YUCCA MOUNTAIN PROJECT

Studies

Mined Geologic Disposal System Viability Assessment Cost Estimate Plan

Presented to:
Nuclear Waste Technical Review Board

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U.S. Department of Energy
Office of Civilian Radioactive
Waste Management

Outline

- Why we are doing the MGDS VA cost estimate
- Components of the estimate
- Estimating approach
- Cost control process and review plans
- Example draft estimate
- Key milestones on path to final MGDS VA cost estimate
- Issues and challenges

VA Cost Estimate Requirement

- **MGDS-VA cost estimate required by the Energy and Water Development Appropriation Bill, 1997 (became law 9/30/97) H.R.3816**

Nuclear Waste Disposal Fund

".....That no later than September 30, 1998, the Secretary shall provide to the President and to the Congress a viability assessment of the Yucca Mountain site. The viability assessment shall include:

(1) the preliminary design concept for the critical elements for the repository and waste package;

(2) a total system performance assessment, based upon the design concept and the scientific data and analysis available by September 30, 1998, describing the probable behavior of the repository in the Yucca Mountain geological setting relative to the overall system performance standards;

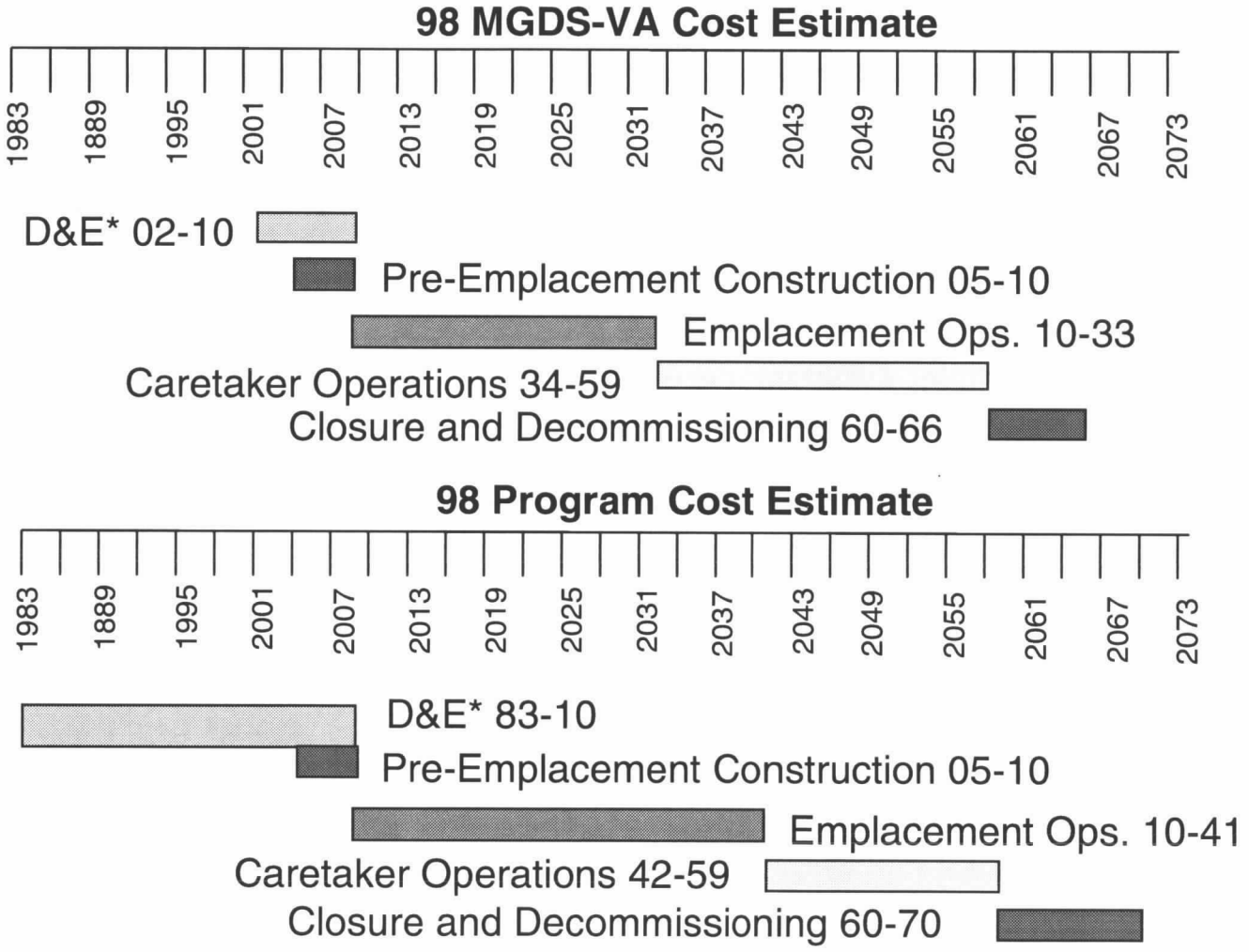
(3) a plan and cost estimate for the remaining work required to complete a license application; and

