

**CHAPTER 10  
COST ANALYSIS**

**10-1. Cost Elements**

a. Cost elements for hazardous waste facilities are based on a number of variables, including:

- Regional hydrogeologic setting
- Condition of the existing facility
- Local construction costs
- Available water quality data

Because of the number and complexity of the variables governing costs, the analysis is limited to typical hazardous waste land disposal/land treatment facilities, namely lined units.

b. Cost elements for lined hazardous waste units include materials costs for liners, underdrain systems, and ground-water monitoring wells; and installation costs, including the costs of necessary equipment and labor. Since there will be considerable variation between projects, however, a number of factors must be considered in estimating the capital cost of a lined hazardous waste unit.

(1) *Type of liner material.* Liner material costs can vary significantly, depending on the type of liner installed, the required thickness of the liner and, in the case of synthetic liners, whether they are reinforced or not. Liner type will also influence installation costs. For example, seaming methods for synthetic liners (solvent, heat or contact adhesive) may differ depending on the liner material selected; preparation of the liner base is also different for soil liners than for synthetic membranes.

(2) *Location of the facility.* The location of the hazardous waste unit can affect both the cost of labor and the delivery cost for materials. Materials costs can also be affected by the facility location, depending on the availability of needed soils and aggregates.

(3) *Facility size.* The size of the waste unit to be

lined can have a significant effect on unit costs. Polymeric membranes and natural soil materials are usually sold at a discount when purchased in large quantities.

(4) *Site conditions.* The soil types, topography and configuration of a site can influence liner installation costs. Preparation of the liner base is essential to liner effectiveness and integrity; the ease with which the base can be prepared will depend on site conditions. Whether soils for liners and earthwork must be imported (at higher cost) will also depend on site conditions.

(5) *Economic factors.* The cost of synthetic liners depends, to a large extent, on the cost of the petroleum used in their manufacture. Market supply and demand will also influence the cost of liner materials.

**10-2. Unit Costs**

a. Unit costs for various elements of a hazardous waste facility are presented in table 10-1.

b. The costs presented in table 10-1 are based upon standard building cost references, bid prices and telephone inquiries to material suppliers. Unit costs have, in general, been expressed in ranges to account for the variation likely to occur from site to site. In estimating the cost of a specific hazardous waste unit, the designer should consider the preliminary design criteria as well as any site-specific factors which would influence the cost of materials or installation. Contingency and wastage factors should be added to the cost of installation, to account for adverse weather, seam overlap requirements, and other such considerations; soil shrinkage and compaction should also be factored into the cost analysis.

**Table 10-1.  
SUMMARY OF UNIT COSTS FOR LINED FACILITY**

Element	1983 Costs
Excavation (including clearing and grubbing)	\$1.50/yd <sup>3</sup>
Earthfill	
berms and levees	\$2.00/yd <sup>3</sup>
soil liners	\$3.00/yd <sup>3</sup>
Soil Import	
sand (gradation for drainage)	\$10.00/yd <sup>3</sup>
drainage rock (rounded) (cost delivered)	\$10.00/yd <sup>3</sup>
Soil Placement	
sand	\$1.00/yd <sup>3</sup>
Vegetation	
mulch and hydroseed	\$1,000/acre
Filter Cloth	\$0.75-1.50/yd <sup>2</sup>

**Table 10-1-Continued**  
**SUMMARY OF UNIT COSTS FOR LINED FACILITY**

Element	1983 Costs
Geotextile Fabrics	\$1.00-3.00/yd <sup>2</sup>
Membrane Liners'	
Non-reinforced Materials	
30 mil PVC	0.25-0.30ft <sup>2</sup>
30 mil CPE	0.35-0.40mft <sup>2</sup>
30 mil Butyl/EPDM	0.45-0.50/ft <sup>2</sup>
30 mil Neoprene	0.70-0.75/ft <sup>2</sup>
100 mil HDPE	1.00-1.50/ft <sup>2</sup>
Reinforced Materials	
36 mil Hypalon (CSPER)	0.50-0.55/ft <sup>2</sup>
60 mil Hypalon (CSPER)	0.80-0.90ft <sup>2</sup>
36 mil CPER	0.50-0.55/ft <sup>2</sup>
Installation, excluding earthwork	0.06-0.121ft <sup>2</sup>
2"Slotted plastic drain pipe	\$3.00/ft
Monitoring Wells	\$50.00/ft
(drilling, casing and gravel pack up to 50 feet deep)	

\*Prices from Watersaver, Inc., based upon 400,000 ft<sup>2</sup> installations

U.S. Army Corps of Engineers