

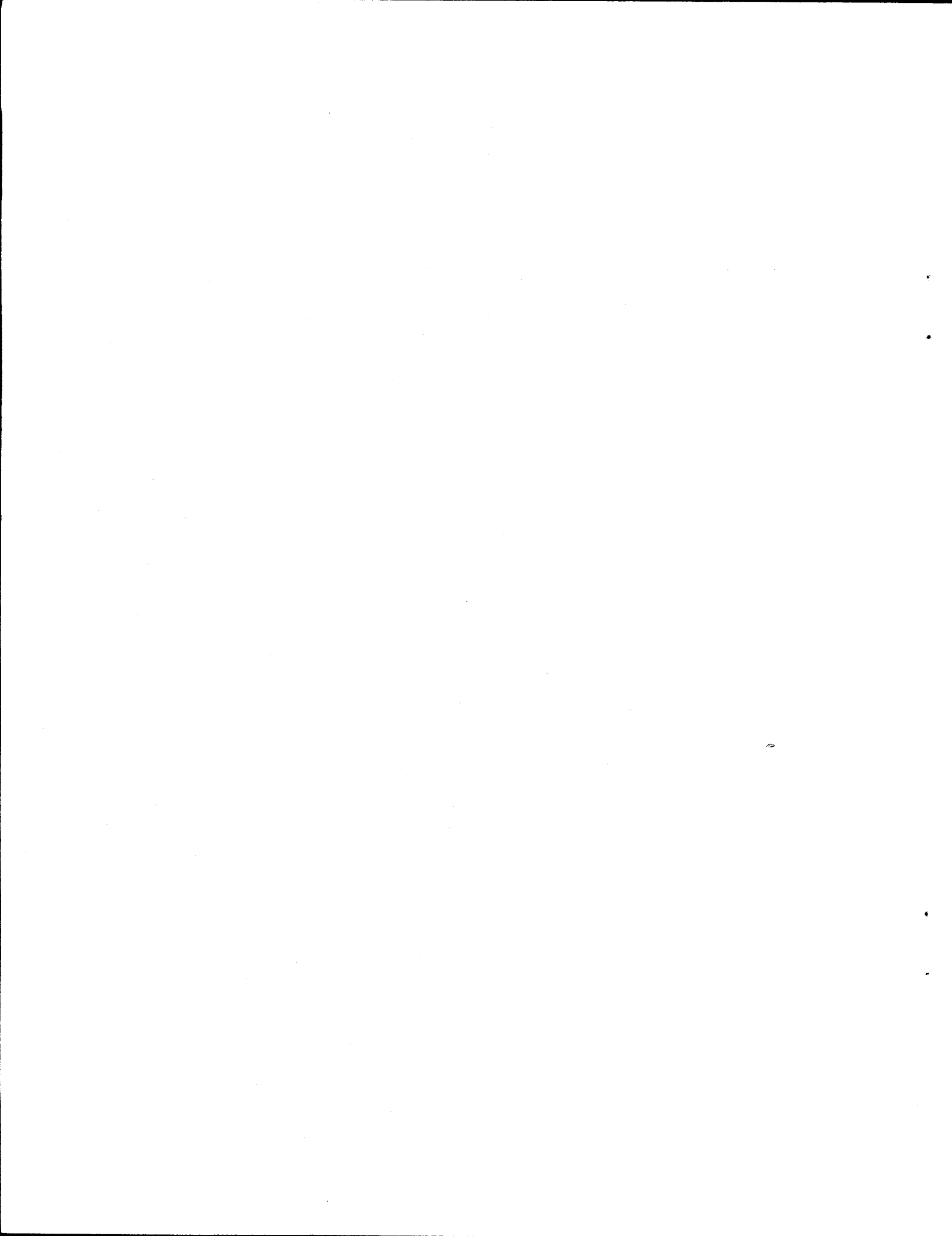
**Life-Cycle Cost Study for a Low-Level Radioactive  
Waste Disposal Facility in Texas**

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## **ABSTRACT**

This report documents the life-cycle cost estimates for a proposed low-level radioactive waste disposal facility near Sierra Blanca, Texas. The work was requested by the Texas Low-Level Radioactive Waste Disposal Authority and performed by the National Low-Level Waste Management Program with the assistance of Rogers & Associates Engineering Corporation.



## SUMMARY

The investigation was initially intended to produce a detailed, peer-reviewed life-cycle cost estimate that could provide data to be used in developing options and methodologies for calculating disposal charges that might be assessed at the facility. As the project proceeded, its objectives were expanded to include the definition of a process by which waste expected for disposal could be characterized with reasonable confidence and at reasonable cost.

The technical approach to the estimating of life-cycle costs involved several tasks. These tasks include preparing a preliminary cost estimate, preparing a workshop draft cost estimate, participating in a cost estimate workshop; preparing a final report of the cost estimate; and providing follow-up technical support to the Texas Low-Level Radioactive Waste Disposal Authority and the National Low-Level Waste Management Program, as directed.

Constraints that affect the life-cycle cost estimate include disposal unit capacities, use of concrete canisters; facility operating life; support of local community; and creating and funding of a post-closure maintenance fund. Assumptions made include those regarding facility life, annual disposal rate, contingency allowance, inflation rate, cost of capital, tax effects, multi-capable facility work force, construction equipment lease/purchase, and periodic regulatory costs.

Cost components include disposal unit construction, operation, and closure; payroll; construction equipment lease/purchase; building and facility maintenance; utilities and consumables; office equipment; training; monitoring; regulatory costs; authority administration; and legal fees.

As shown in Table S-1, the facility's life-cycle costs were estimated over its operating life to total about \$118 million (1997 constant dollars), excluding contingency allowance and incentive payments. Of this total, the largest single cost component was construction of Class A disposal units which accounted for about 47 percent of the total estimated life-cycle cost. Other significant cost components included payroll (\$23 million or about 19 percent of total costs), and construction equipment lease/purchase (\$12 million or about 12 percent of total costs).

The costs for Class A and B/C disposal unit construction, operation, and closure were found to vary according to the annual disposal volume. However, other cost components that could potentially be affected by the disposal volume include payroll, training, construction equipment (that is, fuel, maintenance, and repairs), and facility maintenance. All other costs (such as regulatory costs, Authority administration, legal fees, monitoring, office equipment, utilities, and consumables) would not likely vary with disposal volume.

**Table S-1.** Summary of estimated life-cycle costs.

<b>Cost Component</b>	<b>Million of 1997 Dollars</b>	<b>Percent Subtotal</b>
Class A Disposal Unit Costs	55.0	46.6
Payroll	22.8	19.3
Construction Equipment Lease/ Purchase	13.7	11.6
Utilities and Consumables	5.6	4.8
Authority Administration	4.8	4.1
Post-Closure Maintenance Fund	4.5	3.8
Class B/C Disposal Unit Costs	4.4	3.7
All Others	7.2	6.1
Subtotal Costs	118.0	100.0
Contingency Allowance	11.4	9.7
Incentive Payments	<u>12.9</u>	<u>10.9</u>
Total Estimated 20-Year Cost	<b>142.4</b>	<b>120.7</b>



# CONTENTS

ABSTRACT .....	iii
SUMMARY .....	v
1. INTRODUCTION .....	1
2. TECHNICAL APPROACH TO ESTIMATING LIFE-CYCLE COSTS.....	2
2.1 Prepare Preliminary Cost Estimate.....	2
2.2 Prepare Workshop Draft Cost Estimate and Participate in Workshop.....	4
2.3 Prepare Final Report.....	5
2.4 Follow-Up Technical Support.....	5
3. CONSTRAINTS AND ASSUMPTIONS.....	6
3.1 Constraints.....	6
3.2 Assumptions.....	6
4. DESCRIPTION OF COST ELEMENTS .....	9
4.1 Disposal Unit Construction, Operation, and Closure .....	9
4.1.1 Class A Disposal Units.....	9
4.1.2 Differences for Class B/C Disposal Units.....	10
4.2 Payroll .....	10
4.3 Construction Equipment Lease/Purchase .....	12
4.4 Building and Facility Maintenance .....	12
4.5 Utilities and Consumables.....	13
4.6 Office Equipment .....	13
4.7 Training .....	13
4.8 Monitoring.....	14
4.9 Regulatory Costs .....	14
4.10 Authority Administration .....	14
4.11 Legal Fees .....	15
4.12 Post-Closure Maintenance Fund.....	15

4.13	Contingencies and Incentive Payments .....	15
5.	SUMMARY AND SENSITIVITY OF ESTIMATED COSTS.....	16
5.1	Summary of Cost Estimates .....	16
5.2	Cost Sensitivities .....	17
5.3	Disposal Facility Variable and Fixed Costs as Functions of Annual Disposal Volume .....	18
5.3.1	Qualitative Assessment .....	18
5.3.2	Quantitative Assessment .....	18
5.4	Effects of Generators' Efforts to Reduce Volume.....	22
Appendix A – Projected Disposal Volumes by Year		
Appendix B – Cost Estimate Spreadsheets		
Appendix C – Viewgraphs Used in Workshop		

## FIGURES

4-1.	Partial organization chart for Texas LLRW Disposal Authority. (RAE-106658) .....	11
5-1.	Variable cost of disposal versus disposal volume.....	22

## TABLES

S-1.	Summary of estimated life-cycle costs .....	vi
3-1.	Summary of annual waste volumes projected for disposal .....	7
5-1.	Summary of estimated life-cycle costs .....	16
5-2.	Summary of equipment lease/purchase costs.....	17
5-3.	Crew size requirements with ranges of annual disposal volumes. ....	19
5-4.	Total variable costs and total cost per cubic foot as functions of the annual disposal rate.....	21

# **Life-Cycle Cost Study for a Low-Level Radioactive Waste Disposal Facility In Texas**

## **1. INTRODUCTION**

Under provisions of the Low-Level Radioactive Waste Policy Amendments Act of 1985, the U.S. Department of Energy (DOE), through its National Low-Level Waste Management Program (Program), provides technical assistance to states and compact regions in support of their responsibilities for low-level radioactive waste (LLRW) management. The Program was asked by the Texas Low-Level Radioactive Waste Disposal Authority (Authority) to assist in developing options and methodologies for assessing disposal charges at a planned LLRW disposal facility. More specifically, the Authority wished to determine whether projected disposal charges would be competitive with those currently charged at operating LLRW disposal facilities.

In order to devise methodologies for assessing disposal options, the elements that contribute to a facility's life-cycle costs must be known and understood. This understanding can be achieved only if life-cycle cost estimates are available at a very detailed level, complete with the projected magnitude and timing of each element. Standard cost models provide a reasonable starting point but must be adapted to account for specific peculiarities to be of appropriate assistance in this effort. Such was recognized to be the case in preparing a Texas-specific life-cycle cost estimate.

The study reported in this document was initially intended to produce a detailed, peer-reviewed life-cycle cost estimate that could provide data with which to develop options and methodologies for calculating disposal charges that might be assessed at the facility. As the project proceeded, its objectives were expanded to include the definition of a process by which waste expected for disposal could be characterized with reasonable confidence and at reasonable cost.

The Texas Natural Resource Conservation Commission (TNRCC) is responsible to review the Authority's LLRW disposal license application and to determine whether a disposal license should be issued. TNRCC denied the Authority's license application in October 1998.

The Program contracted with Rogers & Associates Engineering Corporation (RAE) to conduct the work necessary to accomplish the objectives of the requested work. RAE has supported both the Program and the Authority in numerous similar and related tasks for many years.

This document provides a report of activities, results, and conclusions that resulted from the Program's efforts to support the State of Texas. Chapter 2 describes the technical approach used in preparing the life-cycle cost estimate. Chapter 3 documents the constraints that affected the conduct of this effort. Chapter 3 also describes the assumptions made in preparing the life-cycle cost estimate.

Chapter 4 of this document presents a description of the various cost components and elements that were considered in preparing the life-cycle cost estimate. Chapter 5 summarizes estimated life-cycle costs and presents a discussion of the sensitivity of estimated costs to variations in the volume of waste disposed.

As noted above, the scope of this investigation was expanded after the life-cycle costs were estimated to include preparation of a methodology for characterizing LLRW expected for disposal at a disposal facility. The results of this activity are summarized in Chapter 6 of this document.

## 2. TECHNICAL APPROACH TO ESTIMATING LIFE-CYCLE COSTS

RAE accomplished the work described in this report following an approach that involved several tasks related to the scope of work, as it was requested by the Program. These tasks included:

- Prepare a preliminary cost estimate
- Prepare a workshop draft cost estimate
- Participate in a cost estimate workshop
- Prepare a final report of the cost estimate
- Provide follow-up technical support to the Authority and the Program, as directed.

These tasks are described in greater detail in the following sections.

### 2.1 Prepare Preliminary Cost Estimate

The initial activity was an extended telephone conference with Program staff, Authority staff, and RAE's assigned project personnel. One important purpose of this telephone conference was to ensure that the objectives of the project were fully understood. Another was to identify existing reports, evaluations, and sources of other information that could be consulted in conducting the work. Finally, a discussion of the approach to estimating the life-cycle costs was held to capitalize upon the ideas of all participants.

RAE then collected and reviewed all existing relevant documents, evaluations, and other related information. RAE referred to numerous life-cycle cost estimates it had prepared over the years for others and capitalized on these as appropriate. RAE also referred to the following Texas-specific and general resources:

- RAE document entitled "Design and Analysis of the Texas LLRW Disposal Facility Using Modular Concrete Canisters for All Waste" (including associated cost estimate spreadsheets), RAE-9150/1-1, dated September 1992
- RAE document entitled "Low-Level Radioactive Waste Projections for Texas, Maine, and Vermont," RAE-9433/2-1, dated November 1994
- RAE document entitled "Detailed Information Used in the Low-Level Radioactive Waste Projections for Texas, Maine, and Vermont," RAE-9433/2-2, dated November 1994
- Radian document entitled "Cost Estimate for the Texas Low-Level Radioactive Waste Disposal Facility in Sierra Blanca, Texas," dated July 1996
- Radian document entitled "Design Report for Construction and Closure of Disposal Cells at the Texas Low-Level Radioactive Waste Disposal Facility in Sierra Blanca, Texas," April 1994
- Radian document entitled "Design Report for Operation of Disposal Cells at the Texas Low-Level Radioactive Waste Disposal Facility in Sierra Blanca, Texas," April 1994

- "Means Site Work & Landscape Cost Data," R.S. Means Company, Inc., 1996
- "Means Building Construction Cost Data," R.S. Means Company, Inc., 1996
- "Means Square Foot Costs," R.S. Means Company, Inc., 1996
- "Means Heavy Construction Cost Data," R.S. Means Company, Inc., 1996
- "Building Construction Cost Data," R.S. Means Company, Inc., 1996
- "Means Site Work Cost Data," R.S. Means Company, Inc., 1988
- "Environmental Restoration: Unit Cost Book," ECHOS, 1995
- "Environmental Restoration: Assemblies Cost Book," ECHOS, 1995.

RAE also referred to a time and motion study of the Texas LLRW disposal facility.

RAE prepared estimates of costs by phase of facility life. The phases that RAE addressed included:

- Operations (beginning when waste receipt first commences)
- Facility Closure.

The costs of post-closure maintenance and monitoring were not directly estimated but were based upon directives given by the TNRCC. According to their instructions, the Authority was required to accumulate \$4,451,061 (in constant 1997 dollars) by the end of facility disposal operations.

The activities, equipment, materials, contract services and other cost components required in each phase of facility life were identified and associated costs estimated. The duration of each phase was also determined through consultation with Authority staff.

Conventional spreadsheet applications (namely Microsoft Excel) were utilized to define facility characteristics, calculate quantities, tabulate unit costs, and consolidate information in the form of the cost estimate. For each cost component, the quantities and unit costs were estimated. The magnitude of each was calculated and its timing also estimated. Based on the magnitudes and timings, constant-dollar, current-dollar, and present-value estimates were prepared, as described below.

**Constant-Dollar Estimates:** For each cost element, the magnitude of the cost and the time at which it will be incurred were estimated. The magnitude of each cost was estimated assuming that all such costs over the life of the facility would be incurred immediately. That is, no allowance was made for the effects of costs or values because of passage of time. Costs were based on 1997 costs taken from standard unit cost references.

The magnitudes were estimated using one of three techniques: quantity estimate, scaling estimate, or judgment estimate. The magnitude of a cost element can be estimated using the quantity estimate if a well-defined basis exists by which the quantities of such resources as material, supplies, and manpower can be confidently estimated. For example, based on engineering designs, the quantities of such resources as cubic yards of soil, tons of reinforcing steel, cubic yards of concrete, and number of full-time equivalent equipment operators can be estimated. Once the quantities are known, the cost was estimated

by multiplying the quantity by the unit cost (for example, dollars per cubic yard, dollars per ton, or dollars per person-hour).

Scaling estimates can be used where reasonably well established relationships between two related costs are known. For example, the cost of engineering a structure is frequently taken to be 10 to 15 percent of the cost to construct it, depending on the level of quality assurance and quality control required during design and construction.

Finally, if neither quantity nor scaling estimates are justified by the level of definition in the cost element, it may be necessary to estimate the cost on the basis of experience or judgment. In these cases, information from others previously involved in similar activities should be sought and can be very helpful.

**Current-Dollar Estimates:** Once the constant-dollar magnitudes and timings of cost elements were known, current-dollar estimates were prepared for the total annual costs only. The total constant-dollar estimate for a year was escalated by the appropriate number of years from 1997 at the assumed inflation rate. Current-dollar estimates are always larger than constant-dollar estimates, when inflation is greater than zero, as is typically true.

**Present-Value Estimates:** Once the current-dollar estimates (magnitudes and timings) were known, their present values were estimated. The current-dollar estimate was discounted using the estimated or assumed cost of capital for the appropriate number of years. Under normal and typical circumstances (where the inflation rate is positive and the cost of capital exceeds the inflation rate), present-value estimates are always smaller than constant-dollar estimates. Furthermore, as the timing of the cost becomes more distant, the present-value estimate becomes smaller.

The assumptions and calculations used in the cost estimate were documented. This documentation was intended to be sufficient that an educated person, not familiar with the details of the cost estimate, would be able to examine the spreadsheet and understand what was done and, generally, the associated rationale. RAE delivered all relevant spreadsheets and documentation to the Authority and the Program for review.

Upon review and revision of deliverable documentation, a working session was convened in the Austin, Texas offices of the Authority. The purpose of this working session was to review all aspects of the cost estimate, including the data used, assumptions made, and the methods used to estimate the costs. Those participating included RAE personnel, Authority staff, Program staff, and Authority contractor personnel.

The participants in the Austin working session were asked to help identify missing cost components, identify duplicative cost components, comment upon and suggest alternative assumptions, and recommend revisions. During this working session, notes were kept of decisions made and of actions that should be taken to prepare the Workshop Draft of the cost estimate and associated documentation.

## **2.2 Prepare Workshop Draft Cost Estimate and Participate in Workshop**

Upon conclusion of the working session in Austin, RAE followed up all action items and revised the spreadsheet calculation and the associated documentation as agreed. The Workshop Draft included a hard copy of the spreadsheets. Also prepared for the workshop were viewgraphs to facilitate presentation of the information and conclusions to the participants of the workshop.

Those participating in the workshop included RAE personnel, Authority staff, Program staff, Authority contractor personnel and principal LLRW generators. Program staff provided background information for the project. Authority staff reported on the current status of facility development. RAE participated by describing the approach, presenting results, responding to questions, and entering into discussions about the cost estimate.

### **2.3 Prepare Final Report**

Upon completion of the workshop, RAE prepared a final report of the life-cycle cost estimate. Preparation of this document, however, was delayed from the original schedule under direction of both the Authority and the Program. This delay was attributable to the changing needs of the Authority.

### **2.4 Follow-Up Technical Support**

RAE provided follow-up technical and other support to the Authority and the Program as required upon completion of the workshop. Follow-up questions addressed such topics as identifying the fixed and variable costs of disposal, assessing the sensitivity of disposal costs to changes in the annual disposal rate, and evaluating a candidate disposal fee schedule.

### 3. CONSTRAINTS AND ASSUMPTIONS

Several constraints existed that had to be considered in preparing the estimate of life-cycle costs for the Texas LLRW disposal facility. Furthermore, several assumptions were also required. With these assumptions as a base, the cost elements were identified and characterized, and their magnitudes and timings estimated or projected. The constraints are described in Section 3.1, while assumed conditions are discussed in Section 3.2.

#### 3.1 Constraints

The constraints considered in estimating life-cycle costs are discussed below.

**Capacity of Disposal Units:** The capacities of disposal units were based on information presented in the license application. Class A disposal units had a capacity of 1,300 concrete canisters, while the capacity of the Class B/C disposal units was 135 canisters. As originally designed, a Class A disposal unit was expected to be filled every other year, assuming a constant disposal rate. In contrast, a Class B/C disposal unit was originally designed to be filled every six years, again assuming a constant disposal rate. However, based on the best available information about the schedule and volume of waste to be disposed, the expected service life of any individual disposal unit is variable over the life of the entire facility.

**Concrete Canister:** Based on the Authority's earlier policy determinations, all waste received at the facility would be disposed in modular concrete canisters.

**Operating Life:** The operating life of the disposal facility was assumed to be 20 years, consistent with current Texas state law. The schedule for operations is discussed in Section 3.2.

**Support of Local Community:** Under applicable law and Authority policy, the facility was obligated to make annual payments to the community of Hudspeth County totaling 10 percent of total facility revenues, including collections for the Post-Closure Maintenance Fund.

**Post-Closure Maintenance Fund:** Under directives of the Texas Natural Resource Conservation Commission the Authority must accumulate a Post-Closure Maintenance Fund that totals \$4,451,061 (in constant 1997 dollars) at the time the facility is closed. These instructions were the basis for costs expected to be incurred following facility closure. Independent cost estimates generally corroborated the adequacy of a fund of this magnitude.

#### 3.2 Assumptions

**Facility Life:** The facility was assumed to commence disposal operations at the beginning of the year 2000 and to conclude them at the end of the year 2019, consistent with the operating life of 20 years identified in Section 3.1. The facility closure period was assumed to last five years and conclude at the end of 2024. The institutional control period was assumed to last for 100 years, with the level of effort decreasing as time proceeds.

**Annual Disposal Rate:** The annual costs were recognized to depend upon the rate at which waste would be disposed because the need to construct new disposal units depends upon the rate at which waste is disposed over any period of time. Therefore, the disposal rate over time was estimated based on the best available information at the time this work was conducted.

Volumes generated in the decommissioning of nuclear power plants have a major impact on the annual volumes that require disposal at the facility. Based on information provided by the utilities, it was



assumed that Maine Yankee decommissioning volumes would arrive at the disposal facility beginning in the year 2000 and continue for three years. Vermont Yankee decommissioning waste was assumed to be disposed over a seven-year period beginning in the year 2013.

The details of the projected annual disposal rates are presented in Appendix A. The annual disposal rates are summarized in Table 3-1 below.