(4) *an estimate of the costs to construct and operate the repository in accordance with the design concept."*

Program/Project Cost Estimates - Usage

- MGDS-VA cost estimate
  - Provides the cost of a reference repository design
  - Used as input into Program cost estimates
  - Supports project trade and optimization studies
- Program cost estimates are used to
  - Determine waste fund fee adequacy
  - Determine defense funding required
  - Compare available funding with anticipated near-term costs
  - Determine Program economic viability
  - Perform Program trade and optimization studies

MGDS VA Cost Estimate Time Phases



* Development and Evaluation

Elements Excluded From MGDS Estimate

- Historical MGDS D&E costs (prior to 1998)
  - Site characterization, prior design activities
- License application cost (10/98 - 3/02)
- Program costs
  - Waste acceptance
  - Storage
  - National transportation (Regional Servicing Agent (RSA) concept)
  - Other Program costs (NRC, NWTRB, misc.)

Elements Included in MGDS Estimate

- MGDS development and evaluation (D&E)
- Surface facilities
- Subsurface facilities
- Disposal containers
- Performance confirmation
- Nevada transportation

Development and Evaluation: Cost Estimating Approach

- Multi-year project plan approach
  - Includes design activities, management, institutional, Payment Equal To Taxes (PETT), and planning for performance confirmation and Nevada transportation construction activities
  - Expansion of the planning horizon from historical five-year planning to include activities through 2010

Surface Facilities: Cost Estimating Approach

- Radiological facilities
  - Design-based bottoms-up
  - Equipment--commercial database and quotes
  - Manpower--manpower studies, means database and site unique factors
  - Closure and decommissioning--factoring
- Balance of plant
  - Capital costs--scaling (MRS design/cost base)
  - Operation costs--manpower studies based
  - Closure and decommissioning--factoring

Subsurface Facilities: Cost Estimating Approach

- Design layout based excavation modeling
  - Efficiency based progress
    - Tunnel Boring Machine (TBM) primary method
    - Road headers/ other excavation used
  - Ground support--bottoms-up
- Manpower based on crew assignment and schedules
  - Crew costs based manpower studies, crew efficiency considerations and NTS labor agreement rate bases
- Materials and equipment based on industrial reference databases
  - Dataquest
  - Western Mining Engineering
  - US Army Corps of Engineers

Disposal Containers: Cost Estimating Approach

- Unit costs
  - Design-based quantity takeoffs
  - Material costs based on supplier quotes
  - Other contributors include
    - Nye County sales tax
    - Factors for transport, project management
    - Contingency
- Disposal container quantities
  - Waste stream based

