS 01.02.1 | 13 | Roads (Expanded) | | \$0 |
| | | C-UGS 01.02.1 | L4 | Parking (Expanded as needed) | | \$0 |
| | | C-UGS 01.02.1 | 15 | Site Work (Expanded) | | \$0 |
| | | C-UGS 01.02.1 | 16 | Warehouse (Expanded if Needed) | | \$0 |
| | | C-UGS 01.02.1 | L7 | Maintenance Facility (Expanded if needed) | | \$0 |
| | | C-UGS 01.02.1 | 18 | Waste management Facility (Expanded if needed |) | \$0 |
| | | C-UGS 01.02.1 | 19 | Hot Cell / Laboratories | | \$0 |
| | | C-UGS 01.02.2 | 20 | Pool Packaging Facility | | \$0 |
| | | C-UGS 01.02.2 | 21 | Standardized Storage System | | \$0 |
| | | C-UGS 01.02.2 | 22 | Standardized Disposal Canister | | \$0 |
| | | C-UGS 01.02.2 | 23 | Canister Repackaging Facility (For Repository | | \$0 |
| | C-UGS 01.03 | | Transı | portation Equipment | \$0 | |
| | | C-UGS 01.03.0 |)1 | Transportation Casks | | \$0 |
| | | C-UGS 01.03.0 |)2 | Rail Equipment | | \$0 |
| | | C-UGS 01.03.0 |)3 | Rail Maintenance Facility | | \$0 |
| | | C-UGS 01.03.0 |)4 | Transportation Systems Services | | \$0 |
| | C-UGS 01.04 | | Pre-Co | onstruction Capitalized Costs | \$56,269,000 | |
| | | C-UGS 01.04.0 | | Land or Land Leases | | \$1,920,000 |
| | | C-UGS 01.04.0 | | Site permits | | \$200,000 |
| | | C-UGS 01.04.0 |)3 | Site Licensing | | \$6,240,000 |
| | | C-UGS 01.04.0 | | Plant Permits | | \$0 |
| | | C LICS 01 04 (| 0.0 | Dianning and Alternative Studies | | ¢7F0 000 |

Planning and Alternative Studies

C-UGS 01.04.06

Project Total



| C-UGS 01.0407 Research and Development S23,955,000 C-UGS 01.0408 Other Pre- construction Costs S13,204,000 C-UGS 01.04.010 Pre- construction contingencies S10,000,000 S0 C-UGS 01.04.010 C-UGS 01.05.02 Indirect Capitalized Costs S63,180,000 S0 C-UGS 01.05.02 C-UGS 01.05.02 C-UGS 01.05.03 Field indirect services S11,200,000 C-UGS 01.05.05 C-UGS 01.05.12 C-UGS 01.05.05 | | | | |
|---|--------------|-----------------|---|---------------|
| C-UGS 01.04.09 | | C-UGS 01.04.07 | Research and Development | • |
| C-UGS 01.05 C-UGS 01.04.10 Pre-construction contingencies \$10,000,000 \$0 \$0 \$0 \$0 \$0 \$0 | | C-UGS 01.04.08 | Design | \$23,955,000 |
| C-UGS 01.05 C-UGS 01.05 Indirect Capitalized Costs \$63,180,000 | | C-UGS 01.04.09 | Other Pre-construction Costs | \$13,204,000 |
| C-UGS 01.05 Indirect Capitalized Costs \$53,80,000 | | C-UGS 01.04.10 | Pre-construction contingencies | \$10,000,000 |
| C-UGS 01.05.01 | | C-UGS 01.04.xx | (Add Further Breakdown as needed) | \$0 |
| C-UGS 01.05.02 Construction Management S3,000,000 C-UGS 01.05.04 Design Services in surport of Construction S7,000,000 S7,000,000 S1,000,000 | C-UGS 01.05 | | Indirect Capitalized Costs \$63,180,000 | |
| C-UGS 01.05.03 Filed indirect services \$11,880,000 C-UGS 01.05.04 Design Services in support of Construction \$5,400,000 C-UGS 01.05.06 C-UGS 01.05.06 C-UGS 01.05.07 C-UGS 01.05.06 C-UGS 01.05.07 C-UGS 01.05.08 Document Control \$2,700,000 C-UGS 01.05.09 Project Controls \$3,600,000 \$2,700,000 C-UGS 01.05.11 Inspections \$3,600,000 C-UGS 01.05.12 C-UGS 01.05.11 Inspections \$3,600,000 C-UGS 01.05.12 Startup and Testing \$3,600,000 C-UGS 01.05.12 Startup and Testing \$3,000,000 C-UGS 01.05.12 Startup and Testing \$3,000,000 C-UGS 01.05.12 Startup and Testing \$3,000,000 C-UGS 01.05.12 C-UGS 01.05.13 Commissioning \$3,000,000 C-UGS 01.05.12 C-UGS 01.05.13 Commissioning \$3,000,000 C-UGS 01.05.12 C-UGS 01.05.13 Commissioning \$3,000,000 C-UGS 01.05.13 C-UGS 01.07.04 C-UGS 01.07.03 Deconstruction \$0 C-UGS 01.07.04 C-UGS 01.07.04 C-UGS 01.07.05 C-UGS 01.07.05 C-UGS 01.08.02 E-calation Costs \$81,477,699 \$60 C-UGS 01.08.02 C-UGS 01.08.03 Interest Payments \$81,477,699 \$60 C-UGS 01.08.02 C-UGS 01.09.01 C-UGS | | C-UGS 01.05.01 | Project Management | \$2,700,000 |
| C-UGS 01.05.04 Design Services in support of Construction \$1,200,000 | | C-UGS 01.05.02 | Construction Management | \$3,600,000 |
| C-UGS 01.05.06 | | C-UGS 01.05.03 | Field indirect services | \$11,880,000 |
| C-UGS 01.05.06 Commissioning and Startup \$1,200,000 | | C-UGS 01.05.o4 | Design Services in support of Construction | \$5,400,000 |
| C-UGS 01.05.07 | | C-UGS 01.05.05 | QA/QC | \$12,600,000 |
| C-UGS 01.05.08 | | C-UGS 01.05.06 | Commissioning and Startup | \$1,200,000 |
| C-UGS 01.05.09 | | C-UGS 01.05.07 | Home office Engineering support to Construction | \$7,200,000 |
| C-UGS 01.05.10 | | C-UGS 01.05.08 | Document Control | \$2,700,000 |
| C-UGS 01.05.11 | | C-UGS 01.05.09 | Project Controls | \$3,600,000 |
| C-UGS 01.05.11 | | C-UGS 01.05.10 | Construction Testing | \$2,700,000 |
| C-UGS 01.05.12 | | C-UGS 01.05.11 | | \$3,600,000 |
| C-UGS 01.06 C-UGS 01.06.01 Site Selection S0 Site Selec | | C-UGS 01.05.12 | | |
| C-UGS 01.06 | | C-UGS 01.05.13 | | |
| C-UGS 01.06.01 Site Selection | C-UGS 01.06 | | | |
| C-UGS 01.06.02 Public Information Process \$0 C-UGS 01.07.01 Decomtamination and Deconstruction \$0 C-UGS 01.07.02 Decontamination \$0 C-UGS 01.07.03 Deconstruction \$0 C-UGS 01.07.04 \$0 C-UGS 01.07.05 Project Financial Costs \$1,477,699 C-UGS 01.08.01 C-UGS 01.08.01 C-UGS 01.08.02 Escalation Costs \$32,834.296 C-UGS 01.08.04 Indirect costs to support shipments to repository \$0 C-UGS 01.08.04 C-UGS 01.08.02 (Add Further Breakdown as needed) \$0 C-UGS 01.09.02 C-UGS 01.09.01 Management Reserve - Contractor Held \$34,476,011 C-UGS 01.09.02 C-UGS 01.09.02 Contingencies \$106,875,635 C-UGS 01.09 C-UGS 01.10.01 Other Direct Costs Solution Costs Miscellaneous C-UGS 01.10.03 DOE TM&E \$0 C-UGS 01.10.04 Host site Operational Costs Miscellaneous \$0 C-UGS 01.11.01 Operations Costs \$0 C-UGS 01.11.01 C-UGS 01.11.01 Deconsider Costs Solution Costs \$0 C-UGS 01.11.01 C-UGS 01.11.03 DOE TM&E \$0 C-UGS 01.11.03 DOE TM&E \$0 C-UGS 01.11.04 Host site Operational Costs Miscellaneous \$0 C-UGS 01.11.05 C-UGS 01.11.05 Fixed Costs \$0 C-UGS 01.11.06 C-UGS 01.11.07 Transportation Costs \$0 C-UGS 01.11.07 C-UGS 01.11.08 Fixed Costs \$0 C-UGS 01.11.09 C-UGS 01.11.00 Poperations Costs \$0 C-UGS 01.11.00 Fixed Costs \$0 C-UGS 01.11.01 C-UGS 01.11.03 Fixed Costs \$0 C-UGS 01.11.02 Fixed Costs Solution Costs \$0 C-UGS 01.11.03 Fixed | | C-UGS 01.06.01 | · | \$0 |
| C-UGS 01.07.01 Decommissioning S0 C-UGS 01.07.02 Decontamination S0 C-UGS 01.07.03 Deconstruction S0 S0 C-UGS 01.07.04 S0 S0 C-UGS 01.07.05 S0 S0 C-UGS 01.07.05 S0 S0 C-UGS 01.07.05 S0 S0 C-UGS 01.08.01 C-UGS 01.08.01 Contractor Fees S48,643,402 S2,834,296 C-UGS 01.08.02 Escalation Costs S32,834,296 C-UGS 01.08.03 Interest Payments S0 C-UGS 01.08.03 Interest Payments S0 C-UGS 01.08.05 C-UGS 01.09.02 C-UGS 01.09.03 C-UGS 01.10.03 DOE TM& S0 C-UGS 01.10.04 Host site Operations S0 C-UGS 01.10.05 Miscellaneous ODC S0 S0 C-UGS 01.10.05 C-UGS 01.10.05 Miscellaneous ODC S0 S0 C-UGS 01.11.01 C-UGS 01.11.02 C-UGS 01.10.05 C-UGS 01.11.03 C-UGS 01.11.03 Escalation (Operations Costs S0 C-UGS 01.11.03 C-UGS 01.11.04 C-UGS 01.11.05 C-UGS 01.11.05 C-UGS 01.11.06 C-UGS 01.11.07 C-UGS 01.11.09 C-UGS 01.11.09 C-UGS 01.11.09 C-UGS 01.11.00 C-UG | | C-UGS 01.06.02 | Public Information Process | |
| C-UGS 01.07.02 Decontamination \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0 | C-UGS 01.07 | | Decontamination and Deconstruction \$0 | |
| C-UGS 01.07.02 Decontamination \$0 C-UGS 01.07.03 Deconstruction \$0 C-UGS 01.07.03 Deconstruction \$0 C-UGS 01.07.03 Sport \$0 C-UGS 01.07.04 \$0 C-UGS 01.07.05 \$0 C-UGS 01.07.05 \$0 C-UGS 01.08.07 Project Financial Costs \$1,477,699 Project Financial Costs \$81,477,699 C-UGS 01.08.01 Contractor Fees \$48,643,402 C-UGS 01.08.02 Escalation Costs \$32,834,296 C-UGS 01.08.03 Interest Payments \$32,834,296 C-UGS 01.08.04 Indirect costs to support shipments to repository \$0 C-UGS 01.08.05 \$0 C-UGS 01.08.08 \$10,09.01 Indirect costs to support shipments to repository \$0 C-UGS 01.08.09 Project Contingencies \$106,875,635 C-UGS 01.09.00 Management Reserve - Contractor Held \$34,476,011 C-UGS 01.09.01 Contingency - DOE held \$772,399,624 C-UGS 01.10 Other Direct Costs \$0 C-UGS 01.10.01 Other Direct Costs \$0 C-UGS 01.10.02 DOE Project Operations \$0 C-UGS 01.10.03 DOE TM&E C-UGS 01.10.04 Host site Operational Costs Miscellaneous \$0 C-UGS 01.10.05 Miscellaneous ODC \$0 C-UGS 01.11.01 Operations Costs \$0 C-UGS 01.11.02 Transportation Costs \$0 C-UGS 01.11.03 Escalation (Operations/Transportation) \$70,799,837 TEC (All Direct & indirect Costs, MR, Escalation) \$793,179,460 All Capitol, Operation, Transportation, | | C-UGS 01.07.01 | Decommissioning | \$0 |
| C-UGS 01.07.03 | | C-UGS 01.07.02 | | |
| C-UGS 01.07.04 C-UGS 01.07.05 C-UGS 01.08 C-UGS 01.08.01 C-UGS 01.08.02 C-UGS 01.08.03 C-UGS 01.08.04 C-UGS 01.08.04 C-UGS 01.08.05 C-UGS 01.08.05 C-UGS 01.08.05 C-UGS 01.08.05 C-UGS 01.08.07 C-UGS 01.09 Project Contingencies C-UGS 01.09 Project Contingencies C-UGS 01.09 C-UGS 01.09 C-UGS 01.09 Project Contingencies C-UGS 01.09 Project Contingencies S106,875,635 C-UGS 01.09 C-UGS 01.09 C-UGS 01.09 C-UGS 01.00 C-UGS 01.10 C-UGS 01.10 C-UGS 01.10 C-UGS 01.10.02 DOE Project Operations C-UGS 01.10.04 C-UGS 01.10.05 C-UGS 01.10.05 Miscellaneous ODC C-UGS 01.11 Operations Costs S0 C-UGS 01.11 C-UGS 01.11.01 C-UGS 01.11.01 C-UGS 01.11.02 C-UGS 01.11.05 Miscellaneous ODC C-UGS 01.11.06 C-UGS 01.11.07 C-UGS 01.11.07 C-UGS 01.11.08 C-UGS 01.11.09 C-UGS 01.11.01 C-UGS 01.11.01 C-UGS 01.11.02 C-UGS 01.11.01 C-UGS 01.11.03 C | | C-UGS 01.07.03 | Deconstruction | \$0 |
| C-UGS 01.08 Project Financial Costs \$81,477,699 | | C-UGS 01.07.04 | | \$0 |
| C-UGS 01.08.01 Contractor Fees \$48,643,402 | | C-UGS 01.07.05 | | \$0 |
| C-UGS 01.08.02 | C-UGS 01.08 | | Project Financial Costs \$81,477,699 | |
| C-UGS 01.08.03 Interest Payments \$0 C-UGS 01.08.04 Indirect costs to support shipments to repository \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$ | | C-UGS 01.08.01 | Contractor Fees | \$48,643,402 |
| C-UGS 01.08.04 Indirect costs to support shipments to repository \$0 C-UGS 01.08.05 \$0 \$0 \$0 \$0 \$0 \$0 \$0 | | C-UGS 01.08.02 | Escalation Costs | \$32,834,296 |
| C-UGS 01.09.05 C-UGS 01.09.02 C-UGS 01.09.01 C-UGS 01.09.01 C-UGS 01.09.02 C-UGS 01.100 C-UGS 01.100 C-UGS 01.10.01 C-UGS 01.10.02 C-UGS 01.10.03 C-UGS 01.10.04 C-UGS 01.10.05 C-UGS 01.11 | | C-UGS 01.08.03 | Interest Payments | \$0 |
| C-UGS 01.08.xx | | C-UGS 01.08.04 | Indirect costs to support shipments to repository | \$0 |
| C-UGS 01.09 | | C-UGS 01.08.05 | | \$0 |
| C-UGS 01.09.01 Management Reserve - Contractor Held \$34,476,011 C-UGS 01.09.02 Contingency - DOE held \$72,399,624 C-UGS 01.10 C-UGS 01.10.01 Other Direct Costs \$0 C-UGS 01.10.02 DOE Project Operations \$0 C-UGS 01.10.03 DOE TM&E \$0 C-UGS 01.10.04 Host site Operational Costs Miscellaneous \$0 C-UGS 01.10.05 Miscellaneous ODC \$0 C-UGS 01.11.01 Operational Costs \$0 C-UGS 01.11.01 Coperations Costs \$0 C-UGS 01.11.01 Coperations Costs \$0 C-UGS 01.11.02 Transportation Costs \$0 C-UGS 01.11.03 Escalation (Operations/Transportation) \$720,779,837 TPC (TEC plus Contingency, ODCs) \$793,179,460 All Capitol, Operation, Transportation, | | C-UGS 01.08.xx | (Add Further Breakdown as needed) | \$0 |
| C-UGS 01.09.01 Management Reserve - Contractor Held \$34,476,011 C-UGS 01.09.02 Contingency - DOE held \$72,399,624 C-UGS 01.10 C-UGS 01.10.01 Other Direct Costs \$0 C-UGS 01.10.02 DOE Project Operations \$0 C-UGS 01.10.03 DOE TM&E \$0 C-UGS 01.10.04 Host site Operational Costs Miscellaneous \$0 C-UGS 01.10.05 Miscellaneous ODC \$0 C-UGS 01.11.01 Operational Costs \$0 C-UGS 01.11.01 Coperations Costs \$0 C-UGS 01.11.01 Coperations Costs \$0 C-UGS 01.11.02 Transportation Costs \$0 C-UGS 01.11.03 Escalation (Operations/Transportation) \$720,779,837 TPC (TEC plus Contingency, ODCs) \$793,179,460 All Capitol, Operation, Transportation, | | | | |
| C-UGS 01.10 C-UGS 01.10.01 Other Direct Costs \$0 C-UGS 01.10.02 DOE Project Operations \$0 C-UGS 01.10.03 DOE TM&E \$0 C-UGS 01.10.04 Host site Operational Costs Miscellaneous \$0 C-UGS 01.10.05 Miscellaneous ODC \$0 C-UGS 01.11.01 Operations Costs \$0 C-UGS 01.11.01 Operations Costs \$0 C-UGS 01.11.02 Transportation Costs \$0 C-UGS 01.11.03 Escalation (Operations/Transportation) \$720,779,837 TPC (All Direct & indirect Costs, MR, Escalation) \$733,179,460 All Capitol, Operation, Transportation, | C-UGS 01.09 | | Project Contingencies \$106,875,635 | |
| C-UGS 01.100 C-UGS 01.10.01 Other Direct Costs \$0 C-UGS 01.10.02 DOE Project Operations \$0 C-UGS 01.10.03 DOE TM&E \$0 C-UGS 01.10.04 Host site Operational Costs Miscellaneous \$0 C-UGS 01.10.05 Miscellaneous ODC \$0 C-UGS 01.10.05 Miscellaneous ODC \$0 C-UGS 01.11.01 Operations Costs \$0 C-UGS 01.11.01 Operations Costs \$0 C-UGS 01.11.02 Transportation Costs \$0 C-UGS 01.11.03 Escalation (Operations/Transportation) \$0 C-UGS 01.11.03 C-UGS 01.11.03 C-UGS 01.11.03 Escalation (Operations/Transportation) \$720,779,837 TPC (TEC plus Contingency, ODCs) \$793,179,460 All Capitol, Operation, Transportation, | | C-UGS 01.09.01 | Management Reserve - Contractor Held | \$34,476,011 |
| C-UGS 01.10.01 Other Direct Costs \$0 C-UGS 01.10.02 DOE Project Operations \$0 C-UGS 01.10.03 DOE TM&E \$0 C-UGS 01.10.04 Host site Operational Costs Miscellaneous Miscellaneous C-UGS 01.10.05 Miscellaneous ODC \$0 C-UGS 01.11.01 Operational Costs Operations Costs Octoor \$0 C-UGS 01.11.01 Operations Costs Octoor \$0 C-UGS 01.11.02 Transportation Costs Octoor \$0 C-UGS 01.11.03 Escalation (Operations/Transportation) \$0 TEC (All Direct & indirect Costs, MR, Escalation) \$720,779,837 TPC (TEC plus Contingency, ODCs) \$793,179,460 All Capitol, Operation, Transportation, \$793,179,460 | | C-UGS 01.09.02 | Contingency - DOE held | \$72,399,624 |
| C-UGS 01.10.01 Other Direct Costs \$0 C-UGS 01.10.02 DOE Project Operations \$0 C-UGS 01.10.03 DOE TM&E \$0 C-UGS 01.10.04 Host site Operational Costs Miscellaneous Miscellaneous C-UGS 01.10.05 Miscellaneous ODC \$0 C-UGS 01.11.01 Operational Costs Operations Costs Octoor \$0 C-UGS 01.11.01 Operations Costs Octoor \$0 C-UGS 01.11.02 Transportation Costs Octoor \$0 C-UGS 01.11.03 Escalation (Operations/Transportation) \$0 TEC (All Direct & indirect Costs, MR, Escalation) \$720,779,837 TPC (TEC plus Contingency, ODCs) \$793,179,460 All Capitol, Operation, Transportation, \$793,179,460 | | | | |
| C-UGS 01.10.02 DOE Project Operations \$0 C-UGS 01.10.03 DOE TM&E \$0 C-UGS 01.10.04 Host site Operational Costs Miscellaneous \$0 C-UGS 01.10.05 Miscellaneous ODC \$0 C-UGS 01.11.01 Operations Costs \$0 C-UGS 01.11.02 Transportation Costs \$0 C-UGS 01.11.03 Escalation (Operations/Transportation) \$720,779,837 TPC (All Direct & indirect Costs, MR, Escalation) \$793,179,460 All Capitol, Operation, Transportation, | C-UGS 01.10 | | | |
| C-UGS 01.10.03 DOE TM&E \$0 C-UGS 01.10.04 Host site Operational Costs Miscellaneous \$0 C-UGS 01.10.05 Miscellaneous ODC \$0 C-UGS 01.11.01 Operations Costs \$0 C-UGS 01.11.01 Transportation Costs \$0 C-UGS 01.11.02 Transportation Costs \$0 C-UGS 01.11.03 Escalation (Operations/Transportation) \$720,779,837 TPC (All Direct & indirect Costs, MR, Escalation) \$720,779,837 TPC (TEC plus Contingency, ODCs) \$793,179,460 All Capitol, Operation, Transportation, | | | · | |
| C-UGS 01.10.04 Host site Operational Costs Miscellaneous SDC \$0 C-UGS 01.10.05 Miscellaneous ODC \$0 C-UGS 01.11 Operational Costs 0 C-UGS 01.11.01 Operations Costs \$0 C-UGS 01.11.02 Transportation Costs \$0 C-UGS 01.11.03 Escalation (Operations/Transportation) \$0 TEC (All Direct & indirect Costs, MR, Escalation) \$720,779,837 TPC (TEC plus Contingency, ODCs) \$793,179,460 All Capitol, Operation, Transportation, | | C-UGS 01.10.02 | DOE Project Operations | \$0 |
| C-UGS 01.10.05 Miscellaneous ODC \$0 C-UGS 01.11 Operational Costs 0 C-UGS 01.11.01 Operations Costs \$0 C-UGS 01.11.02 Transportation Costs \$0 C-UGS 01.11.03 Escalation (Operations/Transportation) \$0 TEC (All Direct & indirect Costs, MR, Escalation) \$720,779,837 TPC (TEC plus Contingency, ODCs) \$793,179,460 All Capitol, Operation, Transportation, | | C-UGS 01.10.03 | DOE TM&E | \$0 |
| C-UGS 01.11 Operational Costs \$0 C-UGS 01.11.01 Operations Costs \$0 C-UGS 01.11.02 Transportation Costs \$0 C-UGS 01.11.03 Escalation (Operations/Transportation) \$0 TEC (All Direct & indirect Costs, MR, Escalation) \$720,779,837 TPC (TEC plus Contingency, ODCs) \$793,179,460 All Capitol, Operation, Transportation, | | C-UGS 01.10.04 | Host site Operational Costs Miscellaneous | |
| C-UGS 01.11.01 Operations Costs \$0 C-UGS 01.11.02 Transportation Costs \$0 C-UGS 01.11.03 Escalation (Operations/Transportation) \$0 TEC (All Direct & indirect Costs, MR, Escalation) \$720,779,837 TPC (TEC plus Contingency, ODCs) \$793,179,460 All Capitol, Operation, Transportation, | | C-UGS 01.10.05 | Miscellaneous ODC | \$0 |
| C-UGS 01.11.01 Operations Costs \$0 C-UGS 01.11.02 Transportation Costs \$0 C-UGS 01.11.03 Escalation (Operations/Transportation) \$0 TEC (All Direct & indirect Costs, MR, Escalation) \$720,779,837 TPC (TEC plus Contingency, ODCs) \$793,179,460 All Capitol, Operation, Transportation, | 0.1100.01.11 | | | |
| C-UGS 01.11.02 Transportation Costs \$0 C-UGS 01.11.03 Escalation (Operations/Transportation) \$0 TEC (All Direct & indirect Costs, MR, Escalation) \$720,779,837 TPC (TEC plus Contingency, ODCs) \$793,179,460 All Capitol, Operation, Transportation, | C-UGS 01.11 | 0.1.00.04.44.04 | · | 4.0 |
| C-UGS 01.11.03 Escalation (Operations/Transportation) \$0 TEC (All Direct & indirect Costs, MR, Escalation) \$720,779,837 TPC (TEC plus Contingency, ODCs) \$793,179,460 All Capitol, Operation, Transportation, | | | · | |
| TEC (All Direct & indirect Costs, MR, Escalation) \$720,779,837 TPC (TEC plus Contingency, ODCs) \$793,179,460 All Capitol, Operation, Transportation, | | | · | |
| TPC (TEC plus Contingency, ODCs) \$793,179,460 All Capitol, Operation, Transportation, | | C-UGS 01.11.03 | Escalation (Operations/Transportation) | \$0 |
| TPC (TEC plus Contingency, ODCs) \$793,179,460 All Capitol, Operation, Transportation, | | | | |
| TPC (TEC plus Contingency, ODCs) \$793,179,460 All Capitol, Operation, Transportation, | | | TEC (All Direct & indirect Costs, MR, Escalation) | \$720,779,837 |
| All Capitol, Operation, Transportation, | | | , | |
| LCC Escalation \$793,179,460 | | | All Capitol, Operation, Transportation, | • |
| | | | LCC Escalation | \$793,179,460 |