**Table 3-1. Summary of annual waste volumes projected for disposal.**

<b>Year</b>	<b>Disposal Rate (cubic feet per year)</b>	<b>Comment</b>
2000	86,553	MY D&D Waste
2001	111,979	MY D&D Waste
2002	59,396	MY D&D Waste
2003	36,328	
2004	36,754	
2005	34,171	
2006	36,103	
2007	36,529	
2008	33,946	
2009	32,938	
2010	33,529	
2011	31,111	
2012	33,208	
2013	36,362	VY D&D Waste
2014	82,325	VY D&D Waste
2015	75,326	VY D&D Waste
2016	68,061	VY D&D Waste
2017	57,785	VY D&D Waste
2018	52,025	VY D&D Waste
2019	44,759	VY D&D Waste
<b>TOTAL</b>	<b>1,019,188</b>	

**Contingency Allowance:** A contingency allowance of 10 percent was added to the subtotal of estimated costs, excluding the incentive payments to the local community and collections for the Post-Closure Maintenance Fund. This contingency allowance was included to account for uncertainties and unexpected conditions that could add to the actual facility operating costs.

**Inflation Rate:** All costs were assumed to escalate at a constant annual rate of 3 percent per year because of inflation. This rate is representative of actual experience of escalation rates in recent years.

**Cost of Capital:** The cost of capital was assumed to be the annual inflation rate plus 2 percent per year. Given the assumed inflation rate of 3 percent per year, the cost of capital was assumed to be 5 percent per year. This rate is representative of actual experience of very secure financial investments (that is, government bonds) in recent years.

**Tax Effects:** The facility was assumed not to be subject to income or other taxes on its earnings by virtue of its status as a public entity.

**Multi-Capable Facility Work Force:** The assumed size of the workforce is somewhat smaller than might be expected if a full-time person were required for every function that must be performed at the facility during operations. However, many of the functions do not require full-time attention. Therefore, in estimating the size of the facility workforce it was assumed that some of the facility workers would be cross-trained and capable of performing more than one function.

**Construction Equipment Lease/Purchase:** Construction equipment items costing more than \$10,000 were assumed to be leased through the Texas Public Finance Authority. This program allows the cost of the equipment to be spread over ten years or other equipment lifetime. Other equipment was assumed to be purchased outright.

**Periodic Regulatory Costs:** The annual regulatory cost at the facility was assumed to be the cost to support the regulatory staff that would maintain surveillance at the facility and perform regulatory inspections and audits. Some administrative costs of the regulatory agency were also assumed to be covered. It was also assumed that the facility's disposal license must be renewed every five years. In those renewal years, the regulatory costs were assumed to be about 55 percent greater than those in other years.

## 4. DESCRIPTION OF COST ELEMENTS

The various cost elements addressed in the cost estimate are described in this chapter. The life-cycle costs of the Texas LLRW disposal facility were estimated for all activities from the time waste will first be received for disposal at the facility. The costs included in this estimate and reported in this document are those that will be associated with facility operation, construction of disposal units (needed to replace the initial disposal units as they are filled), and facility closure.

No development costs (such as site characterization, design, licensing, or construction costs) were addressed in this cost estimate, following directions of the Authority staff. Further, no startup costs needed to make the facility and workforce ready actually to receive waste were included in this cost estimate and the costs of constructing the first Class A and the first Class B/C disposal units were also not included.

### 4.1 Disposal Unit Construction, Operation, and Closure

The costs of constructing disposal units, receiving, handling, and emplacing the waste in the disposal units, and closing the disposal units are significant cost-incurred activities. The details considered in estimating these costs for Class A and Class B/C disposal units are described in the following sections.

#### 4.1.1 Class A Disposal Units

As the disposal capacity of the previously constructed disposal unit is depleted by waste emplacement, another must be constructed to allow waste disposal operations to continue. In order to estimate the costs of constructing, operating, and closing a disposal unit, all activities involved in disposal unit construction were tabulated. Each activity was then characterized in terms of the types and quantities of materials, types of equipment, amounts of equipment time, types of workers, and levels of workers' effort required to complete it. Major activities in the life of a disposal unit are as follows:

- Perform Land Survey
- Place and Remove Fence
- Construct and Backfill Ramp
- Excavate Disposal Unit
- Construct Subsurface Drainage System
- Prepare Disposal Unit Floor
- Purchase Concrete Canisters
- Emplace Waste
- Backfill Voids
- Construct Canister Lids

- Construct Engineered Cover
- Construct Surface Drainage System.

For each of these activities, materials, equipment, and labor costs were estimated. Overhead and profit were separately calculated for each activity, as were the effects of location-specific cost indices.

The temporal effects of disposing varying quantities of waste each year were considered in developing the schedule of disposal unit construction. Construction was assumed to be sequenced so that a new disposal unit would be available when the capacity of the previous one was depleted. The projected construction schedule was then used to project the schedule of annual costs of constructing, operating, and closing disposal units.

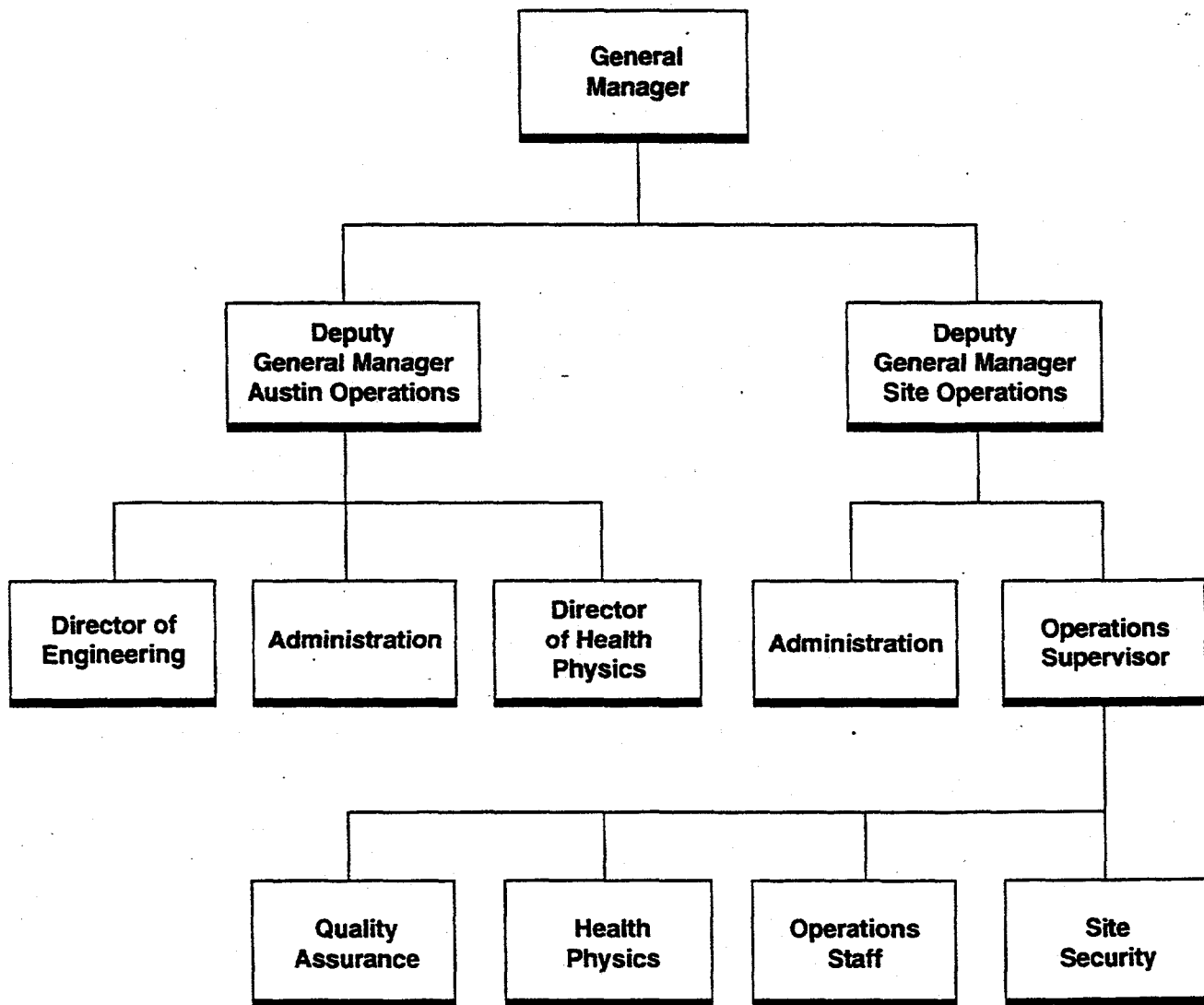
#### **4.1.2 Differences for Class B/C Disposal Units**

The construction, operation, and closure of Class B/C disposal units are essentially identical to that of Class A disposal units. The same activities are required for Class B/C as are required for Class A disposal units.

The major differences are in the relative capacities and disposal rates of the two types of disposal units. Class B/C disposal units are much smaller and the disposal rate is much lower than that of Class A disposal units. The effect on the schedule of annual costs for Class B/C disposal units is that the annual costs are generally smaller and new disposal units are required much less frequently.

## **4.2 Payroll**

The cost of payroll for the Authority staff and facility workforce was estimated based on numbers and types of workers expected at the Authority administrative offices and at the disposal facility. Salary and wage rates were set considering typical pay scales for various worker types. This payroll cost was based upon a maximum of 40 full-time employees. A partial organization chart for the Authority is shown in Figure 4-1. The fringe benefits were set at 34 percent of the direct rate and the annual payroll cost determined.



**Figure 4-1.** Partial organization chart for Texas LLRW Disposal Authority. (RAE-106658)

### **4.3 Construction Equipment Lease/Purchase**

The costs to procure, operate, maintain, and repair construction equipment at the facility were estimated considering the types of equipment required. For each type of equipment, the capital cost, operating cost, maintenance/repair cost, effective life, and annual usage were considered in estimating the annual cost. Major equipment included the following:

- Ten-Wheel End Dump Trucks
- Backhoe
- Crawler Tractor
- Motor Grader
- Wheel Scraper
- Hydraulic Crane
- Front End Wheel Loader.

A total of over 30 different types of equipment, machines, and instruments will be required to operate the facility.

### **4.4 Building and Facility Maintenance**

The major cost of building and facility maintenance included the cost of repairing facility roadways. Roadways repair comprised about 50 percent of the total cost of this cost element. Other cost components included:

- Garbage Collection
- Painting
- Carpet Cleaning and Replacement
- Plumbing Maintenance
- Electrical Maintenance
- Mechanical Maintenance
- Fence Repair
- Landscaping and Grounds Maintenance.

## **4.5 Utilities and Consumables**

The annual cost of utilities and consumables considered the following:

- Electricity Service
- Telecommunications Services, including Data Lines
- Water Service
- Office Supplies
- Maintenance Shop Supplies
- Laboratory Supplies
- Safety Equipment
- Level D Clothing
- Level C Half-Face Respirators
- Coveralls and Boot Covers.

## **4.6 Office Equipment**

The annual cost of office equipment was nominal compared to other costs. They considered the following:

- Computer System and Software Replacement
- Copier Replacement
- Television/VCR Replacement
- Facsimile Machine Replacement
- Miscellaneous Equipment Replacement.

## **4.7 Training**

The cost of personnel training considered the following training activities, with the indicated frequencies:

- Emergency Training Exercise (every three years)
- OSHA 8-Hour Health and Safety Training for Supervisors (every five years)
- OSHA 8-Hour Health and Safety Training Refresher (every year)

- OSHA 40-Hour Health and Safety Training (every year)
- Miscellaneous Training (every year).

## **4.8 Monitoring**

The costs of the environmental monitoring program were based on the program description presented in the Texas LLRW Disposal Facility License Application. It involved the following types of sampling/analysis activities:

- Ambient Air Monitor Replacement (every five years)
- Well Maintenance Equipment Replacement (every three years)
- Sampling Equipment Replacement (every five years)
- Sampling Materials
- Air Particulate Analyses (two quarterly analyses of samples from seven locations)
- Groundwater Analyses (six quarterly analyses of samples from 11 locations)
- Surface Water Analyses (five analyses five times annually of samples from six locations)
- Soil Analyses (one quarterly analysis of samples from seven locations)
- Sediment Analyses (one quarterly analysis of samples from eight locations)
- Vegetation Analyses (four semi-annual analyses of samples from nine locations)
- Mammal Tissue Analyses (four semi-annual analyses of samples from seven locations)
- Radon Analyses (monthly analyses from eight locations)
- Bioassays (semi-annual analyses for 40 persons)
- Environmental, Personnel, and Visitor TLD Analyses (total of 380 per year).

## **4.9 Regulatory Costs**

Regulatory costs consisted largely of fees to cover the cost of activities of the regulatory agency to inspect and monitor the facility. The cost of renewing the facility license every five years was also included. An allowance was also made of costs to terminate or transfer the license as the end of active disposal operations approaches.

## **4.10 Authority Administration**

The Authority estimated its annual administrative and operating budget, exclusive of facility operations, to total \$240,000.



## **4.11 Legal Fees**

Fees to cover unspecified legal activities were estimated to total \$30,000 per year.

## **4.12 Post-Closure Maintenance Fund**

An annual contribution of \$222,553 to the Post-Closure Maintenance Fund was estimated, based on TNRCC's determination that the fund must total \$4,451,061 (in constant 1997 dollars) at end of disposal operations. These contributions were assumed to be invested in secure financial instruments that would accrue interest annually.

## **4.13 Contingencies and Incentive Payments**

A contingency allowance of 10 percent of all costs was added to the subtotal of estimated costs, excluding the incentive payments to the local community and collections for the Post-Closure Maintenance Fund. This contingency allowance was included to account for uncertainties and unexpected conditions that could add to the actual facility operating costs.

Following current law and Authority policy, the facility was assumed to make annual payments to the community of Hudspeth County totaling 10 percent of total facility revenues, including collections for the Post-Closure Maintenance Fund.

## 5. SUMMARY AND SENSITIVITY OF ESTIMATED COSTS

### 5.1 Summary of Cost Estimates

Based on the cost estimating methodology described in Chapter 2 and the cost elements described in Chapter 3, the facility's costs were estimated over its operating life. The operating costs are presented in detail in Appendix B and are summarized in Table 5-1.

**Table 5-1.** Summary of estimated life-cycle costs.

Cost Component	Million of 1997 Dollars	Percent Subtotal
Class A Disposal Unit Costs	55.0	46.6
Payroll	22.8	19.3
Construction Equipment Lease/ Purchase	13.7	11.6
Utilities and Consumables	5.6	4.8
Authority Administration	4.8	4.1
Post-Closure Maintenance Fund	4.5	3.8
Class B/C Disposal Unit Costs	4.4	3.7
All Others	7.2	6.1
Subtotal Costs	118.0	100.0
Contingency Allowance	11.4	9.7
Incentive Payments	<u>12.9</u>	<u>10.9</u>
Total Estimated 20-Year Cost	142.4	120.7

The costs associated with the Class A disposal units included construction costs, operating costs (exclusive of payroll costs), and closure costs. The single most significant cost element within this cost component was the cost of purchasing concrete canisters, into which the waste containers will be placed. Approximately 11,000 of these canisters will be required. In the Authority's earlier cost estimates these canisters were determined to cost about \$2,500 each. Thus, the cost of concrete canisters for Class A waste was estimated to total about \$27 million. This amount is nearly 50 percent of the cost of constructing, operating, and closing Class A disposal units, and nearly 23 percent of the total life-cycle cost of the facility.

Class A disposal unit construction costs over the 20-year life of the facility were estimated to total over \$9 million, or about 18 percent of the total Class A disposal unit cost. Closure costs were estimated to amount to over \$9 million or about 17 percent of the total Class A disposal unit cost.

Payroll costs were estimated to total nearly \$23 million.

The largest costs of the 20-year total cost of equipment lease/purchase are presented in Table 5-2.

**Table 5-2.** Summary of equipment lease/purchase costs.

<b>Equipment Item</b>	<b>20-Year Cost (\$ million)</b>
Ten-Wheel End Dump Trucks	2.2
Backhoe	1.9
Crawler Tractor	1.8
Motor Grader	1.1
Wheel Scraper	1.0
Hydraulic Crane	0.9
Front End Wheel Loader	0.8
All Others	4.0

The cost of fuel for equipment was included in the cost of lease/purchase for the equipment.

The largest single cost element of utilities and consumables was the cost of electrical power supply. Electrical power service was estimated to total \$4.4 million over the 20-year facility life, fully 80 percent of the cost of all utilities and consumables.

The results of the life-cycle cost estimate were presented in a workshop held in Austin, Texas on December 9, 1997. The workshop involved the major generators of the Compact so that any ideas they had about costs that might have been omitted could be expressed. Also, discussions were held about the cost estimating methodology. Copies of the viewgraphs used during the presentations and discussion are reproduced in Appendix C. The consensus of the workshop was that the costs had been estimated using a reasonable methodology and that the results appeared reasonable.

## **5.2 Cost Sensitivities**

The cost estimate contains no readily apparent cost components or elements with exponential or geometric effects of the total life-cycle cost estimate. Instead, the life-cycle cost estimate involves only cost components and elements with linear effects. Of course, changes in laws, regulations, policies, and public acceptance could have dramatic effects on the estimated costs, but neither these nor their effects can be quantified.

The largest cost element of the largest cost component is the purchase of concrete canisters for Class A waste disposal. The canister was estimated to cost \$2,500 per unit. Depending on the volume of Class A waste disposed, the number of canisters required for Class A waste disposal ranges from about 330 to about 1,300 per year, with canister purchase costs ranging from about \$833,000 to about \$3.25 million per year. Over 20 years of facility life, the estimated cost for canister purchases totals about \$27.4 million.

The canister purchase cost is fully 50 percent of the cost of Class A Disposal Unit Construction, Operation, and Closure and 23 percent of the life-cycle costs summarized in Table 5-1. Thus, a variation of canister unit cost of 10 percent (\$250) would cause the life-cycle cost estimate to vary by about 2.3 percent. For example, if the cost of concrete canisters were found to be \$2,750 per canister (in

constant 1997 dollars), the life-cycle cost estimate would increase by about 2.3 percent to about \$121 million.

Class A disposal unit excavation, including loading and hauling excavated soils, totals about \$6,300,000 over the 20-year life of the facility. This constitutes over 11 percent of the costs of Class A Disposal Unit Construction, Operation, and Closure, and about 5 percent of the estimated total facility life-cycle cost.

Facility payroll is also a significant cost component, contributing nearly 20 percent of the total life-cycle costs. Each category of employee will have a different annual cost. In general, however, the number of facility employees is directly linked to the total payroll cost. If the payroll cost were to increase or decrease by 10 percent (either through a change in the number of facility employees or in individual salary rates), the total life-cycle cost estimate would similarly increase or decrease by about 2 percent.

### **5.3 Disposal Facility Variable and Fixed Costs as Functions of Annual Disposal Volume**

The fluctuation of variable and fixed costs relative to increases and decreases in the annual disposal volume was evaluated. This assessment is presented in the following sections in qualitative and quantitative terms.

#### **5.3.1 Qualitative Assessment**

The costs for Class A and B/C disposal unit construction, operation, and closure were the only functional areas included in the cost estimate that varied according to the annual disposal volume. However, other cost components that could potentially be affected by the disposal volume include payroll, training, construction equipment (that is, fuel, maintenance, and repairs), and facility maintenance. Assuming that the number of individuals in supervisory or management positions would not vary with disposal volume, the fluctuation in payroll cost would be minimal as a result of small variations in the number of laborers, equipment operators, and mechanics. Training would also vary relative to the number of employees working at the site.

To estimate operating costs for construction equipment (including fuel, maintenance, and repairs), it was assumed that the equipment would be operated eight hours per day, 150 days per year. Therefore, if volumes increased or decreased significantly, the cost for operating the construction equipment would fluctuate accordingly. Required road maintenance and repairs were also assumed to vary according to volume. This cost, however, is minimal compared to the total annual costs to operate the facility. All other costs (such as regulatory costs, Authority administration, legal fees, monitoring, office equipment, utilities, and consumables) would most likely not vary with disposal volume.

#### **5.3.2 Quantitative Assessment**

This quantitative assessment provided information about breakeven costs for a combination of waste management practices such as volume reduction and waste minimization. The following sections discuss the fluctuation in disposal costs on a constant-dollar basis for each of the four areas identified above. At the conclusion of this section, a summary of total variable and fixed costs is presented to determine disposal cost sensitivity to declining disposal volumes.

**Payroll and Training:** Payroll and training will fluctuate according to the number of employees that are required to perform disposal operations. The report prepared by Radian Corporation, "Design

Report for Operation of Disposal Cells at the Texas Low-Level Radioactive Waste Disposal Facility in Sierra Blanca, Texas," lists the staffing requirements for operating at an average disposal rate of 60,000 ft<sup>3</sup> per year. The approximate number of employees required is two laborers, four equipment operators, and one mechanic. This crew would be capable of disposing of waste received within certain limits before the number of required employees would have to increase or would be decreased. It was assumed that the range of annual disposal rates and number of required employees would change in a stepwise manner as shown in Table 5-3.

**Table 5-3.** Crew size requirements with ranges of annual disposal volumes.

Annual Disposal Volume (ft <sup>3</sup> )	Laborer	Equipment Operator	Mechanic
0 - 24,000	2	1	1
24,001 - 48,000	3	2	1
48,001 - 72,000	4	2	1
72,001 - 96,000	5	3	1
96,001 - 120,000	6	4	2

The ranges of annual disposal rates shown in Table 5-1 are based on the assumption that each crew can handle fluctuations of 12,000 ft<sup>3</sup>. Additionally, it was assumed that the facility must have a crew with at least four employees to handle small disposal volumes.

Training costs are directly related to the number of employees. Therefore, training costs will also increase and decrease in a stepwise manner with respect to the annual disposal rate.