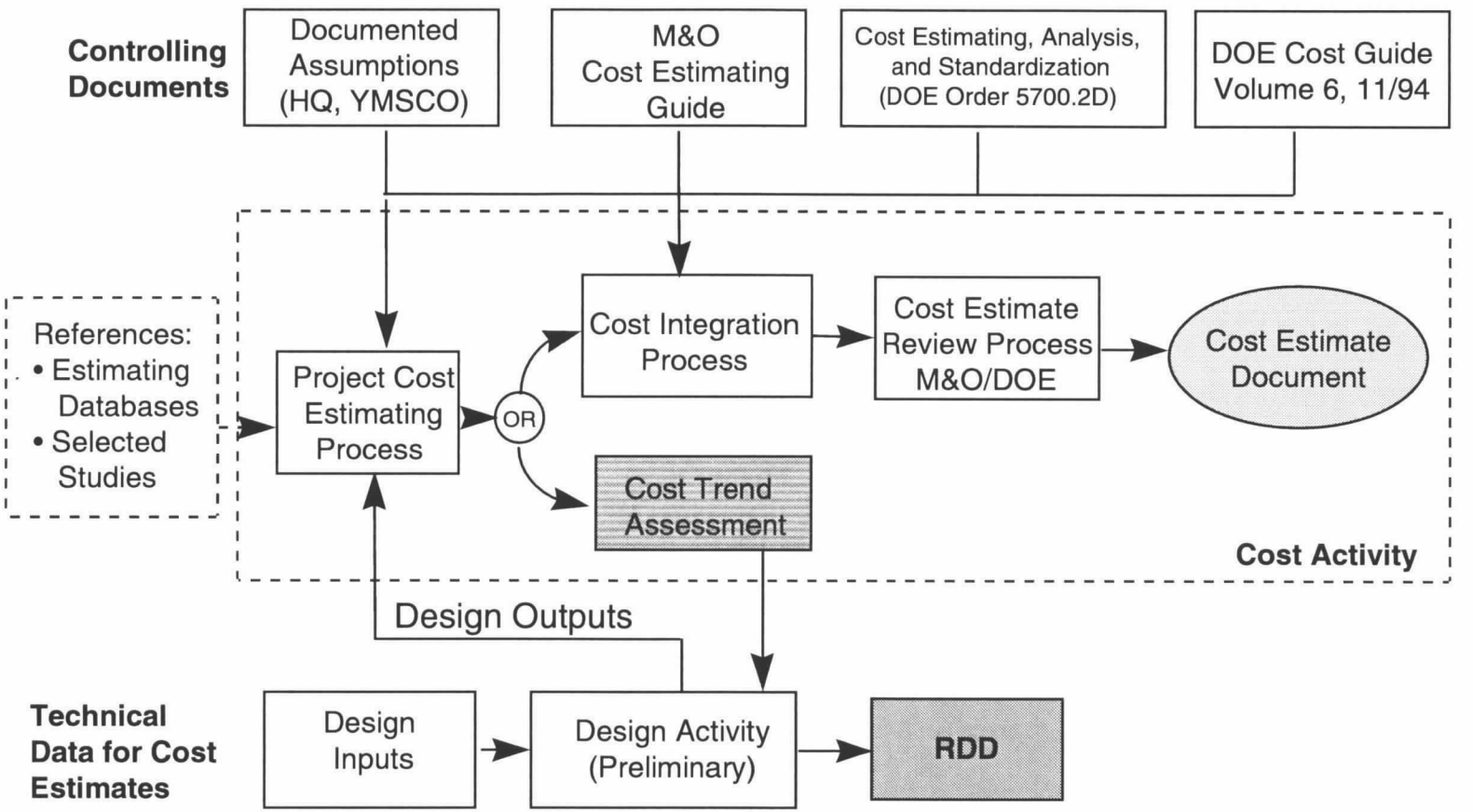
Performance Confirmation - Cost Estimating Approach

- Capital costs
  - Facilities estimated by Surface--capacity factoring; and Subsurface--bottoms-up
  - Boreholes scaled from historical local database
- Operations
  - Based on scaling and factoring
  - Data analysis, new studies, and scaling from historical local database

Nevada Transportation: Cost Estimating Approach

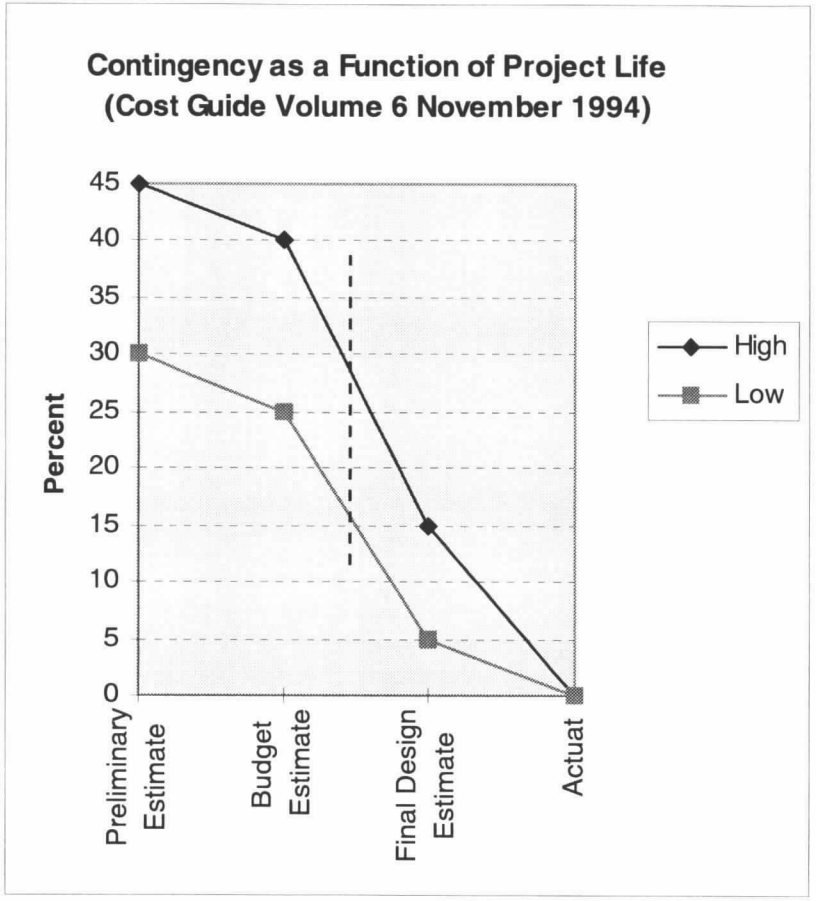
- Until such time that the transportation mode/route is selected, the following assumptions are made for cost estimating purposes
  - Assumes a government-owned and Regional Service Agency (RSA) operated rail line from a main railroad line to the repository
  - Route assumed to be the average of five rail route alternatives in EIS studies (in review)