STUDY 1 - ALTERNATIVE STORAGE SYSTEMS FOR DUAL PURPOSE CANISTERS

COST DETAILS

ALTERNATIVE 9 - C-UGS, PILOT, LOW SEISMIC

LIFE CYCLE COST - 40 YEAR OPERATING LIFE



Pilot Storage Facility (5,000 MTU)

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

Total

Design/Const

\$ 793,179,460

Total

0&M

\$ 532,356,575

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

Separate CHB

| Separate CHB Annual Escalation Discou | | | | | | | | | | | count Rate | | | |
|--|-------------|--------------|------------------|--------------------------|-------------|--------------|------------------|------------|---|------------------------|-------------|--------------------------|-------------|--------------------------------|
| 40 Yea | r Op | erating life | | | | | | | | 1.90% | | | | 3.40% |
| YEAR | | esign/Const | | O&M | | ask Handling | | D&D | | Escalation | An | nual 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 | \$ | - | \$ | - | Ş | - | , | 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 | \$ | 24,243,717 | \$ | - | \$ | - | , | 41,392,899 | \$ | 265,636,616 | \$ | 637,616,638 |
| 10 | \$ | 265,291,061 | \$ | 23,603,013 | \$ \$ | - | \$ \$ | - | , | 59,828,831 | \$ \$ | 348,722,905 | \$ | 986,339,543 |
| 11 | ۲. | | \$ | 24,056,528 | \$ | 12,836,230 | \$ | - | , | 8,486,475 | \$ | 45,379,232 | \$ | 1,031,718,775 |
| 12 | \$ | - | \$ ¢ | 24,056,528 | \$ | 12,836,230 | \$ | - | | 9,348,680 | \$ | 46,241,438 | \$ | 1,077,960,213 |
| 13 | \$ ¢ | - | \$ ¢ | 24,056,528 | \$ | 12,836,230 | \$ \$ | - | ; | 10,227,267 | \$ | 47,120,025 | \$ ¢ | 1,125,080,238 |
| 14 15 | ۶ ۲ | - | ۶ د | 11,144,331 | \$ | - | > | - | ; | 3,359,829 | \$ | 14,504,160 | \$ | 1,139,584,398 |
| 15 16 | ې د | - | ۶ د | 11,144,331 | \$ ¢ | - | ې د | - | | 3,635,408 | \$ ¢ | 14,779,739 | \$ ¢ | 1,154,364,138 |
| 17 | ې د | - | ې د | 11,144,331 | \$ ¢ | - | ې د | - | | 3,916,223 4,202,374 | \$ \$ | 15,060,554 | \$ ¢ | 1,169,424,692 |
| 18 | ې د | - | ې د | 11,144,331 11,144,331 | \$ \$ | - | ې د | _ | | 4,493,961 | ۶ \$ | 15,346,705 15,638,292 | \$ \$ | 1,184,771,397 1,200,409,689 |
| 19 | ې د | - | ې د | 11,144,331 | ۶ \$ | - | ې د | _ | | 4,791,089 | ۶ \$ | 15,935,420 | | |
| 20 | ې د | - | ې د | 11,144,331 | ۶ \$ | - | ې د | _ | | 5,093,862 | ۶ \$ | 16,238,193 | \$ \$ | 1,216,345,109 1,232,583,302 |
| 21 | ب ذ | _ | ب ذ | 11,144,331 | ۶ \$ | _ | ب د | _ | | 5,402,387 | ۶ \$ | 16,546,719 | ۶ \$ | 1,249,130,021 |
| 22 | ب ذ | _ | ب ذ | 11,144,331 | ۶ \$ | _ | ب د | _ | | 5,716,775 | ۶ \$ | 16,861,106 | ب \$ | 1,265,991,127 |
| 23 | ب ذ | _ | ب ذ | 11,144,331 | ۶ \$ | _ | ب د | _ | | 6,037,136 | ۶ \$ | 17,181,467 | ۶ \$ | 1,283,172,594 |
| 24 | ب خ | _ | ٠ < | 11,144,331 | \$ | _ | ب د | _ | , | 6,363,584 | \$ | 17,507,915 | \$ | 1,300,680,509 |
| 25 | ς ς | _ | \$ | 11,144,331 | \$ | _ | \$ | _ | , | 6,696,234 | \$ | 17,840,566 | \$ | 1,318,521,075 |
| 26 | \$ | _ | \$ | 11,144,331 | \$ | _ | Ś | _ | , | 7,035,205 | \$ | 18,179,536 | \$ | 1,336,700,611 |
| 27 | \$ | _ | \$ | 11,144,331 | \$ | _ | \$ | _ | • | 7,380,616 | \$ | 18,524,947 | \$ | 1,355,225,559 |
| 28 | \$ | _ | \$ | 11,144,331 | \$ | _ | \$ | _ | 9 | 7,732,590 | \$ | 18,876,921 | \$ | 1,374,102,480 |
| 29 | \$ | _ | \$ | 11,144,331 | \$ | - | \$ | - | 9 | 8,091,252 | \$ | 19,235,583 | \$ | 1,393,338,063 |
| 30 | \$ | - | \$ | 11,144,331 | \$ | - | \$ | _ | (| 8,456,728 | \$ | 19,601,059 | \$ | 1,412,939,122 |
| 31 | \$ | - | \$ | 11,144,331 | \$ | - | \$ | _ | | 8,829,148 | \$ | 19,973,479 | \$ | 1,432,912,601 |
| 32 | \$ | - | \$ | 11,144,331 | \$ | - | \$ | _ | (| 9,208,644 | \$ | 20,352,975 | \$ | 1,453,265,577 |
| 33 | \$ | - | \$ | 11,144,331 | \$ | - | \$ | - | (| 9,595,350 | \$ | 20,739,682 | \$ | 1,474,005,258 |
| 34 | \$ | - | \$ | 11,144,331 | \$ | - | \$ | - | Ç | 9,989,404 | \$ | 21,133,736 | \$ | 1,495,138,994 |
| 35 | \$ | - | \$ | 11,144,331 | \$ | - | \$ | - | (| 10,390,945 | \$ | 21,535,277 | \$ | 1,516,674,271 |
| 36 | \$ | - | \$ | 11,144,331 | \$ | - | \$ | - | (| 10,800,116 | \$ | 21,944,447 | \$ | 1,538,618,718 |
| 37 | \$ | - | \$ | 11,144,331 | \$ | - | \$ | - | | 11,217,060 | \$ | 22,361,391 | \$ | 1,560,980,109 |
| 38 | \$ | - | \$ | 11,144,331 | \$ | - | \$ | - | , | 11,641,927 | \$ | 22,786,258 | \$ | 1,583,766,367 |
| 39 | \$ | - | \$ | 11,144,331 | \$ | - | \$ | - | , | 12,074,865 | \$ | 23,219,197 | \$ | 1,606,985,564 |
| 40 | \$ | - | \$ | 11,144,331 | \$ | - | \$ | - | ç | 12,516,030 | \$ | 23,660,362 | \$ | 1,630,645,926 |
| 41 | \$ | - | \$ | 11,144,331 | \$ | - | \$ | - | , | 12,965,577 | \$ | 24,109,908 | \$ | 1,654,755,834 |
| 42 | \$ | - | \$ | 11,144,331 | \$ | - | \$ | - | | 13,423,665 | \$ | 24,567,997 | \$ | 1,679,323,831 |
| 43 | \$ | - | \$ | 11,144,331 | \$ | - | \$ | - | , | 13,890,457 | \$ | 25,034,789 | \$ | 1,704,358,619 |
| 44 | \$ | - | \$ | 11,144,331 | \$ | - | \$ | - | , | 14,366,118 | \$ | 25,510,450 | \$ | 1,729,869,069 |
| 45 | \$ | - | \$ | 11,144,331 | \$ | - | \$ | - | , | 14,850,817 | \$ | 25,995,148 | \$ | 1,755,864,217 |
| 46 | \$ | - | \$ | 11,144,331 | \$ | - | \$ | - | , | 15,344,725 | \$ | 26,489,056 | \$ | 1,782,353,273 |
| 47 | \$ | - | \$ | 11,144,331 | \$ | - | \$ | - | , | 15,848,017 | \$ | 26,992,348 | \$ | 1,809,345,621 |
| 48 | \$ | - | \$ | 11,144,331 | \$ | - | \$ | - | , | 16,360,871 | \$ | 27,505,203 | \$ | 1,836,850,824 |
| 49 | \$ | - | \$ | 11,144,331 | \$ | - | \$ | - | , | 16,883,470 | \$ | 28,027,801 | \$ | 1,864,878,625 |
| 50 | \$ | - | \$ | 11,144,331 | \$ | - | Ş | - | , | 17,415,998 | \$ | 28,560,330 | Ş | 1,893,438,955 |
| 51 | \$ | - | \$ • | - | \$ • | - | \$ • | 21,175,000 | , | 34,122,666 | \$ | 55,297,666 | \$ • | 1,948,736,621 |
| 52 | \$ | - | \$ | - | \$ | - | \$ | 20,000,000 | , | 33,221,556 | \$ | 53,221,556 | \$ \$ | 2,001,958,177 |
| 53 | \$ | - | \$ ^ | - | \$ • | - | \$ ^ | 25,482,716 | , | 43,617,192 | \$ | 69,099,908 | \$ | 2,071,058,085 |
| 54 | \$ | - | \$ | - | \$ • | - | \$ ^ | 25,482,716 | 7 | 44,930,090 | \$ | 70,412,806 | \$ \$ | 2,141,470,891 |
| 55 56 | \$ \$ | - | \$ * | - | \$ | - | \$ ^ | 25,482,716 | 7 | 46,267,933 | \$ ^ | 71,750,650 | \$ ¢ | 2,213,221,541 |
| 56 | <u>></u> | - | <u>۲</u> | - | <u>></u> | - | \$ ^ | - | , | - | > | - | <u>></u> | 2,213,221,541 |
| 57 50 | \$ ¢ | - | > د | - | <u>۲</u> | - | \$ ¢ | - | , | - | \$ ¢ | - | <u>۲</u> | 2,213,221,541 |
| 58 59 | ې خ | - | ک د | - | ب | - | > د | - | , | - | ب | - | ب | 2,213,221,541 2,213,221,541 |
| 60 | ې د | - | ې د | - | \$ \$ | - | \$ \$ | - | | - - | ې د | - | ç | 2,213,221,541 2,213,221,541 |
| UU | ې | - | ې | - | Ş | - | Ş | - | , | - | Ş | - | Ş | ۷,۷13,۷21,341 |
| | | Tatal | | T 1 | | | | T ! | | Tatal | | | | |

\$ 38,508,689

Total

D&D

\$ 117,623,149

Total

Escalation

731,553,669

Total

Life Cycle

\$ 2,213,221,541



STUDY 1 - ALTERNATIVE STORAGE SYSTEMS FOR DUAL PURPOSE CANISTERS

COST DETAILS

ALTERNATIVE 9 - C-UGS, PILOT, LOW SEISMIC

LIFE CYCLE COST - 80 YEAR OPERATING LIFE



Pilot Storage Facility (5,000 MTU)

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

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

Separate CHB

80 Year Operating Life

| 00 . ca | . • | Jerum 6 2.116 | | | | | | | | Ann | ual Escalation | | Discount Rate |
|----------|----------|---------------|----------|--------------------------|----------|---------------|----------|-----|---|----------|--------------------------|------------------------------|------------------------------------|
| | | | | | | | | | | | 1.90% | | 3.40% |
| | | | | | | | | | | | | Annual | |
| YEAR | D | esign/Const | | 0&M | C | Cask Handling | | D&D | | | Escalation | 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 | \$ | 24,243,717 | \$ | - | \$ | - | | \$ | 41,392,899 | \$265,636,616 | \$637,616,638 |
| 10 | \$ | 265,291,061 | \$ | 23,603,013 | \$ | - | \$ | - | | \$ | 59,828,831 | \$348,722,905 | \$986,339,543 |
| 11 | | | \$ | 24,056,528 | \$ | 12,836,230 | \$ | - | | \$ | 8,486,475 | \$45,379,232 | \$1,031,718,775 |
| 12 | \$ | - | \$ | 24,056,528 | \$ | 12,836,230 | \$ | - | | \$ | 9,348,680 | \$46,241,438 | \$1,077,960,213 |
| 13 | \$ | - | \$ | 24,056,528 | \$ | 12,836,230 | \$ | - | | \$ | 10,227,267 | \$47,120,025 | \$1,125,080,238 |
| 14 | \$ | - | \$ | 11,144,331 | \$ | - | \$ | - | | \$ | 3,359,829 | \$14,504,160 | \$1,139,584,398 |
| 15 | \$ | - | \$ | 11,144,331 | \$ | - | \$ | - | | \$ | 3,635,408 | \$14,779,739 | \$1,154,364,138 |
| 16 | \$ | - | \$ | 11,144,331 | \$ | - | \$ | - | | \$ | 3,916,223 | \$15,060,554 | \$1,169,424,692 |
| 17 | \$ | - | \$ | 11,144,331 | \$ | - | \$ | - | | \$ | 4,202,374 | \$15,346,705 | \$1,184,771,397 |
| 18 | \$ | - | \$ | 11,144,331 | \$ | - | \$ | - | | \$ | 4,493,961 | \$15,638,292 | \$1,200,409,689 |
| 19 | \$ | - | \$ | 11,144,331 | \$ | - | \$ | - | | \$ | 4,791,089 | \$15,935,420 | \$1,216,345,109 |
| 20 | \$ | - | \$ | 11,144,331 | \$ | - | \$ | - | | Ş | 5,093,862 | \$16,238,193 | \$1,232,583,302 |
| 21 | \$ | - | \$ | 11,144,331 | \$ | - | \$ | - | | Ş | 5,402,387 | \$16,546,719 | \$1,249,130,021 |
| 22 | \$ | - | \$ | 11,144,331 | \$ | - | \$ | - | | Ş | 5,716,775 | \$16,861,106 | \$1,265,991,127 |
| 23 | \$ | - | \$ | 11,144,331 | \$ | - | \$ | - | | Ş | 6,037,136 | \$17,181,467 | \$1,283,172,594 |
| 24 | \$ | - | \$ | 11,144,331 | \$ | - | \$ | - | | Ş | 6,363,584 | \$17,507,915 | \$1,300,680,509 |
| 25 | \$, | - | \$ | 11,144,331 | \$ | - | \$ | - | | \$, | 6,696,234 | \$17,840,566 | \$1,318,521,075 |
| 26 | \$ | - | \$ | 11,144,331 | \$ | - | \$ | - | | \$ | 7,035,205 | \$18,179,536 | \$1,336,700,611 |
| 27 | \$ | - | \$ | 11,144,331 | \$ | - | \$ | - | | Ş | 7,380,616 | \$18,524,947 | \$1,355,225,559 |
| 28 | \$ | - | \$ | 11,144,331 | \$ | - | \$ | - | | Ş | 7,732,590 | \$18,876,921 | \$1,374,102,480 |
| 29 | \$ | - | \$ | 11,144,331 | \$ | - | \$ | - | | Ş | 8,091,252 | \$19,235,583 | \$1,393,338,063 |
| 30 | \$ | - | \$ | 11,144,331 | \$ | - | \$ | - | | \$ | 8,456,728 | \$19,601,059 | \$1,412,939,122 |
| 31 | \$ \$ | - | \$ | 11,144,331 | \$ \$ | - | \$ | - | | \$ \$ | 8,829,148 | \$19,973,479 | \$1,432,912,601 |
| 32 | \$ \$ | - | \$ | 11,144,331 | \$ ¢ | - | \$ ¢ | - | | \$ ¢ | 9,208,644 | \$20,352,975 | \$1,453,265,577 |
| 33 | \$ \$ | - | \$ ¢ | 11,144,331 | \$ ¢ | - | \$ ¢ | - | | \$ ¢ | 9,595,350 | \$20,739,682 | \$1,474,005,258 |
| 34 25 | ک ک | - | <u>۲</u> | 11,144,331 | <u>۲</u> | - | <u>ې</u> | - | | <u>۲</u> | 9,989,404 | \$21,133,736 | \$1,495,138,994 |
| 35 36 | ې د | - | \$ ¢ | 11,144,331 | ې د | - | ۶ د | - | • | ې د | 10,390,945 | \$21,535,277 | \$1,516,674,271 |
| 36 27 | ې خ | - | \$ ¢ | 11,144,331 | ې خ | - | ۶ خ | - | • | ۶ ۲ | 10,800,116 | \$21,944,447 | \$1,538,618,718 |
| 37 38 | ې د | - | ې د | 11,144,331 11,144,331 | ې د | - | ې د | - | | ې د | 11,217,060 11,641,927 | \$22,361,391 \$22,786,258 | \$1,560,980,109 \$1,583,766,367 |
| 39 | ې د | - | ۶ \$ | 11,144,331 | ې د | _ | ې د | - | | ې د | 12,074,865 | \$22,780,238 | \$1,606,985,564 |
| 40 | ې د | - | ۶ \$ | 11,144,331 | ې د | _ | ې د | - | | ې د | 12,516,030 | \$23,660,362 | \$1,630,645,926 |
| 41 | ب خ | _ | ب خ | 11,144,331 | ب خ | _ | ٠ د | _ | | ر ز | 12,965,577 | \$23,000,302 | \$1,654,755,834 |
| 42 | ب خ | _ | ς , | 11,144,331 | ٠ د | _ | ς ς | _ | | ٠ د | 13,423,665 | \$24,567,997 | \$1,679,323,831 |
| 43 | ς ς | _ | \$ | 11,144,331 | ς ς | _ | \$ | _ | | ς ς | 13,890,457 | \$25,034,789 | \$1,704,358,619 |
| 44 | ς ς | _ | \$ | 11,144,331 | ς ς | _ | \$ | _ | | ς ς | 14,366,118 | \$25,510,450 | \$1,729,869,069 |
| 45 | \$ | _ | \$ | 11,144,331 | \$ | _ | \$ | _ | | \$ | 14,850,817 | \$25,995,148 | \$1,755,864,217 |
| 46 | \$ | _ | \$ | 11,144,331 | \$ | _ | \$ | _ | | \$ | 15,344,725 | \$26,489,056 | \$1,782,353,273 |
| 47 | \$ | _ | \$ | 11,144,331 | \$ | _ | \$ | _ | | \$ | 15,848,017 | \$26,992,348 | \$1,809,345,621 |
| 48 | \$ | _ | \$ | 11,144,331 | \$ | _ | \$ | _ | | \$ | 16,360,871 | \$27,505,203 | \$1,836,850,824 |
| 49 | \$ | _ | \$ | 11,144,331 | \$ | _ | \$ | _ | | \$ | 16,883,470 | \$28,027,801 | \$1,864,878,625 |
| 50 | \$ | _ | \$ | 11,144,331 | Ś | _ | \$ | _ | | Ś | 17,415,998 | \$28,560,330 | \$1,893,438,955 |
| 51 | \$ | _ | \$ | 11,144,331 | \$ | - | \$ | - | | \$ | 17,958,645 | \$29,102,976 | \$1,922,541,931 |
| 52 | \$ | _ | \$ | 11,144,331 | \$ | - | \$ | - | | \$ | 18,511,601 | \$29,655,933 | \$1,952,197,864 |
| 53 | \$ | _ | \$ | 11,144,331 | \$ | _ | \$ | - | | \$ | 19,075,064 | \$30,219,395 | \$1,982,417,259 |
| 54 | \$ | - | \$ | 11,144,331 | \$ | _ | \$ | - | | , \$ | 19,649,232 | \$30,793,564 | \$2,013,210,823 |
| 55 | \$ | - | \$ | 11,144,331 | \$ | - | \$ | - | | \$ | 20,234,310 | \$31,378,641 | \$2,044,589,464 |
| 56 | \$ | - | \$ | 11,144,331 | \$ | - | \$ | - | | \$ | 20,830,504 | \$31,974,836 | \$2,076,564,300 |
| 57 | \$ | - | \$ | 11,144,331 | \$ | - | \$ | - | | \$ | 21,438,026 | \$32,582,358 | \$2,109,146,657 |
| 58 | \$ | - | \$ | 11,144,331 | \$ | - | \$ | - | | \$ | 22,057,091 | \$33,201,422 | \$2,142,348,080 |
| - | • | | • | , , | , | | • | | | • | , , , , | . , - , -= - | . , , -,, |