**Operation of Construction Equipment:** The cost of operating the construction equipment was assumed to depend linearly on fluctuations in the annual disposal rate (i.e. the more the equipment is used, the more fuel, maintenance, and repairs will be required). The original cost of operating the equipment was based on an average disposal rate of 60,000 ft<sup>3</sup> per year and was estimated at about \$221,000 per year. Thus, in order to calculate the increase/decrease in cost to operate the equipment, a ratio of the projected annual disposal rate to the average disposal rate was used as follows:

$$\text{Annual Equipment Operating Cost} = \$220,740 \times \left( \frac{\text{Annual Volume (ft}^3\text{)}}{60,000 \text{ ft}^3} \right)$$

**Facility Maintenance:** The cost of maintaining roads within the facility was also assumed to increase/decrease linearly with fluctuations in the annual disposal rate. These costs, however, are very small compared to other costs associated with operating the disposal facility. An estimated annual cost of about \$21,500 was used in the cost estimate to account for road maintenance. This estimate was based on an average disposal rate of 60,000 ft<sup>3</sup> per year. Therefore, in order to calculate the dependence of cost for road maintenance on disposal volume, the ratio of the projected annual disposal rate to the average disposal rate was used:

$$\text{Annual Road Maintenance Cost} = \$21,450 \times \left( \frac{\text{Annual Volume (ft}^3\text{)}}{60,000 \text{ ft}^3} \right)$$

**Total Fixed and Variable Costs:** The annual costs associated with the construction, operation, and closure of disposal units also varies with the disposal rate. Based on the 20-year total disposal unit costs of about \$71.9 million and the projected disposal volume of about 1,020,000 ft<sup>3</sup> the average disposal unit cost was estimated to be about \$71 per cubic foot. This estimate includes a 10 percent contingency and the required 10 percent incentive payment. Table 5-4 combines the variable costs discussed above with the disposal unit costs to obtain the total variable costs with respect to a specific disposal volume. The lines in the table distinguish the different disposal volume regions. A graph of the data is shown in Figure 5-1. The equation of the line that best fits the data represents the total variable costs as a function of the disposal rate. The variable cost equation is:

$$\text{Variable Costs} = \frac{\$78}{\text{ft}^3} \times \text{Disposal Volume (ft}^3\text{)}$$

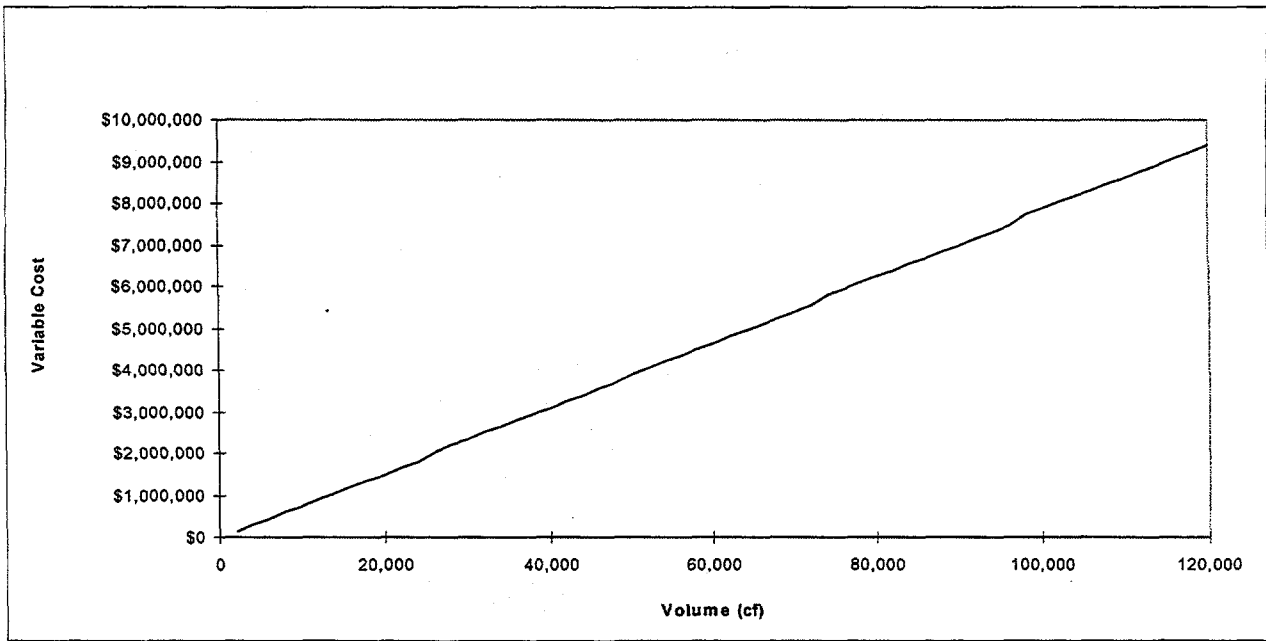
The fixed cost components include utilities and consumables, office equipment, monitoring, regulatory costs, Authority administration, legal fees, and the Post-Closure Maintenance Fund. In addition to these fixed costs, the variable cost components discussed above also have a base amount that was considered fixed (that is, the minimum cost required to keep the facility open, assuming no disposal operations take place). These fixed costs include construction equipment, all building and facility maintenance except road repair, and payroll and training for the minimum required staff. The combination of all these items comprises the "fixed costs" of the disposal facility. Taking the average of the 20-year total, based on constant-dollar costs, the annual fixed cost was calculated to be about \$3.11 million. Therefore, the total fixed and variable cost are estimated by the following equation:

$$\text{Total Cost} = \$78/\text{ft}^3 \times \text{Disposal Volume (ft}^3\text{)} + \$3,108,000$$

The total cost per cubic foot is also presented as a function of the volume of waste disposed annually in Table 5-4. The disposal cost per cubic foot grows inversely with volume as the latter decreases and approaches zero. This occurs because the fixed costs must be recovered by a progressively smaller volume, even though the variable cost per cubic foot remains essentially constant.

**Table 5-4.** Total variable costs and total cost per cubic foot as functions of the annual disposal rate.

<b>Annual Disposal Rate (ft<sup>3</sup>)</b>	<b>Total Variable Costs</b>	<b>Total Fixed and Variable Costs</b>	<b>Total Cost per Cubic Foot</b>
4,000	\$302,000	\$3,312,000	\$828
8,000	\$603,000	\$3,613,000	\$452
12,000	\$905,000	\$3,915,000	\$326
16,000	\$1,207,000	\$4,217,000	\$264
20,000	\$1,508,000	\$4,518,000	\$226
24,000	\$1,810,000	\$4,820,000	\$201
28,000	\$2,195,000	\$5,205,000	\$186
32,000	\$2,497,000	\$5,507,000	\$172
36,000	\$2,798,000	\$5,808,000	\$161
40,000	\$3,100,000	\$6,110,000	\$153
44,000	\$3,402,000	\$6,412,000	\$146
48,000	\$3,703,000	\$6,713,000	\$140
52,000	\$4,044,000	\$7,054,000	\$136
56,000	\$4,346,000	\$7,356,000	\$131
60,000	\$4,647,000	\$7,657,000	\$128
64,000	\$4,949,000	\$7,959,000	\$124
68,000	\$5,251,000	\$8,261,000	\$121
72,000	\$5,552,000	\$8,562,000	\$119
76,000	\$5,937,000	\$8,947,000	\$118
80,000	\$6,239,000	\$9,249,000	\$116
84,000	\$6,541,000	\$9,551,000	\$114
88,000	\$6,842,000	\$9,852,000	\$112
92,000	\$7,144,000	\$10,154,000	\$110
96,000	\$7,446,000	\$10,456,000	\$109
100,000	\$7,870,000	\$10,880,000	\$109
104,000	\$8,171,000	\$11,181,000	\$108
108,000	\$8,473,000	\$11,483,000	\$106
112,000	\$8,775,000	\$11,785,000	\$105
116,000	\$9,076,000	\$12,086,000	\$104
120,000	\$9,378,000	\$12,388,000	\$103



**Figure 5-1.** Variable cost of disposal versus disposal volume.

## 5.4 Effects of Generators' Efforts to Reduce Volume

The Authority considered a disposal fee schedule that has a significant component based on the volume of waste disposed. Some generators might, therefore, anticipate the opportunity to save on disposal charges by reducing the volume of the waste they deliver for disposal. In this case, the total cost to operate the disposal facility is smaller. If only a few generators were to reduce the volume of waste they deliver for disposal, their disposal charges would be smaller than they would have been without volume reduction. However, those generators that did not reduce the volume of their waste would pay higher disposal charges. That is, those generators that reduce the volume of their waste receive the economic benefit of smaller disposal charges at the expense of those that do not reduce the volume of their waste.

However, if one generator were able to anticipate this savings opportunity, others would likely also see the opportunity. Accordingly, at the opposite extreme, all generators might elect to reduce the volume of waste they deliver for disposal. If all generators reduced their waste volumes, the facility's total operating costs would, indeed, be smaller. Thus, if all generators were to volume reduce to a similar extent, they would all benefit from smaller disposal charges.

If all generators were to volume reduce, the total cost of disposal would range from about 50 percent to about 60 percent of the total disposal cost without volume reduction. The savings would depend primarily upon the total annual volume disposed at the facility, and secondarily upon the volume reduction achieved.

Of course, whether any generator would actually elect to reduce the volume of its waste depends strongly upon the cost to achieve the volume reduction. Assuming only one or a few generators volume reduce, and for reasonable volume reduction factors and generator annual volumes, the breakeven cost for



volume reduction ranges between \$100 and \$150 per cubic foot of waste generated. That is, if volume reduction costs less than about \$100 to \$150 per cubic foot with only one or a few generators volume reducing, those generator(s) reducing waste volume would save more in disposal charges than volume reduction would cost.

If, on the other hand, all generators chose to volume reduce, the breakeven cost of volume reduction would range between \$60 and \$70 per cubic foot, depending primarily upon the volume reduction achieved and secondarily upon the total annual volume disposed at the facility. That is, at volume reduction costs less than about \$60 to \$70 per cubic foot with all generators volume reducing, all generators would save more in disposal charges than volume reduction would cost.

**Appendix A**  
**Projected Disposal Volumes by Year**

Table A-1. APPROXIMATE TEXAS LLRWDF DISPOSAL RATE (cf/yr) BY YEAR

- REFs: 1. RAE-9433/2-1, -2.  
 2. Telephone conversation with Susan Jablonski/TLLRWDA, 2Dec97.  
 3. Telephone conversation with Tim McCarthy/VY, 2Dec97.

	YEAR	CLASS A	CLASS B/C	TOTAL	TOTAL BY PHASE	CLASS B	CLASS C
	1995	35,458	1,971	37,429		1,586	386
	1996	32,985	1,861	34,846		1,526	335
	1997	34,856	1,922	36,778		1,555	368
	1998	35,278	1,926	37,204		1,554	373
	1999	32,805	1,816	34,621		1,494	321
ME D&D	2000	79,309	7,244	86,553		6,389	854
ME D&D	2001	102,048	9,931	111,979		8,822	1,109
ME D&D	2002	54,942	4,454	59,396		3,896	558
	2003	34,496	1,832	36,328		1,490	341
	2004	34,919	1,836	36,754		1,489	346
	2005	32,446	1,725	34,171		1,430	295
	2006	34,316	1,786	36,103		1,458	328
	2007	34,739	1,790	36,529		1,457	333
	2008	32,266	1,680	33,946		1,398	282
	2009	31,474	1,464	32,938		1,232	232
	2010	32,046	1,483	33,529		1,242	241
	2011	29,722	1,389	31,111		1,194	195
	2012	31,742	1,465	33,208		1,233	232
VT D&D	2013	35,972	390	36,362		191	199
VT D&D	2014	80,792	1,533	82,325		416	1,117
VT D&D	2015	74,954	372	75,326		181	190
VT D&D	2016	67,669	391	68,061		191	200
VT D&D	2017	57,489	297	57,785		143	154
VT D&D	2018	51,651	373	52,025		182	191
VT D&D	2019	44,366	393	44,759		192	201
	2020	26,329	298	26,627		144	154
	2021	28,349	375	28,723		183	192
	2022	28,921	394	29,315		192	202
	2023	26,597	299	26,897		144	155
	2024	28,617	376	28,993		183	193
	2025	29,189	396	29,585		193	203
	2026	26,866	301	27,167		145	156
	2027	28,886	378	29,263		184	194
	2028	29,458	397	29,855		194	203
	2029	24,721	207	24,928		97	110
TX D&D	2030	87,479	3,140	90,618		2,229	911
TX D&D	2031	338,239	14,869	353,108		10,757	4,112
TX D&D	2032	274,213	11,880	286,093		8,596	3,284
TX D&D	2033	245,337	12,377	257,713		8,977	3,399
TX D&D	2034	321,426	23,310	344,737		16,974	6,337
TX D&D	2035	161,514	13,980	175,493		10,178	3,802
TX D&D	2036	126,936	10,514	137,450		7,646	2,868
TX D&D	2037	92,359	7,048	99,407		5,114	1,934
	2038	23,114	116	23,230		50	66
	2039	23,204	116	23,320		51	66
	2040	23,293	117	23,410		51	66
	2041	23,383	117	23,500		51	66
	2042	23,472	118	23,590		51	67
	2043	23,562	118	23,680		51	67
	2044	23,651	119	23,770		52	67
	20-year TOTAL	977,360	41,828	1,019,188		34,228	7,600
	30-year TOTAL	1,255,292	45,248	1,300,541		35,887	9,362

Table A-2. APPROXIMATE TEXAS LLRWDF DISPOSAL RATE (cf/yr) BY YEAR

TEXAS/MAINE/VERMONT OPERATIONAL AND DECOMMISSIONING WASTE

- REFs:  
 1. RAE-9433/2-1, -2.  
 2. Telephone conversation with Susan Jablonski/TLLRWDA, 2Dec97.  
 3. Telephone conversation with Tim McCarthy/VY, 2Dec97.

Description	State	Sector	TYPE	Class		1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Total TX Util Ops waste					230,500	7,500	5,000	7,000	7,500	5,000	7,000	7,500	5,000	7,000	7,500	5,000	7,000	7,500
TX Util Ops A						7,239	4,826	6,756	7,239	4,826	6,756	7,239	4,826	6,756	7,239	4,826	6,756	7,239
TX Util Ops B						146	97	136	146	97	136	146	97	136	146	97	136	146
TX Util Ops C						140	94	131	140	94	131	140	94	131	140	94	131	140
CP Util D&D Waste -- SOYD @ 50yr					572000													
STP Util D&D Waste -- SOYD @ 50 yr					984000													
TX Util D&D A																		
TX Util D&D B																		
TX Util D&D C																		
Total TX Non-Util Ops Waste						18,000	18,090	18,180	18,270	18,360	18,450	18,540	18,630	18,720	18,810	18,900	18,990	19,080
TX Non-U Ops A						17,905	17,994	18,084	18,173	18,263	18,352	18,442	18,531	18,621	18,710	18,800	18,889	18,979
TX Non-U Ops B						41	42	42	42	42	42	43	43	43	43	43	44	44
TX Non-U Ops C						54	54	55	55	55	55	56	56	56	56	57	57	57
Total ME Util Ops Waste						5,250	5,085	4,920	4,755	4,590	4,425	4,260	4,095	3,930	3,765	3,600	3,435	3,270
ME Util Ops A						4,755	4,605	4,456	4,307	4,157	4,008	3,858	3,709	3,559	3,410	3,261	3,111	2,962
ME Util Ops B						347	336	325	314	303	292	281	270	259	248	238	227	216
ME Util Ops C						149	144	139	135	130	125	121	116	111	107	102	97	93
ME Util D&D Waste																		
ME Util D&D A					133,900						44,633	66,950	22,317					
ME Util D&D B					14,600						4,867	7,300	2,433					
ME Util D&D C					1,500						500	750	250					
ME Non-Util Ops Waste						1,060												
ME Non-U Ops A						1,060	1,060	1,060	1,060	1,060	1,060	1,060	1,060	1,060	1,060	1,060	1,060	1,060
ME Non-U Ops B																		
ME Non-U Ops C																		
VT Util Ops Waste																		
VT Util Ops A					75590	4,199	4,199	4,199	4,199	4,199	4,199	4,199	4,199	4,199	4,199	4,199	4,199	4,199
VT Util Ops B					18940	1,052	1,052	1,052	1,052	1,052	1,052	1,052	1,052	1,052	1,052	1,052	1,052	1,052
VT Util Ops C					770	43	43	43	43	43	43	43	43	43	43	43	43	43
VT Util D&D Waste																		
VT Util D&D A					220000													
VT Util D&D B					274													
VT Util D&D C					964													
VT Non-Util Ops Waste																		
VT Non-U Ops A					300	300	300	300	300	300	300	300	300	300	300	300	300	300
VT Non-U Ops B																		
VT Non-U Ops C																		
ALL ALL ALL A						35,458	32,985	34,856	35,278	32,805	79,309	102,048	54,942	34,496	34,919	32,446	34,316	34,739
ALL ALL ALL B						1,586	1,526	1,555	1,554	1,494	6,389	8,822	3,896	1,490	1,489	1,430	1,458	1,457
ALL ALL ALL C						386	335	368	373	321	854	1,109	558	341	346	295	328	333
ALL ALL ALL ALL						37,429	34,846	36,778	37,204	34,621	86,553	111,979	59,396	36,328	36,754	34,171	36,103	36,529

Table A-2. APPROXIMATE TEXAS LLRWDF DISPOSAL RATE

TEXAS/MAINE/VERMONT OPERATIONAL AND DECOMMISS

- REFs:  
 1. RAE-9433/2-1, -2.  
 2. Telephone conversation with Susan Jablor  
 3. Telephone conversation with Tim McCart

Description	State	Sector	TYPE	Class		2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Total TX Util Ops waste					230,500	5,000	7,000	7,500	5,000	7,000	7,500	5,000	7,000	7,500	5,000	7,000	7,500	5,000
	TX	Util	Ops	A		4,826	6,756	7,239	4,826	6,756	7,239	4,826	6,756	7,239	4,826	6,756	7,239	4,826
	TX	Util	Ops	B		97	136	146	97	136	146	97	136	146	97	136	146	97
	TX	Util	Ops	C		94	131	140	94	131	140	94	131	140	94	131	140	94
CP Util D&D Waste -- SOYD @ 50yr					572000													
STP Util D&D Waste -- SOYD @ 50 yr					984000													
	TX	Util	D&D	A														
	TX	Util	D&D	B														
	TX	Util	D&D	C														
Total TX Non-Util Ops Waste						19,170	19,260	19,350	19,440	19,530	19,620	19,710	19,800	19,890	19,980	20,070	20,160	20,250
	TX	Non-U	Ops	A		19,068	19,158	19,247	19,337	19,426	19,516	19,606	19,695	19,785	19,874	19,964	20,053	20,143
	TX	Non-U	Ops	B		44	44	45	45	45	45	45	46	46	46	46	46	47
	TX	Non-U	Ops	C		58	58	58	58	59	59	59	59	60	60	60	60	61
Total ME Util Ops Waste						3,105												
	ME	Util	Ops	A		2,812												
	ME	Util	Ops	B		205												
	ME	Util	Ops	C		88												
ME Util D&D Waste																		
	ME	Util	D&D	A	133,900													
	ME	Util	D&D	B	14,600													
	ME	Util	D&D	C	1,500													
ME Non-Util Ops Waste																		
	ME	Non-U	Ops	A		1,060	1,060	1,060	1,060	1,060	1,060	1,060	1,060	1,060	1,060	1,060	1,060	1,060
	ME	Non-U	Ops	B														
	ME	Non-U	Ops	C														
VT Util Ops Waste																		
	VT	Util	Ops	A	75590	4,199	4,199	4,199	4,199	4,199								
	VT	Util	Ops	B	18940	1,052	1,052	1,052	1,052	1,052								
	VT	Util	Ops	C	770	43	43	43	43	43								
VT Util D&D Waste																		
	VT	Util	D&D	A	220000						7,857	55,000	47,143	39,286	31,429	23,571	15,714	
	VT	Util	D&D	B	274							274						
	VT	Util	D&D	C	964							964						
VT Non-Util Ops Waste																		
	VT	Non-U	Ops	A	300	300	300	300	300	300	300	300	300	300	300	300	300	300
	VT	Non-U	Ops	B														
	VT	Non-U	Ops	C														
	ALL	ALL	ALL	A		32,266	31,474	32,046	29,722	31,742	35,972	80,792	74,954	67,669	57,489	51,651	44,366	26,329
	ALL	ALL	ALL	B		1,398	1,232	1,242	1,194	1,233	191	416	181	191	143	182	192	144
	ALL	ALL	ALL	C		282	232	241	195	232	199	1,117	190	200	154	191	201	154
	ALL	ALL	ALL	ALL		33,946	32,938	33,529	31,111	33,208	36,362	82,325	75,326	68,061	57,785	52,025	44,759	26,627

Table A-2. APPROXIMATE TEXAS LLRWDF DISPOSAL RATE

TEXAS/MAINE/VERMONT OPERATIONAL AND DECOMMISS  
REFs:

1. RAE-9433/2-1, -2.
2. Telephone conversation with Susan Jablor
3. Telephone conversation with Tim McCart

Description	State	Sector	TYPE	Class		2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
Total TX Util Ops waste					230,500	7,000	7,500	5,000	7,000	7,500	5,000	7,000	7,500	2,500	2,500	2,500	1,000	
	TX	Util	Ops	A		6,756	7,239	4,826	6,756	7,239	4,826	6,756	7,239	2,413	2,413	2,413	965	
	TX	Util	Ops	B		136	146	97	136	146	97	136	146	49	49	49	19	
	TX	Util	Ops	C		131	140	94	131	140	94	131	140	47	47	47	19	
CP Util D&D Waste -- SOYD @ 50yr					572000													38,133
STP Util D&D Waste -- SOYD @ 50 yr					984000										65,600	328,000	262,400	196,800
	TX	Util	D&D	A											62,668	313,338	250,671	222,670
	TX	Util	D&D	B											2,132	10,660	8,528	8,928
	TX	Util	D&D	C											800	4,002	3,201	3,335
Total TX Non-Util Ops Waste						20,340	20,430	20,520	20,610	20,700	20,790	20,880	20,970	21,060	21,150	21,240	21,330	21,420
	TX	Non-U	Ops	A		20,232	20,322	20,411	20,501	20,590	20,680	20,769	20,859	20,948	21,038	21,127	21,217	21,306
	TX	Non-U	Ops	B		47	47	47	47	48	48	48	48	48	49	49	49	49
	TX	Non-U	Ops	C		61	61	62	62	62	62	63	63	63	63	64	64	64
Total ME Util Ops Waste																		
	ME	Util	Ops	A														
	ME	Util	Ops	B														
	ME	Util	Ops	C														
ME Util D&D Waste																		
	ME	Util	D&D	A	133,900													
	ME	Util	D&D	B	14,600													
	ME	Util	D&D	C	1,500													
ME Non-Util Ops Waste																		
	ME	Non-U	Ops	A		1,060	1,060	1,060	1,060	1,060	1,060	1,060	1,060	1,060	1,060	1,060	1,060	1,060
	ME	Non-U	Ops	B														
	ME	Non-U	Ops	C														
VT Util Ops Waste																		
	VT	Util	Ops	A	75590													
	VT	Util	Ops	B	18940													
	VT	Util	Ops	C	770													
VT Util D&D Waste																		
	VT	Util	D&D	A	220000													
	VT	Util	D&D	B	274													
	VT	Util	D&D	C	964													
VT Non-Util Ops Waste																		
	VT	Non-U	Ops	A	300	300	300	300	300	300	300	300	300	300	300	300	300	300
	VT	Non-U	Ops	B														
	VT	Non-U	Ops	C														
	ALL	ALL	ALL	A		28,349	28,921	26,597	28,617	29,189	26,866	28,886	29,458	24,721	87,479	338,239	274,213	245,337
	ALL	ALL	ALL	B		183	192	144	183	193	145	184	194	97	2,229	10,757	8,596	8,977
	ALL	ALL	ALL	C		192	202	155	193	203	156	194	203	110	911	4,112	3,284	3,399
	ALL	ALL	ALL	ALL		28,723	29,315	26,897	28,993	29,585	27,167	29,263	29,855	24,928	90,618	353,108	286,093	257,713