Cost Control Process



Assessing Accuracy and Risk

- **Developing a plan for assessing risk of the overall estimate**
- **Current estimating guide and industry experience provides for a range contingency levels, based upon design maturity, that which are applied to elements of the estimate**

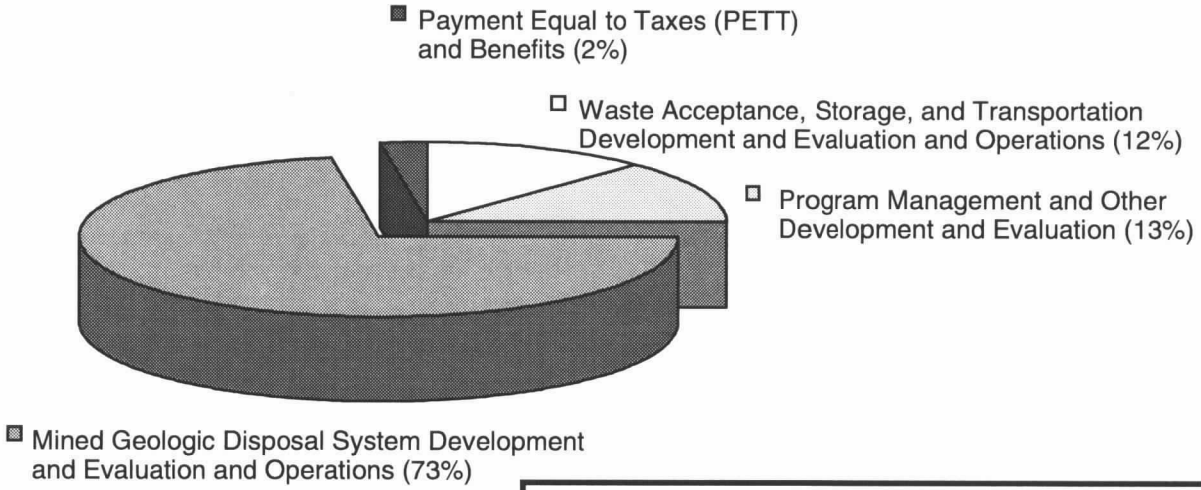


MGDS VA Estimate Reviews

- Yucca Mountain Project (YMP)
  - Multi-year planning January - February 1998
  - MGDS estimate April 1998 and July 1998
- External Review Team
  - Review completed segments and submit feedback at end of segment review
    - » Assumption segment - October 1997
    - » Disposal container segment - January 1998
    - » D&E (multi-year segment) - February 1998
    - » Repository and remaining elements - April 1998
    - » Draft Final report - June 1998

Yucca Mountain is the Largest Element of Total System Life Cycle Costs

Relationships of Major Elements of Total Life Cycle Costs (Based on 1997 Program Cost Estimate)