\$793,179,460

\$978,129,829

\$38,508,689

\$117,623,149

\$2,365,192,495

\$4,292,633,622



| 59 | \$ | - | \$ 11,144,331 | \$ | - | \$ | - | \$ | 22,687,918 | \$33,832,249 | \$2,176,180,329 |
|-----|-----------|------|------------------|----|----------|----|------------|----|-------------|---------------|-----------------|
| 60 | \$ | - | \$ 11,144,331 | \$ | - | \$ | - | \$ | 23,330,731 | \$34,475,062 | \$2,210,655,391 |
| 61 | \$ | - | \$ 11,144,331 | \$ | - | \$ | - | \$ | 23,985,757 | \$35,130,088 | \$2,245,785,479 |
| 62 | \$ | - | \$ 11,144,331 | \$ | - | \$ | - | \$ | 24,653,229 | \$35,797,560 | \$2,281,583,039 |
| 63 | \$ | - | \$ 11,144,331 | \$ | - | \$ | - | \$ | 25,333,382 | \$36,477,714 | \$2,318,060,753 |
| 64 | \$ | - | \$ 11,144,331 | \$ | - | \$ | - | \$ | 26,026,459 | \$37,170,790 | \$2,355,231,543 |
| 65 | | \$0 | \$ 11,144,331 | \$ | - | \$ | - | \$ | 26,732,704 | \$37,877,035 | \$2,393,108,578 |
| 66 | | \$0 | \$ 11,144,331 | \$ | - | \$ | - | \$ | 27,452,367 | \$38,596,699 | \$2,431,705,277 |
| 67 | | \$0 | \$ 11,144,331 | \$ | - | \$ | - | \$ | 28,185,705 | \$39,330,036 | \$2,471,035,313 |
| 68 | | \$0 | \$ 11,144,331 | \$ | - | \$ | - | \$ | 28,932,975 | \$40,077,307 | \$2,511,112,620 |
| 69 | | \$0 | \$ 11,144,331 | \$ | - | \$ | - | \$ | 29,694,444 | \$40,838,776 | \$2,551,951,396 |
| 70 | | \$0 | \$ 11,144,331 | \$ | - | \$ | - | \$ | 30,470,381 | \$41,614,712 | \$2,593,566,108 |
| 71 | | \$0 | \$ 11,144,331 | \$ | - | \$ | - | \$ | 31,261,061 | \$42,405,392 | \$2,635,971,500 |
| 72 | | \$0 | \$ 11,144,331 | \$ | - | \$ | - | \$ | 32,066,763 | \$43,211,094 | \$2,679,182,594 |
| 73 | | \$0 | \$ 11,144,331 | \$ | - | \$ | - | \$ | 32,887,774 | \$44,032,105 | \$2,723,214,699 |
| 74 | | \$0 | \$ 11,144,331 | \$ | - | \$ | - | \$ | 33,724,384 | \$44,868,715 | \$2,768,083,414 |
| 75 | | \$0 | \$ 11,144,331 | \$ | - | \$ | - | \$ | 34,576,889 | \$45,721,221 | \$2,813,804,635 |
| 76 | | \$0 | \$ 11,144,331 | \$ | - | \$ | - | \$ | 35,445,593 | \$46,589,924 | \$2,860,394,559 |
| 77 | | \$0 | \$ 11,144,331 | \$ | - | \$ | - | \$ | 36,330,801 | \$47,475,132 | \$2,907,869,692 |
| 78 | | \$0 | \$ 11,144,331 | \$ | - | \$ | - | \$ | 37,232,829 | \$48,377,160 | \$2,956,246,852 |
| 79 | | \$0 | \$ 11,144,331 | \$ | - | \$ | - | \$ | 38,151,995 | \$49,296,326 | \$3,005,543,178 |
| 80 | | \$0 | \$ 11,144,331 | \$ | - | \$ | - | \$ | 39,088,625 | \$50,232,956 | \$3,055,776,134 |
| 81 | | \$0 | \$ 11,144,331 | \$ | - | \$ | - | \$ | 40,043,051 | \$51,187,382 | \$3,106,963,516 |
| 82 | | \$0 | \$ 11,144,331 | \$ | - | \$ | - | \$ | 41,015,611 | \$52,159,943 | \$3,159,123,459 |
| 83 | | \$0 | \$ 11,144,331 | \$ | - | \$ | - | \$ | 42,006,650 | \$53,150,982 | \$3,212,274,440 |
| 84 | | \$0 | \$ 11,144,331 | \$ | - | \$ | - | \$ | 43,016,519 | \$54,160,850 | \$3,266,435,291 |
| 85 | | \$0 | \$ 11,144,331 | \$ | - | \$ | - | \$ | 44,045,575 | \$55,189,906 | \$3,321,625,197 |
| 86 | | \$0 | \$ 11,144,331 | \$ | - | \$ | - | \$ | 45,094,183 | \$56,238,515 | \$3,377,863,712 |
| 87 | | \$0 | \$ 11,144,331 | \$ | - | \$ | - | \$ | 46,162,715 | \$57,307,046 | \$3,435,170,758 |
| 88 | | \$0 | \$ 11,144,331 | \$ | - | \$ | - | \$ | 47,251,549 | \$58,395,880 | \$3,493,566,638 |
| 89 | | \$0 | \$ 11,144,331 | \$ | - | \$ | - | \$ | 48,361,071 | \$59,505,402 | \$3,553,072,040 |
| 90 | | \$0 | \$ 11,144,331 | \$ | - | \$ | - | \$ | 49,491,673 | \$60,636,005 | \$3,613,708,045 |
| 91 | | | | \$ | - | \$ | 21,175,000 | \$ | 96,226,640 | \$117,401,640 | \$3,731,109,685 |
| 92 | | | | \$ | _ | \$ | 20,000,000 | \$ | 92,993,881 | \$112,993,881 | \$3,844,103,565 |
| 93 | | | | \$ | _ | \$ | 25,482,716 | \$ | 121,222,255 | \$146,704,971 | \$3,990,808,536 |
| 94 | | | | \$ | _ | \$ | 25,482,716 | \$ | 124,009,649 | \$149,492,365 | \$4,140,300,902 |
| 95 | | | | \$ | _ | \$ | 25,482,716 | \$ | 126,850,004 | \$152,332,720 | \$4,292,633,622 |
| 96 | | | | • | | \$ | - | \$ | - | \$0 | \$4,292,633,622 |
| 97 | | | | | | \$ | - | \$ | - | \$0 | \$4,292,633,622 |
| 98 | | | | | | • | | \$ | - | \$0 | \$4,292,633,622 |
| 99 | | | | | | | | \$ | - | , \$0 | \$4,292,633,622 |
| 100 | | | | | | | | \$ | - | \$0 | \$4,292,633,622 |
| | | | | | | | | • | | , - | . , ,,- |
| | Total | | Total | Т | otal | | Total | | Total | | Total |
| | Design/Co | onst | 0&M | | Handling | | D&D | | Escalation | | Life Cycle |
| | , 3 , 5 1 | | | | J | | | | | | |



STUDY 1 - ALTERNATIVE STORAGE SYSTEMS FOR DUAL PURPOSE CANISTERS

COST DETAILS

ALTERNATIVE 10 - C-UGS, PILOT, HIGH SEISMIC

LIFE CYCLE COST SUMMARIES



Pilot Storage Facility (5,000 MTU)

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

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

Separate CHB

Annual Escalation Factor 1.90% Discount Rate 3.40%

| Life Cycle Costs (40 Year Life) Design & Construction Operations & Maintenance (40 Year Life) Cask Handling | Capital <i>\$846,002,405</i> | Operations \$532,356,575 \$38,508,689 | Transport | Decommissioning | Escalation | Total Costs \$846,002,405 \$532,356,575 \$38,508,689 |
|---|---------------------------------|---|-----------|-----------------|-----------------|---|
| Transportation Equipment | \$0 | | | | | \$0 |
| Transport Operations | | \$0 | \$0 | | | \$0 |
| Repackaging | \$0 | \$0 | | | | \$0 |
| Transport to Repository | \$0 | | \$0 | | | \$0 |
| D&D | | | | \$139,867,276 | | \$139,867,276 |
| Escalation | | | | | \$781,720,294 | \$781,720,294 |
| Total Costs (40 year Life) Present Value | | | | | | \$2,338,455,240 \$1,208,070,262 |
| Life Cycle Costs (80 Year Life) Design & Construction | Capital \$846,002,405 | Operations | Transport | Decommissioning | Escalation | Total Costs \$846,002,405 |
| Operations & Maintenance (80 Year Life) Cask Handling | φο (ο)ου Σ) (ου | <i>\$978,129,829</i> \$38,508,689 | | | | \$978,129,829 \$38,508,689 |
| Transportation Equipment | \$0 | | | | | \$0 |
| Transport Operations | | \$0 | \$0 | | | \$0 |
| Repackaging | \$0 | \$0 | | | | \$0 |
| Transport to Repository | \$0 | | \$0 | | | \$0 |
| D&D | | | | \$139,867,276 | | \$139,867,276 |
| Escalation | | | | | \$2,484,396,642 | \$2,484,396,642 |
| Total Costs (80 Year Life) Present Value | | | | | | <i>\$4,486,904,841</i> \$1,341,019,283 |



STUDY 1 - ALTERNATIVE STORAGE SYSTEMS FOR DUAL PURPOSE CANISTERS

COST DETAILS

ALTERNATIVE 10 - C-UGS, PILOT, HIGH SEISMIC

CAPITAL COST SUMMARY

\$750,000



Interim Storage Facility

Pilot Storage Facility (5,000 MTU)

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

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

Separate CHB

Level 3 Cost Summary - First of A kind module

| Level 1 C-UGS LE 01 | Level 2 | | ription | Level 3 Total |
|------------------------|-----------------|--|--|------------------------------|
| C-0G2 LE 01 | C-UGS LE 01.01 | inter | im Storage Facility and transportation Project Pilot ISF Facility \$516,711,768 | |
| | 0 0 00 == 0==0= | | , not is. | |
| | | C-UGS LE 01.01.01 | Storage UGSs | \$0 |
| | | C-UGS LE 01.01.02 | Cask Handling (Transfer) Facility | \$163,293,960 |
| | | C-UGS LE 01.01.03 | Horizontal Dry Storage Modules | \$0 |
| | | C-UGS LE 01.01.04 | Vertical Dry Storage Module | \$194,278,647 |
| | | C-UGS LE 01.01.05 | Storage Cask Fabrication Facility | \$0 |
| | | C-UGS LE 01.01.06 | Cask Maintenance Facility | \$0 |
| | | C-UGS LE 01.01.07 | Concrete Batch Plant | \$1,850,000 |
| | | C-UGS LE 01.01.08 | Visitor Center/ Auditorium | \$0 |
| | | C-UGS LE 01.01.09 C-UGS LE 01.01.10 | Administration Building | \$3,140,000 |
| | | C-UGS LE 01.01.11 | Security Rail Spur/ Receiving Yard | \$24,148,975 \$58,752,800 |
| | | C-UGS LE 01.01.11 | Utilities | \$18,682,150 |
| | | C-UGS LE 01.01.13 | Roads | \$18,212,737 |
| | | C-UGS LE 01.01.14 | Parking | \$735,000 |
| | | C-UGS LE 01.01.15 | Site Work | \$23,417,500 |
| | | C-UGS LE 01.01.16 | Warehouse | \$10,200,000 |
| | | C-UGS LE 01.01.17 | Maintenance Facility | \$0 |
| | | C-UGS LE 01.01.18 | Waste management Facility | \$0 |
| | | C-UGS LE | | 4 |
| | | 01.01.01.xx | (Add Further Breakdown as needed) | \$0 |
| | C-UGS LE 01.02 | | Expanded Interim Storage Facility \$0 | |
| | 0 0 00 11 01.01 | C-UGS LE 01.02.01 | Expanded Storage UGSs and Dry Cask Storage Systems | \$0 |
| | | C-UGS LE 01.02.02 | Expanded Cask Handling Facility (if required) | \$0 |
| | | C-UGS LE 01.02.03 | Horizontal Dry Storage Modules | \$0 |
| | | C-UGS LE 01.02.04 | Vertical Dry Storage Casks | \$0 |
| | | C-UGS LE 01.02.05 | Storage Cask Fabrication Facility (Expanded) | \$0 |
| | | C-UGS LE 01.02.06 | Cask Maintenance Facility (Expanded) | \$0 |
| | | C-UGS LE 01.02.07 | Concrete Batch Plant (Expanded if needed) | \$0 |
| | | C-UGS LE 01.02.08 | Visitor Center/ Auditorium (expanded if needed) | \$0 |
| | | C-UGS LE 01.02.09 | Administration Building (Expanded if needed) | \$0 |
| | | C-UGS LE 01.02.10 | Security (Expanded) | \$0 |
| | | C-UGS LE 01.02.11 | Rail Spur/ Receiving Yard (Expanded) | \$0 |
| | | C-UGS LE 01.02.12 | Utilities Expanded as needed) | \$0 |
| | | C-UGS LE 01.02.13 | Roads (Expanded) | \$0 |
| | | C-UGS LE 01.02.14 | Parking (Expanded as needed) | \$0 |
| | | C-UGS LE 01.02.15 | Site Work (Expanded) | \$0 |
| | | C-UGS LE 01.02.16 | Warehouse (Expanded if Needed) | \$0 \$0 |
| | | C-UGS LE 01.02.17 C-UGS LE 01.02.18 | Maintenance Facility (Expanded if needed) Waste management Facility (Expanded if needed) | \$0 \$0 |
| | | C-UGS LE 01.02.19 | Hot Cell / Laboratories | \$0 \$0 |
| | | C-UGS LE 01.02.19 | Pool Packaging Facility | \$0 \$0 |
| | | C-UGS LE 01.02.21 | Standardized Storage System | \$0 \$0 |
| | | C-UGS LE 01.02.22 | Standardized Storage System Standardized Disposal Canister | \$0 |
| | | C-UGS LE 01.02.23 | Canister Repackaging Facility (For Repository | \$0 |
| | C-UGS LE 01.03 | | Transportation Equipment \$0 | • |
| | | C-UGS LE 01.03.01 | Transportation Casks | \$0 |
| | | C-UGS LE 01.03.02 | Rail Equipment | \$0 |
| | | C-UGS LE 01.03.03 | Rail Maintenance Facility | \$0 |
| | | C-UGS LE 01.03.04 | Transportation Systems Services | \$0 |
| | C-UGS LE 01.04 | | Pre-Construction Capitalized Costs \$66,025,000 | |
| | | C-UGS LE 01.04.01 | Land or Land Leases | \$7,680,000 |
| | | C-UGS LE 01.04.02 | Site permits | \$200,000 |
| | | C-UGS LE 01.04.03 | Site Licensing | \$6,240,000 |
| | | C-UGS LE 01.04.05 | Plant Permits | \$0 \$750,000 |

Planning and Alternative Studies

C-UGS LE 01.04.06



| | C-UGS LE 01.04.07 | Research and Development | | \$0 |
|----------------|-------------------|---|---------------|---------------|
| | C-UGS LE 01.04.08 | Design | | \$23,955,000 |
| | C-UGS LE 01.04.09 | Other Pre-construction Costs | | \$17,200,000 |
| | C-UGS LE 01.04.10 | Pre-construction contingencies | | \$10,000,000 |
| | C-UGS LE 01.04.xx | (Add Further Breakdown as needed) | | \$0 |
| C-UGS LE 01.05 | | Indirect Capitalized Costs | \$63,180,000 | |
| | C-UGS LE 01.05.01 | Project Management | | \$2,700,000 |
| | C-UGS LE 01.05.02 | Construction Management | | \$3,600,000 |
| | C-UGS LE 01.05.03 | Field indirect services | | \$11,880,000 |
| | C-UGS LE 01.05.04 | Design Services in support of Construction | | \$5,400,000 |
| | C-UGS LE 01.05.05 | QA/QC | | \$12,600,000 |
| | C-UGS LE 01.05.06 | Commissioning and Startup | | \$1,200,000 |
| | C-UGS LE 01.05.07 | Home office Engineering support to Construction | | \$7,200,000 |
| | C-UGS LE 01.05.08 | Document Control | | \$2,700,000 |
| | C-UGS LE 01.05.09 | Project Controls | | \$3,600,000 |
| | C-UGS LE 01.05.10 | Construction Testing | | \$2,700,000 |
| | C-UGS LE 01.05.11 | Inspections | | \$3,600,000 |
| | C-UGS LE 01.05.12 | Startup and Testing | | \$3,000,000 |
| | C-UGS LE 01.05.13 | Commissioning | | \$3,000,000 |
| C-UGS LE 01.06 | | Site Selection | \$0 | |
| | C-UGS LE 01.06.01 | Site Selection | | \$0 |
| | C-UGS LE 01.06.02 | Public Information Process | | \$0 |
| C-UGS LE 01.07 | | Decontamination and Deconstruction | \$0 | |
| | C-UGS LE 01.07.01 | Decommissioning | | \$0 |
| | C-UGS LE 01.07.02 | Decontamination | | \$0 |
| | C-UGS LE 01.07.03 | Deconstruction | | \$0 |
| | C-UGS LE 01.07.04 | | | \$0 |
| | C-UGS LE 01.07.05 | | | \$0 |
| C-UGS LE 01.08 | | Project Financial Costs | \$86,552,847 | |
| | C-UGS LE 01.08.01 | Contractor Fees | | \$51,673,341 |
| | C-UGS LE 01.08.02 | Escalation Costs | | \$34,879,505 |
| | C-UGS LE 01.08.03 | Interest Payments | | \$0 |
| | C-UGS LE 01.08.04 | Indirect costs to support shipments to repository | | \$0 |
| | C-UGS LE 01.08.05 | | | \$0 |
| | C-UGS LE 01.08.xx | (Add Further Breakdown as needed) | | \$0 |
| | | | | |
| C-UGS LE 01.09 | | Project Contingencies | \$113,532,790 | |
| | C-UGS LE 01.09.01 | Management Reserve - Contractor Held | | \$36,623,481 |
| | C-UGS LE 01.09.02 | Contingency - DOE held | | \$76,909,310 |
| | | | | |
| C-UGS LE 01.10 | | | | |
| | C-UGS LE 01.10.01 | Other Direct Costs | \$0 | |
| | C-UGS LE 01.10.02 | DOE Project Operations | | \$0 |
| | C-UGS LE 01.10.03 | DOE TM&E | | \$0 |
| | C-UGS LE 01.10.04 | Host site Operational Costs Miscellaneous | | \$0 |
| | C-UGS LE 01.10.05 | Miscellaneous ODC | | \$0 |
| | | | | |
| C-UGS LE 01.11 | | Operational Costs | 0 | |
| | C-UGS LE 01.11.01 | Operations Costs | | \$0 |
| | C-UGS LE 01.11.02 | Transportation Costs | | \$0 |
| | C-UGS LE 01.11.03 | Escalation (Operations/Transportation) | | \$0 |
| | | | | |
| | | | | |
| | | | | |
| | | TEC (All Direct & indirect Costs, MR | , Escalation) | \$769,093,096 |
| | | TDC /TEC plus Contingona, ODCs) | | ¢046 003 40E |

Project Total

| TEC | (All Direct & indirect Costs, MR, Escalation) | \$769,093,096 |
|-----|---|---------------|
| TPC | (TEC plus Contingency, ODCs) | \$846,002,405 |
| | All Capitol, Operation, Transportation, | |
| LCC | Escalation | \$846,002,405 |



STUDY 1 - ALTERNATIVE STORAGE SYSTEMS FOR DUAL PURPOSE CANISTERS

COST DETAILS

ALTERNATIVE 10 - C-UGS, PILOT, HIGH SEISMIC

LIFE CYCLE COST - 40 YEAR OPERATING LIFE



Pilot Storage Facility (5,000 MTU)