Table A-2. APPROXIMATE TEXAS LLRWDF DISPOSAL RATE

TEXAS/MAINE/VERMONT OPERATIONAL AND DECOMMISS

REFs:

1. RAE-9433/2-1, -2.
2. Telephone conversation with Susan Jablor
3. Telephone conversation with Tim McCartl

Description	State	Sector	TYPE	Class	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044
Total TX Util Ops waste					230,500										
	TX	Util	Ops	A											
	TX	Util	Ops	B											
	TX	Util	Ops	C											
CP Util D&D Waste -- SOYD @ 50yr					572000	190,667	152,533	114,400	76,267						
STP Util D&D Waste -- SOYD @ 50 yr					984000	131,200									
	TX	Util	D&D	A	298,670	138,668	104,001	69,334							
	TX	Util	D&D	B	16,924	10,128	7,596	5,064							
	TX	Util	D&D	C	6,272	3,737	2,803	1,869							
Total TX Non-Util Ops Waste					21,510	21,600	21,690	21,780	21,870	21,960	22,050	22,140	22,230	22,320	22,410
	TX	Non-U	Ops	A	21,396	21,486	21,575	21,665	21,754	21,844	21,933	22,023	22,112	22,202	22,291
	TX	Non-U	Ops	B	49	50	50	50	50	51	51	51	51	51	52
	TX	Non-U	Ops	C	65	65	65	65	66	66	66	66	67	67	67
Total ME Util Ops Waste															
	ME	Util	Ops	A											
	ME	Util	Ops	B											
	ME	Util	Ops	C											
ME Util D&D Waste															
	ME	Util	D&D	A	133,900										
	ME	Util	D&D	B	14,600										
	ME	Util	D&D	C	1,500										
ME Non-Util Ops Waste															
	ME	Non-U	Ops	A		1,060	1,060	1,060	1,060	1,060	1,060	1,060	1,060	1,060	1,060
	ME	Non-U	Ops	B											
	ME	Non-U	Ops	C											
VT Util Ops Waste															
	VT	Util	Ops	A	75590										
	VT	Util	Ops	B	18940										
	VT	Util	Ops	C	770										
VT Util D&D Waste															
	VT	Util	D&D	A	220000										
	VT	Util	D&D	B	274										
	VT	Util	D&D	C	964										
VT Non-Util Ops Waste															
	VT	Non-U	Ops	A	300	300	300	300	300	300	300	300	300	300	300
	VT	Non-U	Ops	B											
	VT	Non-U	Ops	C											
	ALL	ALL	ALL	A	321,426	161,514	126,936	92,359	23,114	23,204	23,293	23,383	23,472	23,562	23,651
	ALL	ALL	ALL	B	16,974	10,178	7,646	5,114	50	51	51	51	51	51	52
	ALL	ALL	ALL	C	6,337	3,802	2,868	1,934	66	66	66	66	67	67	67
	ALL	ALL	ALL	ALL	344,737	175,493	137,450	99,407	23,230	23,320	23,410	23,500	23,590	23,680	23,770

**Appendix B**  
**Cost Estimate Spreadsheets**



Table B-S. Summary of TLLRWDA Disposal Facility Operating Costs

	1992	1993	1994	1995	1996	1997	1998
	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	YEAR 6	YEAR 7
Assumed Cost Escalation Rate (per year)	3.0%						
Assumed Cost of Capital (per year)	5.0%						
Assumed Effective Cost of Capital (per year)	1.9%						
Contingency Percent	10.0%						
<b>FUNCTIONAL AREA - PREOPERATIONS</b>							
A.1 PREOPERATIONS (SITE CHARACTERIZATION, DESIGN, ETC.)	\$1,555,500	\$2,937,000	\$1,357,000	\$1,020,000	\$1,961,000	\$700,000	\$1,000,000
A.2 AIF CONSTRUCTION & STARTUP							
<b>TOTAL</b>							
PRESENT VALUE COSTS - PREOPERATIONAL ACTIVITIES (YEAR 2000)	\$2,298,182	\$4,132,654	\$1,818,510	\$1,301,807	\$2,383,608	\$810,338	\$1,102,500
<b>FUNCTIONAL AREA</b>	<b>YEAR 1</b>	<b>YEAR 2</b>	<b>YEAR 3</b>	<b>YEAR 4</b>	<b>YEAR 5</b>	<b>YEAR 6</b>	<b>YEAR 7</b>
A.1 CLASS A DISPOSAL UNIT CONSTRUCTION, OPERATION, & CLOSURE	\$4,143,089	\$6,136,686	\$3,183,589	\$1,272,194	\$1,287,783	\$2,412,428	\$2,422,916
A.2 CLASS B/C DISPOSAL UNIT CONSTRUCTION, OPERATION, & CLOSURE	\$710,894	\$876,705	\$175,762	\$495,437	\$557,244	\$68,084	\$70,498
A.3 PAYROLL	\$1,139,043	\$1,139,043	\$1,139,043	\$1,139,043	\$1,139,043	\$1,139,043	\$1,139,043
A.4 CONSTRUCTION EQUIPMENT LEASE/PURCHASE	\$675,975	\$675,975	\$675,975	\$675,975	\$712,979	\$675,975	\$675,975
A.5 BUILDING AND FACILITY MAINTENANCE	\$43,270	\$43,270	\$43,270	\$43,270	\$43,270	\$43,270	\$43,270
A.6 UTILITIES AND CONSUMABLES	\$277,979	\$277,979	\$277,979	\$277,979	\$277,979	\$277,979	\$277,979
A.7 OFFICE EQUIPMENT	\$0	\$0	\$0	\$34,500	\$10,000	\$21,300	\$0
A.8 TRAINING	\$27,026	\$27,026	\$62,026	\$27,026	\$27,026	\$62,151	\$27,026
A.9 MONITORING	\$134,291	\$101,231	\$101,231	\$134,231	\$115,377	\$101,231	\$134,231
A.10 REGULATORY COSTS	\$127,298	\$82,412	\$82,412	\$82,412	\$82,412	\$127,298	\$82,412
A.11 AUTHORITY ADMINISTRATION	\$240,000	\$240,000	\$240,000	\$240,000	\$240,000	\$240,000	\$240,000
A.12 LEGAL FEES	\$30,000	\$30,000	\$30,000	\$30,000	\$30,000	\$30,000	\$30,000
A.13 FINANCIAL ASSURANCE -- POST-CLOSURE MAINTENANCE FUND	\$222,553	\$222,553	\$222,553	\$222,553	\$222,553	\$222,553	\$222,553
A.14 CONTINGENCIES	\$754,886	\$963,033	\$601,129	\$445,207	\$452,311	\$519,876	\$514,335
GROSS REVENUE REQUIREMENTS	\$8,526,304	\$10,815,913	\$6,834,968	\$5,119,826	\$5,197,976	\$5,941,187	\$5,880,238
INCENTIVE PAYMENTS (10% OF GROSS REVENUE REQUIREMENTS)	\$852,630	\$1,081,591	\$683,497	\$511,983	\$519,798	\$594,119	\$588,024
TOTALS (1997 \$)	\$9,378,935	\$11,897,504	\$7,518,465	\$5,631,809	\$5,717,774	\$6,535,306	\$6,468,262
ESCALATED COSTS (BEGINNING IN YEAR 2000)	\$10,165,297.22	\$13,296,200.02	\$8,600,407.65	\$6,587,613.43	\$6,850,617.52	\$8,105,072.37	\$8,242,455.97
VOLUME DISPOSED (CF)	86,553	111,979	59,396	36,328	36,754	34,171	36,103
ESCALATED COST PER CUBIC FOOT	\$117	\$119	\$145	\$181	\$186	\$237	\$228
PRESENT VALUE COSTS (YR 2000)	\$10,165,297	\$12,663,048	\$7,800,823	\$5,690,628	\$5,636,020	\$6,350,536	\$6,150,648
Present Value Per cubic foot	\$117	\$113	\$131	\$157	\$153	\$186	\$170
LLC TOTAL - PRESENT VALUE COSTS (YR 2000)							
CURRENT VALUE OF POST-CLOSURE MAINTENANCE FUND	\$222,553	\$456,234	\$701,599	\$959,232	\$1,229,746	\$1,513,787	\$1,812,029

Table B-S. Summary of TLLRWDA Disposal Facility Operating Costs

Assumed Cost Escalation Rate (per year)  
 Assumed Cost of Capital (per year)  
 Assumed Effective Cost of Capital (per year)  
 Contingency Percent

FUNCTIONAL AREA - PREOPERATIONS	1999 YEAR 8	TOTAL
A.1 PREOPERATIONS (SITE CHARACTERIZATION, DESIGN, ETC.)		\$10,530,500
A.2 AIF CONSTRUCTION & STARTUP	\$7,913,243	\$7,913,243
<b>TOTAL</b>		<b>\$18,443,743</b>
PRESENT VALUE COSTS - PREOPERATIONAL ACTIVITIES (YEAR 2000)	\$8,308,905	\$22,156,504

FUNCTIONAL AREA	YEAR 8	YEAR 9	YEAR 10	YEAR 11	YEAR 12	YEAR 13	YEAR 14
A.1 CLASS A DISPOSAL UNIT CONSTRUCTION, OPERATION, & CLOSURE	\$1,281,153	\$2,405,798	\$2,318,086	\$1,181,834	\$1,096,146	\$2,386,484	\$2,483,984
A.2 CLASS B/C DISPOSAL UNIT CONSTRUCTION, OPERATION, & CLOSURE	\$70,655	\$66,299	\$57,772	\$481,696	\$539,604	\$57,828	\$15,387
A.3 PAYROLL	\$1,139,043	\$1,139,043	\$1,139,043	\$1,139,043	\$1,139,043	\$1,139,043	\$1,139,043
A.4 CONSTRUCTION EQUIPMENT LEASE/PURCHASE	\$675,975	\$678,975	\$713,567	\$675,975	\$675,975	\$675,975	\$675,975
A.5 BUILDING AND FACILITY MAINTENANCE	\$43,270	\$43,270	\$43,270	\$43,270	\$43,270	\$43,270	\$43,270
A.6 UTILITIES AND CONSUMABLES	\$277,979	\$277,979	\$277,979	\$277,979	\$277,979	\$277,979	\$277,979
A.7 OFFICE EQUIPMENT	\$34,500	\$0	\$12,400	\$0	\$55,800	\$0	\$0
A.8 TRAINING	\$27,026	\$62,026	\$27,026	\$27,026	\$62,151	\$27,026	\$27,026
A.9 MONITORING	\$101,231	\$101,231	\$148,377	\$101,231	\$101,231	\$134,231	\$101,231
A.10 REGULATORY COSTS	\$82,412	\$82,412	\$82,412	\$127,298	\$82,412	\$82,412	\$82,412
A.11 AUTHORITY ADMINISTRATION	\$240,000	\$240,000	\$240,000	\$240,000	\$240,000	\$240,000	\$240,000
A.12 LEGAL FEES	\$30,000	\$30,000	\$30,000	\$30,000	\$30,000	\$30,000	\$30,000
A.13 FINANCIAL ASSURANCE -- POST-CLOSURE MAINTENANCE FUND	\$222,553	\$222,553	\$222,553	\$222,553	\$222,553	\$222,553	\$222,553
A.14 CONTINGENCIES	\$400,324	\$512,703	\$508,993	\$432,535	\$434,361	\$509,425	\$511,631
<b>GROSS REVENUE REQUIREMENTS</b>	<b>\$4,626,121</b>	<b>\$5,862,289</b>	<b>\$5,821,477</b>	<b>\$4,980,440</b>	<b>\$5,000,524</b>	<b>\$5,826,226</b>	<b>\$5,850,491</b>
INCENTIVE PAYMENTS (10% OF GROSS REVENUE REQUIREMENTS)	\$462,612	\$586,229	\$582,148	\$498,044	\$500,052	\$582,623	\$585,049
<b>TOTALS (1997 \$)</b>	<b>\$5,088,734</b>	<b>\$6,448,518</b>	<b>\$6,403,625</b>	<b>\$5,478,484</b>	<b>\$5,500,576</b>	<b>\$6,408,849</b>	<b>\$6,435,540</b>
ESCALATED COSTS (BEGINNING IN YEAR 2000)	\$6,617,468.10	\$8,675,807.65	\$8,985,786.65	\$7,906,468.78	\$8,154,001.84	\$9,790,602.49	\$10,104,074.80
VOLUME DISPOSED (CF)	36,529	33,946	32,938	33,529	31,111	33,208	36,362
ESCALATED COST PER CUBIC FOOT	\$181	\$256	\$273	\$236	\$262	\$295	\$278
<b>PRESENT VALUE COSTS (YR 2000)</b>	<b>\$4,702,911</b>	<b>\$5,872,128</b>	<b>\$5,792,318</b>	<b>\$4,853,886</b>	<b>\$4,767,476</b>	<b>\$5,451,774</b>	<b>\$5,358,407</b>
Present Value Per cubic foot	\$129	\$173	\$176	\$145	\$153	\$164	\$147
<b>LLC TOTAL - PRESENT VALUE COSTS (YR 2000)</b>							
CURRENT VALUE OF POST-CLOSURE MAINTENANCE FUND	\$2,125,183	\$2,453,996	\$2,799,249	\$3,161,764	\$3,542,405	\$3,942,079	\$4,361,736

Table B-S. Summary of TLLRWDA Disposal Facility Operating Costs

Assumed Cost Escalation Rate (per year)  
 Assumed Cost of Capital (per year)  
 Assumed Effective Cost of Capital (per year)  
 Contingency Percent

FUNCTIONAL AREA - PREOPERATIONS	
A.1	PREOPERATIONS (SITE CHARACTERIZATION, DESIGN, ETC.)
A.2	AIF CONSTRUCTION & STARTUP
<b>TOTAL</b>	

PRESENT VALUE COSTS - PREOPERATIONAL ACTIVITIES (YEAR 2000)

FUNCTIONAL AREA	YEAR 15	YEAR 16	YEAR 17	YEAR 18	YEAR 19	YEAR 20	TOTAL
A.1 CLASS A DISPOSAL UNIT CONSTRUCTION, OPERATION, & CLOSURE	\$4,195,392	\$5,137,469	\$3,652,957	\$3,335,995	\$3,062,228	\$1,636,209	\$55,032,423
A.2 CLASS B/C DISPOSAL UNIT CONSTRUCTION, OPERATION, & CLOSURE	\$60,500	\$14,673	\$15,444	\$11,701	\$14,729	\$15,500	\$4,376,413
A.3 PAYROLL	\$1,139,043	\$1,139,043	\$1,139,043	\$1,139,043	\$1,139,043	\$1,139,043	\$22,780,857
A.4 CONSTRUCTION EQUIPMENT LEASE/PURCHASE	\$712,979	\$675,975	\$675,975	\$675,975	\$675,975	\$712,979	\$13,671,103
A.5 BUILDING AND FACILITY MAINTENANCE	\$43,270	\$43,270	\$43,270	\$43,270	\$43,270	\$43,270	\$865,400
A.6 UTILITIES AND CONSUMABLES	\$277,979	\$277,979	\$277,979	\$277,979	\$277,979	\$277,979	\$5,559,576
A.7 OFFICE EQUIPMENT	\$10,000	\$34,500	\$0	\$21,300	\$0	\$46,900	\$281,200
A.8 TRAINING	\$62,026	\$27,026	\$27,026	\$62,151	\$27,026	\$27,026	\$750,892
A.9 MONITORING	\$115,377	\$134,231	\$101,231	\$101,231	\$134,231	\$115,377	\$2,312,264
A.10 REGULATORY COSTS	\$82,412	\$127,298	\$82,412	\$82,412	\$582,412	\$332,412	\$2,577,784
A.11 AUTHORITY ADMINISTRATION	\$240,000	\$240,000	\$240,000	\$240,000	\$240,000	\$240,000	\$4,800,000
A.12 LEGAL FEES	\$30,000	\$30,000	\$30,000	\$30,000	\$30,000	\$30,000	\$600,000
A.13 FINANCIAL ASSURANCE -- POST-CLOSURE MAINTENANCE FUND	\$222,553	\$222,553	\$222,553	\$222,553	\$222,553	\$222,553	\$4,451,061
A.14 CONTINGENCIES	\$696,898	\$788,146	\$628,534	\$602,106	\$622,689	\$461,670	\$11,360,791
<b>GROSS REVENUE REQUIREMENTS</b>	<b>\$7,886,428</b>	<b>\$8,892,163</b>	<b>\$7,136,423</b>	<b>\$6,845,716</b>	<b>\$7,072,135</b>	<b>\$5,300,918</b>	<b>\$129,419,765</b>
<b>INCENTIVE PAYMENTS (10% OF GROSS REVENUE REQUIREMENTS)</b>	<b>\$788,643</b>	<b>\$889,216</b>	<b>\$713,642</b>	<b>\$684,572</b>	<b>\$707,214</b>	<b>\$530,092</b>	<b>\$12,941,976</b>
<b>TOTALS (1997 \$)</b>	<b>\$8,677,271</b>	<b>\$9,781,379</b>	<b>\$7,850,065</b>	<b>\$7,530,287</b>	<b>\$7,779,349</b>	<b>\$5,831,010</b>	<b>\$142,361,741</b>
<b>ESCALATED COSTS (BEGINNING IN YEAR 2000)</b>	<b>\$14,054,930.98</b>	<b>\$16,375,972.32</b>	<b>\$13,457,382.77</b>	<b>\$13,260,251.45</b>	<b>\$14,098,088.50</b>	<b>\$10,693,609.63</b>	<b>\$204,022,110</b>
<b>VOLUME DISPOSED (CF)</b>	<b>82,325</b>	<b>75,326</b>	<b>68,061</b>	<b>57,785</b>	<b>52,025</b>	<b>44,759</b>	<b>1,019,188</b>
<b>ESCALATED COST PER CUBIC FOOT</b>	<b>\$171</b>	<b>\$217</b>	<b>\$198</b>	<b>\$229</b>	<b>\$271</b>	<b>\$239</b>	<b>\$200</b>
<b>PRESENT VALUE COSTS (YR 2000)</b>	<b>\$7,098,695</b>	<b>\$7,877,123</b>	<b>\$6,164,982</b>	<b>\$5,785,404</b>	<b>\$5,858,047</b>	<b>\$4,231,824</b>	<b>\$128,271,975</b>
<i>Present Value Per cubic foot</i>	<b>\$86</b>	<b>\$105</b>	<b>\$91</b>	<b>\$100</b>	<b>\$113</b>	<b>\$95</b>	<b>\$126</b>
<b>LLC TOTAL - PRESENT VALUE COSTS (YR 2000)</b>							<b>\$150,428,479</b>
							<b>\$148</b>
<b>CURRENT VALUE OF POST-CLOSURE MAINTENANCE FUND</b>	<b>\$4,802,375</b>	<b>\$5,265,047</b>	<b>\$5,750,853</b>	<b>\$6,260,948</b>	<b>\$6,796,549</b>	<b>\$7,358,929</b>	