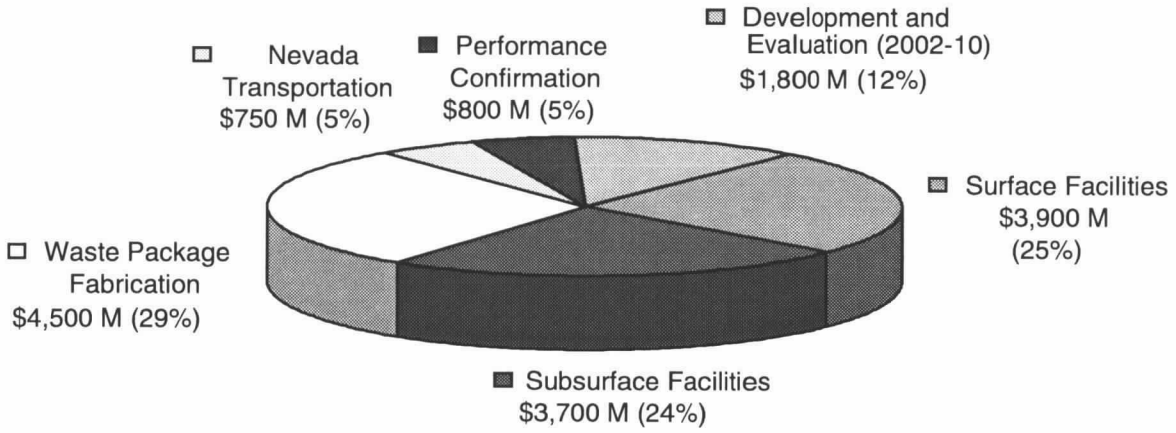


Assumptions:

- **Disposal of total requirement in a single repository.**
- **Emplacement 2010-2041.**
- **Closure 50 years after start of emplacement.**
- **No centralized interim storage.**
- **Disposal in large waste packages.**
- **Rail and truck transport (13 truck sites).**

Repository Cost Drivers

70,000 MTU repository (scaled from 97 PCE)



Total = $15,450 M FY 97 Dollars

The MGDS estimate is presently in work, the data presented herein is result of a scaling effort to be replaced by the cost estimate of the RDD Rev. 0

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Key Milestones

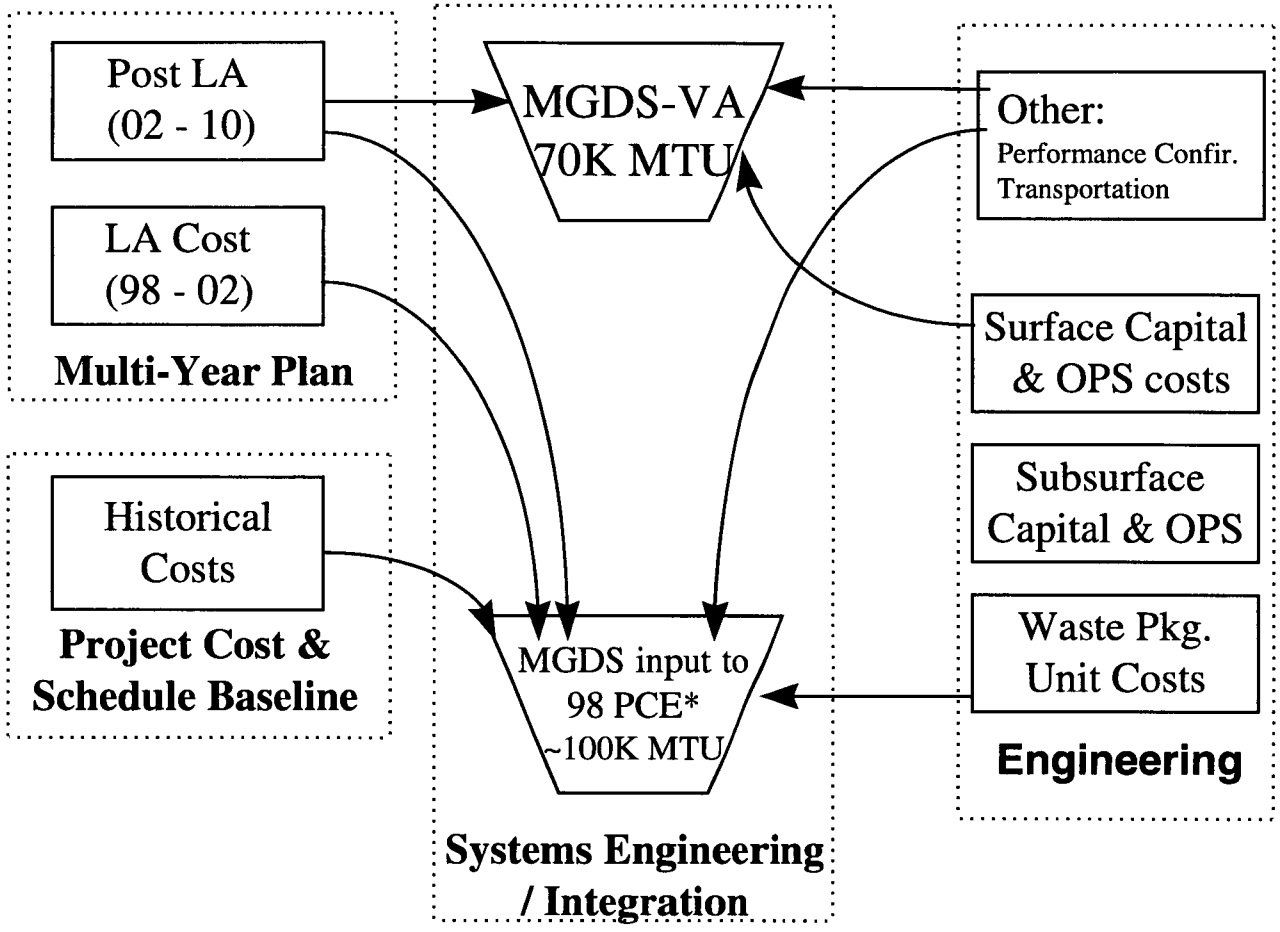
- Cost Analysis Report - VA assumptions 9/30/97
- Disposal container design freeze - 9/30/97
- Bin 3 freeze - 9/30/97
- Final design freeze (non-Bin 3) 2/10/98
- VA Document due - 8/28/98