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

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

Separate CHB

| Separa 40 Yea | | perating life | | | | | | | Ar | nnual Escalation 1.90% | | | Dis | count Rate 3.40% |
|------------------|----------|-----------------------|----------|--------------------------|----------|--------------|---------|--------------|---------|-------------------------|----------|--------------------------|---------|--------------------------------|
| YEAR | · | Design/Const | | O&M | C | ask Handling | | D&D | | Escalation | Λn | ınual Expense | | Cumulative |
| 1 | \$ | 10,000,000 | \$ | OQIVI - | ς | - | \$ | DQD - | \$ | 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 | \$ | 24,243,717 | \$ | - | \$ | _ | \$ | 41,392,899 | \$ | 265,636,616 | \$ | 637,616,638 |
| 10 | \$ | 318,114,006 | \$ | 23,603,013 | \$ | - | \$ | - | \$ | 70,768,256 | \$ | 412,485,275 | \$ | 1,050,101,913 |
| 11 | | | \$ | 24,056,528 | \$ | 12,836,230 | \$ | - | \$ | 8,486,475 | \$ | 45,379,232 | \$ | 1,095,481,145 |
| 12 | \$ | - | \$ | 24,056,528 | \$ | 12,836,230 | \$ | - | \$ | 9,348,680 | \$ | 46,241,438 | \$ | 1,141,722,583 |
| 13 | \$ | - | \$ | 24,056,528 | \$ | 12,836,230 | \$ | - | \$ | 10,227,267 | \$ | 47,120,025 | \$ | 1,188,842,608 |
| 14 | \$ | - | \$ | 11,144,331 | \$ | - | \$ | - | \$ | 3,359,829 | \$ | 14,504,160 | \$ | 1,203,346,768 |
| 15 | \$ | - | \$ | 11,144,331 | \$ | - | \$ | - | \$ | 3,635,408 | \$ | 14,779,739 | \$ | 1,218,126,507 |
| 16 | \$ | - | \$ | 11,144,331 | \$ | - | \$ | - | \$ | 3,916,223 | \$ | 15,060,554 | \$ | 1,233,187,062 |
| 17 | \$ | - | \$ | 11,144,331 | \$ | - | \$ | - | \$ | 4,202,374 | \$ | 15,346,705 | \$ | 1,248,533,767 |
| 18 | \$ | - | \$ | 11,144,331 | \$ | - | \$ | - | \$ | 4,493,961 | \$ | 15,638,292 | \$ | 1,264,172,059 |
| 19 | \$ | - | \$ | 11,144,331 | \$ | - | \$ | - | \$ | 4,791,089 | \$ | 15,935,420 | \$ | 1,280,107,479 |
| 20 | \$ | - | \$ | 11,144,331 | \$ | - | \$ | - | \$ | 5,093,862 | \$ | 16,238,193 | \$ | 1,296,345,672 |
| 21 | \$ | - | \$ | 11,144,331 | \$ | - | \$ | - | \$ | 5,402,387 | \$ | 16,546,719 | \$ | 1,312,892,391 |
| 22 | \$ | - | \$ | 11,144,331 | \$ | - | \$ | - | \$ | 5,716,775 | \$ | 16,861,106 | \$ | 1,329,753,497 |
| 23 | \$ | - | \$ | 11,144,331 | \$ | - | \$ | - | \$ | 6,037,136 | \$ | 17,181,467 | \$ | 1,346,934,964 |
| 24 | \$ | - | \$ | 11,144,331 | \$ | - | \$ | - | \$ | 6,363,584 | \$ | 17,507,915 | \$ | 1,364,442,879 |
| 25 | \$ | - | \$ | 11,144,331 | \$ | - | \$ | - | \$ | 6,696,234 | \$ | 17,840,566 | \$ | 1,382,283,445 |
| 26 | \$ | - | \$ | 11,144,331 | \$ | - | \$ | - | \$ | 7,035,205 | \$ | 18,179,536 | \$ | 1,400,462,981 |
| 27 | \$ | - | \$ | 11,144,331 | \$ | - | \$ | - | \$ | 7,380,616 | \$ | 18,524,947 | \$ | 1,418,987,929 |
| 28 | \$ | - | \$ | 11,144,331 | \$ | - | \$ | - | \$ | 7,732,590 | \$ | 18,876,921 | \$ | 1,437,864,850 |
| 29 | \$ | - | \$ • | 11,144,331 | \$ | - | \$ | - | \$ | 8,091,252 | \$ | 19,235,583 | \$ | 1,457,100,433 |
| 30 | \$ | - | \$ | 11,144,331 | \$ | - | \$ | - | \$ | 8,456,728 | \$ | 19,601,059 | \$ | 1,476,701,492 |
| 31 | \$ \$ | - | \$ ¢ | 11,144,331 | \$ ¢ | - | \$ ¢ | - | \$ ¢ | 8,829,148 | \$ | 19,973,479 | \$ ¢ | 1,496,674,971 |
| 32 | \$ ¢ | - | \$ د | 11,144,331 | \$ ¢ | - | \$ ¢ | - | \$ ¢ | 9,208,644 | \$ | 20,352,975 | \$ ¢ | 1,517,027,947 |
| 33 | <u>۲</u> | - | <u>۲</u> | 11,144,331 | <u>ې</u> | - | \$ د | - | \$ د | 9,595,350 | \$ | 20,739,682 | \$ ¢ | 1,537,767,628 |
| 34 35 | ې خ | - | ې د | 11,144,331 | ې د | - | ې د | - | ې د | 9,989,404 10,390,945 | \$ ¢ | 21,133,736 | ې د | 1,558,901,364 |
| 36 | ې د | _ | ې د | 11,144,331 11,144,331 | ې د | - | ې د | _ | ې د | 10,800,116 | \$ \$ | 21,535,277 21,944,447 | ې د | 1,580,436,641 1,602,381,088 |
| 30 37 | ب خ | _ | ب خ | 11,144,331 | ب خ | _ | ب خ | _ | ب خ | 11,217,060 | ب \$ | 22,361,391 | ب خ | 1,624,742,479 |
| 38 | ٠ \$ | _ | ς ς | 11,144,331 | ς ς | _ | ς ς | _ | ς , | 11,641,927 | \$ | 22,786,258 | ς ς | 1,647,528,737 |
| 39 | \$ | _ | \$ | 11,144,331 | \$ | _ | ς ς | _ | \$ | 12,074,865 | \$ | 23,219,197 | \$ | 1,670,747,934 |
| 40 | \$ | _ | \$ | 11,144,331 | \$ | _ | \$ | _ | \$ | 12,516,030 | \$ | 23,660,362 | \$ | 1,694,408,296 |
| 41 | \$ | _ | \$ | 11,144,331 | \$ | _ | \$ | _ | \$ | 12,965,577 | \$ | 24,109,908 | \$ | 1,718,518,204 |
| 42 | \$ | _ | \$ | 11,144,331 | \$ | _ | \$ | _ | \$ | 13,423,665 | \$ | 24,567,997 | \$ | 1,743,086,201 |
| 43 | \$ | _ | \$ | 11,144,331 | \$ | _ | \$ | _ | \$ | 13,890,457 | \$ | 25,034,789 | \$ | 1,768,120,989 |
| 44 | \$ | _ | \$ | 11,144,331 | \$ | - | \$ | _ | \$ | 14,366,118 | \$ | 25,510,450 | \$ | 1,793,631,439 |
| 45 | \$ | - | \$ | 11,144,331 | \$ | - | \$ | - | \$ | 14,850,817 | \$ | 25,995,148 | \$ | 1,819,626,587 |
| 46 | \$ | - | \$ | 11,144,331 | \$ | - | \$ | - | \$ | 15,344,725 | \$ | 26,489,056 | \$ | 1,846,115,643 |
| 47 | \$ | - | \$ | 11,144,331 | \$ | - | \$ | - | \$ | 15,848,017 | \$ | 26,992,348 | \$ | 1,873,107,991 |
| 48 | \$ | - | \$ | 11,144,331 | \$ | - | \$ | - | \$ | 16,360,871 | \$ | 27,505,203 | \$ | 1,900,613,194 |
| 49 | \$ | - | \$ | 11,144,331 | \$ | - | \$ | - | \$ | 16,883,470 | \$ | 28,027,801 | \$ | 1,928,640,995 |
| 50 | \$ | - | \$ | 11,144,331 | \$ | - | \$ | - | \$ | 17,415,998 | \$ | 28,560,330 | \$ | 1,957,201,325 |
| 51 | \$ | - | \$ | - | \$ | - | \$ | 21,175,000 | \$ | 34,122,666 | \$ | 55,297,666 | \$ | 2,012,498,991 |
| 52 | \$ | - | \$ | - | \$ | - | \$ | 20,000,000 | \$ | 33,221,556 | \$ | 53,221,556 | \$ | 2,065,720,547 |
| 53 | \$ | - | \$ | - | \$ | - | \$ | 32,897,425 | \$ | 56,308,492 | \$ | 89,205,917 | \$ | 2,154,926,464 |
| 54 | \$ | - | \$ | - | \$ | - | \$ | 32,897,425 | \$ | 58,003,404 | \$ | 90,900,830 | \$ | 2,245,827,294 |
| 55 | \$ | - | \$ | - | \$ | - | \$ | 32,897,425 | \$ | 59,730,520 | \$ | 92,627,946 | \$ | 2,338,455,240 |
| 56 | \$ | - | \$ | - | \$ | - | \$ | - | \$ | - | \$ | - | \$ | 2,338,455,240 |
| 57 | \$ | - | \$ | - | \$ | - | \$ | - | \$ | - | \$ | - | \$ | 2,338,455,240 |
| 58 | \$ | - | \$ | - | \$ | - | \$ | - | \$ | - | \$ | - | \$ | 2,338,455,240 |
| 59 | \$ | - | \$ | - | \$ | - | \$ | - | \$ | - | \$ | - | \$ | 2,338,455,240 |
| 60 | \$ | - | \$ | - | \$ | - | \$ | - | \$ | - | \$ | - | \$ | 2,338,455,240 |
| | | Total | | Total | | | | Total | | Total | | | | Total |
| | , | Total Design/Const | | Total O&M | | | | Total D&D | | Total Escalation | | | | Total Life Cycle |
| | | 846.002.405 | ς. | 532.356.575 | ς' | 38.508.689 | ς. | 139.867.276 | ς. | 781.720.294 | | | ς. | 2.338.455.240 |

\$ 139,867,276

781,720,294

\$ 2,338,455,240

\$ 846,002,405 \$ 532,356,575 \$ 38,508,689



STUDY 1 - ALTERNATIVE STORAGE SYSTEMS FOR DUAL PURPOSE CANISTERS

COST DETAILS

ALTERNATIVE 10 - C-UGS, PILOT, HIGH SEISMIC

LIFE CYCLE COST - 80 YEAR OPERATING LIFE



Pilot Storage Facility (5,000 MTU)

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

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

Separate CHB

80 Year Operating Life

| 80 Yea | r Operating Life | | | | | | | | | | |
|--------|------------------|---------|------------|---------|--------------|--------|---------------|---------|-----------------|--------------------------|-----------------------------|
| | | | | | | | | Anr | nual Escalation | | Discount Rate |
| | | | | | | | | | 1.90% | | 3.40% |
| | | | | | | | | | | Annual | |
| YEAR | Design/Const | | 0&M | Ca | ask Handling | | D&D | | Escalation | 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 | \$ | 24,243,717 | \$ | - | \$ | _ | \$ | 41,392,899 | \$265,636,616 | \$637,616,638 |
| 10 | \$ 318,114,006 | \$ | 23,603,013 | \$ | - | \$ | _ | \$ | 70,768,256 | \$412,485,275 | \$1,050,101,913 |
| 11 | | \$ | 24,056,528 | \$ | 12,836,230 | \$ | _ | \$ | 8,486,475 | \$45,379,232 | \$1,095,481,145 |
| 12 | \$ - | \$ | 24,056,528 | \$ | 12,836,230 | \$ | _ | \$ | 9,348,680 | \$46,241,438 | \$1,141,722,583 |
| 13 | \$ - | \$ | 24,056,528 | \$ | 12,836,230 | \$ | _ | \$ | 10,227,267 | \$47,120,025 | \$1,188,842,608 |
| 14 | \$ - | Ś | 11,144,331 | \$ | ,, | \$ | _ | Ś | 3,359,829 | \$14,504,160 | \$1,203,346,768 |
| 15 | \$ - | \$ | 11,144,331 | \$ | _ | \$ | _ | Ś | 3,635,408 | \$14,779,739 | \$1,218,126,507 |
| 16 | \$ - | \$ | 11,144,331 | \$ | _ | \$ | _ | \$ | 3,916,223 | \$15,060,554 | \$1,233,187,062 |
| 17 | \$ - | \$ | 11,144,331 | \$ | _ | \$ | _ | \$ | 4,202,374 | \$15,346,705 | \$1,248,533,767 |
| 18 | \$ - | \$ | 11,144,331 | \$ | _ | \$ | _ | ς ς | 4,493,961 | \$15,638,292 | \$1,264,172,059 |
| 19 | \$ - | \$ | 11,144,331 | ς ς | _ | ς , | _ | ς ς | 4,791,089 | \$15,935,420 | \$1,280,107,479 |
| 20 | \$ - | \$ | 11,144,331 | ς ς | _ | ς , | _ | ς ς | 5,093,862 | \$16,238,193 | \$1,296,345,672 |
| 21 | \$ - | ς ς | 11,144,331 | ς ς | _ | \$ | _ | ς ς | 5,402,387 | \$16,546,719 | \$1,312,892,391 |
| 22 | \$ - | ς , | 11,144,331 | ς ς | _ | ς ς | _ | ς ς | 5,716,775 | \$16,861,106 | \$1,329,753,497 |
| 23 | \$ - | ς , | 11,144,331 | ς ς | _ | ς ς | _ | ς ς | 6,037,136 | \$17,181,467 | \$1,346,934,964 |
| 24 | ٠ • | ς , | 11,144,331 | ς ς | _ | ς ς | _ | ς ς | 6,363,584 | \$17,507,915 | \$1,364,442,879 |
| 25 | ٠ • | ς , | 11,144,331 | ς ς | _ | ς ς | _ | ς ς | 6,696,234 | \$17,840,566 | |
| 26 | ٠ • | ς , | 11,144,331 | ς ς | _ | ς ς | _ | ς ς | 7,035,205 | \$18,179,536 | \$1,400,462,981 |
| 27 | ٠ • | ς , | 11,144,331 | ς ς | _ | ς ς | _ | ς ς | 7,380,616 | \$18,524,947 | \$1,418,987,929 |
| 28 | ٠ • | ς , | 11,144,331 | ς ς | _ | ς ς | _ | ς ς | 7,732,590 | \$18,876,921 | \$1,437,864,850 |
| 29 | ٠ • | ς , | 11,144,331 | ς ς | _ | ς ς | _ | ς ς | 8,091,252 | \$19,235,583 | \$1,457,100,433 |
| 30 | ٠ • | ς , | 11,144,331 | ς ς | _ | ς ς | _ | ς ς | 8,456,728 | \$19,601,059 | \$1,476,701,492 |
| 31 | ٠ • | ς , | 11,144,331 | ς ς | _ | ς ς | _ | ς ς | 8,829,148 | \$19,973,479 | \$1,496,674,971 |
| 32 | ٠ • | ς , | 11,144,331 | ς ς | _ | ς ς | _ | ς ς | 9,208,644 | \$20,352,975 | \$1,517,027,947 |
| 33 | ٠ • | ς , | 11,144,331 | ς ς | _ | ς ς | _ | ς ς | 9,595,350 | \$20,739,682 | \$1,537,767,628 |
| 34 | ٠ • | ς , | 11,144,331 | ς ς | _ | ς ς | _ | ς ς | 9,989,404 | \$20,733,082 | \$1,558,901,364 |
| 35 | ٠ • | ς , | 11,144,331 | ς ς | _ | ς ς | _ | ς ς | 10,390,945 | \$21,535,730 | \$1,580,436,641 |
| 36 | ٠ • | ς , | 11,144,331 | ς ς | _ | ς ς | _ | ς ς | 10,800,116 | \$21,944,447 | \$1,602,381,088 |
| 37 | - د - | ç | 11,144,331 | ٠ , | | ٠ د | _ | ٠ د | 11,217,060 | \$22,361,391 | \$1,624,742,479 |
| 38 | - د - | ç | 11,144,331 | ٠ , | | ٠ د | _ | ٠ د | 11,641,927 | \$22,786,258 | \$1,647,528,737 |
| 39 | - د - | ç | 11,144,331 | ٠ , | | ٠ د | _ | ٠ د | 12,074,865 | \$23,219,197 | \$1,670,747,934 |
| 40 | - د - | ç | 11,144,331 | ٠ , | | ٠ د | _ | ٠ د | 12,516,030 | \$23,660,362 | \$1,694,408,296 |
| 41 | - د - | ç | 11,144,331 | ٠ , | | ٠ د | _ | ٠ د | 12,965,577 | \$23,000,302 | \$1,718,518,204 |
| 42 | - د - | ç | 11,144,331 | ٠ , | | ٠ د | _ | ٠ د | 13,423,665 | \$24,567,997 | \$1,743,086,201 |
| 43 | - د - | ç | 11,144,331 | ٠ , | | ٠ د | _ | ٠ د | 13,890,457 | \$25,034,789 | \$1,768,120,989 |
| 44 | - د - | ç | 11,144,331 | ٠ , | | ٠ د | _ | ٠ د | 14,366,118 | \$25,510,450 | \$1,793,631,439 |
| 45 | - د - | ç | 11,144,331 | ٠ , | | ٠ د | _ | ٠ د | 14,850,817 | \$25,995,148 | \$1,819,626,587 |
| 46 | - د - | ç | 11,144,331 | ٠ , | | ٠ د | _ | ٠ د | 15,344,725 | \$26,489,056 | \$1,846,115,643 |
| 47 | - د - | ç | 11,144,331 | ٠ , | | ٠ د | _ | ٠ د | 15,848,017 | \$26,992,348 | \$1,873,107,991 |
| 48 | - د - | ç | 11,144,331 | ٠ , | | ٠ د | _ | ٠ د | 16,360,871 | \$20,552,348 | \$1,900,613,194 |
| 49 | - د - | ç | 11,144,331 | ٠ , | | ٠ د | _ | ٠ د | 16,883,470 | \$27,303,203 | \$1,928,640,995 |
| 50 | - د - | ç | 11,144,331 | ٠ , | | ٠ د | _ | ٠ د | 17,415,998 | \$28,560,330 | \$1,957,201,325 |
| 51 | - خ | ¢ | 11,144,331 | ب د | - - | ب د | - - | ب خ | 17,958,645 | \$29,102,976 | \$1,986,304,301 |
| 52 | - خ | ¢ | 11,144,331 | ب د | - - | ب د | - - | ب خ | 18,511,601 | \$29,655,933 | \$2,015,960,234 |
| 53 | - خ | ¢ | 11,144,331 | ب د | - - | ب د | - - | ب خ | 19,075,064 | \$30,219,395 | \$2,013,900,234 |
| 54 | - خ | ¢ | 11,144,331 | ب د | - - | ب د | - - | ب خ | 19,649,232 | \$30,219,593 | \$2,046,179,629 |
| 55 | - خ | ¢ | 11,144,331 | ب د | - - | ب د | - - | ب خ | 20,234,310 | \$30,793,304 | \$2,070,973,193 |
| 56 | \$ - | ¢ | 11,144,331 | ۶ \$ | - - | ب د | - - | ۶ \$ | 20,234,310 | \$31,974,836 | \$2,140,326,670 |
| 57 | \$ - | ب \$ | 11,144,331 | ب خ | - - | ς ς | - | ۶ \$ | 21,438,026 | \$32,582,358 | \$2,172,909,027 |
| 58 | \$ - | ٠ \$ | 11,144,331 | ۶ \$ | - - | ς ς | - | ۶ \$ | 22,057,091 | \$33,201,422 | \$2,206,110,450 |
| 50 | · · | Y | ±±,±¬¬,∪∪± | ڔ | _ | Ţ | _ | ب | 22,001,001 | 433,201, 4 22 | 72,200,110, 1 00 |

\$846,002,405

\$978,129,829

\$38,508,689

\$139,867,276

\$2,484,396,642

\$4,486,904,841



| 59 | \$ | - | \$ 11,144,331 | \$ | - | \$ - | \$ 22,687,918 | \$33,832,249 | \$2,239,942,699 |
|-----|--------|---------|------------------|----------|-------|---------------|-------------------|---------------|-----------------|
| 60 | \$ | - | \$ 11,144,331 | \$ | - | \$ - | \$ 23,330,731 | \$34,475,062 | \$2,274,417,761 |
| 61 | \$ | - | \$ 11,144,331 | \$ | - | \$ - | \$ 23,985,757 | \$35,130,088 | \$2,309,547,849 |
| 62 | \$ | - | \$ 11,144,331 | \$ | - | \$ - | \$ 24,653,229 | \$35,797,560 | \$2,345,345,409 |
| 63 | \$ | - | \$ 11,144,331 | \$ | - | \$ - | \$ 25,333,382 | \$36,477,714 | \$2,381,823,123 |
| 64 | \$ | - | \$ 11,144,331 | \$ | - | \$ - | \$ 26,026,459 | \$37,170,790 | \$2,418,993,913 |
| 65 | | \$0 | \$ 11,144,331 | \$ | - | \$ - | \$ 26,732,704 | \$37,877,035 | \$2,456,870,948 |
| 66 | | \$0 | \$ 11,144,331 | \$ | - | \$ - | \$ 27,452,367 | \$38,596,699 | \$2,495,467,647 |
| 67 | | \$0 | \$ 11,144,331 | \$ | - | \$ - | \$ 28,185,705 | \$39,330,036 | \$2,534,797,683 |
| 68 | | \$0 | \$ 11,144,331 | \$ | - | \$ - | \$ 28,932,975 | \$40,077,307 | \$2,574,874,990 |
| 69 | | \$0 | \$ 11,144,331 | \$ | - | \$ - | \$ 29,694,444 | \$40,838,776 | \$2,615,713,765 |
| 70 | | \$0 | \$ 11,144,331 | \$ | - | \$ - | \$ 30,470,381 | \$41,614,712 | \$2,657,328,478 |
| 71 | | \$0 | \$ 11,144,331 | \$ | - | \$ - | \$ 31,261,061 | \$42,405,392 | \$2,699,733,870 |
| 72 | | \$0 | \$ 11,144,331 | \$ | - | \$ - | \$ 32,066,763 | \$43,211,094 | \$2,742,944,964 |
| 73 | | \$0 | \$ 11,144,331 | \$ | - | \$ - | \$ 32,887,774 | \$44,032,105 | \$2,786,977,069 |
| 74 | | \$0 | \$ 11,144,331 | \$ | - | \$ - | \$ 33,724,384 | \$44,868,715 | \$2,831,845,784 |
| 75 | | \$0 | \$ 11,144,331 | \$ | - | \$ - | \$ 34,576,889 | \$45,721,221 | \$2,877,567,005 |
| 76 | | \$0 | \$ 11,144,331 | \$ | - | \$ - | \$ 35,445,593 | \$46,589,924 | \$2,924,156,929 |
| 77 | | \$0 | \$ 11,144,331 | \$ | - | \$ - | \$ 36,330,801 | \$47,475,132 | \$2,971,632,061 |
| 78 | | \$0 | \$ 11,144,331 | \$ | - | \$ - | \$ 37,232,829 | \$48,377,160 | \$3,020,009,221 |
| 79 | | \$0 | \$ 11,144,331 | \$ | - | \$ - | \$ 38,151,995 | \$49,296,326 | \$3,069,305,547 |
| 80 | | \$0 | \$ 11,144,331 | \$ | - | \$ - | \$ 39,088,625 | \$50,232,956 | \$3,119,538,504 |
| 81 | | \$0 | \$ 11,144,331 | \$ | - | \$ - | \$ 40,043,051 | \$51,187,382 | \$3,170,725,886 |
| 82 | | \$0 | \$ 11,144,331 | \$ | - | \$ - | \$ 41,015,611 | \$52,159,943 | \$3,222,885,829 |
| 83 | | \$0 | \$ 11,144,331 | \$ | - | \$ - | \$ 42,006,650 | \$53,150,982 | \$3,276,036,810 |
| 84 | | \$0 | \$ 11,144,331 | \$ | - | \$ - | \$ 43,016,519 | \$54,160,850 | \$3,330,197,660 |
| 85 | | \$0 | \$ 11,144,331 | \$ | - | \$ - | \$ 44,045,575 | \$55,189,906 | \$3,385,387,567 |
| 86 | | \$0 | \$ 11,144,331 | \$ | - | \$ - | \$ 45,094,183 | \$56,238,515 | \$3,441,626,081 |
| 87 | | \$0 | \$ 11,144,331 | \$ | - | \$ - | \$ 46,162,715 | \$57,307,046 | \$3,498,933,128 |
| 88 | | \$0 | \$ 11,144,331 | \$ | - | \$ - | \$ 47,251,549 | \$58,395,880 | \$3,557,329,008 |
| 89 | | \$0 | \$ 11,144,331 | \$ | - | \$ - | \$ 48,361,071 | \$59,505,402 | \$3,616,834,410 |
| 90 | | \$0 | \$ 11,144,331 | \$ | - | \$ - | \$ 49,491,673 | \$60,636,005 | \$3,677,470,415 |
| 91 | | | | \$ | - | \$ 21,175,000 | \$ 96,226,640 | \$117,401,640 | \$3,794,872,055 |
| 92 | | | | \$ | - | \$ 20,000,000 | \$ 92,993,881 | \$112,993,881 | \$3,907,865,935 |
| 93 | | | | \$ | - | \$ 32,897,425 | \$ 156,494,310 | \$189,391,736 | \$4,097,257,671 |
| 94 | | | | \$ | - | \$ 32,897,425 | \$ 160,092,753 | \$192,990,179 | \$4,290,247,849 |
| 95 | | | | \$ | - | \$ 32,897,425 | \$ 163,759,566 | \$196,656,992 | \$4,486,904,841 |
| 96 | | | | | | \$ - | \$ - | \$0 | \$4,486,904,841 |
| 97 | | | | | | \$ - | \$ - | \$0 | \$4,486,904,841 |
| 98 | | | | | | | \$ - | \$0 | \$4,486,904,841 |
| 99 | | | | | | | \$ - | \$0 | \$4,486,904,841 |
| 100 | | | | | | | \$ - | \$0 | \$4,486,904,841 |
| | To | otal | Total | Tota | I | Total | Total | | Total |
| | Design | n/Const | O&M | Cask Han | dling | D&D | Escalation | | Life Cycle |
| | | | | | | | | | |