Table B-2. CLASS B/C DISPOSAL UNIT CONSTRUCTION, OF

A.2	CLASS B/C DISPOSAL UNIT CONSTRUCTION, OPERATION, AND CLOSURE	YEAR 9	YEAR 10	YEAR 11	YEAR 12	YEAR 13	YEAR 14	YEAR 15	YEAR 16	YEAR 17	YEAR 18	YEAR 19	YEAR 20	TOTAL
A.2.1	SURVEY CELLS			\$3,190										\$9,588
A.2.2	DISPOSAL UNIT EXCAVATION			\$102,342										\$307,027
A.2.3	DUMP TRUCK LOADING			\$15,351										\$46,054
A.2.4	HAUL			\$131,583										\$394,749
A.2.5	BOUNDARY FENCE, 5' GALVANIZED													\$1,888
A.2.6	REMOVE AND RESET CHAIN LINK FENCE			\$9,471										\$28,413
A.2.7	CONSTRUCT RAMP													
A.2.8	COMPACT SUBGRADE			\$312										\$936
A.2.9	14" AGGREGATE BASE, COARSE			\$24,782										\$74,345
A.2.10	6" AGGREGATE SURFACE, COARSE			\$11,126										\$33,378
A.2.11	NEUTRON PROBE ASSEMBLY													
A.2.12	ALUMINUM TUBE FOR NEUTRON PROBE			\$15,274										\$45,822
A.2.13	END CAP FOR ALUMINUM TUBE			\$488										\$1,404
A.2.14	CONCRETE COLLAR			\$206										\$618
A.2.15	GRADE CELL FLOOR TO SPECIFICATION			\$782										\$2,347
A.2.16	COMPACT SUBGRADE			\$175										\$526
A.2.17	WATER MANAGEMENT (DUST CONTROL & HYDRATION)			\$716										\$2,147
A.2.18	PLACE AND COMPACT CELL SOIL LINER			\$69,154										\$207,461
A.2.19	PLACE GEOTEXTILE, NON-WOVEN			\$1,577										\$4,730
A.2.20	CONSTRUCT UNDER DRAIN													
A.2.21	EXCAVATE UNDER DRAIN			\$996										\$2,988
A.2.22	GEOTEXTILE, NON-WOVEN			\$1,147										\$3,441
A.2.23	38" CRUSHED STONE FILL FOR UNDER DRAIN			\$4,822										\$14,467
A.2.24	CONCRETE SUMP ASSEMBLY													
A.2.25	HAND EXCAVATE AREA			\$335										\$1,004
A.2.26	FORMWORK			\$875										\$2,624
A.2.27	REBAR			\$172										\$517
A.2.28	CONCRETE			\$371										\$1,113
A.2.29	8" PVC STAINLESS PIPE			\$1,720										\$5,160
A.2.30	12" SLEEVE			\$374										\$1,123
A.2.31	CONCRETE COLLAR			\$165										\$494
A.2.32	2" MINIMUM CELL FLOOR GRAVELLY SAND			\$13,493										\$40,479
A.2.33	PLACE 6" CELL FLOOR CRUSHED 3/4" STONE BASE			\$12,168										\$36,504
A.2.34	CANISTER PURCHASE	\$47,076	\$41,021	\$41,589	\$39,911	\$41,061	\$10,920	\$42,958	\$10,419	\$10,966	\$8,309	\$10,459	\$11,006	\$1,172,058
A.2.35	CANISTER PLACEMENT	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
A.2.36	WASTE PLACEMENT - SLIKS	\$226	\$197	\$200	\$187	\$197	\$52	\$206	\$50	\$53	\$40	\$50	\$53	\$5,626
A.2.37	BACKFILL VOIDS IN CANISTERS WITH GROUT	\$2,834	\$2,470	\$2,503	\$2,343	\$2,472	\$668	\$2,588	\$627	\$660	\$500	\$630	\$663	\$70,561
A.2.38	STEEL MATS OF #4 REINFORCING STEEL	\$1,199	\$1,045	\$1,059	\$991	\$1,046	\$278	\$1,094	\$265	\$279	\$212	\$266	\$289	\$29,981
A.2.39	CONCRETE LID POUR (DELIVERY INCLUDED IN MATERIAL COST)	\$1,923	\$1,675	\$1,698	\$1,589	\$1,677	\$448	\$1,754	\$426	\$448	\$339	\$427	\$450	\$47,868
A.2.40	BRASS ID PLATE WITH ENGRAVINGS (6" X 6")	\$220	\$192	\$195	\$182	\$192	\$51	\$201	\$49	\$51	\$39	\$49	\$52	\$5,485
A.2.41	BACKFILL AROUND CANISTERS WITH 38" CRUSHED STONE	\$10,941	\$9,534	\$9,662	\$9,044	\$9,544	\$2,539	\$9,985	\$2,422	\$2,549	\$1,931	\$2,431	\$2,558	\$272,413
A.2.42	PLACE 2" GRAVELLY SAND	\$1,749	\$1,524	\$1,544	\$1,446	\$1,520	\$400	\$1,596	\$387	\$407	\$309	\$389	\$409	\$43,548
A.2.43	PLACE MINIMUM 2" OF SAT. MATL - TEMP COVER	\$130	\$113	\$115	\$107	\$113	\$30	\$119	\$29	\$30	\$23	\$29	\$30	\$3,236
A.2.44	PLACE MINIMUM 7" 4" OF SATISFACTORY MATERIAL				\$74,902									\$224,706
A.2.45	BACKFILL ACCESS RAMP				\$88,578									\$259,735
A.2.46	COMPACT CLAY LINER				\$688									\$2,053
A.2.47	COVER ACCESS RAMP BACKFILL				\$11,235									\$33,704
A.2.48	COVER SYSTEM AND SECONDARY DRAINAGE DITCH INTERFACE													
A.2.49	COMPACT SUBGRADE				\$838									\$2,514
A.2.50	PLACE GEOTEXTILE, NON-WOVEN				\$3,542									\$10,626
A.2.51	PLACE RIPRAP				\$44,928									\$134,784
A.2.52	AMEND DITCH LINING WITH LIME				\$599									\$1,706
A.2.53	PLACE 12" THICK LIME AMENDED DITCH LINING				\$7,144									\$21,433
A.2.54	GRADE AREA TO SPECIFICATION				\$3,383									\$10,150
A.2.55	APPLY LIQUID ASPHALT EMULSION TACK COAT				\$2,424									\$7,272
A.2.56	PLACE 8" OF ASPHALT CONCRETE ABOVE SAT MATERIAL				\$55,988									\$167,963
A.2.57	PLACE 2" OF SURFACE COURSE ASPHALT CONCRETE				\$32,099									\$98,297
A.2.58	APPLY LIQUID ASPHALT EMULSION TACK COAT				\$2,970									\$8,911
A.2.59	PLACE GEOSYNTHETIC CLAY LINER OVER ASPHALT CONCRETE				\$97,150									\$291,451
A.2.60	4" 4" OF SATISFACTORY MATERIAL - INCLUDES 1" OF "TOPSOIL"				\$50,175									\$150,524
A.2.61	GRADE AREA TO SPECIFICATION				\$4,079									\$14,037
A.2.62	SEEDING, VEGETATIVE COVER (MULCHING, WATERING TRUCK)				\$3,238									\$9,714
A.2.63	WATERING AND MAINTENANCE OF VEGETATIVE COVER				\$289									\$859
A.2.64	GRANITE MONUMENT				\$1,500									\$4,500
A.2.65	SETTLEMENT MONITORS				\$587									\$1,760
		\$65,299	\$57,772	\$481,696	\$539,004	\$57,828	\$15,387	\$90,500	\$14,673	\$15,444	\$11,701	\$14,729	\$15,500	\$4,376,413

Table B-3. Payroll Costs

A.3	PAYROLL	UNIT	QUANTITY	LABOR	TOTAL/YEAR	20 YEAR TOTAL
	PERSONNEL (34% FRINGE BENEFITS)	YR	1	\$850,032	\$1,139,043	\$22,780,857



Table B-4 EQUIPMENT LEASE/PURCHASE (ESCALATED DOLLAR)

A.4	EQUIPMENT LEASE/PURCHASE (ESCALATED COSTS)	UNIT	QUANTITY	MATERIAL	MAT. TOTAL	MAT. TOTAL	8 LEASE AMT	MAT. TOTAL	13 LEASE AMT	MAT. TOTAL	18 LEASE AMT	LIFE CYCLE	USAGE, HR/DAY	USAGE, DAY/YR	OP COST/HR
A.4.1	3 CY, 155 HP FRONT END WHEEL LOADER, KOMATSU WA 380	EA	1	185,000.00	185,000.00			271,678.74	36,043.01			10	8	150	9.06
A.4.2	180 HP MOTOR GRADER, GD670 KOMATSU	EA	1	235,000.00	235,000.00			345,105.42	45,784.37			10	8	150	14.40
A.4.3	10-12 CY 10-WHEEL END DUMP TRUCK, GMC C7H046	EA	2	215,000.00	430,000.00			631,469.50	83,775.65			10	8	150	16.90
A.4.4	5 TON OVERHEAD CRANE	EA	1	25,000.00	25,000.00			36,713.34	4,870.68			10	8	150	13.33
A.4.5	PORTABLE LIGHT TOWER, 2000 WATT	EA	3	12,300.00	36,900.00			54,188.89	7,189.12			10	8	150	1.50
A.4.6	MATERIAL HANDLING SYSTEM	EA	1	9,695.00	9,695.00							20			
A.4.7	65 TON HYDRAULIC CRANE	EA	1	150,000.00	150,000.00							20	8	150	23.66
A.4.8	BULLDOZER CAT. D9	EA	2	198,500.00	397,000.00			583,007.88	77,346.36			10	8	150	10.65
A.4.9	BACKHOE CAT. 375	EA	1	549,000.00	549,000.00			806,225.01	106,960.07			10	8	150	7.10
A.4.10	WHEEL SCRAPER 623 F	EA	1	309,000.00	309,000.00			453,776.92	60,201.57			10	8	150	3.10
A.4.11	FORK LIFT, CLARK C500-100	EA	1	25,000.00	25,000.00			36,713.34	4,870.68			10	8	150	6.20
A.4.12	FORK LIFT, CLARK GCS-25	EA	2	20,000.00	40,000.00			58,741.35	7,793.08			10	8	150	6.20
A.4.13	REMOTE CONTROL PACKAGE FOR CRANE	EA	2	8,000.00	16,000.00			23,496.54	3,117.23			10	8	150	
A.4.14	FARM TRACTOR, FORD 4630 4X4	EA	1	25,000.00	25,000.00			36,713.34	4,870.68			10	8	150	4.40
A.4.15	UTILITY TRAILER, ETNYGE 160000#	EA	1	12,800.00	12,800.00							20	8	150	1.35
A.4.16	REBAR CUTTER, MUBEA BS100	EA	1	217.65	217.65							5	4	150	
A.4.17	REBAR BENDER MUBEA	EA	1	286.95	286.95							5	4	150	
A.4.18	1 HP CONCRETE VIBRATOR MOTOR, 3 FT SHAFT AND HEAD	EA	1	587.60	587.60							10	4	150	0.30
A.4.19	MOBILE CONCRETE/GROUT PLANT	EA	1	110,000.00	110,000.00							20	4	150	31.52
A.4.20	GMC 4X4 PICK-UP TRUCK	EA	2	25,000.00	50,000.00	63,338.50	14,832.39	73,426.69	17,194.80	85,121.65	19,933.49	5	8	250	1.20
A.4.21	3/4 TON 4X4 SUBURBAN, GMC	EA	2	30,000.00	60,000.00	76,006.20	17,798.86	88,112.02	20,633.76	102,145.98	23,820.18	5	8	250	1.20
A.4.22	COMMUNICATIONS SYSTEM - CELLULAR TELEPHONES	EA	5	300.00	1,500.00							5	8	350	
A.4.23	SMOOTH DRUM COMPACTOR CAT. CS563, 84 IN DRUM	EA	1	123,000.00	123,000.00			180,629.65	23,963.73			10	8	150	
A.4.24	PUMP, 170 GPM	EA	3	1,000.00	3,000.00							5	8	75	0.50
A.4.25	PUMP, 50 GPM	EA	3	8,000.00	24,000.00	30,402.48	7,119.54	35,244.81	8,253.50	40,858.39	9,568.07	5	8	75	0.50
A.4.26	NEUTRON PROBE	EA	1	3,000.00	3,000.00							10	2	30	
A.4.27	3300 GALLON WATER TRUCK	EA	1	25,000.00	25,000.00							20	4	150	7.88
A.4.28	LABORATORY EQUIPMENT	EA	1	35,000.00	35,000.00			51,398.68	6,818.95			10	0	0	
A.4.29	MISCELLANEOUS EQUIPMENT LEASES	YR	1	5,000.00	5,000.00							1	0	0	0.00
A.4.30	GPS SYSTEM, ROVER AND BASE RECEIVER	EA	1	8,000.00	8,000.00							5	0	0	0.00
A.4.31	GPS COMPUTER SOFTWARE UPDATES	YR	1	200.00	200.00							1	0	0	0.00

TOTALS.

Table B-4 EQUIPMENT LEASE/PURCHASE (ESC)

A.4 EQUIPMENT LEASE/PURCHASE (ESCALATED COSTS)		EQUIPMENT/YR	REPAIRS/ YR	LEASE AMT	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	YEAR 6	YEAR 7	YEAR 8	YEAR 9	YEAR 10	YEAR 11
A.4.1	3 CY, 155 HP FRONT END WHEEL LOADER, KOMATSU WA 380	\$10,872	\$4,625	\$24,544	\$40,041	\$40,984	\$41,478	\$41,986	\$42,509	\$43,048	\$43,603	\$44,175	\$44,764	\$45,370	\$45,994
A.4.2	180 HP MOTOR GRADER, GD670 KOMATSU	\$17,280	\$5,875	\$31,177	\$54,332	\$55,742	\$56,479	\$57,238	\$58,020	\$58,825	\$59,655	\$60,509	\$61,389	\$62,293	\$63,222
A.4.3	10-12 CY 10-WHEEL END DUMP TRUCK, GMC C7H046	\$40,560	\$10,750	\$57,047	\$108,357	\$111,482	\$113,115	\$114,797	\$116,529	\$118,314	\$120,152	\$122,045	\$123,995	\$125,932	\$127,947
A.4.4	5 TON OVERHEAD CRANE	\$15,996	\$625	\$3,317	\$19,938	\$20,950	\$21,479	\$22,024	\$22,585	\$23,163	\$23,758	\$24,372	\$25,003	\$25,650	\$26,313
A.4.5	PORTABLE LIGHT TOWER, 2000 WATT	\$5,400	\$923	\$4,895	\$11,218	\$11,603	\$11,804	\$12,011	\$12,225	\$12,445	\$12,671	\$12,905	\$13,145	\$13,391	\$13,642
A.4.6	MATERIAL HANDLING SYSTEM	\$0	\$121	\$0	\$121	\$129	\$132	\$136	\$140	\$145	\$149	\$154	\$158	\$163	\$168
A.4.7	65 TON HYDRAULIC CRANE	\$28,392	\$1,875	\$12,552	\$42,819	\$44,662	\$45,625	\$46,618	\$47,640	\$48,692	\$49,776	\$50,893	\$52,043	\$53,228	\$54,449
A.4.8	BULLDOZER CAT. D8	\$25,560	\$9,925	\$52,669	\$88,154	\$90,315	\$91,445	\$92,608	\$93,806	\$95,040	\$96,311	\$97,620	\$98,969	\$100,359	\$101,789
A.4.9	BACKHOE CAT. 375	\$8,520	\$13,725	\$72,835	\$95,080	\$96,434	\$97,142	\$97,872	\$98,623	\$99,396	\$100,193	\$101,014	\$101,859	\$102,728	\$103,622
A.4.10	WHEEL SCRAPER 623 F	\$3,720	\$7,725	\$40,994	\$52,439	\$53,136	\$53,501	\$53,876	\$54,262	\$54,660	\$55,070	\$55,493	\$55,927	\$56,374	\$56,833
A.4.11	FORK LIFT, CLARK C500-100	\$7,440	\$625	\$3,317	\$11,382	\$11,873	\$12,130	\$12,394	\$12,666	\$12,947	\$13,236	\$13,533	\$13,840	\$14,157	\$14,484
A.4.12	FORK LIFT, CLARK GCS-25	\$14,880	\$1,000	\$5,307	\$21,187	\$22,154	\$22,659	\$23,180	\$23,716	\$24,268	\$24,837	\$25,423	\$26,027	\$26,649	\$27,288
A.4.13	REMOTE CONTROL PACKAGE FOR CRANE	\$0	\$400	\$0	\$400	\$424	\$437	\$450	\$464	\$478	\$492	\$507	\$522	\$537	\$552
A.4.14	FARM TRACTOR, FORD 4630 4X4	\$5,280	\$625	\$3,317	\$9,222	\$9,581	\$9,769	\$9,963	\$10,162	\$10,368	\$10,579	\$10,797	\$11,021	\$11,251	\$11,486
A.4.15	UTILITY TRAILER, ETNYGE 160000#	\$1,620	\$160	\$1,071	\$2,851	\$2,959	\$3,016	\$3,075	\$3,135	\$3,197	\$3,260	\$3,326	\$3,394	\$3,463	\$3,533
A.4.16	REBAR CUTTER, MUBEA BS100	\$0	\$11	\$0	\$11	\$12	\$12	\$12	\$12	\$13	\$13	\$14	\$14	\$15	\$15
A.4.17	REBAR BENDER MUBEA	\$0	\$14	\$0	\$14	\$15	\$16	\$16	\$347	\$17	\$18	\$18	\$19	\$400	\$20
A.4.18	1 HP CONCRETE VIBRATOR MOTOR, 3 FT SHAFT AND HEAD	\$180	\$15	\$0	\$195	\$207	\$213	\$219	\$226	\$232	\$239	\$247	\$254	\$1,051	\$269
A.4.19	MOBILE CONCRETE/GROUT PLANT	\$18,912	\$1,375	\$9,205	\$29,492	\$30,727	\$31,373	\$32,038	\$32,723	\$33,428	\$34,155	\$34,904	\$35,675	\$36,469	\$37,287
A.4.20	GMC 4X4 PICK-UP TRUCK	\$4,800	\$2,500	\$11,709	\$19,009	\$19,453	\$19,686	\$19,925	\$23,295	\$23,549	\$23,810	\$24,080	\$24,357	\$27,005	\$27,300
A.4.21	3/4 TON 4X4 SUBURBAN, GMC	\$4,800	\$3,000	\$14,051	\$21,851	\$22,326	\$22,574	\$22,830	\$26,841	\$27,112	\$27,392	\$27,680	\$27,976	\$31,116	\$31,431
A.4.22	COMMUNICATIONS SYSTEM - CELLULAR TELEPHONES	\$0	\$75	\$0	\$75	\$80	\$82	\$84	\$1,814	\$90	\$92	\$95	\$98	\$2,091	\$104
A.4.23	SMOOTH DRUM COMPACTOR CAT. CS563, 84 IN DRUM	\$0	\$3,075	\$16,318	\$19,393	\$19,580	\$19,678	\$19,779	\$19,883	\$19,990	\$20,100	\$20,213	\$20,330	\$28,096	\$28,220
A.4.24	PUMP, 170 GPM	\$900	\$150	\$0	\$1,050	\$1,114	\$1,147	\$1,182	\$4,528	\$1,254	\$1,291	\$1,330	\$1,370	\$5,082	\$1,453
A.4.25	PUMP, 50 GPM	\$900	\$1,200	\$5,620	\$7,720	\$7,848	\$7,720	\$7,720	\$9,220	\$9,220	\$9,220	\$9,220	\$9,220	\$10,354	\$10,354
A.4.26	NEUTRON PROBE	\$0	\$75	\$0	\$75	\$80	\$82	\$84	\$87	\$90	\$92	\$95	\$98	\$4,133	\$104
A.4.27	3300 GALLON WATER TRUCK	\$4,728	\$313	\$2,092	\$7,132	\$7,439	\$7,600	\$7,765	\$7,935	\$8,111	\$8,291	\$8,477	\$8,669	\$8,866	\$9,069
A.4.28	LABORATORY EQUIPMENT	\$0	\$875	\$4,643	\$5,518	\$5,572	\$5,600	\$5,628	\$5,658	\$5,688	\$5,720	\$5,752	\$5,785	\$7,995	\$8,030
A.4.29	MISCELLANEOUS EQUIPMENT LEASES	\$0	\$1,250	\$0	\$6,250	\$6,631	\$6,830	\$7,034	\$7,245	\$7,463	\$7,687	\$7,917	\$8,155	\$8,399	\$8,651
A.4.30	GPS SYSTEM, ROVER AND BASE RECEIVER	\$0	\$400	\$0	\$400	\$424	\$437	\$450	\$9,674	\$478	\$492	\$507	\$522	\$11,151	\$554
A.4.31	GPS COMPUTER SOFTWARE UPDATES	\$0	\$50	\$0	\$250	\$265	\$273	\$281	\$290	\$299	\$307	\$317	\$326	\$336	\$346
TOTALS:					\$675,975	\$694,202	\$703,533	\$713,276	\$746,511	\$742,018	\$752,664	\$763,629	\$774,923	\$967,879	\$958,086

Table B-4 EQUIPMENT LEASE/PURCHASE (ESC)

A.4	EQUIPMENT LEASE/PURCHASE (ESCALATED COSTS)	12	13	14	15	16	17	18	19	20	TOTAL
		YEAR 12	YEAR 13	YEAR 14	YEAR 15	YEAR 16	YEAR 17	YEAR 18	YEAR 19	YEAR 20	
A.4.1	3 CY, 155 HP FRONT END WHEEL LOADER, KOMATSU WA 380	\$58,138	\$58,801	\$59,484	\$60,187	\$60,911	\$61,657	\$62,426	\$63,217	\$64,032	\$1,045,803
A.4.2	180 HP MOTOR GRADER, GD670 KOMATSU	\$78,798	\$79,788	\$80,808	\$81,859	\$82,941	\$84,056	\$85,204	\$86,387	\$87,605	\$1,424,375
A.4.3	10-12 CY 10-WHEEL END DUMP TRUCK, GMC C7H046	\$156,931	\$159,126	\$161,387	\$163,715	\$166,113	\$168,583	\$171,127	\$173,748	\$176,447	\$2,853,498
A.4.4	5 TON OVERHEAD CRANE	\$28,568	\$29,279	\$30,011	\$30,766	\$31,543	\$32,343	\$33,167	\$34,016	\$34,890	\$542,940
A.4.5	PORTABLE LIGHT TOWER, 2000 WATT	\$16,203	\$16,474	\$16,752	\$17,039	\$17,335	\$17,639	\$17,953	\$18,276	\$18,608	\$297,934
A.4.6	MATERIAL HANDLING SYSTEM	\$173	\$178	\$183	\$189	\$194	\$200	\$206	\$213	\$219	\$3,350
A.4.7	65 TON HYDRAULIC CRANE	\$55,705	\$57,000	\$58,333	\$59,707	\$61,122	\$62,579	\$64,079	\$65,625	\$67,217	\$1,087,814
A.4.8	BULLDOZER CAT. D9	\$127,939	\$129,457	\$131,021	\$132,631	\$134,289	\$135,998	\$137,757	\$139,570	\$141,436	\$2,305,867
A.4.9	BACKHOE CAT. 375	\$138,676	\$139,628	\$140,608	\$141,617	\$142,657	\$143,728	\$144,831	\$145,967	\$147,137	\$2,447,068
A.4.10	WHEEL SCRAPER 623 F	\$76,519	\$77,009	\$77,513	\$78,033	\$78,567	\$79,118	\$79,686	\$80,270	\$80,873	\$1,347,580
A.4.11	FORK LIFT, CLARK C500-100	\$16,369	\$16,714	\$17,070	\$17,436	\$17,813	\$18,201	\$18,601	\$19,013	\$19,437	\$306,397
A.4.12	FORK LIFT, CLARK GCS-25	\$30,434	\$31,113	\$31,813	\$32,534	\$33,276	\$34,040	\$34,828	\$35,639	\$36,474	\$572,511
A.4.13	REMOTE CONTROL PACKAGE FOR CRANE	\$3,688	\$3,705	\$3,722	\$3,740	\$3,759	\$3,778	\$3,798	\$3,819	\$3,840	\$45,348
A.4.14	FARM TRACTOR, FORD 4630 4X4	\$13,290	\$13,542	\$13,803	\$14,070	\$14,346	\$14,631	\$14,924	\$15,225	\$15,536	\$246,680
A.4.15	UTILITY TRAILER, ETNYGE 1600000	\$3,609	\$3,685	\$3,764	\$3,844	\$3,927	\$4,013	\$4,101	\$4,192	\$4,286	\$70,633
A.4.16	REBAR CUTTER, MUBEA BS100	\$16	\$16	\$16	\$350	\$17	\$18	\$19	\$19	\$20	\$1,173
A.4.17	REBAR BENDER MUBEA	\$20	\$21	\$22	\$461	\$23	\$24	\$24	\$25	\$26	\$1,547
A.4.18	1 HP CONCRETE VIBRATOR MOTOR, 3 FT SHAFT AND HEAD	\$278	\$286	\$294	\$303	\$312	\$322	\$331	\$341	\$352	\$6,172
A.4.19	MOBILE CONCRETE/GROUT PLANT	\$38,129	\$38,997	\$39,891	\$40,811	\$41,759	\$42,736	\$43,742	\$44,778	\$45,845	\$744,959
A.4.20	GMC 4X4 PICK-UP TRUCK	\$27,603	\$27,915	\$28,237	\$31,307	\$31,648	\$31,999	\$32,361	\$32,734	\$33,118	\$529,391
A.4.21	3/4 TON 4X4 SUBURBAN, GMC	\$31,755	\$32,088	\$32,432	\$36,072	\$36,437	\$36,812	\$37,199	\$37,598	\$38,008	\$607,529
A.4.22	COMMUNICATIONS SYSTEM - CELLULAR TELEPHONES	\$107	\$110	\$113	\$2,412	\$120	\$124	\$128	\$132	\$135	\$8,086
A.4.23	SMOOTH DRUM COMPACTOR CAT. CS563, 84 IN DRUM	\$28,348	\$28,479	\$28,615	\$28,754	\$28,898	\$29,046	\$29,199	\$29,356	\$29,518	\$495,477
A.4.24	PUMP, 170 GPM	\$1,497	\$1,542	\$1,588	\$5,724	\$1,685	\$1,735	\$1,788	\$1,841	\$1,896	\$40,098
A.4.25	PUMP, 50 GPM	\$10,354	\$10,354	\$10,354	\$11,668	\$11,668	\$11,668	\$11,668	\$11,668	\$11,668	\$198,883
A.4.26	NEUTRON PROBE	\$107	\$110	\$113	\$117	\$120	\$124	\$128	\$132	\$135	\$6,105
A.4.27	3300 GALLON WATER TRUCK	\$9,279	\$9,494	\$9,716	\$9,945	\$10,181	\$10,423	\$10,673	\$10,931	\$11,196	\$181,192
A.4.28	LABORATORY EQUIPMENT	\$8,066	\$8,104	\$8,142	\$8,182	\$8,223	\$8,265	\$8,309	\$8,353	\$8,399	\$140,989
A.4.29	MISCELLANEOUS EQUIPMENT LEASES	\$8,911	\$9,178	\$9,454	\$9,737	\$10,029	\$10,330	\$10,640	\$10,959	\$11,288	\$172,791
A.4.30	GPS SYSTEM, ROVER AND BASE RECEIVER	\$570	\$587	\$605	\$12,864	\$642	\$661	\$681	\$701	\$722	\$43,123
A.4.31	GPS COMPUTER SOFTWARE UPDATES	\$356	\$367	\$378	\$389	\$401	\$413	\$426	\$438	\$452	\$6,912
<b>TOTALS:</b>		<b>\$970,438</b>	<b>\$983,140</b>	<b>\$996,243</b>	<b>\$1,036,464</b>	<b>\$1,030,950</b>	<b>\$1,045,267</b>	<b>\$1,060,003</b>	<b>\$1,075,182</b>	<b>\$1,090,816</b>	<b>\$17,781,225</b>