Challenges

- Reconcile external review comments
- Incorporate late design changes which have a significant impact on the cost estimate
- Integrate design and related costs details from design segments

Backup Charts

98 MGDS Cost Products

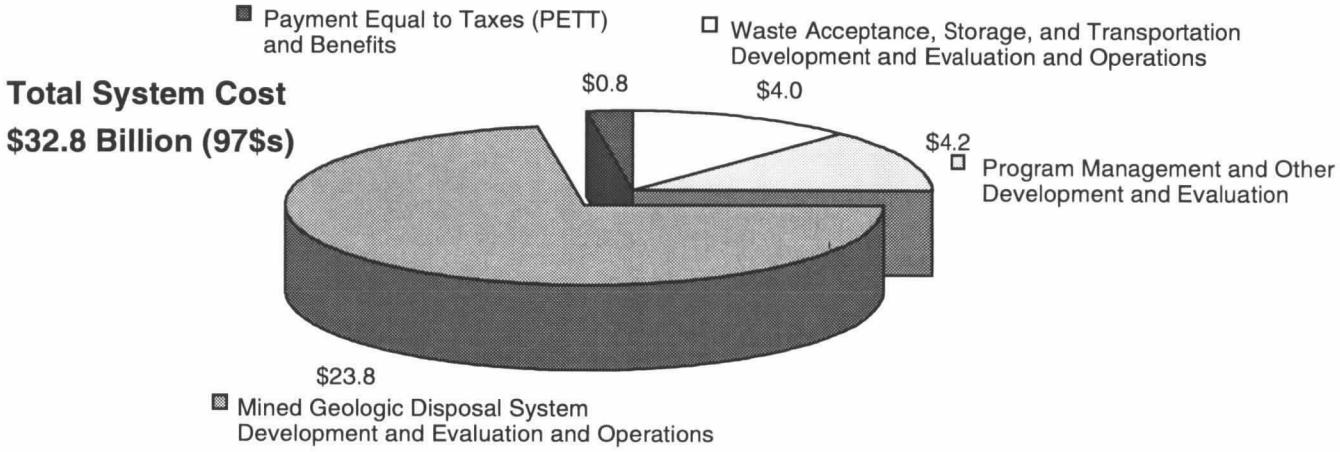


*** Program Cost Estimate**

Total System Life Cycle Costs (Existing Estimate)

Major Elements of Total Life Cycle Costs

Billions of constant 1997 dollars



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Major Difference Between 95 TSLCC and 97 PCE

Item	95 TSLCC	97 PCE
Waste stream	SNF & DHLW	SNF, DHLW & DOE SNF
Mass Thermal Loading	100 MTU/acre	83 MTU/acre
Tunnel ground support	(minimal) Mesh & rock bolts	Concrete liner
Emplacement drift Diameter	5 meters	5.5 meters