STUDY 1 - ALTERNATIVE STORAGE SYSTEMS FOR DUAL PURPOSE CANISTERS

COST DETAILS

ALTERNATIVE 11 - C-UGS, EXPANDED, LOW SEISMIC

LIFE CYCLE COST SUMMARIES

\$5,020,872,220

\$1,598,599,606



Interim Storage Facility

Expanded Storage Facility (10,000 MTU)

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

Expanded Project - C-UGS 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 |
|---|-----------------|---------------|-----------|-----------------|---------------|----------------------|
| Design & Construction | \$1,099,347,594 | | | | | \$1,099,347,594 |
| Operations & Maintenance (40 Year Life) | | \$532,356,575 | | | | <i>\$532,356,575</i> |
| Cask Handling | | \$77,017,378 | | | | <i>\$77,017,378</i> |
| Transportation Equipment | \$0 | | | | | \$0 |
| Transport Operations | | \$0 | \$0 | | | \$0 |
| Repackaging | \$0 | \$0 | | | | \$0 |
| Transport to Repository | \$0 | | \$0 | | | \$0 |
| D&D | | | | \$170,280,450 | | \$170,280,450 |
| Escalation | | | | | \$899,748,242 | \$899,748,242 |
| | | | | | | |

| Total Costs (40 year Life) | \$2,778,750,239 |
|----------------------------|-----------------|
| Present Value | \$1,471,803,203 |

| Life Cycle Costs (80 Year Life) Design & Construction | Capital \$1,099,347,594 | Operations | Transport | Decommissioning | Escalation | Total Costs \$1,099,347,594 |
|--|----------------------------|---------------|-----------|-----------------|-----------------|--------------------------------|
| • | 71,033,347,334 | Ć070 130 030 | | | | |
| Operations & Maintenance (80 Year Life) | | \$978,129,829 | | | | \$978,129,829 |
| Cask Handling | | \$77,017,378 | | | | <i>\$77,017,378</i> |
| Transportation Equipment | \$0 | | | | | \$0 |
| Transport Operations | | \$0 | \$0 | | | \$0 |
| Repackaging | \$0 | \$0 | | | | \$0 |
| Transport to Repository | \$0 | | \$0 | | | \$0 |
| D&D | | | | \$170,280,450 | | \$170,280,450 |
| Escalation | | | | | \$2,696,096,969 | \$2,696,096,969 |

Total Costs (80 Year Life)

Present Value



STUDY 1 - ALTERNATIVE STORAGE SYSTEMS FOR DUAL PURPOSE CANISTERS

COST DETAILS

ALTERNATIVE 11 - C-UGS, EXPANDED, LOW SEISMIC

CAPITAL COST SUMMARY



Expanded Storage Facility (10,000 MTU)

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

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

Separate CHB

| Level 3 Cost Sumi | mary - First of A kin | d module | | |
|------------------------|-----------------------|-------------------|--|---------------|
| Level 1 C-UGS EX 01 | Level 2 | Level 3 Descrip | otion n Storage Facility and transportation Project | Level 3 Total |
| | C-UGS EX 01.01 | | Pilot ISF Facility \$488,593,527 | |
| | | C-UGS EX 01.01.01 | Storage UGSs | \$0 |
| | | C-UGS EX 01.01.02 | Cask Handling (Transfer) Facility | \$135,175,719 |
| | | C-UGS EX 01.01.03 | Horizontal Dry Storage Modules | \$133,173,713 |
| | | C-UGS EX 01.01.04 | Vertical Dry Storage Module | \$194,278,647 |
| | | | , | |
| | | C-UGS EX 01.01.05 | Storage Cask Fabrication Facility | \$0 \$0 |
| | | C-UGS EX 01.01.06 | Cask Maintenance Facility | \$0 |
| | | C-UGS EX 01.01.07 | Concrete Batch Plant | \$1,850,000 |
| | | C-UGS EX 01.01.08 | Visitor Center/ Auditorium | \$0 |
| | | C-UGS EX 01.01.09 | Administration Building | \$3,140,000 |
| | | C-UGS EX 01.01.10 | Security | \$24,148,975 |
| | | C-UGS EX 01.01.11 | Rail Spur/ Receiving Yard | \$58,752,800 |
| | | C-UGS EX 01.01.12 | Utilities | \$18,682,150 |
| | | C-UGS EX 01.01.13 | Roads | \$18,212,737 |
| | | C-UGS EX 01.01.14 | Parking | \$735,000 |
| | | C-UGS EX 01.01.15 | Site Work | \$23,417,500 |
| | | C-UGS EX 01.01.16 | Warehouse | \$10,200,000 |
| | | C-UGS EX 01.01.17 | Maintenance Facility | \$0 |
| | | C-UGS EX 01.01.18 | Waste management Facility | \$0 |
| | | C-UGS EX | (Add Further Dural day or as dad) | ćo |
| | | 01.01.01.xx | (Add Further Breakdown as needed) | \$0 |
| | C-UGS EX 01.02 | | Expanded Interim Storage Facility \$221,545,476 | |
| | C 003 LX 01.02 | C-UGS EX 01.02.01 | Expanded Storage UGSs and Dry Cask Storage Systems | \$0 |
| | | C-UGS EX 01.02.02 | Expanded Cask Handling Facility (if required) | \$0 \$0 |
| | | C-UGS EX 01.02.02 | Horizontal Dry Storage Modules | \$0 \$0 |
| | | C-UGS EX 01.02.03 | Vertical Dry Storage Casks | • |
| | | | , - | \$194,278,647 |
| | | C-UGS EX 01.02.05 | Storage Cask Fabrication Facility (Expanded) | \$0 \$0 |
| | | C-UGS EX 01.02.06 | Cask Maintenance Facility (Expanded) | \$0 |
| | | C-UGS EX 01.02.07 | Concrete Batch Plant (Expanded if needed) | \$1,850,000 |
| | | C-UGS EX 01.02.08 | Visitor Center/ Auditorium (expanded if needed) | \$745,000 |
| | | C-UGS EX 01.02.09 | Administration Building (Expanded if needed) | \$0 |
| | | C-UGS EX 01.02.10 | Security (Expanded) | \$10,074,488 |
| | | C-UGS EX 01.02.11 | Rail Spur/ Receiving Yard (Expanded) | \$0 |
| | | C-UGS EX 01.02.12 | Utilities Expanded as needed) | \$3,624,200 |
| | | C-UGS EX 01.02.13 | Roads (Expanded) | \$83,142 |
| | | C-UGS EX 01.02.14 | Parking (Expanded as needed) | \$0 |
| | | C-UGS EX 01.02.15 | Site Work (Expanded) | \$10,890,000 |
| | | C-UGS EX 01.02.16 | Warehouse (Expanded if Needed) | \$0 |
| | | C-UGS EX 01.02.17 | Maintenance Facility (Expanded if needed) | \$0 |
| | | C-UGS EX 01.02.18 | Waste management Facility (Expanded if needed) | \$0 |
| | | C-UGS EX 01.02.19 | Hot Cell / Laboratories | \$0 |
| | | C-UGS EX 01.02.20 | Pool Packaging Facility | \$0 |
| | | C-UGS EX 01.02.21 | Standardized Storage System | \$0 |
| | | C-UGS EX 01.02.22 | Standardized Disposal Canister | \$0 |
| | | C-UGS EX 01.02.23 | Canister Repackaging Facility (For Repository | \$0 |
| | C-UGS EX 01.03 | | Transportation Equipment \$0 | |
| | | C-UGS EX 01.03.01 | Transportation Casks | \$0 |
| | | C-UGS EX 01.03.02 | Rail Equipment | \$0 |
| | | C-UGS EX 01.03.03 | Rail Maintenance Facility | \$0 |
| | | C-UGS EX 01.03.04 | Transportation Systems Services | \$0 |
| | C-UGS EX 01.04 | | Pre-Construction Capitalized Costs \$66,025,000 | |
| | | C-UGS EX 01.04.01 | Land or Land Leases | \$7,680,000 |
| | | C-UGS EX 01.04.02 | Site permits | \$200,000 |
| | | C-UGS EX 01.04.03 | Site Licensing | \$6,240,000 |
| | | C-UGS EX 01.04.05 | Plant Permits | \$0 |
| | | C-UGS EX 01.04.06 | Planning and Alternative Studies | \$750,000 |

Project Total



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

\$1,099,347,594

| | C-UGS EX 01.04.07 | Research and Dev | velopment | | \$0 |
|-----------------|-------------------|-----------------------------------|---|---------------|-----------------|
| | C-UGS EX 01.04.08 | Design | | | \$23,955,000 |
| | C-UGS EX 01.04.09 | Other Pre-constru | uction Costs | | \$17,200,000 |
| | C-UGS EX 01.04.10 | Pre-construction | contingencies | | \$10,000,000 |
| | C-UGS EX 01.04.xx | (Add Further Brea | akdown as needed) | | \$0 |
| C-UGS EX 01.05 | | Indirect Capitalized Costs | | \$63,180,000 | |
| | C-UGS EX 01.05.01 | Project Managem | nent | | \$2,700,000 |
| | C-UGS EX 01.05.02 | Construction Mar | nagement | | \$3,600,000 |
| | C-UGS EX 01.05.03 | Field indirect serv | vices | | \$11,880,000 |
| | C-UGS EX 01.05.04 | Design Services ir | support of Construction | | \$5,400,000 |
| | C-UGS EX 01.05.05 | QA/QC | | | \$12,600,000 |
| | C-UGS EX 01.05.06 | Commissioning a | nd Startup | | \$1,200,000 |
| | C-UGS EX 01.05.07 | | neering support to Construction | | \$7,200,000 |
| | C-UGS EX 01.05.08 | Document Contro | - : | | \$2,700,000 |
| | C-UGS EX 01.05.09 | Project Controls | | | \$3,600,000 |
| | C-UGS EX 01.05.10 | Construction Test | ing | | \$2,700,000 |
| | C-UGS EX 01.05.11 | Inspections | S | | \$3,600,000 |
| | C-UGS EX 01.05.12 | Startup and Testi | ng | | \$3,000,000 |
| | C-UGS EX 01.05.13 | Commissioning | | | \$3,000,000 |
| C-UGS EX 01.06 | | Site Selection | | \$0 | 40,000,000 |
| 0 000 =/(0=/00 | C-UGS EX 01.06.01 | Site Selection | | 7.0 | \$0 |
| | C-UGS EX 01.06.02 | Public Informatio | n Process | | \$0 |
| C-UGS EX 01.07 | 0 000 17 01.00.02 | Decontamination and Dec | | \$0 | ΨO |
| C 003 LX 01.07 | C-UGS EX 01.07.01 | Decommissioning | | γo | \$0 |
| | C-UGS EX 01.07.02 | Decontamination | | | \$0 \$0 |
| | C-UGS EX 01.07.03 | Deconstruction | | | \$0 \$0 |
| | C-UGS EX 01.07.04 | Deconstruction | | | \$0 \$0 |
| | C-UGS EX 01.07.05 | | | | \$0 \$0 |
| C-UGS EX 01.08 | C-003 LX 01.07.03 | Project Financial Costs | | \$112,472,096 | ŞÛ |
| C-003 LX 01.08 | C-UGS EX 01.08.01 | Contractor Fees | | \$112,472,090 | \$67,147,520 |
| | C-UGS EX 01.08.02 | Escalation Costs | | | \$45,324,576 |
| | C-UGS EX 01.08.03 | Interest Payment | c | | \$45,324,570 |
| | C-UGS EX 01.08.04 | • | support shipments to repository | | \$0 \$0 |
| | C-UGS EX 01.08.05 | munect costs to s | apport shipments to repository | | \$0 \$0 |
| | C-UGS EX 01.08.xx | (Add Eurthor Proc | akdown as needed) | | \$0 \$0 |
| | C-003 EX 01.06.XX | (Auu Furtilei Bred | akuowii as needed) | | ŞU |
| C-UGS EX 01.09 | | Project Contingencies | | ¢147 E21 40E | |
| C-0G3 EX 01.09 | C-UGS EX 01.09.01 | , | anyo Contractor Hold | \$147,531,495 | ¢47 E00 90E |
| | C-UGS EX 01.09.01 | - | erve - Contractor Held | | \$47,590,805 |
| | C-0G3 EX 01.09.02 | Contingency - DO | Effeta | | \$99,940,690 |
| C LIGS EV 01 10 | | | | | |
| C-UGS EX 01.10 | C-UGS EX 01.10.01 | Other Direct Costs | | \$0 | |
| | | | nations. | \$0 | ćo |
| | C-UGS EX 01.10.02 | DOE Project Oper | ations | | \$0 |
| | C-UGS EX 01.10.03 | DOE TM&E | 10 | | \$0 |
| | C-UGS EX 01.10.04 | Host site Operation | | | \$0 |
| | C-UGS EX 01.10.05 | Miscellaneous OI | DC . | | \$0 |
| | | | | _ | |
| C-UGS EX 01.11 | | Operational Costs | | 0 | 4.0 |
| | C-UGS EX 01.11.01 | Operations Costs | | | \$0 |
| | C-UGS EX 01.11.02 | Transportation Co | | | \$0 |
| | C-UGS EX 01.11.03 | Escalation (Opera | tions/Transportation) | | \$0 |
| | | TEC | (All Direct & indirect Costs, MR | , Escalation) | \$999,406,904 |
| | | TPC | (TEC plus Contingency, ODCs) All Capitol, Operation, Transpor | • | \$1,099,347,594 |
| | | LCC | Escalation | | \$1,099,347,594 |

LCC Escalation



STUDY 1 - ALTERNATIVE STORAGE SYSTEMS FOR DUAL PURPOSE CANISTERS

COST DETAILS

ALTERNATIVE 11 - C-UGS, EXPANDED, LOW SEISMIC

LIFE CYCLE COST - 40 YEAR OPERATING LIFE

Life Cycle

\$ 2,778,750,239



Interim Storage Facility

Expanded Storage Facility (10,000 MTU)

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

Design/Const

\$ 1,099,347,594

0&M

\$ 532,356,575

\$ 77,017,378

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

Separate CHB

| 3epara | | erating life | | | | | | | An | nual Escalation 1.90% | | | Disc | count Rate 3.40% |
|-----------|-------------|----------------------------|----------|--------------------------|----------|-------------------|---------|------------|----------|--------------------------|----------|--------------------------|----------|--------------------------------|
| | · | _ | | 0814 | C. | ack Handling | | D&D | | | ۸ ۰ | unual Evnanca | | |
| YEAR 1 | \$ | Design/Const 10,000,000 | \$ | O&M - | ز | ask Handling - | \$ | עאָט | \$ | Escalation 190,000 | Ar \$ | 10,190,000 | \$ | Cumulative 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 | \$ | 24,243,717 | \$ | - | \$ | - | \$ | 41,392,899 | \$ | 265,636,616 | \$ | 637,616,638 |
| 10 | \$ | 571,459,195 | \$ | 23,603,013 | \$ | - | \$ | - | \$ | 123,235,052 | \$ | 718,297,260 | \$ | 1,355,913,897 |
| 11 | | | \$ | 24,056,528 | \$ | 12,836,230 | \$ | - | \$ | 8,486,475 | \$ | 45,379,232 | \$ | 1,401,293,130 |
| 12 | \$ | - | \$ | 24,056,528 | \$ | 12,836,230 | \$ | - | \$ | 9,348,680 | \$ | 46,241,438 | \$ | 1,447,534,567 |
| 13 | \$ | - | \$ | 24,056,528 | \$ | 12,836,230 | \$ | - | \$ | 10,227,267 | \$ | 47,120,025 | \$ | 1,494,654,592 |
| 14 | \$ | - | \$ | 11,144,331 | \$ | 12,836,230 | \$ | - | \$ | 7,229,737 | \$ | 31,210,298 | \$ | 1,525,864,890 |
| 15 | \$ | - | \$ | 11,144,331 | \$ | 12,836,230 | \$ | - | \$ | 7,822,733 | \$ | 31,803,294 | \$ | 1,557,668,184 |
| 16 | \$ | - | \$ | 11,144,331 | \$ | 12,836,230 | \$ | - | \$ | 8,426,995 | \$ | 32,407,556 | \$ | 1,590,075,740 |
| 17 | \$ | - | \$ | 11,144,331 | \$ | - | \$ | - | \$ | 4,202,374 | \$ | 15,346,705 | \$ | 1,605,422,445 |
| 18 | \$ | - | \$ | 11,144,331 | \$ | - | \$ | - | \$ | 4,493,961 | \$ | 15,638,292 | \$ | 1,621,060,738 |
| 19 | \$ | - | \$ | 11,144,331 | \$ | - | \$ | - | \$ | 4,791,089 | \$ | 15,935,420 | \$ | 1,636,996,157 |
| 20 | \$ | - | \$ | 11,144,331 | \$ | - | \$ | - | \$ | 5,093,862 | \$ | 16,238,193 | \$ | 1,653,234,350 |
| 21 | \$ | - | \$ | 11,144,331 | \$ | - | \$ | - | \$ | 5,402,387 | \$ | 16,546,719 | \$ | 1,669,781,069 |
| 22 | \$ | - | \$ | 11,144,331 | \$ | - | \$ | - | \$ | 5,716,775 | \$ | 16,861,106 | \$ | 1,686,642,175 |
| 23 | \$ | - | \$ | 11,144,331 | \$ | - | \$ | - | \$ | 6,037,136 | \$ | 17,181,467 | \$ | 1,703,823,643 |
| 24 | \$ | - | \$ | 11,144,331 | \$ | - | \$ | - | \$ | 6,363,584 | \$ | 17,507,915 | \$ | 1,721,331,558 |
| 25 | \$ | - | \$ | 11,144,331 | \$ | - | \$ | - | \$ | 6,696,234 | \$ | 17,840,566 | \$ | 1,739,172,123 |
| 26 | \$ | - | \$ | 11,144,331 | \$ | - | \$ | - | \$ | 7,035,205 | \$ | 18,179,536 | \$ | 1,757,351,659 |
| 27 | \$ | - | \$ | 11,144,331 | \$ | - | \$ | - | \$ | 7,380,616 | \$ | 18,524,947 | \$ | 1,775,876,607 |
| 28 | \$ | - | \$ | 11,144,331 | \$ | - | \$ | - | \$ | 7,732,590 | \$ | 18,876,921 | \$ | 1,794,753,528 |
| 29 | \$ | - | \$ | 11,144,331 | \$ | - | \$ | - | \$ | 8,091,252 | \$ | 19,235,583 | \$ | 1,813,989,111 |
| 30 | \$ | - | \$ | 11,144,331 | \$ | - | \$ | - | \$ | 8,456,728 | \$ | 19,601,059 | \$ | 1,833,590,170 |
| 31 | \$ | - | \$ | 11,144,331 | \$ | - | \$ | - | \$ | 8,829,148 | \$ | 19,973,479 | \$ | 1,853,563,650 |
| 32 | \$ | - | \$ | 11,144,331 | \$ | - | \$ | - | \$ | 9,208,644 | \$ | 20,352,975 | \$ | 1,873,916,625 |
| 33 | \$ | - | \$ | 11,144,331 | \$ | - | \$ | - | \$ | 9,595,350 | \$ | 20,739,682 | \$ | 1,894,656,307 |
| 34 | \$ | - | \$ | 11,144,331 | \$ | - | \$ | - | \$ | 9,989,404 | \$ | 21,133,736 | \$ | 1,915,790,042 |
| 35 | \$ • | - | \$ | 11,144,331 | \$ | - | \$ | - | \$ | 10,390,945 | \$ | 21,535,277 | \$ | 1,937,325,319 |
| 36 | \$ \$ | - | \$ | 11,144,331 | \$ \$ | - | \$ | - | \$ \$ | 10,800,116 | \$ | 21,944,447 | \$ \$ | 1,959,269,766 |
| 37 | \$ \$ | - | \$ | 11,144,331 | \$ \$ | - | \$ | - | \$ \$ | 11,217,060 | \$ | 22,361,391 | \$ \$ | 1,981,631,158 |
| 38 | \$ \$ | - | \$ \$ | 11,144,331 | \$ \$ | - | \$ | - | \$ \$ | 11,641,927 | \$ | 22,786,258 | \$ | 2,004,417,415 |
| 39 | > | - | \$ ¢ | 11,144,331 | \$ | - | \$ ¢ | - | \$ ¢ | 12,074,865 | \$ | 23,219,197 | \$ ¢ | 2,027,636,612 |
| 40 | ې د | - | ۶ خ | 11,144,331 | ې د | - | ې د | - | ې د | 12,516,030 | \$ ¢ | 23,660,362 | \$ ¢ | 2,051,296,974 |
| 41 42 | ې د | - | ۶ خ | 11,144,331 | ې د | - | ې د | - | ې د | 12,965,577 | \$ ¢ | 24,109,908 | \$ ¢ | 2,075,406,882 |
| 43 | ې د | - | ې د | 11,144,331 11,144,331 | ې د | - | ې د | - | ې د | 13,423,665 13,890,457 | \$ \$ | 24,567,997 | \$ \$ | 2,099,974,879 |
| 43 44 | ې د | - | ې د | 11,144,331 | ې د | - | ې د | - | ې د | 14,366,118 | ۶ \$ | 25,034,789 25,510,450 | ۶ \$ | 2,125,009,668 2,150,520,117 |
| 45 | ٠ د | _ | ب د | 11,144,331 | ب د | _ | ب د | _ | ب خ | 14,850,817 | ۶ \$ | 25,995,148 | ۶ \$ | 2,176,515,265 |
| 46 | ٠ د | _ | ب د | 11,144,331 | ب د | _ | ب د | _ | ب خ | 15,344,725 | ۶ \$ | 26,489,056 | \$ | 2,203,004,321 |
| 47 | ς ς | _ | ٠ \$ | 11,144,331 | \$ | _ | \$ | _ | ς ς | 15,848,017 | \$ | 26,992,348 | \$ | 2,229,996,669 |
| 48 | \$ | _ | \$ | 11,144,331 | \$ | _ | \$ | _ | \$ | 16,360,871 | \$ | 27,505,203 | \$ | 2,257,501,872 |
| 49 | \$ | _ | \$ | 11,144,331 | \$ | _ | \$ | - | \$ | 16,883,470 | \$ | 28,027,801 | \$ | 2,285,529,674 |
| 50 | \$ | _ | \$ | 11,144,331 | \$ | _ | \$ | _ | \$ | 17,415,998 | \$ | 28,560,330 | \$ | 2,314,090,003 |
| 51 | \$ | _ | \$ | | \$ | _ | \$ | 21,175,000 | \$ | 34,122,666 | \$ | 55,297,666 | \$ | 2,369,387,670 |
| 52 | \$ | - | \$ | - | \$ | _ | \$ | 26,250,000 | \$ | 43,603,292 | \$ | 69,853,292 | \$ | 2,439,240,961 |
| 53 | \$ | - | , \$ | - | \$ | _ | \$ | 40,951,817 | \$ | 70,094,696 | , \$ | 111,046,513 | \$ | 2,550,287,474 |
| 54 | , \$ | - | \$ | - | , \$ | _ | , \$ | 40,951,817 | \$ | 72,204,580 | , \$ | 113,156,397 | \$ | 2,663,443,871 |
| 55 | \$ | - | \$ | - | \$ | - | \$ | 40,951,817 | \$ | 74,354,551 | \$ | 115,306,368 | \$ | 2,778,750,239 |
| 56 | \$ | - | , \$ | - | \$ | _ | \$ | , , | \$ | - | , \$ | - | \$ | 2,778,750,239 |
| 57 | \$ | - | , \$ | - | \$ | _ | \$ | - | \$ | - | \$ | - | \$ | 2,778,750,239 |
| 58 | \$ | - | \$ | - | \$ | - | \$ | - | \$ | - | \$ | - | \$ | 2,778,750,239 |
| 59 | \$ | - | \$ | - | \$ | - | \$ | - | \$ | - | ; \$ | - | \$ | 2,778,750,239 |
| 60 | \$ | - | \$ | - | \$ | - | \$ | - | \$ | - | \$ | - | \$ | 2,778,750,239 |
| | | | | | | | | | | | | | | |
| | | Total | | Total | | | | Total | | Total | | | | Total |
| | Г | Design/Const | | Ω N | | | | חאט | | Escalation | | | | Life Cycle |