Table B-5 EQUIPMENT LEASE/PURCHASE (ESCALATED DOLLAR)

A.4	EQUIPMENT LEASE/PURCHASE (ESCALATED COSTS)	UNIT	QUANTITY	MATERIAL	MAT. TOTAL	8 LEASE AMT	MAT. TOTAL	13 LEASE AMT	MAT. TOTAL	18 LEASE AMT	LIFE CYCLE	USAGE, HR/DAY	USAGE, DAY/YR	OP COST/HR	
A.4.1	3 CY, 165 HP FRONT END WHEEL LOADER, KOMATSU WA 380	EA	1	185,000.00	185,000.00			271,678.74	36,043.01		10	8	150	9.06	
A.4.2	180 HP MOTOR GRADER, GD670 KOMATSU	EA	1	235,000.00	235,000.00			345,105.42	45,784.37		10	8	150	14.40	
A.4.3	10-12 CY 10-WHEEL END DUMP TRUCK, GMC C7H046	EA	2	215,000.00	430,000.00			631,469.50	83,775.65		10	8	150	16.90	
A.4.4	5 TON OVERHEAD CRANE	EA	1	25,000.00	25,000.00			36,713.34	4,870.68		10	8	150	13.33	
A.4.5	PORTABLE LIGHT TOWER, 2000 WATT	EA	3	12,300.00	36,900.00			54,188.89	7,189.12		10	8	150	1.50	
A.4.6	MATERIAL HANDLING SYSTEM	EA	1	9,695.00	9,695.00						20				
A.4.7	65 TON HYDRAULIC CRANE	EA	1	150,000.00	150,000.00						20	8	150	23.66	
A.4.8	BULLDOZER CAT. D8	EA	2	188,500.00	387,000.00			583,007.88	77,346.36		10	8	150	10.65	
A.4.9	BACKHOE CAT. 375	EA	1	549,000.00	549,000.00			806,225.01	106,960.07		10	8	150	7.10	
A.4.10	WHEEL SCRAPER 623 F	EA	1	309,000.00	309,000.00			453,776.92	60,201.57		10	8	150	3.10	
A.4.11	FORK LIFT, CLARK C500-100	EA	1	25,000.00	25,000.00			36,713.34	4,870.68		10	8	150	6.20	
A.4.12	FORK LIFT, CLARK GCS-25	EA	2	20,000.00	40,000.00			58,741.35	7,793.08		10	8	150	6.20	
A.4.13	REMOTE CONTROL PACKAGE FOR CRANE	EA	2	8,000.00	16,000.00			23,496.54	3,117.23		10	8	150		
A.4.14	FARM TRACTOR, FORD 4630 4X4	EA	1	25,000.00	25,000.00			36,713.34	4,870.68		10	8	150	4.40	
A.4.15	UTILITY TRAILER, ETNYGE 160000#	EA	1	12,800.00	12,800.00						20	8	150	1.35	
A.4.16	REBAR CUTTER, MUBEA BS100	EA	1	217.65	217.65						5	4	150		
A.4.17	REBAR BENDER MUBEA	EA	1	286.95	286.95						5	4	150		
A.4.18	1 HP CONCRETE VIBRATOR MOTOR, 3 FT SHAFT AND HEAD	EA	1	587.60	587.60						10	4	150	0.30	
A.4.19	MOBILE CONCRETE/GROUT PLANT	EA	1	110,000.00	110,000.00						20	4	150	31.52	
A.4.20	GMC 4X4 PICK-UP TRUCK	EA	2	25,000.00	50,000.00	63,338.50	14,832.39	73,426.69	17,194.80	85,121.65	19,933.49	5	8	250	1.20
A.4.21	3/4 TON 4X4 SUBURBAN, GMC	EA	2	30,000.00	60,000.00	76,006.20	17,798.86	88,112.02	20,633.76	102,145.99	23,920.18	5	8	250	1.20
A.4.22	COMMUNICATIONS SYSTEM - CELLULAR TELEPHONES	EA	5	300.00	1,500.00						5	8	350		
A.4.23	SMOOTH DRUM COMPACTOR CAT. CS563, 84 IN DRUM	EA	1	123,000.00	123,000.00			180,629.65	23,963.73		10	8	150		
A.4.24	PUMP, 170 GPM	EA	3	1,000.00	3,000.00						5	8	75	0.50	
A.4.25	PUMP, 50 GPM	EA	3	8,000.00	24,000.00	30,402.48	7,119.54	35,244.81	8,253.50	40,858.39	9,568.07	5	8	75	0.50
A.4.26	NEUTRON PROBE	EA	1	3,000.00	3,000.00						10	2	30		
A.4.27	3300 GALLON WATER TRUCK	EA	1	25,000.00	25,000.00						20	4	150	7.88	
A.4.28	LABORATORY EQUIPMENT	EA	1	35,000.00	35,000.00			51,398.68	6,818.95		10	0	0		
A.4.29	MISCELLANEOUS EQUIPMENT LEASES	YR	1	5,000.00	5,000.00						1	0	0	0.00	
A.4.30	GPS SYSTEM, ROVER AND BASE RECEIVER	EA	1	8,000.00	8,000.00						5	0	0	0.00	
A.4.31	GPS COMPUTER SOFTWARE UPDATES	YR	1	200.00	200.00						1	0	0	0.00	

TOTALS:

Table B-5 EQUIPMENT LEASE/PURCHASE (ESC)

A.4	EQUIPMENT LEASE/PURCHASE (ESCALATED COSTS)	EQUIPMENT/YR	REPAIRS/ YR	LEASE AMT	YEAR 1	2	3	4	5	6	7	8	9	10	11
A.4.1	3 CY, 155 HP FRONT END WHEEL LOADER, KOMATSU WA 380	\$10,872	\$4,625	\$24,544	\$40,041	\$40,984	\$41,478	\$41,986	\$42,509	\$43,048	\$43,603	\$44,175	\$44,764	\$56,870	\$57,494
A.4.2	180 HP MOTOR GRADER, GD670 KOMATSU	\$17,280	\$5,875	\$31,177	\$54,332	\$55,742	\$56,479	\$57,239	\$58,020	\$58,825	\$59,655	\$60,509	\$61,389	\$76,903	\$77,836
A.4.3	10-12 CY 10-WHEEL END DUMP TRUCK, GMC C7H046	\$40,560	\$10,750	\$57,047	\$108,357	\$111,482	\$113,115	\$114,797	\$116,529	\$118,314	\$120,152	\$122,045	\$123,995	\$152,732	\$154,801
A.4.4	5 TON OVERHEAD CRANE	\$15,996	\$625	\$3,317	\$19,938	\$20,950	\$21,479	\$22,024	\$22,585	\$23,163	\$23,758	\$24,372	\$25,003	\$27,208	\$27,878
A.4.5	PORTABLE LIGHT TOWER, 2000 WATT	\$5,400	\$923	\$4,895	\$11,218	\$11,603	\$11,804	\$12,011	\$12,225	\$12,445	\$12,671	\$12,905	\$13,145	\$15,686	\$15,941
A.4.6	MATERIAL HANDLING SYSTEM	\$0	\$121	\$0	\$121	\$129	\$132	\$136	\$140	\$145	\$149	\$154	\$158	\$163	\$168
A.4.7	65 TON HYDRAULIC CRANE	\$28,392	\$1,875	\$12,552	\$42,819	\$44,662	\$45,625	\$46,618	\$47,640	\$48,692	\$49,776	\$50,893	\$52,043	\$53,228	\$54,449
A.4.8	BULLDOZER CAT. D8	\$25,560	\$9,925	\$52,660	\$88,154	\$90,315	\$91,445	\$92,608	\$93,806	\$95,040	\$96,311	\$97,620	\$98,969	\$125,035	\$126,466
A.4.9	BACKHOE CAT. 375	\$8,520	\$13,725	\$72,835	\$95,080	\$96,434	\$97,142	\$97,872	\$98,623	\$99,396	\$100,193	\$101,014	\$101,859	\$136,855	\$137,752
A.4.10	WHEEL SCRAPER 623 F	\$3,720	\$7,725	\$40,994	\$52,439	\$53,136	\$53,501	\$53,876	\$54,262	\$54,660	\$55,070	\$55,493	\$55,927	\$75,583	\$76,044
A.4.11	FORK LIFT, CLARK C500-100	\$7,440	\$625	\$3,317	\$11,382	\$11,873	\$12,130	\$12,394	\$12,666	\$12,947	\$13,236	\$13,533	\$13,840	\$15,709	\$16,035
A.4.12	FORK LIFT, CLARK GCS-25	\$14,880	\$1,000	\$5,307	\$21,187	\$22,154	\$22,659	\$23,180	\$23,716	\$24,268	\$24,837	\$25,423	\$26,027	\$29,134	\$29,775
A.4.13	REMOTE CONTROL PACKAGE FOR CRANE	\$0	\$400	\$0	\$400	\$424	\$437	\$450	\$464	\$478	\$492	\$507	\$522	\$3,655	\$3,671
A.4.14	FARM TRACTOR, FORD 4630 4X4	\$5,280	\$625	\$3,317	\$9,222	\$9,581	\$9,769	\$9,963	\$10,162	\$10,368	\$10,579	\$10,797	\$11,021	\$12,807	\$13,045
A.4.15	UTILITY TRAILER, ETNYGE 160000#	\$1,620	\$160	\$1,071	\$2,851	\$2,959	\$3,016	\$3,075	\$3,135	\$3,197	\$3,260	\$3,326	\$3,394	\$3,463	\$3,535
A.4.16	REBAR CUTTER, MUBEA BS100	\$0	\$11	\$0	\$11	\$12	\$12	\$12	\$263	\$13	\$13	\$14	\$14	\$303	\$15
A.4.17	REBAR BENDER MUBEA	\$0	\$14	\$0	\$14	\$15	\$16	\$16	\$347	\$17	\$18	\$18	\$19	\$400	\$20
A.4.18	1 HP CONCRETE VIBRATOR MOTOR, 3 FT SHAFT AND HEAD	\$180	\$15	\$0	\$195	\$207	\$213	\$219	\$226	\$232	\$239	\$247	\$254	\$1,051	\$269
A.4.19	MOBILE CONCRETE/GROUT PLANT	\$19,912	\$1,375	\$9,205	\$29,492	\$30,727	\$31,373	\$32,038	\$32,723	\$33,428	\$34,155	\$34,904	\$35,675	\$36,469	\$37,287
A.4.20	GMC 4X4 PICK-UP TRUCK	\$4,800	\$2,500	\$11,709	\$19,009	\$19,453	\$19,686	\$19,925	\$20,295	\$20,549	\$20,810	\$21,080	\$21,357	\$27,005	\$27,300
A.4.21	3/4 TON 4X4 SUBURBAN, GMC	\$4,800	\$3,000	\$14,051	\$21,851	\$22,326	\$22,574	\$22,830	\$26,841	\$27,112	\$27,392	\$27,680	\$27,976	\$31,116	\$31,431
A.4.22	COMMUNICATIONS SYSTEM - CELLULAR TELEPHONES	\$0	\$75	\$0	\$75	\$80	\$82	\$84	\$1,814	\$90	\$92	\$95	\$98	\$2,091	\$104
A.4.23	SMOOTH DRUM COMPACTOR CAT. CS563, 84 IN DRUM	\$0	\$3,075	\$16,318	\$19,393	\$19,580	\$19,678	\$19,779	\$19,883	\$19,990	\$20,100	\$20,213	\$20,330	\$28,096	\$28,220
A.4.24	PUMP, 170 GPM	\$900	\$150	\$0	\$1,050	\$1,114	\$1,147	\$1,182	\$4,528	\$1,254	\$1,291	\$1,330	\$1,370	\$5,082	\$1,453
A.4.25	PUMP, 50 GPM	\$900	\$1,200	\$5,620	\$7,720	\$7,848	\$7,720	\$7,720	\$9,220	\$9,220	\$9,220	\$9,220	\$9,220	\$10,354	\$10,354
A.4.26	NEUTRON PROBE	\$0	\$75	\$0	\$75	\$80	\$82	\$84	\$87	\$90	\$92	\$95	\$98	\$4,133	\$104
A.4.27	3300 GALLON WATER TRUCK	\$4,728	\$313	\$2,092	\$7,132	\$7,439	\$7,600	\$7,765	\$7,935	\$8,111	\$8,291	\$8,477	\$8,669	\$8,866	\$9,069
A.4.28	LABORATORY EQUIPMENT	\$0	\$875	\$4,643	\$5,518	\$5,572	\$5,600	\$5,628	\$5,658	\$5,688	\$5,720	\$5,752	\$5,785	\$7,995	\$8,030
A.4.29	MISCELLANEOUS EQUIPMENT LEASES	\$0	\$1,250	\$0	\$6,250	\$6,631	\$6,830	\$7,034	\$7,245	\$7,463	\$7,687	\$7,917	\$8,155	\$8,399	\$8,651
A.4.30	GPS SYSTEM, ROVER AND BASE RECEIVER	\$0	\$400	\$0	\$400	\$424	\$437	\$450	\$9,674	\$478	\$492	\$507	\$522	\$11,151	\$554
A.4.31	GPS COMPUTER SOFTWARE UPDATES	\$0	\$50	\$0	\$250	\$265	\$273	\$281	\$290	\$299	\$307	\$317	\$326	\$336	\$346
TOTALS:					\$675,975	\$694,202	\$703,533	\$713,276	\$746,511	\$742,018	\$752,664	\$763,629	\$774,923	\$967,879	\$958,096

Table B-5 EQUIPMENT LEASE/PURCHASE (ESC/

A.4	EQUIPMENT LEASE/PURCHASE (ESCALATED COSTS)	12	13	14	15	16	17	18	19	20	TOTAL
		YEAR 12	YEAR 13	YEAR 14	YEAR 15	YEAR 16	YEAR 17	YEAR 18	YEAR 19	YEAR 20	
A.4.1	3 CY, 155 HP FRONT END WHEEL LOADER, KOMATSU WA 380	\$58,138	\$58,801	\$59,484	\$60,187	\$60,911	\$61,657	\$62,426	\$63,217	\$64,032	\$1,045,803
A.4.2	180 HP MOTOR GRADER, GD670 KOMATSU	\$78,798	\$79,788	\$80,808	\$81,859	\$82,941	\$84,056	\$85,204	\$86,387	\$87,605	\$1,424,375
A.4.3	10-12 CY 10-WHEEL END DUMP TRUCK, GMC C7H046	\$156,931	\$159,126	\$161,387	\$163,715	\$166,113	\$168,583	\$171,127	\$173,748	\$176,447	\$2,853,498
A.4.4	5 TON OVERHEAD CRANE	\$28,568	\$29,279	\$30,011	\$30,766	\$31,543	\$32,343	\$33,167	\$34,016	\$34,890	\$542,940
A.4.5	PORTABLE LIGHT TOWER, 2000 WATT	\$16,203	\$16,474	\$16,752	\$17,039	\$17,335	\$17,639	\$17,953	\$18,276	\$18,608	\$297,934
A.4.6	MATERIAL HANDLING SYSTEM	\$173	\$178	\$183	\$189	\$194	\$200	\$206	\$213	\$219	\$3,350
A.4.7	65 TON HYDRAULIC CRANE	\$55,705	\$57,000	\$58,333	\$59,707	\$61,122	\$62,579	\$64,079	\$65,625	\$67,217	\$1,087,814
A.4.8	BULLDOZER CAT, D8	\$127,939	\$129,457	\$131,021	\$132,631	\$134,289	\$135,998	\$137,757	\$139,570	\$141,436	\$2,305,867
A.4.9	BACKHOE CAT, 375	\$138,676	\$139,628	\$140,608	\$141,617	\$142,657	\$143,728	\$144,831	\$145,967	\$147,137	\$2,447,068
A.4.10	WHEEL SCRAPER 623 F	\$76,519	\$77,009	\$77,513	\$78,033	\$78,567	\$79,118	\$79,686	\$80,270	\$80,873	\$1,347,580
A.4.11	FORK LIFT, CLARK C500-100	\$16,369	\$16,714	\$17,070	\$17,436	\$17,813	\$18,201	\$18,601	\$19,013	\$19,437	\$306,397
A.4.12	FORK LIFT, CLARK GCS-25	\$30,434	\$31,113	\$31,813	\$32,534	\$33,276	\$34,040	\$34,828	\$35,639	\$36,474	\$572,511
A.4.13	REMOTE CONTROL PACKAGE FOR CRANE	\$3,688	\$3,705	\$3,722	\$3,740	\$3,759	\$3,778	\$3,798	\$3,819	\$3,840	\$45,348
A.4.14	FARM TRACTOR, FORD 4630 4X4	\$13,290	\$13,542	\$13,803	\$14,070	\$14,346	\$14,631	\$14,924	\$15,225	\$15,536	\$246,680
A.4.15	UTILITY TRAILER, ETNYGE 160000#	\$3,609	\$3,685	\$3,764	\$3,844	\$3,927	\$4,013	\$4,101	\$4,192	\$4,286	\$70,633
A.4.16	REBAR CUTTER, MUBEA BS100	\$16	\$16	\$16	\$350	\$17	\$18	\$19	\$19	\$20	\$1,173
A.4.17	REBAR BENDER MUBEA	\$20	\$21	\$22	\$461	\$23	\$24	\$24	\$25	\$26	\$1,547
A.4.18	1 HP CONCRETE VIBRATOR MOTOR, 3 FT SHAFT AND HEAD	\$278	\$286	\$294	\$303	\$312	\$322	\$331	\$341	\$352	\$6,172
A.4.19	MOBILE CONCRETE/GROUT PLANT	\$38,129	\$38,997	\$39,891	\$40,811	\$41,759	\$42,736	\$43,742	\$44,778	\$45,845	\$744,959
A.4.20	GMC 4X4 PICK-UP TRUCK	\$27,603	\$27,915	\$28,237	\$31,307	\$31,648	\$31,999	\$32,361	\$32,734	\$33,118	\$528,391
A.4.21	3/4 TON 4X4 SUBURBAN, GMC	\$31,755	\$32,088	\$32,432	\$36,072	\$36,437	\$36,812	\$37,199	\$37,598	\$38,008	\$607,529
A.4.22	COMMUNICATIONS SYSTEM - CELLULAR TELEPHONES	\$20,347	\$110	\$113	\$2,412	\$120	\$124	\$128	\$132	\$135	\$8,086
A.4.23	SMOOTH DRUM COMPACTOR CAT, CS563, 84 IN DRUM	\$28,348	\$28,479	\$28,615	\$28,754	\$28,898	\$29,046	\$29,199	\$29,356	\$29,518	\$495,477
A.4.24	PUMP, 170 GPM	\$1,497	\$1,542	\$1,588	\$5,724	\$1,685	\$1,735	\$1,788	\$1,841	\$1,896	\$40,098
A.4.25	PUMP, 50 GPM	\$10,354	\$10,354	\$10,354	\$11,668	\$11,668	\$11,668	\$11,668	\$11,668	\$11,668	\$198,883
A.4.26	NEUTRON PROBE	\$107	\$110	\$113	\$117	\$120	\$124	\$128	\$132	\$135	\$6,105
A.4.27	3300 GALLON WATER TRUCK	\$9,279	\$9,494	\$9,716	\$9,945	\$10,181	\$10,423	\$10,673	\$10,931	\$11,196	\$181,192
A.4.28	LABORATORY EQUIPMENT	\$8,066	\$8,104	\$8,142	\$8,182	\$8,223	\$8,265	\$8,309	\$8,353	\$8,399	\$140,989
A.4.29	MISCELLANEOUS EQUIPMENT LEASES	\$8,911	\$9,178	\$9,454	\$9,737	\$10,029	\$10,330	\$10,640	\$10,959	\$11,288	\$172,791
A.4.30	GPS SYSTEM, ROVER AND BASE RECEIVER	\$570	\$587	\$605	\$12,864	\$642	\$661	\$681	\$701	\$722	\$43,123
A.4.31	GPS COMPUTER SOFTWARE UPDATES	\$356	\$367	\$378	\$389	\$401	\$413	\$426	\$438	\$452	\$6,812
TOTALS:		\$970,438	\$983,149	\$996,243	\$1,036,464	\$1,030,959	\$1,045,267	\$1,060,003	\$1,075,182	\$1,090,816	\$17,781,225

Table B-6. BUILDING AND FACILITY MAINTENANCE

<b>A.5 BUILDING AND FACILITY MAINTENANCE</b>	<b>UNIT</b>	<b>QUANTITY</b>	<b>TOTAL/YEAR</b>	<b>20 YEAR TOTAL</b>
A.5.1 BUILDING MAINTENANCE	YR	1	\$17,820	\$356,400
A.5.2 FACILITY MAINTENANCE	YR	1	\$25,450	\$509,000
		<b>TOTALS:</b>	<b>\$43,270</b>	<b>\$865,400</b>