D&D

\$ 170,280,450

Escalation

899,748,242



STUDY 1 - ALTERNATIVE STORAGE SYSTEMS FOR DUAL PURPOSE CANISTERS

COST DETAILS

ALTERNATIVE 11 - C-UGS, EXPANDED, LOW SEISMIC

LIFE CYCLE COST - 80 YEAR OPERATING LIFE



Expanded Storage Facility (10,000 MTU)

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

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

Separate CHB

80 Year Operating Life

| 80 Yea | r Op | erating Lite | | | | | | | | Ann | ual Escalation | | Discount Rate |
|----------|----------|--------------|----------|--------------------------|----------|---------------|---------|---------|---|---------|---------------------------|--------------------------------|------------------------------------|
| | | | | | | | | | | | 1.90% | | 3.40% |
| YEAR | [| Design/Const | | O&M | C | 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 | \$ | - 24 242 717 | \$ \$ | - | ۶ د | | - | ۶ د | 32,500,273 | \$232,500,273 \$265,636,616 | \$371,980,021 \$637,616,638 |
| 9 10 | \$ \$ | 571,459,195 | \$ \$ | 24,243,717 23,603,013 | ې د | _ | ې د | | _ | ې د | 41,392,899 123,235,052 | \$718,297,260 | \$1,355,913,897 |
| 11 | Ţ | 371,433,133 | \$ | 24,056,528 | \$ | 12,836,230 | \$ | | _ | \$ | 8,486,475 | \$45,379,232 | \$1,401,293,130 |
| 12 | \$ | _ | \$ | 24,056,528 | \$ | 12,836,230 | \$ | | _ | \$ | 9,348,680 | \$46,241,438 | \$1,447,534,567 |
| 13 | \$ | - | \$ | 24,056,528 | \$ | 12,836,230 | \$ | | _ | \$ | 10,227,267 | \$47,120,025 | \$1,494,654,592 |
| 14 | \$ | - | \$ | 11,144,331 | \$ | 12,836,230 | \$ | | _ | ; \$ | 7,229,737 | \$31,210,298 | \$1,525,864,890 |
| 15 | \$ | - | \$ | 11,144,331 | \$ | 12,836,230 | \$ | | - | \$ | 7,822,733 | \$31,803,294 | \$1,557,668,184 |
| 16 | \$ | - | \$ | 11,144,331 | \$ | 12,836,230 | \$ | | - | \$ | 8,426,995 | \$32,407,556 | \$1,590,075,740 |
| 17 | \$ | - | \$ | 11,144,331 | \$ | - | \$ | | - | \$ | 4,202,374 | \$15,346,705 | \$1,605,422,445 |
| 18 | \$ | - | \$ | 11,144,331 | \$ | - | \$ | | - | \$ | 4,493,961 | \$15,638,292 | \$1,621,060,738 |
| 19 | \$ | - | \$ | 11,144,331 | \$ | - | \$ | | - | \$ | 4,791,089 | \$15,935,420 | \$1,636,996,157 |
| 20 | \$ | - | \$ | 11,144,331 | \$ | - | \$ | | - | \$ | 5,093,862 | \$16,238,193 | \$1,653,234,350 |
| 21 | \$ | - | \$ | 11,144,331 | \$ | - | \$ | | - | \$ | 5,402,387 | \$16,546,719 | \$1,669,781,069 |
| 22 | \$ | - | \$ | 11,144,331 | \$ | - | \$ | | - | \$ | 5,716,775 | \$16,861,106 | \$1,686,642,175 |
| 23 | \$ ¢ | - | \$ | 11,144,331 | \$ | - | \$ ¢ | | - | \$ ¢ | 6,037,136 | \$17,181,467 \$17,507,915 | \$1,703,823,643 |
| 24 25 | Ş ¢ | _ | ۶ \$ | 11,144,331 11,144,331 | \$ \$ | _ | ۶ د | | _ | ۶ د | 6,363,584 6,696,234 | \$17,840,566 | \$1,721,331,558 \$1,739,172,123 |
| 26 | ۶ \$ | _ | ٠ \$ | 11,144,331 | ۶ \$ | _ | ب خ | | _ | ٠ \$ | 7,035,205 | \$18,179,536 | \$1,757,351,659 |
| 27 | \$ | - | \$ | 11,144,331 | \$ | _ | \$ | | _ | \$ | 7,380,616 | \$18,524,947 | \$1,775,876,607 |
| 28 | \$ | - | \$ | 11,144,331 | \$ | _ | \$ | | _ | \$ | 7,732,590 | \$18,876,921 | \$1,794,753,528 |
| 29 | , \$ | - | \$ | 11,144,331 | \$ | _ | \$ | | _ | , \$ | 8,091,252 | \$19,235,583 | \$1,813,989,111 |
| 30 | \$ | - | \$ | 11,144,331 | \$ | - | \$ | | - | \$ | 8,456,728 | \$19,601,059 | \$1,833,590,170 |
| 31 | \$ | - | \$ | 11,144,331 | \$ | - | \$ | | - | \$ | 8,829,148 | \$19,973,479 | \$1,853,563,650 |
| 32 | \$ | - | \$ | 11,144,331 | \$ | - | \$ | | - | \$ | 9,208,644 | \$20,352,975 | \$1,873,916,625 |
| 33 | \$ | - | \$ | 11,144,331 | \$ | - | \$ | | - | \$ | 9,595,350 | \$20,739,682 | \$1,894,656,307 |
| 34 | \$ | - | \$ | 11,144,331 | \$ | - | \$ | | - | \$ | 9,989,404 | \$21,133,736 | \$1,915,790,042 |
| 35 | \$ | - | \$ | 11,144,331 | \$ | - | \$ | | - | \$ | 10,390,945 | \$21,535,277 | \$1,937,325,319 |
| 36 | \$ | - | \$ | 11,144,331 | \$ | - | \$ | | - | \$ | 10,800,116 | \$21,944,447 | \$1,959,269,766 |
| 37 38 | \$ ¢ | - | \$ ¢ | 11,144,331 | \$ ¢ | - | \$ ¢ | | - | \$ ¢ | 11,217,060 | \$22,361,391 | \$1,981,631,158 |
| 39 | ٠ , | - | ې د | 11,144,331 11,144,331 | ٠ \$ | _ | ۶ \$ | | _ | ۶ \$ | 11,641,927 12,074,865 | \$22,786,258 \$23,219,197 | \$2,004,417,415 \$2,027,636,612 |
| 40 | \$ | - | \$ | 11,144,331 | \$ | _ | \$ | | _ | \$ | 12,516,030 | \$23,660,362 | \$2,051,296,974 |
| 41 | \$ | - | \$ | 11,144,331 | \$ | _ | \$ | | _ | \$ | 12,965,577 | \$24,109,908 | \$2,075,406,882 |
| 42 | , \$ | - | \$ | 11,144,331 | \$ | _ | \$ | | _ | , \$ | 13,423,665 | \$24,567,997 | \$2,099,974,879 |
| 43 | \$ | - | \$ | 11,144,331 | \$ | - | \$ | | - | \$ | 13,890,457 | \$25,034,789 | \$2,125,009,668 |
| 44 | \$ | - | \$ | 11,144,331 | \$ | - | \$ | | - | \$ | 14,366,118 | \$25,510,450 | \$2,150,520,117 |
| 45 | \$ | - | \$ | 11,144,331 | \$ | - | \$ | | - | \$ | 14,850,817 | \$25,995,148 | \$2,176,515,265 |
| 46 | \$ | - | \$ | 11,144,331 | \$ | - | \$ | | - | \$ | 15,344,725 | \$26,489,056 | \$2,203,004,321 |
| 47 | \$ | - | \$ | 11,144,331 | \$ | - | \$ | | - | \$ | 15,848,017 | \$26,992,348 | \$2,229,996,669 |
| 48 | \$ | - | \$ | 11,144,331 | \$ | - | \$ | | - | \$ | 16,360,871 | \$27,505,203 | \$2,257,501,872 |
| 49 50 | \$ ¢ | - | \$ \$ | 11,144,331 | \$ ¢ | - | \$ ¢ | | - | \$ ¢ | 16,883,470 | \$28,027,801 | \$2,285,529,674 |
| 50 51 | \$ ¢ | - | \$ ¢ | 11,144,331 | \$ ¢ | - | \$ ¢ | | - | \$ ¢ | 17,415,998 17,958,645 | \$28,560,330 | \$2,314,090,003 |
| 52 | Ş ¢ | _ | Ş ¢ | 11,144,331 11,144,331 | Ş Ç | _ | ۶ د | | _ | ۶ د | 18,511,601 | \$29,102,976 \$29,655,933 | \$2,343,192,979 \$2,372,848,912 |
| 53 | ς ς | _ | ٠ \$ | 11,144,331 | ς ς | _ | ٠ \$ | | _ | ٠ \$ | 19,075,064 | \$30,219,395 | \$2,403,068,307 |
| 54 | \$ | _ | \$ | 11,144,331 | \$ | - | \$ | | _ | \$ | 19,649,232 | \$30,793,564 | \$2,433,861,871 |
| 55 | \$ | - | \$ | 11,144,331 | \$ | _ | \$ | | _ | \$ | 20,234,310 | \$31,378,641 | \$2,465,240,512 |
| 56 | \$ | - | \$ | 11,144,331 | \$ | - | \$ | | _ | \$ | 20,830,504 | \$31,974,836 | \$2,497,215,348 |
| 57 | \$ | - | \$ | 11,144,331 | \$ | - | \$ | | - | \$ | 21,438,026 | \$32,582,358 | \$2,529,797,706 |
| 58 | \$ | - | \$ | 11,144,331 | \$ | - | \$ | | - | \$ | 22,057,091 | \$33,201,422 | \$2,562,999,128 |
| 59 | \$ | - | \$ | 11,144,331 | \$ | - | \$ | | - | \$ | 22,687,918 | \$33,832,249 | \$2,596,831,377 |
| 60 | \$ | - | \$ | 11,144,331 | \$ | - | \$ | | - | \$ | 23,330,731 | \$34,475,062 | \$2,631,306,439 |
| 61 | \$ | - | \$ | 11,144,331 | \$ | - | \$ | | - | \$ | 23,985,757 | \$35,130,088 | \$2,666,436,528 |
| 62 | \$ | - | \$ | 11,144,331 | \$ | - | \$ | A C 110 | - | \$ | 24,653,229 | \$35,797,560 | \$2,702,234,088 |
| | | | | | | | | A6-110 | | | | | |

\$1,099,347,594

\$978,129,829

\$77,017,378

\$170,280,450

\$2,696,096,969

\$5,020,872,220



| 63 | \$ - | \$ 11,144,331 | \$ | - | \$ - | \$ 25,333,382 | \$36,477,714 | \$2,738,711,801 |
|-----|--------------|------------------|--------|----------|------------------|-------------------|---------------|-----------------|
| 64 | \$ - | \$ 11,144,331 | \$ | - | \$ - | \$ 26,026,459 | \$37,170,790 | \$2,775,882,591 |
| 65 | \$0 | \$ 11,144,331 | \$ | - | \$ - | \$ 26,732,704 | \$37,877,035 | \$2,813,759,626 |
| 66 | \$0 | \$ 11,144,331 | \$ | - | \$ - | \$ 27,452,367 | \$38,596,699 | \$2,852,356,325 |
| 67 | \$0 | \$ 11,144,331 | \$ | - | \$ - | \$ 28,185,705 | \$39,330,036 | \$2,891,686,361 |
| 68 | \$0 | \$ 11,144,331 | \$ | - | \$ - | \$ 28,932,975 | \$40,077,307 | \$2,931,763,668 |
| 69 | \$0 | \$ 11,144,331 | \$ | - | \$ - | \$ 29,694,444 | \$40,838,776 | \$2,972,602,444 |
| 70 | \$0 | \$ 11,144,331 | \$ | - | \$ - | \$ 30,470,381 | \$41,614,712 | \$3,014,217,156 |
| 71 | \$0 | \$ 11,144,331 | \$ | - | \$ - | \$ 31,261,061 | \$42,405,392 | \$3,056,622,548 |
| 72 | \$0 | \$ 11,144,331 | \$ | - | \$ - | \$ 32,066,763 | \$43,211,094 | \$3,099,833,642 |
| 73 | \$0 | \$ 11,144,331 | \$ | - | \$ - | \$ 32,887,774 | \$44,032,105 | \$3,143,865,748 |
| 74 | \$0 | \$ 11,144,331 | \$ | - | \$ - | \$ 33,724,384 | \$44,868,715 | \$3,188,734,463 |
| 75 | \$0 | \$ 11,144,331 | \$ | - | \$ - | \$ 34,576,889 | \$45,721,221 | \$3,234,455,683 |
| 76 | \$0 | \$ 11,144,331 | \$ | - | \$ - | \$ 35,445,593 | \$46,589,924 | \$3,281,045,607 |
| 77 | \$0 | \$ 11,144,331 | \$ | - | \$ - | \$ 36,330,801 | \$47,475,132 | \$3,328,520,740 |
| 78 | \$0 | \$ 11,144,331 | \$ | - | \$ - | \$ 37,232,829 | \$48,377,160 | \$3,376,897,900 |
| 79 | \$0 | \$ 11,144,331 | \$ | - | \$ - | \$ 38,151,995 | \$49,296,326 | \$3,426,194,226 |
| 80 | \$0 | \$ 11,144,331 | \$ | - | \$ - | \$ 39,088,625 | \$50,232,956 | \$3,476,427,182 |
| 81 | \$0 | \$ 11,144,331 | \$ | - | \$ - | \$ 40,043,051 | \$51,187,382 | \$3,527,614,564 |
| 82 | \$0 | \$ 11,144,331 | \$ | - | \$ - | \$ 41,015,611 | \$52,159,943 | \$3,579,774,507 |
| 83 | \$0 | \$ 11,144,331 | \$ | - | \$ - | \$ 42,006,650 | \$53,150,982 | \$3,632,925,489 |
| 84 | \$0 | \$ 11,144,331 | \$ | - | \$ - | \$ 43,016,519 | \$54,160,850 | \$3,687,086,339 |
| 85 | \$0 | \$ 11,144,331 | \$ | - | \$ - | \$ 44,045,575 | \$55,189,906 | \$3,742,276,245 |
| 86 | \$0 | \$ 11,144,331 | \$ | - | \$ - | \$ 45,094,183 | \$56,238,515 | \$3,798,514,760 |
| 87 | \$0 | \$ 11,144,331 | \$ | - | \$ - | \$ 46,162,715 | \$57,307,046 | \$3,855,821,806 |
| 88 | \$0 | \$ 11,144,331 | \$ | - | \$ - | \$ 47,251,549 | \$58,395,880 | \$3,914,217,686 |
| 89 | \$0 | \$ 11,144,331 | \$ | - | \$ - | \$ 48,361,071 | \$59,505,402 | \$3,973,723,088 |
| 90 | \$0 | \$ 11,144,331 | \$ | - | \$ - | \$ 49,491,673 | \$60,636,005 | \$4,034,359,093 |
| 91 | | | \$ | - | \$ 21,175,000 | \$ 96,226,640 | \$117,401,640 | \$4,151,760,733 |
| 92 | | | \$ | - | \$ 26,250,000 | \$ 122,054,468 | \$148,304,468 | \$4,300,065,201 |
| 93 | | | \$ | - | \$ 40,951,817 | \$ 194,809,357 | \$235,761,174 | \$4,535,826,375 |
| 94 | | | \$ | - | \$ 40,951,817 | \$ 199,288,820 | \$240,240,636 | \$4,776,067,012 |
| 95 | | | \$ | - | \$ 40,951,817 | \$ 203,853,392 | \$244,805,208 | \$5,020,872,220 |
| 96 | | | | | \$ - | \$ - | \$0 | \$5,020,872,220 |
| 97 | | | | | \$ - | \$ - | \$0 | \$5,020,872,220 |
| 98 | | | | | | \$ - | \$0 | \$5,020,872,220 |
| 99 | | | | | | \$ - | \$0 | \$5,020,872,220 |
| 100 | | | | | | \$ - | \$0 | \$5,020,872,220 |
| | Total | Total | To | otal | Total | Total | | Total |
| | Design/Const | 0&M | Cask H | Handling | D&D | Escalation | | Life Cycle |
| | | | _ | | | | | |



STUDY 1 - ALTERNATIVE STORAGE SYSTEMS FOR DUAL PURPOSE CANISTERS

COST DETAILS

ALTERNATIVE 12 - C-UGS, EXPANDED, HIGH SEISMIC

LIFE CYCLE COST SUMMARIES



Expanded Storage Facility (10,000 MTU)

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

expanded Project - C-UGS 60/40 Vertical/Horizontal - High

Seismic

Separate CHB

Annual Escalation Factor 1.90% Discount Rate 3.40%

| Life Cycle Costs (40 Year Life) Design & Construction | Capital <i>\$1,136,176,023</i> | Operations | Transport | Decommissioning | Escalation | Total Costs \$1,136,176,023 |
|---|-----------------------------------|--|---------------|-----------------------|-----------------|---|
| Operations & Maintenance (40 Year Life) | Ψ1,130,170,023 | \$532,356,575 | | | | \$532,356,575 |
| Cask Handling | | \$77,017,378 | | | | \$77,017,378 |
| Transportation Equipment | \$0 | <i>\$77,</i> 017,370 | | | | \$0 |
| Transport Operations | 70 | \$0 | \$0 | | | <i>\$0</i> |
| Repackaging | \$0 | \$0 | ΨŪ | | | \$0 |
| Transport to Repository | \$0 \$0 | 70 | \$0 | | | \$0 |
| D&D | 40 | | ΨŪ | \$179,266,905 | | \$179,266,905 |
| Escalation | | | | ψ173) <u>2</u> 00,303 | \$923,222,749 | \$923,222,749 |
| 23cdid tion | | | | | ψ323)222); i3 | ψ323)222)7 13 |
| Total Costs (40 year Life) | | | | | | \$2,848,039,629 |
| Present Value | | | | | | \$1,507,707,035 |
| | | | | | | |
| Lita Cuala Casta (OO Vasus Lita) | | | | B | Faralatian | Total Costs |
| Life Cycle Costs (80 Year Life) | Capital | Operations | Transport | Decommissioning | Escalation | Total Costs |
| Design & Construction | Capital \$1,136,176,023 | Operations | Transport | Decommissioning | Escalation | \$1,136,176,023 |
| | • | Operations \$978,129,829 | Transport | Decommissioning | Escalation | |
| Design & Construction | • | · | Transport | Decommissioning | Escalation | \$1,136,176,023 |
| Design & Construction Operations & Maintenance (80 Year Life) | • | \$978,129,829 | Transport | Decommissioning | Escalation | \$1,136,176,023 \$978,129,829 |
| Design & Construction Operations & Maintenance (80 Year Life) Cask Handling | \$1,136,176,023 | \$978,129,829 | Fransport \$0 | Decommissioning | Escalation | \$1,136,176,023 \$978,129,829 \$77,017,378 |
| Design & Construction Operations & Maintenance (80 Year Life) Cask Handling Transportation Equipment | \$1,136,176,023 \$0 \$0 | \$ <i>978,129,829</i> \$77,017,378 | · | Decommissioning | Escalation | \$1,136,176,023 \$978,129,829 \$77,017,378 \$0 \$0 \$0 |
| Design & Construction Operations & Maintenance (80 Year Life) Cask Handling Transportation Equipment Transport Operations | \$1,136,176,023 \$0 | \$ <i>978,129,829</i> \$77,017,378 \$0 | · | Decommissioning | Escalation | \$1,136,176,023 \$978,129,829 \$77,017,378 \$0 \$0 |
| Design & Construction Operations & Maintenance (80 Year Life) Cask Handling Transportation Equipment Transport Operations Repackaging | \$1,136,176,023 \$0 \$0 | \$ <i>978,129,829</i> \$77,017,378 \$0 | \$0 | \$179,266,905 | Escalation | \$1,136,176,023 \$978,129,829 \$77,017,378 \$0 \$0 \$0 |
| Design & Construction Operations & Maintenance (80 Year Life) Cask Handling Transportation Equipment Transport Operations Repackaging Transport to Repository | \$1,136,176,023 \$0 \$0 | \$ <i>978,129,829</i> \$77,017,378 \$0 | \$0 | | \$2,747,462,096 | \$1,136,176,023 \$978,129,829 \$77,017,378 \$0 \$0 \$0 \$0 |
| Design & Construction Operations & Maintenance (80 Year Life) Cask Handling Transportation Equipment Transport Operations Repackaging Transport to Repository D&D | \$1,136,176,023 \$0 \$0 | \$ <i>978,129,829</i> \$77,017,378 \$0 | \$0 | | | \$1,136,176,023 \$978,129,829 \$77,017,378 \$0 \$0 \$0 \$0 \$179,266,905 |



STUDY 1 - ALTERNATIVE STORAGE SYSTEMS FOR DUAL PURPOSE CANISTERS

COST DETAILS

ALTERNATIVE 12 - C-UGS, EXPANDED, HIGH SEISMIC

CAPITAL COST SUMMARY

\$17,200,000

\$10,000,000



Interim Storage Facility

Expanded Storage Facility (10,000 MTU)

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

expanded Project - C-UGS 60/40 Vertical/Horizontal - High Seismic

Separate CHB

Level 3 Cost Summary - First of A kind module

| Level 5 Cost Summ | a., | · mia module | | | | | |
|-------------------|-------------|--------------|----------------------------|---------------------------------------|---|----------------------|--------------------------|
| Level 1 | Level 2 | Level 3 | Description | 1 | | | Level 3 Total |
| C-UGC LE EX 01 | | | | • | transportation Project | | |
| | C-UGC LE EX | X 01.01 | I | Pilot ISF Facility | | \$516,711,768 | |
| | | CHCCLE | EV 01 01 01 | Storago II | CCLE | | ćn |
| | | | EX 01.01.01 EX 01.01.02 | Storage U | dling (Transfer) Facility | | \$0 \$163,293,960 |
| | | | EX 01.01.02 EX 01.01.03 | | I Dry Storage Modules | | \$103,293,900 \$0 |
| | | | EX 01.01.03 | | ry Storage Module | | \$194,278,647 |
| | | | EX 01.01.05 | | ask Fabrication Facility | | \$154,270,047 |
| | | | EX 01.01.06 | _ | ntenance Facility | | \$0 |
| | | | EX 01.01.07 | | Batch Plant | | \$1,850,000 |
| | | C-UGC LE | EX 01.01.08 | Visitor Ce | nter/ Auditorium | | \$0 |
| | | C-UGC LE | EX 01.01.09 | Administr | ation Building | | \$3,140,000 |
| | | C-UGC LE | EX 01.01.10 | Security | | | \$24,148,975 |
| | | C-UGC LE | EX 01.01.11 | Rail Spur/ | Receiving Yard | | \$58,752,800 |
| | | | EX 01.01.12 | Utilities | | | \$18,682,150 |
| | | | EX 01.01.13 | Roads | | | \$18,212,737 |
| | | | EX 01.01.14 | Parking | | | \$735,000 |
| | | | EX 01.01.15 | Site Work | | | \$23,417,500 |
| | | | EX 01.01.16 | Warehou | | | \$10,200,000 |
| | | | EX 01.01.17 EX 01.01.18 | | nce Facility Inagement Facility | | \$0 \$0 |
| | | | EX 01.01.18 | | her Breakdown as needed) | | \$0 \$0 |
| | | C-OGC LL | LX 01.01.01.XX | (Add I dit | ner breakdown as needed, | | γo |
| | | | | | | | |
| | C-UGC LE EX | X 01.02 | | Expanded Interir | n Storage Facility | \$221,545,476 | |
| | | C-UGC LE | EX 01.02.01 | Expanded | Storage UGC LE s and Dry C | Cask Storage Systems | \$0 |
| | | | EX 01.02.02 | • | Cask Handling Facility (if re | quired) | \$0 |
| | | | EX 01.02.03 | | l Dry Storage Modules | | \$0 |
| | | | EX 01.02.04 | | ry Storage Casks | | \$194,278,647 |
| | | | EX 01.02.05 | _ | ask Fabrication Facility (Exp | • | \$0 \$0 |
| | | | EX 01.02.06 | | ntenance Facility (Expanded) | • | \$0 |
| | | | EX 01.02.07 EX 01.02.08 | | Batch Plant (Expanded if ne nter/ Auditorium (expanded | · | \$1,850,000 \$745,000 |
| | | | EX 01.02.08 | | ration Building (Expanded if | - | \$743,000 \$0 |
| | | | EX 01.02.03 | | Expanded) | necucuj | \$10,074,488 |
| | | | EX 01.02.11 | | Receiving Yard (Expanded) | | \$0 |
| | | | EX 01.02.12 | · · · · · · · · · · · · · · · · · · · | xpanded as needed) | | \$3,624,200 |
| | | C-UGC LE | EX 01.02.13 | Roads (Ex | · | | \$83,142 |
| | | C-UGC LE | EX 01.02.14 | Parking (E | expanded as needed) | | \$0 |
| | | C-UGC LE | EX 01.02.15 | Site Work | (Expanded) | | \$10,890,000 |
| | | C-UGC LE | EX 01.02.16 | Warehou | se (Expanded if Needed) | | \$0 |
| | | | EX 01.02.17 | | nce Facility (Expanded if nee | | \$0 |
| | | | EX 01.02.18 | | nnagement Facility (Expande | ed if needed) | \$0 |
| | | | EX 01.02.19 | | Laboratories | | \$0 |
| | | | EX 01.02.20 | | aging Facility | | \$0 |
| | | | EX 01.02.21 EX 01.02.22 | | zed Storage System | | \$0 \$0 |
| | | | EX 01.02.22 EX 01.02.23 | | zed Disposal Canister Repackaging Facility (For Rep | oository | \$0 \$0 |
| | C-UGC LE EX | | | Transportation E | | \$0 | ŞÜ |
| | C OGC LL L | | EX 01.03.01 | | ation Casks | ŞŪ | \$0 |
| | | | EX 01.03.02 | Rail Equip | | | \$0 |
| | | C-UGC LE | EX 01.03.03 | | tenance Facility | | \$0 |
| | | C-UGC LE | EX 01.03.04 | | ation Systems Services | | \$0 |
| | | | | | | | |
| | C-UGC LE EX | | | | Capitalized Costs | \$66,025,000 | ¢7.000.000 |
| | | | EX 01.04.01 | | and Leases | | \$7,680,000 |
| | | | EX 01.04.02 EX 01.04.03 | Site perm Site Licen | | | \$200,000 \$6,240,000 |
| | | | EX 01.04.03 EX 01.04.05 | Plant Perr | • | | \$6,240,000 \$0 |
| | | | EX 01.04.05 | | and Alternative Studies | | \$750,000 |
| | | | EX 01.04.07 | | and Development | | \$730,000 \$0 |
| | | | EX 01.04.08 | Design | | | \$23,955,000 |
| | | | EV 01 04 00 | _ | -construction Costs | | \$17,200,000 |

Other Pre-construction Costs

Pre-construction contingencies

C-UGC LE EX 01.04.09

C-UGC LE EX 01.04.10



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

| C-UGC LE EX 01.04.xx | (Add Further Breakdown as needed) | | \$0 |
|----------------------|---|---|----------------|
| C-UGC LE EX 01.05 | Indirect Capitalized Costs | \$63,180,000 | |
| C-UGC LE EX 01.05.01 | Project Management | | \$2,700,000 |
| C-UGC LE EX 01.05.02 | Construction Management | | \$3,600,000 |
| C-UGC LE EX 01.05.03 | Field indirect services | | \$11,880,000 |
| C-UGC LE EX 01.05.04 | Design Services in support of Construction | l | \$5,400,000 |
| C-UGC LE EX 01.05.05 | QA/QC | | \$12,600,000 |
| C-UGC LE EX 01.05.06 | Commissioning and Startup | | \$1,200,000 |
| C-UGC LE EX 01.05.07 | Home office Engineering support to Const | ruction | \$7,200,000 |
| C-UGC LE EX 01.05.08 | Document Control | | \$2,700,000 |
| C-UGC LE EX 01.05.09 | Project Controls | | \$3,600,000 |
| C-UGC LE EX 01.05.10 | Construction Testing | | \$2,700,000 |
| C-UGC LE EX 01.05.11 | Inspections | | \$3,600,000 |
| C-UGC LE EX 01.05.12 | Startup and Testing | | \$3,000,000 |
| C-UGC LE EX 01.05.13 | Commissioning | | \$3,000,000 |
| C-UGC LE EX 01.06 | Site Selection | \$0 | , |
| C-UGC LE EX 01.06.01 | Site Selection | , | \$0 |
| C-UGC LE EX 01.06.02 | Public Information Process | | \$0 |
| C-UGC LE EX 01.07 | Decontamination and Deconstruction | \$0 | |
| C-UGC LE EX 01.07.01 | Decommissioning | 7 - | \$0 |
| C-UGC LE EX 01.07.02 | Decontamination | | \$0 |
| C-UGC LE EX 01.07.03 | Deconstruction | | \$0 |
| C-UGC LE EX 01.07.04 | Deconstruction | | \$0 |
| C-UGC LE EX 01.07.05 | | | \$0 \$0 |
| C-UGC LE EX 01.08 | Project Financial Costs | \$116,239,941 | ÇÜ |
| C-UGC LE EX 01.08.01 | Contractor Fees | 7110,233,341 | \$69,396,980 |
| C-UGC LE EX 01.08.02 | Escalation Costs | | \$46,842,961 |
| C-UGC LE EX 01.08.03 | Interest Payments | | \$40,042,301 |
| C-UGC LE EX 01.08.04 | Indirect costs to support shipments to rep | ository | \$0 \$0 |
| C-UGC LE EX 01.08.05 | munect costs to support simplifients to rep | Ositor y | \$0 \$0 |
| C-UGC LE EX 01.08.xx | (Add Further Breakdown as needed) | | \$0 \$0 |
| C-0GC LE EX 01.08.XX | (Add Fulther Breakdown as needed) | | ŞU |
| C-UGC LE EX 01.09 | Project Contingencies | \$152,473,839 | |
| C-UGC LE EX 01.09.01 | Management Reserve - Contractor Held | \$132,473,639 | \$49,185,109 |
| C-UGC LE EX 01.09.01 | Contingency - DOE held | | |
| C-0GC LE EX 01.09.02 | Contingency - DOE field | | \$103,288,729 |
| C-UGC LE EX 01.10 | | | |
| C-UGC LE EX 01.10 | Other Direct Costs | \$0 | |
| C-UGC LE EX 01.10.01 | | ŞU | ćn |
| C-UGC LE EX 01.10.02 | DOE Project Operations DOE TM&E | | \$0 \$0 |
| C-UGC LE EX 01.10.03 | | | \$0 \$0 |
| | Host site Operational Costs Miscellaneo | us | \$0 \$0 |
| C-UGC LE EX 01.10.05 | Miscellaneous ODC | | \$0 |
| CHCCLE EV 01 11 | Operational Costs | 0 | |
| C-UGC LE EX 01.11 | Operational Costs | 0 | ćo |
| C-UGC LE EX 01.11.01 | Operations Costs | | \$0 \$0 |
| C-UGC LE EX 01.11.02 | Transportation Costs | | \$0 \$0 |
| C-UGC LE EX 01.11.03 | Escalation (Operations/Transportation) | | \$0 |
| | | | |
| | | | |
| | (All Direct & indirect Co | nsts MR | |
| | TEC Feedletien | ,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,, | ¢1 022 007 204 |



STUDY 1 - ALTERNATIVE STORAGE SYSTEMS FOR DUAL PURPOSE CANISTERS

COST DETAILS

ALTERNATIVE 12 - C-UGS, EXPANDED, HIGH SEISMIC

LIFE CYCLE COST - 40 YEAR OPERATING LIFE

\$ 2,848,039,629



Interim Storage Facility

Expanded Storage Facility (10,000 MTU)

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

| Annual Escalation | | | | | | | | | | Dis | Discount Rate | | | |
|-------------------|-------------|-------------------------------|----------|--------------------|----------|--------------------------|-------------|--------------------|----------|------------------------|---------------|---------------|----------|-----------------------------|
| | | erating life | | | | | | | | 1.90% | | | | 3.40% |
| YEAR | | Design/Const | ۲. | O&M | Ç | ask Handling | ۸. | D&D | ۸. | Escalation | | inual Expense | , | Cumulative |
| 1 | \$ | 10,000,000 | \$ ¢ | - | \$ ¢ | - | \$ | - | \$ ¢ | 190,000 | \$ | 10,190,000 | \$ | 10,190,000 |
| 2 | \$ | 10,000,000 | \$ ¢ | - | \$ د | - | <u>۲</u> | - | ۶ د | 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 | <u>۲</u> | - | \$ د | - | <u>۲</u> | - | ۶ د | 32,500,273 | \$ | 232,500,273 | \$ | 371,980,021 |
| 9 | \$ | 200,000,000 | \$ | 24,243,717 | \$ د | - | <u>۲</u> | - | ۶ د | 41,392,899 | \$ | 265,636,616 | \$ | 637,616,638 |
| 10 11 | \$ | 608,287,624 | \$ | 23,603,013 | ې د | 12,836,230 | ې د | - | ې د | 130,862,075 | \$ | 762,752,712 | \$ ¢ | 1,400,369,350 |
| 12 | ç | | \$ \$ | 24,056,528 | ې د | | ې د | - | ې د | 8,486,475 | \$ ¢ | 45,379,232 | ې د | 1,445,748,582 |
| 13 | \$ ¢ | - | ې د | 24,056,528 | \$ ¢ | 12,836,230 | \$ ¢ | - | ې د | 9,348,680 | \$ ¢ | 46,241,438 | ې د | 1,491,990,020 |
| 13 14 | ې د | - | ې د | 24,056,528 | \$ \$ | 12,836,230 | \$ ¢ | - | ې د | 10,227,267 | \$ ¢ | 47,120,025 | ې د | 1,539,110,045 |
| | ې د | - | ې د | 11,144,331 | ې خ | 12,836,230 12,836,230 | \$ ¢ | - | ې د | 7,229,737 | \$ ¢ | 31,210,298 | ې د | 1,570,320,343 |
| 15 16 | ې د | - | ې د | 11,144,331 | ې خ | | \$ ¢ | - | ې د | 7,822,733 | \$ ¢ | 31,803,294 | ې د | 1,602,123,636 |
| 16 | ې د | - | \$ | 11,144,331 | \$ ¢ | 12,836,230 | \$ | - | ې د | 8,426,995 | \$ | 32,407,556 | ې د | 1,634,531,192 |
| 17 | ې د | - | ې خ | 11,144,331 | ې د | - | ې د | - | ې د | 4,202,374 | \$ | 15,346,705 | ې د | 1,649,877,897 |
| 18 | <u>۲</u> | - | <u>۲</u> | 11,144,331 | <u>۲</u> | - | <u>></u> | - | ۶ د | 4,493,961 | \$ | 15,638,292 | <u>۲</u> | 1,665,516,190 |
| 19 | <u>۲</u> | - | <u>۲</u> | 11,144,331 | <u>۲</u> | - | <u>></u> | - | ۶ د | 4,791,089 | \$ | 15,935,420 | <u>۲</u> | 1,681,451,610 |
| 20 | <u>۲</u> | - | <u>۲</u> | 11,144,331 | <u>۲</u> | - | <u>></u> | - | ۶ د | 5,093,862 | \$ | 16,238,193 | <u>۲</u> | 1,697,689,803 |
| 21 | <u>۲</u> | - | <u>۲</u> | 11,144,331 | <u>۲</u> | - | <u>></u> | - | ۶ د | 5,402,387 | \$ | 16,546,719 | <u>۲</u> | 1,714,236,521 |
| 22 | > | - | \$ ¢ | 11,144,331 | \$ ¢ | - | \$ ¢ | - | \$ ¢ | 5,716,775 | \$ | 16,861,106 | \$ ¢ | 1,731,097,627 |
| 23 | \$ ¢ | - | \$ ¢ | 11,144,331 | \$ ¢ | - | \$ ¢ | - | \$ ¢ | 6,037,136 | \$ | 17,181,467 | \$ ¢ | 1,748,279,095 |
| 24 | \$ ¢ | - | \$ ¢ | 11,144,331 | \$ ¢ | - | \$ ¢ | - | \$ ¢ | 6,363,584 | \$ | 17,507,915 | \$ ¢ | 1,765,787,010 |
| 25 | \$ ¢ | - | \$ ¢ | 11,144,331 | \$ ¢ | - | \$ ¢ | - | \$ ¢ | 6,696,234 | \$ | 17,840,566 | \$ ¢ | 1,783,627,575 |
| 26 | \$ ¢ | - | \$ ¢ | 11,144,331 | \$ ¢ | - | \$ ¢ | - | \$ ¢ | 7,035,205 | \$ | 18,179,536 | \$ ¢ | 1,801,807,112 |
| 27 | \$ ¢ | - | \$ ¢ | 11,144,331 | \$ | - | \$ ¢ | - | \$ ¢ | 7,380,616 | \$ | 18,524,947 | \$ | 1,820,332,059 |
| 28 | \$ ¢ | - | \$ ¢ | 11,144,331 | \$ ¢ | - | \$ ¢ | - | \$ ¢ | 7,732,590 | \$ | 18,876,921 | \$ \$ | 1,839,208,981 |
| 29 | \$ ¢ | - | \$ ¢ | 11,144,331 | \$ ¢ | - | \$ ¢ | - | \$ ¢ | 8,091,252 | \$ ¢ | 19,235,583 | \$ ¢ | 1,858,444,564 |
| 30 | \$ ¢ | - | \$ ¢ | 11,144,331 | \$ ¢ | - | \$ ¢ | - | \$ ¢ | 8,456,728 | \$ | 19,601,059 | \$ ¢ | 1,878,045,623 |
| 31 | \$ ¢ | - | \$ ¢ | 11,144,331 | \$ ¢ | - | \$ ¢ | - | \$ ¢ | 8,829,148 | \$ | 19,973,479 | \$ ¢ | 1,898,019,102 |
| 32 | \$ \$ | - | \$ \$ | 11,144,331 | \$ \$ | - | \$ \$ | - | \$ \$ | 9,208,644 | \$ | 20,352,975 | \$ \$ | 1,918,372,077 |
| 33 | > | - | \$ ¢ | 11,144,331 | \$ ¢ | - | \$ ¢ | - | \$ ¢ | 9,595,350 | \$ | 20,739,682 | \$ ¢ | 1,939,111,759 |
| 34 | \$ ¢ | - | \$ ¢ | 11,144,331 | \$ ¢ | - | \$ ¢ | - | \$ ¢ | 9,989,404 | \$ | 21,133,736 | \$ ¢ | 1,960,245,495 |
| 35 | <u>۲</u> | - | <u>۲</u> | 11,144,331 | <u>۲</u> | - | <u>></u> | - | ۶ د | 10,390,945 | \$ | 21,535,277 | <u>۲</u> | 1,981,780,771 |
| 36 37 | ې د | - | ې خ | 11,144,331 | ې د | - | ې د | - | ې د | 10,800,116 | \$ | 21,944,447 | ې د | 2,003,725,218 |
| | ې د | - | ې خ | 11,144,331 | ې د | - | ې د | - | ې د | 11,217,060 | \$ | 22,361,391 | ې د | 2,026,086,610 |
| 38 | ې د | - | ې خ | 11,144,331 | ې د | - | ې د | - | ې د | 11,641,927 | \$ | 22,786,258 | ې د | 2,048,872,868 |
| 39 40 | ې د | - | ې خ | 11,144,331 | ې د | - | ې د | - | ې د | 12,074,865 | \$ | 23,219,197 | ې د | 2,072,092,064 |
| 40 | <u>۲</u> | - | <u>۲</u> | 11,144,331 | <u>۲</u> | - | <u>></u> | - | ۶ د | 12,516,030 | \$ | 23,660,362 | <u>۲</u> | 2,095,752,426 |
| 41 | <u>۲</u> | - | <u>۲</u> | 11,144,331 | <u>۲</u> | - | <u>></u> | - | ۶ د | 12,965,577 | \$ | 24,109,908 | <u>۲</u> | 2,119,862,334 |
| 42 | <u>۲</u> | - | <u>۲</u> | 11,144,331 | <u>۲</u> | - | <u>></u> | - | ۶ د | 13,423,665 | \$ | 24,567,997 | <u>۲</u> | 2,144,430,331 |
| 43 | <u>۲</u> | - | <u>۲</u> | 11,144,331 | <u>۲</u> | - | <u>></u> | - | ۶ د | 13,890,457 | \$ | 25,034,789 | <u>۲</u> | 2,169,465,120 |
| 44 | \$ ¢ | - | \$ ¢ | 11,144,331 | \$ ¢ | - | \$ ¢ | - | \$ ¢ | 14,366,118 | \$ | 25,510,450 | \$ ¢ | 2,194,975,569 |
| 45 | \$ ¢ | - | \$ ¢ | 11,144,331 | \$ ¢ | - | \$ ¢ | - | \$ ¢ | 14,850,817 | \$ | 25,995,148 | \$ ¢ | 2,220,970,718 |
| 46 | \$ ¢ | - | \$ ¢ | 11,144,331 | \$ ¢ | - | \$ ¢ | - | \$ ¢ | 15,344,725 | \$ | 26,489,056 | \$ ¢ | 2,247,459,774 |
| 47 | \$ ¢ | - | \$ ¢ | 11,144,331 | \$ ¢ | - | \$ ¢ | - | \$ ¢ | 15,848,017 | \$ | 26,992,348 | \$ ¢ | 2,274,452,122 |
| 48 | \$ \$ | - | \$ \$ | 11,144,331 | \$ \$ | - | \$ \$ | - | \$ \$ | 16,360,871 | \$ | 27,505,203 | \$ \$ | 2,301,957,324 |
| 49 | \$ \$ | - | \$ \$ | 11,144,331 | \$ \$ | - | \$ \$ | - | \$ \$ | 16,883,470 | \$ | 28,027,801 | \$ \$ | 2,329,985,126 |
| 50 | \$ \$ | - | \$ \$ | 11,144,331 | \$ \$ | - | \$ \$ | - | \$ \$ | 17,415,998 | \$ | 28,560,330 | \$ \$ | 2,358,545,455 |
| 51 | \$ \$ | - | \$ \$ | - | \$ \$ | - | \$ \$ | 21,175,000 | \$ \$ | 34,122,666 | \$ | 55,297,666 | \$ \$ | 2,413,843,122 |
| 52 | \$ | - | \$ | - | \$ | - | \$ | 26,250,000 | \$ | 43,603,292 | \$ | 69,853,292 | \$ | 2,483,696,413 |
| 53 | \$ | - | \$ | - | \$ | - | \$ | 43,947,302 | \$ | 75,221,883 | \$ | 119,169,184 | \$ | 2,602,865,597 |
| 54 | \$ • | - | Ş _ | - | \$ • | - | Ş _ | 43,947,302 | \$ \$ | 77,486,097 | \$ \$ | 121,433,399 | \$ • | 2,724,298,996 |
| 55 | \$ • | - | Ş _ | - | Ş , | - | Ş _ | 43,947,302 | Ş _ | 79,793,332 | \$ • | 123,740,633 | Ş _ | 2,848,039,629 |
| 56 | \$ • | - | Ş _ | - | Ş , | - | Ş _ | - | Ş _ | - | \$ • | - | Ş _ | 2,848,039,629 |
| 57 | \$ | - | \$ | - | \$ | - | \$ | - | \$ | - | \$ | - | \$ _ | 2,848,039,629 |
| 58 | \$ | - | \$ _ | - | \$ | - | \$ | - | \$ _ | - | \$ | - | \$ _ | 2,848,039,629 |
| 59 | \$ • | - | Ş | - | \$ _ | - | \$ | - | \$ _ | - | \$ | - | Ş | 2,848,039,629 |
| 60 | \$ | - | \$ | - | \$ | - | \$ | - | \$ | - | \$ | - | \$ | 2,848,039,629 |
| | | T_1 - 1 | | T-2-1 | | | | T-1-1 | | T-2-1 | | | | T-1-1 |
| | | Total | | Total | | | | Total | | Total | | | | Total |
| | | Design/Const 1.136.176.023 | \$ | O&M 532.356.575 | Ļ | 77.017.378 | \$ | D&D 179.266.905 | ć | Escalation 923.222.749 | | | ç | Life Cycle 2.848.039.629 |
| | | し しった しきかいひろう | `` | ココノ ゴコロ・コノコ | _ | // UI/ 3/X | | 174.700.905 | ` | 9/3/////49 | | | ` | 7.048.U39.D/9 |