Table B-7. Utilities and Consumables

A.6	UTILITIES AND CONSUMABLES	UNIT	QUANTITY	MATERIAL	TOTAL/YEAR	20 YEAR TOTAL
A.6.1	ELECTRICITY	MO	12	18,531.60	\$222,379	\$4,447,584
A.6.2	TELEPHONE	MO	12	800.00	\$9,600	\$192,000
A.6.3	DATA LINES	MO	12	300	\$3,600	\$72,000
A.6.4	WATER	MO	12	74.25	\$891	\$17,820
A.6.5	OFFICE SUPPLIES	MO	12	300.00	\$3,600	\$72,000
A.6.6	MAINTENANCE/SHOP	MO	12	700.00	\$8,400	\$168,000
A.6.7	LABORATORY SUPPLIES	MO	12	500.00	\$6,000	\$120,000
A.6.8	SAFETY EQUIPMENT (SAFETY GLASSES AND HARD HATS)	EA	50	21.61	\$1,081	\$21,610
A.6.9	LEVEL D CLOTHING (GLOVES, COVERALLS, STEEL-TOED BOOTS)	EA	50	102.05	\$5,103	\$102,050
A.6.10	LEVEL C HALF-FACE RESPIRATOR AND CARTRIDGES	EA	60	22.36	\$1,342	\$26,832
A.6.11	TYVEK COVERALLS AND BOOT COVERS, 10 WORKERS, 2 PER DAY	MO	200	6.66	\$15,984	\$319,680
				TOTALS:	\$277,979	\$5,559,576



Table B-8. Office Equipment

A.7 OFFICE EQUIPMENT	UNIT	QUANTITY	MATL	BARE		TOTAL COST	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	YEAR 6	YEAR 7	YEAR 8
				TOTAL	O&P TOTAL									
A.7.1 FAX MACHINE (6 YR REPLACEMENT)	EA	3	600.00	600.00	600.00	\$1,800						\$1,800		
A.7.2 COMPUTER (4 YR REPLACEMENT)	EA	12	2500.00	2500.00	2500.00	\$30,000				\$30,000				\$30,000
A.7.3 PRINTER (4 YR REPLACEMENT)	EA	3	1500.00	1500.00	1500.00	\$4,500				\$4,500				\$4,500
A.7.4 COPY MACHINE (6 YR REPLACEMENT)	EA	3	6500.00	6500.00	6500.00	\$19,500						\$19,500		
A.7.5 MICROWAVE (10 YR REPLACEMENT)	EA	2	200.00	200.00	200.00	\$400								
A.7.6 TELEVISION / VCR (10 YR REPLACEMENT)	EA	2	1000.00	1000.00	1000.00	\$2,000								
A.7.7 OTHER (5 YR REPLACEMENT)	LS	1	10000.00	10000.00	10000.00	\$10,000					\$10,000			
TOTALS:							\$0	\$0	\$0	\$34,500	\$10,000	\$21,300	\$0	\$34,500

A.7 OFFICE EQUIPMENT			YEAR 9	YEAR 12	YEAR 13	YEAR 15	YEAR 17	YEAR 18	YEAR 19	YEAR 20	TOTAL
A.7.1 FAX MACHINE (6 YR REPLACEMENT)	LS	3		\$1,800				\$1,800			\$1,800
A.7.2 COMPUTER (4 YR REPLACEMENT)	LS	12		\$30,000						\$30,000	\$60,000
A.7.3 PRINTER (4 YR REPLACEMENT)	LS	3		\$4,500						\$4,500	\$9,000
A.7.4 COPY MACHINE (6 YR REPLACEMENT)	LS	3		\$19,500				\$19,500			\$19,500
A.7.5 MICROWAVE (10 YR REPLACEMENT)	LS	2								\$400	\$0
A.7.6 TELEVISION / VCR (10 YR REPLACEMENT)	EA	2								\$2,000	\$0
A.7.7 OTHER (5 YR REPLACEMENT)	LS	1				\$10,000				\$10,000	\$10,000
			\$0	\$55,800	\$0	\$10,000	\$0	\$21,300	\$0	\$46,900	\$100,300

Table B-9. Training

A.8 TRAINING	UNIT	QUANTITY	MATERIAL	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	YEAR 6	YEAR 7	YEAR 8	YEAR 9
A.8.1 EMERGENCY EXERCISE TRAINING FOR SITE, EVERY 3 YEARS BEGINNING AT YEAR 0	EA	1	35,000.00			\$35,000			\$35,000			\$35,000
A.8.2 MISCELLANEOUS TRAINING (2% OF PAYROLL)	YR	1	22,780.88	\$22,781	\$22,781	\$22,781	\$22,781	\$22,781	\$22,781	\$22,781	\$22,781	\$22,781
A.8.3 OSHA 40-HOUR HEALTH AND SAFETY TRAINING, 30, 10% TURNOVER	EA	1	425.00	\$1,275	\$1,275	\$1,275	\$1,275	\$1,275	\$1,275	\$1,275	\$1,275	\$1,275
A.8.4 OSHA 8-HOUR HEALTH AND SAFETY TRAINING - SUPERVISOR, 9, 5 TURNOVERS IN 30 YEARS	EA	1	125.00						\$125			
A.8.5 OSHA 8-HOUR HEALTH AND SAFETY TRAINING REFRESHER, 27 (30-10%)	EA	1	110.00	\$2,970	\$2,970	\$2,970	\$2,970	\$2,970	\$2,970	\$2,970	\$2,970	\$2,970
TOTALS:				\$27,026	\$27,026	\$62,026	\$27,026	\$27,026	\$62,151	\$27,026	\$27,026	\$62,026

A.8 TRAINING	YEAR 10	YEAR 11	YEAR 12	YEAR 13	YEAR 14	YEAR 15	YEAR 16	YEAR 17	YEAR 18	YEAR 19	YEAR 20	TOTAL
A.8.1 EMERGENCY EXERCISE TRAINING FOR SITE, EVERY 3 YEARS BEGINNING AT YEAR 0			\$35,000			\$35,000			\$35,000			\$105,000
A.8.2 MISCELLANEOUS TRAINING (2% OF PAYROLL)	\$22,781	\$22,781	\$22,781	\$22,781	\$22,781	\$22,781	\$22,781	\$22,781	\$22,781	\$22,781	\$22,781	\$205,028
A.8.3 OSHA 40-HOUR HEALTH AND SAFETY TRAINING, 30, 10% TURNOVER	\$1,275	\$1,275	\$1,275	\$1,275	\$1,275	\$1,275	\$1,275	\$1,275	\$1,275	\$1,275	\$1,275	\$11,475
A.8.4 OSHA 8-HOUR HEALTH AND SAFETY TRAINING - SUPERVISOR, 9, 5 TURNOVERS IN 30 YEARS			\$125						\$125			\$125
A.8.5 OSHA 8-HOUR HEALTH AND SAFETY TRAINING REFRESHER, 27 (30-10%)	\$2,970	\$2,970	\$2,970	\$2,970	\$2,970	\$2,970	\$2,970	\$2,970	\$2,970	\$2,970	\$2,970	\$26,730
TOTALS:		\$27,026	\$27,026	\$62,151	\$27,026	\$27,026	\$62,026	\$27,026	\$62,151	\$27,026	\$27,026	\$348,358

Table B-10. Monitoring

A.9	MONITORING	UNIT	QUANTITY	MATERIAL	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	YEAR 6	YEAR 7	YEAR 8	YEAR 9	YEAR 10
A.9.1	AMBIENT AIR MONITORS (5 YR)	EA	7	1,841.98					\$12,894					\$12,894
A.9.2	AIR PARTICULATE ANALYSES (7 LOCATIONS)													
A.9.3	GROSS ALPHA AND BETA	YR	28	92.10	\$2,579	\$2,579	\$2,579	\$2,579	\$2,579	\$2,579	\$2,579	\$2,579	\$2,579	\$2,579
A.9.4	TSS	YR	28	132.01	\$3,696	\$3,696	\$3,696	\$3,696	\$3,696	\$3,696	\$3,696	\$3,696	\$3,696	\$3,696
A.9.5	ADDITIONAL AIR SAMPLING	YR	5	700.00	\$3,500	\$3,500	\$3,500	\$3,500	\$3,500	\$3,500	\$3,500	\$3,500	\$3,500	\$3,500
A.9.6	WELL MAINTENANCE EQUIPMENT	YR	11	3,000.00	\$33,000			\$33,000			\$33,000			\$33,000
A.9.7	GROUNDWATER SAMPLING MATERIALS (5YR)	EA	1	150.00					\$200					\$200
A.9.8	GROUNDWATER ANALYSES (11 LOCATIONS)													
A.9.9	GROSS ALPHA AND BETA	YR	44	50.00	\$2,200	\$2,200	\$2,200	\$2,200	\$2,200	\$2,200	\$2,200	\$2,200	\$2,200	\$2,200
A.9.10	GAMMA	YR	44	70.00	\$3,080	\$3,080	\$3,080	\$3,080	\$3,080	\$3,080	\$3,080	\$3,080	\$3,080	\$3,080
A.9.11	H-3	YR	44	65.00	\$2,860	\$2,860	\$2,860	\$2,860	\$2,860	\$2,860	\$2,860	\$2,860	\$2,860	\$2,860
A.9.12	C-14	YR	44	125.00	\$5,500	\$5,500	\$5,500	\$5,500	\$5,500	\$5,500	\$5,500	\$5,500	\$5,500	\$5,500
A.9.13	RADON 222	YR	44	50.00	\$2,200	\$2,200	\$2,200	\$2,200	\$2,200	\$2,200	\$2,200	\$2,200	\$2,200	\$2,200
A.9.14	CHEMISTRY	YR	20	700.00	\$14,000	\$14,000	\$14,000	\$14,000	\$14,000	\$14,000	\$14,000	\$14,000	\$14,000	\$14,000
A.9.15	SURFACE WATER SAMPLING MATERIALS (5 YR)	EA	1	192.00					\$192					\$192
A.9.16	SURFACE WATER ANALYSES (8 LOCATIONS)													
A.9.17	GROSS ALPHA AND BETA	YR	30	50.00	\$1,500	\$1,500	\$1,500	\$1,500	\$1,500	\$1,500	\$1,500	\$1,500	\$1,500	\$1,500
A.9.18	GAMMA	YR	30	70.00	\$2,100	\$2,100	\$2,100	\$2,100	\$2,100	\$2,100	\$2,100	\$2,100	\$2,100	\$2,100
A.9.19	H-3	YR	30	65.00	\$1,950	\$1,950	\$1,950	\$1,950	\$1,950	\$1,950	\$1,950	\$1,950	\$1,950	\$1,950
A.9.20	C-14	YR	30	125.00	\$3,750	\$3,750	\$3,750	\$3,750	\$3,750	\$3,750	\$3,750	\$3,750	\$3,750	\$3,750
A.9.21	CHEMISTRY	YR	20	700.00	\$14,000	\$14,000	\$14,000	\$14,000	\$14,000	\$14,000	\$14,000	\$14,000	\$14,000	\$14,000
A.9.22	SOIL SAMPLING EQUIPMENT (5 YR)	EA	1	318.17					\$318					\$318
A.9.23	SOIL ANALYSES (7 LOCATIONS)													
A.9.24	GAMMA	YR	28	75.00	\$2,100	\$2,100	\$2,100	\$2,100	\$2,100	\$2,100	\$2,100	\$2,100	\$2,100	\$2,100
A.9.25	SEDIMENT SAMPLING EQUIPMENT (5 YR)	EA	1	418.52					\$419					\$419
A.9.26	SEDIMENT ANALYSES (8 LOCATIONS)													
A.9.27	GAMMA	YR	32	75.00	\$2,400	\$2,400	\$2,400	\$2,400	\$2,400	\$2,400	\$2,400	\$2,400	\$2,400	\$2,400
A.9.28	VEGETATION ANALYSES (9 LOCATIONS)													
A.9.29	GROSS ALPHA AND BETA	YR	18	55.00	\$990	\$990	\$990	\$990	\$990	\$990	\$990	\$990	\$990	\$990
A.9.30	GAMMA	YR	18	70.00	\$1,260	\$1,260	\$1,260	\$1,260	\$1,260	\$1,260	\$1,260	\$1,260	\$1,260	\$1,260
A.9.31	H-3	YR	18	75.00	\$1,350	\$1,350	\$1,350	\$1,350	\$1,350	\$1,350	\$1,350	\$1,350	\$1,350	\$1,350
A.9.32	C-14	YR	18	150.00	\$2,700	\$2,700	\$2,700	\$2,700	\$2,700	\$2,700	\$2,700	\$2,700	\$2,700	\$2,700
A.9.33	MAMMAL SAMPLING EQUIPMENT (5 YR)	EA	1	123.00					\$123					\$123
A.9.34	MAMMAL TISSUE ANALYSES													
A.9.35	GROSS ALPHA AND BETA	YR	2	85.00	\$170	\$170	\$170	\$170	\$170	\$170	\$170	\$170	\$170	\$170
A.9.36	GAMMA	YR	2	75.00	\$150	\$170	\$170	\$170	\$170	\$170	\$170	\$170	\$170	\$170
A.9.37	H-3	YR	2	75.00	\$150	\$170	\$170	\$170	\$170	\$170	\$170	\$170	\$170	\$170
A.9.38	C-14	YR	2	135.00	\$270	\$170	\$170	\$170	\$170	\$170	\$170	\$170	\$170	\$170
A.9.39	RADON (8 LOCATIONS)	YR	100	18.00	\$1,800	\$1,800	\$1,800	\$1,800	\$1,800	\$1,800	\$1,800	\$1,800	\$1,800	\$1,800
A.9.40	TLD ENVIRONMENTAL	YR	180	20.00	\$3,600	\$3,600	\$3,600	\$3,600	\$3,600	\$3,600	\$3,600	\$3,600	\$3,600	\$3,600
A.9.41	TLD PERSONNEL AND VISITORS	YR	200	20.00	\$4,000	\$4,000	\$4,000	\$4,000	\$4,000	\$4,000	\$4,000	\$4,000	\$4,000	\$4,000
A.9.42	BIOASSAYS (BIANNUAL, 40 PEOPLE)	YR	80	184.2	\$14,736	\$14,736	\$14,736	\$14,736	\$14,736	\$14,736	\$14,736	\$14,736	\$14,736	\$14,736
A.9.43	SAMPLE SHIPMENTS	YR	5	500.00	\$2,500	\$2,500	\$2,500	\$2,500	\$2,500	\$2,500	\$2,500	\$2,500	\$2,500	\$2,500
A.9.44	ADDITIONAL EQUIPMENT	YR	1	200	\$200	\$200	\$200	\$200	\$200	\$200	\$200	\$200	\$200	\$200
TOTALS:					\$134,291	\$101,231	\$101,231	\$134,231	\$115,377	\$101,231	\$134,231	\$101,231	\$101,231	\$148,377

Table B-10. Monitoring

A.9	MONITORING	YEAR 11	YEAR 12	YEAR 13	YEAR 14	YEAR 15	YEAR 16	YEAR 17	YEAR 18	YEAR 19	YEAR 20	TOTAL
A.9.1	AMBIENT AIR MONITORS (5 YR)					\$12,894					\$12,894	\$51,575
A.9.2	AIR PARTICULATE ANALYSES (7 LOCATIONS)											
A.9.3	GROSS ALPHA AND BETA	\$2,579	\$2,579	\$2,579	\$2,579	\$2,579	\$2,579	\$2,579	\$2,579	\$2,579	\$2,579	\$51,576
A.9.4	TSS	\$3,696	\$3,696	\$3,696	\$3,696	\$3,696	\$3,696	\$3,696	\$3,696	\$3,696	\$3,696	\$73,926
A.9.5	ADDITIONAL AIR SAMPLING	\$3,500	\$3,500	\$3,500	\$3,500	\$3,500	\$3,500	\$3,500	\$3,500	\$3,500	\$3,500	\$70,000
A.9.6	WELL MAINTENANCE EQUIPMENT			\$33,000			\$33,000			\$33,000		\$231,000
A.9.7	GROUNDWATER SAMPLING MATERIALS (5YR)					\$200					\$200	\$800
A.9.8	GROUNDWATER ANALYSES (11 LOCATIONS)											
A.9.9	GROSS ALPHA AND BETA	\$2,200	\$2,200	\$2,200	\$2,200	\$2,200	\$2,200	\$2,200	\$2,200	\$2,200	\$2,200	\$44,000
A.9.10	GAMMA	\$3,080	\$3,080	\$3,080	\$3,080	\$3,080	\$3,080	\$3,080	\$3,080	\$3,080	\$3,080	\$61,600
A.9.11	H-3	\$2,860	\$2,860	\$2,860	\$2,860	\$2,860	\$2,860	\$2,860	\$2,860	\$2,860	\$2,860	\$57,200
A.9.12	C-14	\$5,500	\$5,500	\$5,500	\$5,500	\$5,500	\$5,500	\$5,500	\$5,500	\$5,500	\$5,500	\$110,000
A.9.13	RADON 222	\$2,200	\$2,200	\$2,200	\$2,200	\$2,200	\$2,200	\$2,200	\$2,200	\$2,200	\$2,200	\$44,000
A.9.14	CHEMISTRY	\$14,000	\$14,000	\$14,000	\$14,000	\$14,000	\$14,000	\$14,000	\$14,000	\$14,000	\$14,000	\$280,000
A.9.15	SURFACE WATER SAMPLING MATERIALS (5 YR)					\$192					\$192	\$768
A.9.16	SURFACE WATER ANALYSES (6 LOCATIONS)											
A.9.17	GROSS ALPHA AND BETA	\$1,500	\$1,500	\$1,500	\$1,500	\$1,500	\$1,500	\$1,500	\$1,500	\$1,500	\$1,500	\$30,000
A.9.18	GAMMA	\$2,100	\$2,100	\$2,100	\$2,100	\$2,100	\$2,100	\$2,100	\$2,100	\$2,100	\$2,100	\$42,000
A.9.19	H-3	\$1,950	\$1,950	\$1,950	\$1,950	\$1,950	\$1,950	\$1,950	\$1,950	\$1,950	\$1,950	\$39,000
A.9.20	C-14	\$3,750	\$3,750	\$3,750	\$3,750	\$3,750	\$3,750	\$3,750	\$3,750	\$3,750	\$3,750	\$75,000
A.9.21	CHEMISTRY	\$14,000	\$14,000	\$14,000	\$14,000	\$14,000	\$14,000	\$14,000	\$14,000	\$14,000	\$14,000	\$280,000
A.9.22	SOIL SAMPLING EQUIPMENT (5 YR)					\$318					\$318	\$1,273
A.9.23	SOIL ANALYSES (7 LOCATIONS)											
A.9.24	GAMMA	\$2,100	\$2,100	\$2,100	\$2,100	\$2,100	\$2,100	\$2,100	\$2,100	\$2,100	\$2,100	\$42,000
A.9.25	SEDIMENT SAMPLING EQUIPMENT (5 YR)					\$419					\$419	\$1,674
A.9.26	SEDIMENT ANALYSES (8 LOCATIONS)											
A.9.27	GAMMA	\$2,400	\$2,400	\$2,400	\$2,400	\$2,400	\$2,400	\$2,400	\$2,400	\$2,400	\$2,400	\$48,000
A.9.28	VEGETATION ANALYSES (9 LOCATIONS)											
A.9.29	GROSS ALPHA AND BETA	\$990	\$990	\$990	\$990	\$990	\$990	\$990	\$990	\$990	\$990	\$19,800
A.9.30	GAMMA	\$1,260	\$1,260	\$1,260	\$1,260	\$1,260	\$1,260	\$1,260	\$1,260	\$1,260	\$1,260	\$25,200
A.9.31	H-3	\$1,350	\$1,350	\$1,350	\$1,350	\$1,350	\$1,350	\$1,350	\$1,350	\$1,350	\$1,350	\$27,000
A.9.32	C-14	\$2,700	\$2,700	\$2,700	\$2,700	\$2,700	\$2,700	\$2,700	\$2,700	\$2,700	\$2,700	\$54,000
A.9.33	MAMMAL SAMPLING EQUIPMENT (5 YR)					\$123					\$123	\$492
A.9.34	MAMMAL TISSUE ANALYSES											
A.9.35	GROSS ALPHA AND BETA	\$170	\$170	\$170	\$170	\$170	\$170	\$170	\$170	\$170	\$170	\$3,400
A.9.36	GAMMA	\$170	\$170	\$170	\$170	\$170	\$170	\$170	\$170	\$170	\$170	\$3,380
A.9.37	H-3	\$170	\$170	\$170	\$170	\$170	\$170	\$170	\$170	\$170	\$170	\$3,380
A.9.38	C-14	\$170	\$170	\$170	\$170	\$170	\$170	\$170	\$170	\$170	\$170	\$3,500
A.9.39	RADON (8 LOCATIONS)	\$1,800	\$1,800	\$1,800	\$1,800	\$1,800	\$1,800	\$1,800	\$1,800	\$1,800	\$1,800	\$36,000
A.9.40	TLD ENVIRONMENTAL	\$3,600	\$3,600	\$3,600	\$3,600	\$3,600	\$3,600	\$3,600	\$3,600	\$3,600	\$3,600	\$72,000
A.9.41	TLD PERSONNEL AND VISITORS	\$4,000	\$4,000	\$4,000	\$4,000	\$4,000	\$4,000	\$4,000	\$4,000	\$4,000	\$4,000	\$80,000
A.9.42	BIOASSAYS (BIANNUAL, 40 PEOPLE)	\$14,736	\$14,736	\$14,736	\$14,736	\$14,736	\$14,736	\$14,736	\$14,736	\$14,736	\$14,736	\$294,720
A.9.43	SAMPLE SHIPMENTS	\$2,500	\$2,500	\$2,500	\$2,500	\$2,500	\$2,500	\$2,500	\$2,500	\$2,500	\$2,500	\$50,000
A.9.44	ADDITIONAL EQUIPMENT	\$200	\$200	\$200	\$200	\$200	\$200	\$200	\$200	\$200	\$200	\$4,000
		\$101,231	\$101,231	\$134,231	\$101,231	\$115,377	\$134,231	\$101,231	\$101,231	\$134,231	\$115,377	\$2,312,264

Table B-11. Regulatory Costs

A.10 REGULATORY COSTS	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	YEAR 6	YEAR 7	YEAR 8	YEAR 9	YEAR 10
A.10.1 INSPECTIONS/MONITORING	\$127,098	\$82,212	\$82,212	\$82,212	\$82,212	\$127,098	\$82,212	\$82,212	\$82,212	\$82,212
A.10.2 LICENSING (CLOSURE AND TRANSFER)										
A.10.3 ARCHIVING OF RECORDS	\$200	\$200	\$200	\$200	\$200	\$200	\$200	\$200	\$200	\$200
TOTALS:	\$127,298	\$82,412	\$82,412	\$82,412	\$82,412	\$127,298	\$82,412	\$82,412	\$82,412	\$82,412

A.10 REGULATORY COSTS	YEAR 12	YEAR 13	YEAR 14	YEAR 15	YEAR 16	YEAR 17	YEAR 18	YEAR 19	YEAR 20	TOTAL
A.10.1 INSPECTIONS/MONITORING	\$82,212	\$82,212	\$82,212	\$82,212	\$127,098	\$82,212	\$82,212	\$82,212	\$82,212	\$1,038,990
A.10.2 LICENSING (CLOSURE AND TRANSFER)								\$500,000	\$250,000	\$0
A.10.3 ARCHIVING OF RECORDS	\$200	\$200	\$200	\$200	\$200	\$200	\$200	\$200	\$200	\$2,200
TOTALS:	\$82,412	\$82,412	\$82,412	\$82,412	\$127,298	\$82,412	\$82,412	\$582,412	\$332,412	\$1,041,190