\$ 1,136,176,023 \$ 532,356,575 \$ 77,017,378 \$ 179,266,905 \$ 923,222,749



STUDY 1 - ALTERNATIVE STORAGE SYSTEMS FOR DUAL PURPOSE CANISTERS

COST DETAILS

ALTERNATIVE 12 - C-UGS, EXPANDED, HIGH SEISMIC

LIFE CYCLE COST - 80 YEAR OPERATING LIFE



Expanded Storage Facility (10,000 MTU)

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

expanded Project - C-UGS 60/40 Vertical/Horizontal - High Seismic

Separate CHB

80 Year Operating Life

| 80 Yea | гОр | erating Life | | | | | | | Ar | nnual Escalation 1.90% | | Discount Rate 3.40% |
|----------------|----------|--------------------------|----------|--------------------------|----------|--------------|---------|--------|----------|--------------------------|------------------------------|------------------------------------|
| | | | | | | | | | | 1.50% | Annual | 31.10% |
| YEAR | | Design/Const | | 0&M | | ask Handling | | D&D | | Escalation | Funding | Cumulative |
| 1 | \$ | 10,000,000 | \$ | - | \$ | - | \$ | - | \$ | | \$10,190,000 | \$10,190,000 |
| 2 | \$ | 10,000,000 | \$ | - | \$ | - | \$ | - | \$ | | \$10,383,610 | \$20,573,610 |
| 3 | \$ | 20,000,000 | \$ | - | \$ | - | \$ | - | \$ | | \$21,161,797 | \$41,735,407 |
| 4 | \$ | 20,000,000 | \$ | - | \$ | - | \$ | - | \$ | | \$21,563,871 | \$63,299,279 |
| 5 | \$ | 20,000,000 | \$ | - | \$ ¢ | - | \$ ¢ | - | \$ | | \$21,973,585 | \$85,272,863 |
| 6 7 | \$ \$ | 20,000,000 27,888,399 | \$ \$ | - | ۶ د | - | ۶ د | - | \$ \$ | | \$22,391,083 \$31,815,802 | \$107,663,946 \$139,479,748 |
| 8 | ۶ \$ | 200,000,000 | ۶ \$ | _ | ۶ \$ | _ | Ş Ç | _ | ۶ \$ | | \$232,500,273 | \$371,980,021 |
| 9 | \$ | 200,000,000 | \$ | 24,243,717 | ٠ \$ | _ | ς ς | _ | \$ | | \$265,636,616 | \$637,616,638 |
| 10 | \$ | 608,287,624 | \$ | 23,603,013 | \$ | _ | \$ | _ | \$ | | \$762,752,712 | \$1,400,369,350 |
| 11 | Υ | 000,207,02 | \$ | 24,056,528 | \$ | 12,836,230 | \$ | _ | \$ | | \$45,379,232 | \$1,445,748,582 |
| 12 | \$ | - | \$ | 24,056,528 | , \$ | 12,836,230 | \$ | _ | \$ | | \$46,241,438 | \$1,491,990,020 |
| 13 | \$ | - | \$ | 24,056,528 | \$ | 12,836,230 | \$ | _ | \$ | | \$47,120,025 | \$1,539,110,045 |
| 14 | \$ | - | \$ | 11,144,331 | \$ | 12,836,230 | \$ | - | \$ | | \$31,210,298 | \$1,570,320,343 |
| 15 | \$ | - | \$ | 11,144,331 | \$ | 12,836,230 | \$ | - | \$ | 7,822,733 | \$31,803,294 | \$1,602,123,636 |
| 16 | \$ | - | \$ | 11,144,331 | \$ | 12,836,230 | \$ | - | \$ | 8,426,995 | \$32,407,556 | \$1,634,531,192 |
| 17 | \$ | - | \$ | 11,144,331 | \$ | - | \$ | - | \$ | 4,202,374 | \$15,346,705 | \$1,649,877,897 |
| 18 | \$ | - | \$ | 11,144,331 | \$ | - | \$ | - | \$ | 4,493,961 | \$15,638,292 | \$1,665,516,190 |
| 19 | \$ | - | \$ | 11,144,331 | \$ | - | \$ | - | \$ | 4,791,089 | \$15,935,420 | \$1,681,451,610 |
| 20 | \$ | - | \$ | 11,144,331 | \$ | - | \$ | - | \$ | 5,093,862 | \$16,238,193 | \$1,697,689,803 |
| 21 | \$ | - | \$ | 11,144,331 | \$ | - | \$ | - | \$ | | \$16,546,719 | \$1,714,236,521 |
| 22 | \$ | - | \$ | 11,144,331 | \$ | - | \$ | - | \$ | | \$16,861,106 | \$1,731,097,627 |
| 23 | \$ | - | \$ | 11,144,331 | \$ | - | \$ | - | \$ | | \$17,181,467 | \$1,748,279,095 |
| 24 | \$ | - | \$ | 11,144,331 | \$ | - | \$ | - | \$ | 6,363,584 | \$17,507,915 | \$1,765,787,010 |
| 25 | \$ | - | \$ | 11,144,331 | \$ | - | \$ | - | \$ | 6,696,234 | \$17,840,566 | |
| 26 | Ş _ | - | \$ | 11,144,331 | \$ | - | \$ | - | \$ | 7,035,205 | \$18,179,536 | \$1,801,807,112 |
| 27 | \$ \$ | - | \$ | 11,144,331 | \$ | - | \$ | - | \$ | 7,380,616 | \$18,524,947 | \$1,820,332,059 |
| 28 | \$ ¢ | - | \$ ¢ | 11,144,331 | \$ ¢ | - | \$ ¢ | - | \$ ¢ | 7,732,590 | \$18,876,921 | \$1,839,208,981 |
| 29 30 | ې د | - | ې د | 11,144,331 | ې د | - | ې د | - | ې د | 8,091,252 8,456,738 | \$19,235,583 \$19,601,059 | \$1,858,444,564 \$1,878,045,623 |
| 31 | ې د | - | ې د | 11,144,331 11,144,331 | ې د | _ | ې د | - | ې د | 8,456,728 8,829,148 | \$19,601,039 | \$1,898,019,102 |
| 32 | ٠ \$ | _ | ب خ | 11,144,331 | ٠ \$ | _ | ς , | _ | ٠ \$ | 9,208,644 | \$20,352,975 | \$1,918,372,077 |
| 33 | \$ | _ | \$ | 11,144,331 | \$ | _ | ς ς | _ | ٠ \$ | 9,595,350 | \$20,739,682 | \$1,939,111,759 |
| 34 | \$ | _ | \$ | 11,144,331 | \$ | _ | \$ | _ | \$ | 9,989,404 | \$21,133,736 | \$1,960,245,495 |
| 35 | \$ | _ | \$ | 11,144,331 | \$ | _ | \$ | _ | \$ | 10,390,945 | \$21,535,277 | \$1,981,780,771 |
| 36 | \$ | - | \$ | 11,144,331 | \$ | - | \$ | _ | \$ | 10,800,116 | \$21,944,447 | \$2,003,725,218 |
| 37 | \$ | - | \$ | 11,144,331 | \$ | - | \$ | - | \$ | 11,217,060 | \$22,361,391 | \$2,026,086,610 |
| 38 | \$ | - | \$ | 11,144,331 | \$ | - | \$ | - | \$ | 11,641,927 | \$22,786,258 | \$2,048,872,868 |
| 39 | \$ | - | \$ | 11,144,331 | \$ | - | \$ | - | \$ | 12,074,865 | \$23,219,197 | \$2,072,092,064 |
| 40 | \$ | - | \$ | 11,144,331 | \$ | - | \$ | - | \$ | 12,516,030 | \$23,660,362 | \$2,095,752,426 |
| 41 | \$ | - | \$ | 11,144,331 | \$ | - | \$ | - | \$ | 12,965,577 | \$24,109,908 | \$2,119,862,334 |
| 42 | \$ | - | \$ | 11,144,331 | \$ | - | \$ | - | \$ | 13,423,665 | \$24,567,997 | \$2,144,430,331 |
| 43 | \$ | - | \$ | 11,144,331 | \$ | - | \$ | - | \$ | 13,890,457 | \$25,034,789 | \$2,169,465,120 |
| 44 | \$ | - | \$ | 11,144,331 | \$ | - | \$ | - | \$ | 14,366,118 | \$25,510,450 | \$2,194,975,569 |
| 45 | \$ | - | \$ | 11,144,331 | \$ | - | \$ | - | \$ | 14,850,817 | \$25,995,148 | \$2,220,970,718 |
| 46 | \$ | - | \$ | 11,144,331 | \$ | - | \$ | - | \$ | 15,344,725 | \$26,489,056 | \$2,247,459,774 |
| 47 | \$ | - | \$ | 11,144,331 | \$ | - | \$ | - | \$ | 15,848,017 | \$26,992,348 | \$2,274,452,122 |
| 48 | \$ | - | \$ • | 11,144,331 | \$ | - | \$ | - | \$ | 16,360,871 | \$27,505,203 | \$2,301,957,324 |
| 49 | \$ ¢ | - | \$ ¢ | 11,144,331 | \$ ¢ | - | \$ ¢ | - | \$ ¢ | 16,883,470 | \$28,027,801 | \$2,329,985,126 |
| 50 51 | \$ ¢ | - | \$ ¢ | 11,144,331 | \$ ¢ | - | \$ ¢ | - | \$ ¢ | 17,415,998 | \$28,560,330 | \$2,358,545,455 |
| 51 | \$ د | - | ۶ د | 11,144,331 | \$ ¢ | - | \$ ¢ | - | \$ ¢ | 17,958,645 | \$29,102,976 | \$2,387,648,431 |
| 52 53 | ې د | - | ې د | 11,144,331 11,144,331 | Ş ¢ | - | ې د | - | ې د | 18,511,601 19,075,064 | \$29,655,933 \$30,219,395 | \$2,417,304,364 |
| 54 | ې د | - | ۶ د | 11,144,331 | ۶ د | _ | ې د | _ | ې د | 19,649,232 | \$30,793,564 | \$2,447,523,759 \$2,478,317,323 |
| 5 4 | ٠ ج | - | ٠ ۲ | 11,144,331 | ب خ | - | ب \$ | - | ې د | 20,234,310 | \$30,793,364 | \$2,509,695,964 |
| 56 | ۶ \$ | - | ۶ \$ | 11,144,331 | \$ \$ | _ | ب \$ | - | ۶ \$ | | \$31,974,836 | \$2,541,670,800 |
| 57 | \$ | - | \$ | 11,144,331 | \$ | _ | \$ | _ | \$ | | \$32,582,358 | \$2,574,253,158 |
| 58 | \$ | _ | \$ | 11,144,331 | \$ | _ | \$ | _ | \$ | | \$33,201,422 | \$2,607,454,580 |
| 59 | \$ | _ | \$ | 11,144,331 | \$ | - | \$ | _ | \$ | | \$33,832,249 | \$2,641,286,829 |
| 60 | \$ | - | \$ | 11,144,331 | \$ | - | \$ | - | \$ | | \$34,475,062 | \$2,675,761,891 |
| 61 | \$ | - | \$ | 11,144,331 | \$ | - | \$ | - | \$ | | \$35,130,088 | \$2,710,891,980 |
| | | | | | | | | A6-120 | | | | |
| | | | | | | | | | | | | |

\$1,136,176,023

\$978,129,829

\$77,017,378

\$179,266,905

\$2,747,462,096

\$5,118,052,231



| 62 | \$ - | \$ 11,144,331 | \$ | - | \$ | - | \$ | 24,653,229 | \$35,797,560 | \$2,746,689,540 |
|-----|--------------|------------------|-----------|---|------|------------|----|-------------|---------------|-----------------|
| 63 | \$ - | \$ 11,144,331 | \$ | - | \$ | - | \$ | 25,333,382 | \$36,477,714 | \$2,783,167,253 |
| 64 | \$ - | \$ 11,144,331 | \$ | - | \$ | - | \$ | 26,026,459 | \$37,170,790 | \$2,820,338,043 |
| 65 | \$0 | \$ 11,144,331 | \$ | - | \$ | - | \$ | 26,732,704 | \$37,877,035 | \$2,858,215,079 |
| 66 | \$0 | \$ 11,144,331 | \$ | - | \$ | - | \$ | 27,452,367 | \$38,596,699 | \$2,896,811,777 |
| 67 | \$0 | \$ 11,144,331 | \$ | - | \$ | - | \$ | 28,185,705 | \$39,330,036 | \$2,936,141,814 |
| 68 | \$0 | \$ 11,144,331 | \$ | - | \$ | - | \$ | 28,932,975 | \$40,077,307 | \$2,976,219,120 |
| 69 | \$0 | \$ 11,144,331 | \$ | - | \$ | - | \$ | 29,694,444 | \$40,838,776 | \$3,017,057,896 |
| 70 | \$0 | \$ 11,144,331 | \$ | - | \$ | - | \$ | 30,470,381 | \$41,614,712 | \$3,058,672,608 |
| 71 | \$0 | \$ 11,144,331 | \$ | - | \$ | - | \$ | 31,261,061 | \$42,405,392 | \$3,101,078,000 |
| 72 | \$0 | \$ 11,144,331 | \$ | - | \$ | - | \$ | 32,066,763 | \$43,211,094 | \$3,144,289,095 |
| 73 | \$0 | \$ 11,144,331 | \$ | - | \$ | - | \$ | 32,887,774 | \$44,032,105 | \$3,188,321,200 |
| 74 | \$0 | \$ 11,144,331 | \$ | - | \$ | - | \$ | 33,724,384 | \$44,868,715 | \$3,233,189,915 |
| 75 | \$0 | \$ 11,144,331 | \$ | - | \$ | - | \$ | 34,576,889 | \$45,721,221 | \$3,278,911,136 |
| 76 | \$0 | \$ 11,144,331 | \$ | - | \$ | - | \$ | 35,445,593 | \$46,589,924 | \$3,325,501,059 |
| 77 | \$0 | \$ 11,144,331 | \$ | - | \$ | - | \$ | 36,330,801 | \$47,475,132 | \$3,372,976,192 |
| 78 | \$0 | \$ 11,144,331 | \$ | - | \$ | - | \$ | 37,232,829 | \$48,377,160 | \$3,421,353,352 |
| 79 | \$0 | \$ 11,144,331 | \$ | - | \$ | - | \$ | 38,151,995 | \$49,296,326 | \$3,470,649,678 |
| 80 | \$0 | \$ 11,144,331 | \$ | - | \$ | - | \$ | 39,088,625 | \$50,232,956 | \$3,520,882,634 |
| 81 | \$0 | \$ 11,144,331 | \$ | - | \$ | - | \$ | 40,043,051 | \$51,187,382 | \$3,572,070,017 |
| 82 | \$0 | \$ 11,144,331 | \$ | - | \$ | - | \$ | 41,015,611 | \$52,159,943 | \$3,624,229,959 |
| 83 | \$0 | \$ 11,144,331 | \$ | - | \$ | - | \$ | 42,006,650 | \$53,150,982 | \$3,677,380,941 |
| 84 | \$0 | \$ 11,144,331 | \$ | - | \$ | - | \$ | 43,016,519 | \$54,160,850 | \$3,731,541,791 |
| 85 | \$0 | \$ 11,144,331 | \$ | - | \$ | - | \$ | 44,045,575 | \$55,189,906 | \$3,786,731,697 |
| 86 | \$0 | \$ 11,144,331 | \$ | - | \$ | - | \$ | 45,094,183 | \$56,238,515 | \$3,842,970,212 |
| 87 | \$0 | \$ 11,144,331 | \$ | - | \$ | - | \$ | 46,162,715 | \$57,307,046 | \$3,900,277,258 |
| 88 | \$0 | \$ 11,144,331 | \$ | - | \$ | - | \$ | 47,251,549 | \$58,395,880 | \$3,958,673,139 |
| 89 | \$0 | \$ 11,144,331 | \$ | - | \$ | - | \$ | 48,361,071 | \$59,505,402 | \$4,018,178,540 |
| 90 | \$0 | \$ 11,144,331 | \$ | - | \$ | - | \$ | 49,491,673 | \$60,636,005 | \$4,078,814,545 |
| 91 | | | \$ | - | \$ 2 | 1,175,000 | \$ | 96,226,640 | \$117,401,640 | \$4,196,216,185 |
| 92 | | | \$ | - | \$ 2 | 26,250,000 | \$ | 122,054,468 | \$148,304,468 | \$4,344,520,653 |
| 93 | | | \$ | - | \$ 4 | 3,947,302 | \$ | 209,058,993 | \$253,006,294 | \$4,597,526,948 |
| 94 | | | \$ | - | \$ 4 | 3,947,302 | \$ | 213,866,113 | \$257,813,414 | \$4,855,340,362 |
| 95 | | | \$ | - | \$ 4 | 3,947,302 | \$ | 218,764,567 | \$262,711,869 | \$5,118,052,231 |
| 96 | | | | | \$ | - | \$ | - | \$0 | \$5,118,052,231 |
| 97 | | | | | \$ | - | \$ | _ | \$0 | \$5,118,052,231 |
| 98 | | | | | | | \$ | - | \$0 | \$5,118,052,231 |
| 99 | | | | | | | \$ | - | \$0 | \$5,118,052,231 |
| 100 | | | | | | | \$ | - | \$0 | \$5,118,052,231 |
| | | | | | | | • | | · | , |
| | Total | Total | Total | | | Total | | Total | | Total |
| | Design/Const | O&M | Cask Hand | | | D&D | | Escalation | | Life Cycle |
| | <u>.</u> | | | _ | | | | | | • |