**Appendix C**  
**Viewgraphs Used in Workshop**

**TEXAS LLRW DISPOSAL FACILITY  
LIFE CYCLE COST ESTIMATE WORKSHOP**

December 9, 1997  
Embassy Suites North  
5901 North Interstate-35  
Austin, Texas

**AGENDA**

<b><u>Topic/Activity</u></b>	<b><u>Lead(Org/Person)</u></b>
1. Introductions and Overview	LMITCo/Newberry, Kerr TLLRWDA/Jacobi
2. Project Status and Timeline	TLLRWDA/Jacobi
3. Waste Volume Projections and Updates	TLLRWDA/Jablonski
4. Facility Life Cycle Cost Estimate	
4.1 Facility Description (Physical Description, Construction, Operations, Closure, Post-Closure Maintenance)	TLLRWDA/Alvarado
4.2 Cost Estimating Methodology	RAE/Baird
4.3 Summary of Life Cycle Costs	RAE/Baird
<b>BREAK</b>	All
4.4 Construction Costs (Class A and Class B/C)	RAE/Rogers
4.5 Operating Costs	RAE/Walter
4.6 Closure and Institutional Control Funds	RAE/Baird
4.7 Summary of Life Cycle Costs	RAE/Baird
4.8 Projected Disposal Charges	RAE/Baird
4.9 Disposal Charges in Perspective	TLLRWDA/Jacobi
5. Questions and Answers	TLLRWDA/RAE
6. Open Discussion	All

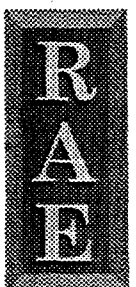
**Life Cycle Cost Estimate  
Texas Low-Level Radioactive  
Waste Disposal Facility;  
Sierra Blanca, Texas**

**December 9, 1997**


**for  
Texas LLRW Disposal Authority**

**by  
Robert Baird  
Bret Rogers  
Paige Walter**

**Rogers & Associates Engineering Corp.  
515 E. 4500 S.  
Salt Lake City, UT 84110-0330**







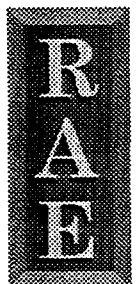
# **Cost Estimating Methodology**


**Rely on Existing Information to the Maximum Reasonable Extent.**

**Estimate Costs by Year Using:**

- **Engineering Quantities and Unit Costs.**
- **Scaling Relationships (Contingencies, Incentive Payments).**
- **Experience/Judgment Estimates (Miscellaneous Laboratory & Office Equipment, Building & Facility Maintenance, Regulatory Costs).**

**Requirements for Closure and Post-Closure Maintenance Funds Based on TNRCC Declarations.**





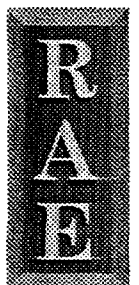
# **Cost Estimating Methodology**

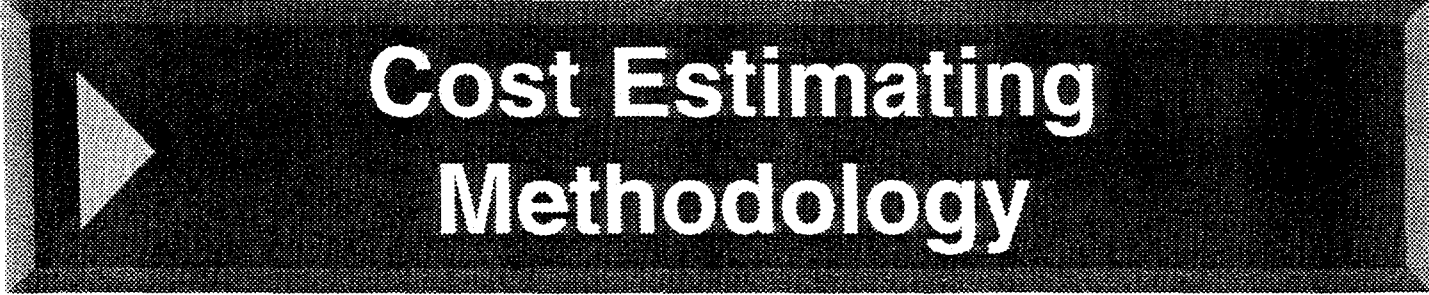
**Quantities Taken from Design Work for the Texas LLRW Disposal Authority by Radian.**

- **Taken Directly from Radian Estimates.**
- **Calculated Using Design Information.**

**Unit Costs from:**

- **R.S. Means Company, Inc. (1998 editions).**
- **Environmental Restoration by Environmental Cost Handling Options and Solutions (ECHOS).**
- **Authority Staff.**
- **Direct Vendor Contact.**





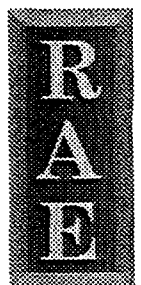
# **Cost Estimating Methodology**

**“Overnight” Costs Were Estimated in 1997 Dollars, Beginning with Commencement of Disposal Operations.**

**A Plausible Year-by-Year Schedule Was Developed.**

**Escalated Costs Were Calculated Using 3 Percent Annual Inflation Rate.**

**Present Values Were Calculated Using 5 Percent Annual Cost of Capital.**





# Major Assumptions

## Schedule:

**Facility Commences Waste Disposal Operations on January 1, 2000.**

- **Maine Yankee Decommissioning Occurs in First Three Years (2000 through 2002).**
- **Vermont Yankee Decommissioning Occurs in the Last Seven Years (2013 through 2019).**



# Major Assumptions

## Schedule:

**Facility Ceases Disposal Operations on December 31, 2019 (i.e., 20-Year Operating Life).**

**Facility Closure Starts January 1, 2020 and Ends December 31, 2024 (5-Year Duration).**

**Institutional Control (Post-Closure Maintenance) Begins January 1, 2025.**

- **10 Years, Initial Activity Level.**
- **15 Years, Activity Level 50 Percent of Initial.**
- **75 Years, Activity Level 25 Percent of Initial.**



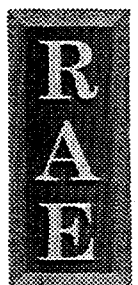


# Major Assumptions

**Variable Annual Disposal Rate Ranging from:**

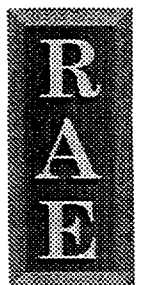
- **36,400 to 112,000 Cubic Feet per Year During Reactor Decommissioning Years.**
- **31,100 to 36,800 Cubic Feet per Year in Other Years.**

**Sources: RAE-9433/2-1, -2; Authority Staff; Maine Yankee Staff; and Vermont Yankee Staff**

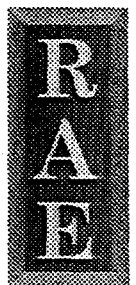
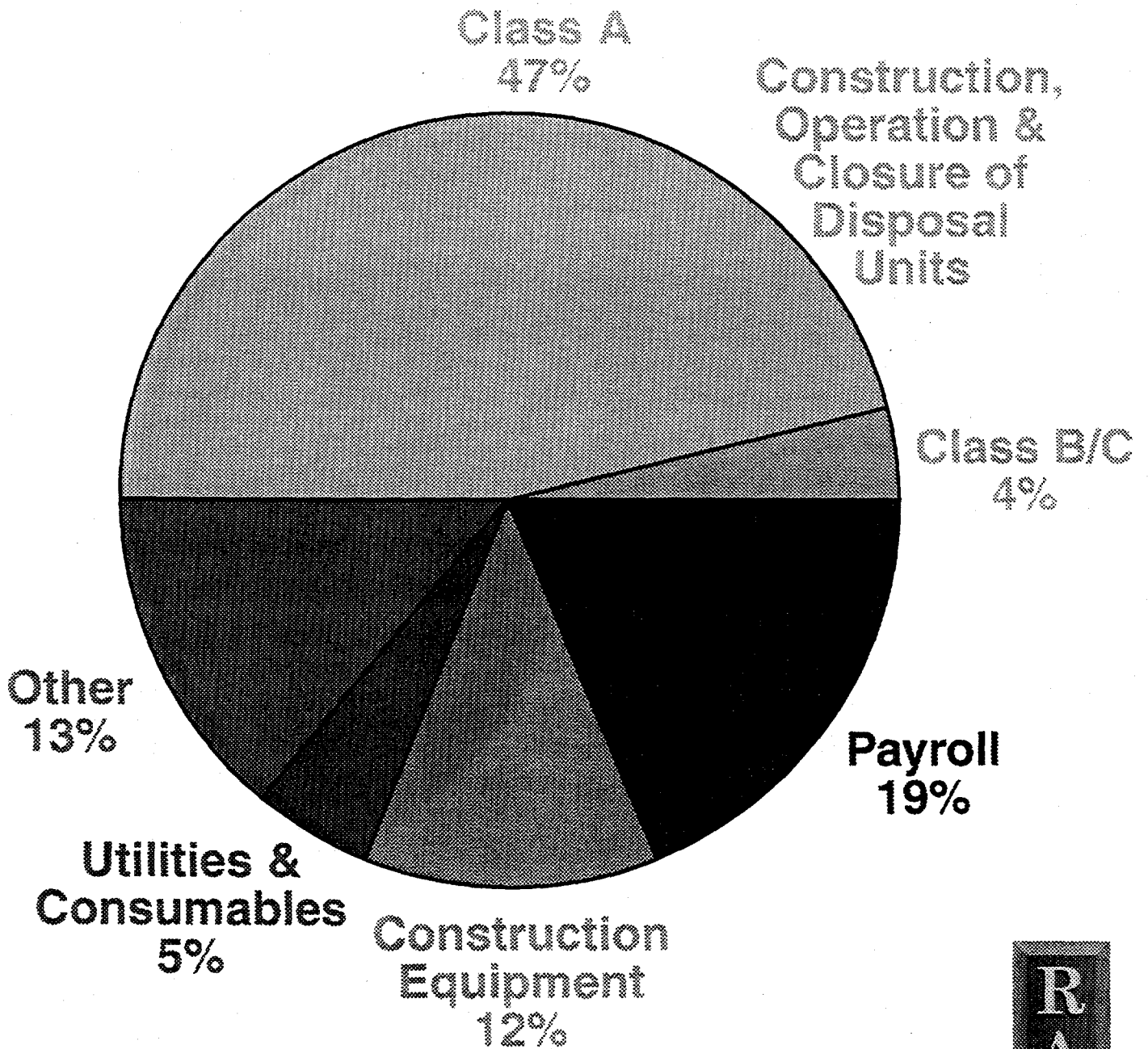


# Summary of 20-Year Cost Estimates

	Millions of 1997 Dollars	Percent of Subtotal
<b>Class A Disposal Unit Construction Costs</b>	\$55	47%
<b>Payroll</b>	23	19
<b>Construction Equipment Lease/Purchase</b>	14	12
<b>Utilities and Consumables</b>	6	5
<b>Authority Administration</b>	5	4
<b>Class B/C Disposal Unit Construction Costs</b>	4	4
<b>Post-Closure Maintenance Fund Collections</b>	4	4
<b>All Others</b>	7	6
<b>Subtotal Cost</b>	<b>\$118</b>	<b>100%</b>
<b>Contingency Allowance</b>	11	
<b>Incentive Payments</b>	<u>13</u>	
<b>Total Estimated 20-Year Cost</b>	<b>\$142</b>	



# Costs During Operating Period







# Costs During Operating Period

	Millions of 1997 Dollars	Percent of Subtotal
Class A Disposal Unit Construction, Operation & Closure	\$55	47%
Payroll	23	19
Construction Equipment Lease/Purchase	14	12
Utilities & Consumables	5.6	5
Authority Administration	4.8	4
Post-Closure Maintenance Fund Collections	4.5	4
Class B/C Disposal Unit Construction, Operation & Closure	4.4	4
Regulatory Costs	2.6	2
Monitoring	2.3	2
Buildings/Facility Maintenance	0.9	1
Training	0.8	1
Legal Fees	0.6	1
Office Equipment	0.3	< 1
<b>Total</b>	<b>\$118</b>	<b>100%</b>



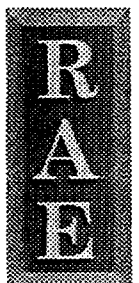
# Class A Disposal Unit Costs (47%)

	Millions of 1997 Dollars	Percent of Class A Disposal Unit Cost
<b>Operation (Payroll Not Included)</b>	<b>\$36</b>	<b>65%</b>
<ul style="list-style-type: none"> <li>• <b>Canister Costs (\$27, 50%)</b>  ~11,000 Canisters  @ \$2,500 Each</li> </ul>		
<b>Construction</b>	<b>9.7</b>	<b>18</b>
<ul style="list-style-type: none"> <li>• <b>Excavation (\$6.3, 11%)</b></li> </ul>		
<b>Closure</b>	<b>9.3</b>	<b>17</b>



# Class B/C Disposal Unit Costs (4%)

	Millions of 1997 Dollars	Percent of Class B/C Disposal Unit Cost
<b>Operation (Payroll Not Included)</b>	<b>\$1.7</b>	<b>38%</b>
<ul style="list-style-type: none"> <li>• <b>Canister Costs (\$1.2, 27%)</b> ~470 Canisters @ \$2,500 Each</li> </ul>		
<b>Construction</b>	<b>1.3</b>	<b>29</b>
<ul style="list-style-type: none"> <li>• <b>Excavation (\$0.7, 17%)</b></li> </ul>		
<b>Closure</b>	<b>1.5</b>	<b>33</b>

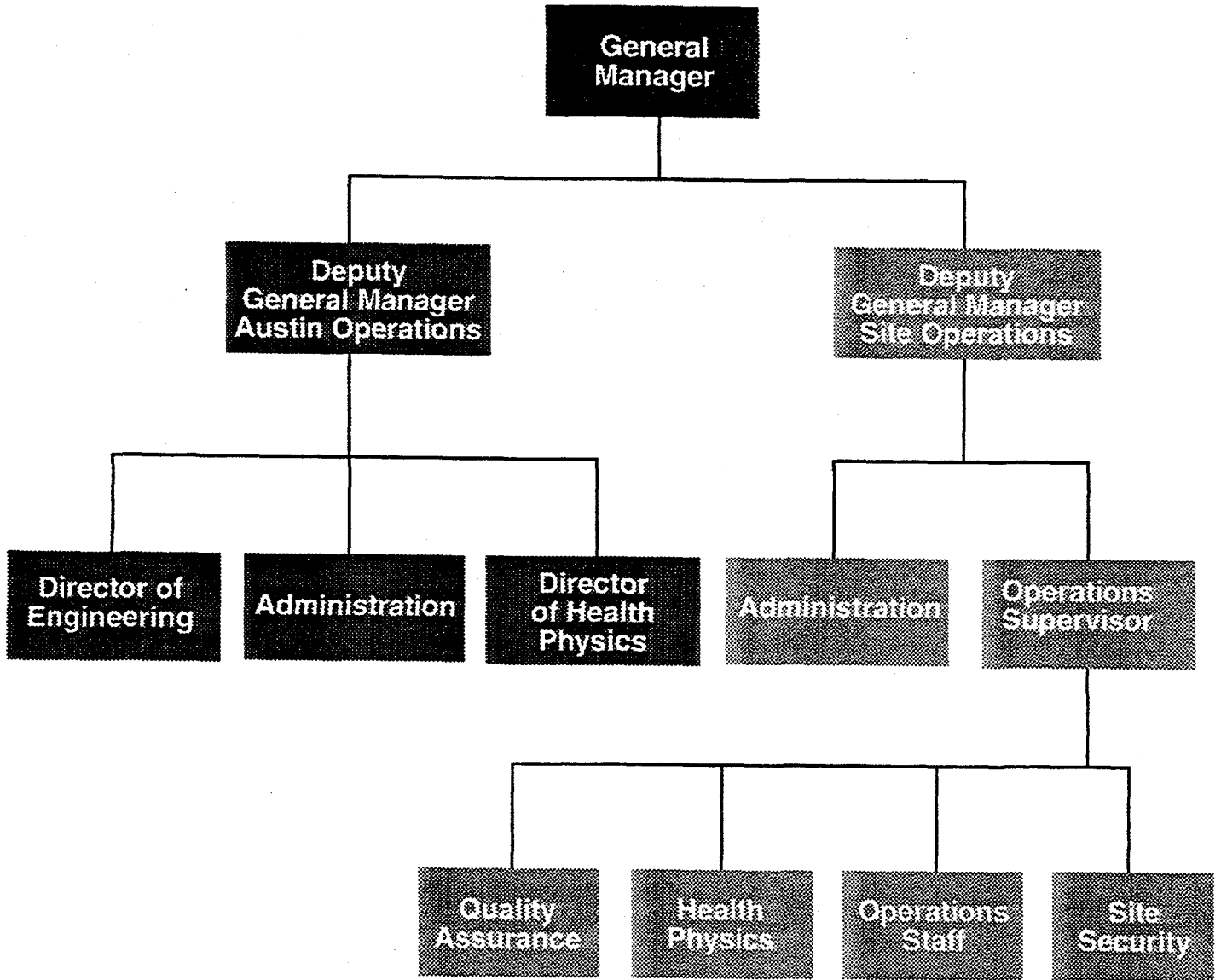




## **Payroll (19%)**

- **Maximum 40 Full-Time Employees**
- **Includes 34% Fringe Benefit**

# Organization Chart



**R  
A  
E**

# Construction Equipment (12%)

	Millions of 1997 Dollars	Percent of Construction Equipment Cost
2 Dump Trucks (10-12 CY, 10-Wheel End)	\$2.2	16%
2 Bulldozers (Cat D8)	1.9	14
Backhoe (Cat 375)	1.8	13
Wheel Scraper (22 CY)	1.1	8
Motor Grader (Cat 14G)	1.0	8
Hydraulic Crane (65 Ton)	0.9	6
Front End Wheel Loader (3 CY)	0.8	6
Miscellaneous Equipment	4.0	30

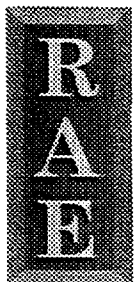




## Utilities and Consumables (5%)

	Millions of 1997 Dollars	Percent of Utilities & Consumables Cost
Utilities* (Electricity, Telephone, Data Lines, Water)	\$4.7	85%
Consumables (Office, Maintenance/Shop, Laboratory, PPE/Safety Equipment)	0.8	15

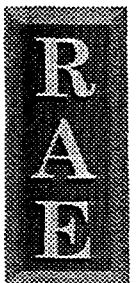
\* Fuel included in equipment costs.





## Regulatory (2%)

	<b>Millions of 1997 Dollars</b>	<b>Percent of Regulatory Cost</b>
<b>Inspections/Monitoring</b>	<b>\$1.8</b>	<b>71%</b>
<b>Licensing (Closure &amp; Transfer)</b>	<b>0.8</b>	<b>29</b>
<b>Archiving of Records</b>	<b>0.004</b>	<b>&lt;1</b>

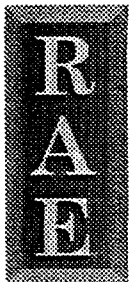






# Monitoring (2%)

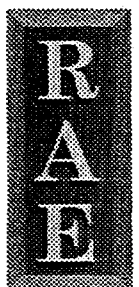
	<u>Millions of 1997 Dollars</u>	<u>Percent of Monitoring Cost</u>
Groundwater Monitoring	\$0.60	26%
Surface Water Monitoring	0.47	20
Bioassays	0.29	13
Air Monitoring	0.25	11
Groundwater Well Maintenance	0.23	10
TLD (Environmental & Personnel)	0.15	7
Vegetation Analyses	0.13	5
Sediment Monitoring	0.05	2
Soil Monitoring	0.04	2
Radon	0.04	2
Mammal Analyses	0.01	1
Other	0.05	2





# Building and Facility Maintenance (1%)

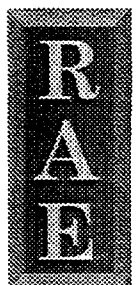
	Millions of 1997 Dollars	Percent of Maintenance Cost
Facility Maintenance (Roads, Fencing, Landscaping, etc.)	\$0.5	59%
Building Maintenance (Electrical, Plumbing, HVAC, Mechanical, Interior, etc.)	0.4	41





## Training (1%)

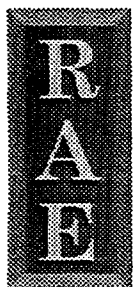
	Millions of 1997 Dollars	Percent of Training Cost
Miscellaneous Training (Continuing Ed.)	\$0.46	61%
Emergency Exercise (Every 3 Years)	0.21	28
OSHA 8-hr Health & Safety Refresher	0.06	8
OSHA 40-hr Health & Safety Training	0.03	3
OSHA 8-hr Supervisory Training	---	<1





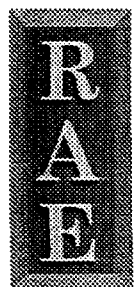
## Office Equipment (<1%)

	Millions of 1997 Dollars	Percent of Office Equipment Cost
Computers	\$0.15	53%
Copy Machines	0.06	21
Printers	0.02	8
FAX Machines	---	2
Televisions/VCRs	---	1
Microwaves	---	1
Miscellaneous Equipment	0.04	14



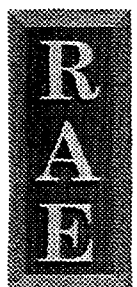
# ▶ Other Components During Operating Period (9%)

	Millions of 1997 Dollars	Percent of Subtotal
Authority Administration	\$4.8	4%
Post-Closure Maintenance Fund Collections	4.5	4
Legal Fees	0.6	1



# Summary of 20-Year Cost Estimates

	Millions of 1997 Dollars	Percent of Subtotal
Class A Disposal Unit Construction Costs	\$55	47%
Payroll	23	19
Construction Equipment Lease/Purchase	14	12
Utilities and Consumables	6	5
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Post-Closure Maintenance Fund Collections	4	4
All Others	7	6
Subtotal Cost	\$118	100%
Contingency Allowance	11	
Incentive Payments	13	
Total Estimated 20-Year Cost	\$142	



# Estimated Unit Disposal Charge

Year	Escalated Annual Costs (\$millions)	Annual Volume (cu ft)	Unit Disposal Cost (\$/cu ft)
2000	\$10	86,533	118
2001	13	111,979	119
2002	8.6	59,396	145
2003	6.6	36,328	183
2004	6.9	36,754	188
.	.	.	.
.	.	.	.
2015	17	75,326	219
2016	14	68,061	200
2017	13	57,785	233
2018	14	52,025	275
2019	11	44,759	243

Without Levelizing Construction/Operating Costs

