

AML HANDBOOK

TAB V PRELIMINARY COST ESTIMATES

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Mining and Minerals Branch  
Land Resources Division-WASO  
National Park Service

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## INTRODUCTION

Project cost estimates are prepared for different purposes and are of varying degrees of accuracy. A construction contractor prepares bid estimates from detailed design drawings and specifications. At the other end of the spectrum, a corporate planner may want a quick-and-dirty estimate of a new facility. Based on prior construction experience, an approximate total cost can be obtained from a unit cost and the proposed plant capacity. Between these two extremes lies a broad band of estimating methods and accuracy.

Cost estimates range in increasing quality as follows: order-of-magnitude, conceptual, preliminary, definitive, engineers, and bid. The level of accuracy given in the following cost estimating worksheets is conceptual, and the recommended contingency allowance is based on this accuracy level.

A conceptual plan requires a description of the project, a general layout - before and after, general arrangement drawings of major project elements (such as closures, backfill, landscaping, erosion control, and revegetation), and quantities (such as monitoring sites, rainfall, stream flow, disturbed areas, earthmoving, size of mine openings, and volume of topsoil). Please refer to Tab III and IV for more information on project planning.

Generally, conceptual cost estimates are adequate for studying or comparing the economic feasibility of alternative projects, funding or budgeting a project, and evaluating construction bids. Additionally, they can substitute for the final cost estimate on small projects (as defined by local management guidance), or where considerable experience has accrued on similar projects.

Cost estimate format and methods are generally unique to the individual estimator, project, and conditions. The estimator must spend a great deal of time in determining the scope and general parameters of a project, and then translate these into meaningful, measurable quantities with reasonable units of cost that are all-encompassing and reliable. The worksheets given below short cut this process of scoping and costing. These short cuts are made possible by the expanding base of experience on AML closures. To use the worksheets, all that is required is a conceptual remediation plan and quantity estimates. The worksheets provide the rest -- estimate format and unit costs.

Profit and fees for contractors are included in the cost estimates. Typically these fees are 10% to 15% of the cost estimate.

Some costs that are not provided for in the worksheets include:

- \* AML program management and administration,
- \* Initial site reconnaissance and inventory,
- \* Cost inflation during construction,
- \* Technical assistance and training, and
- \* External costs such as socio-economic and environmental impacts of a project.

Although the worksheets are conservative, the unit costs do not account for extreme conditions. Statistical distributions of costs are skewed with a long tail that indicates an ever present risk of unusually high costs far beyond the norm. Project managers must be on the alert for conditions that deviate from assumptions behind the remediation methods and unit costs given in this handbook. The cost estimates must be adjusted for site specific conditions, and where available, local cost data should be used in preference to this handbook.

Cost overruns are most likely to occur from inadequate site characterization and inadequate construction management.

Inadequate understanding of the site can result in significant changes in the quantities. In addition, surprises can lead to changes in project scope such as poor foundation conditions or the need to drill and blast when none was assumed.

Inadequate construction management results in poor quality control. Construction progress must be properly and accurately monitored in a timely manner. Construction must be measured against performance criteria and requirements.

#### COST REFERENCES

The best source of cost data is derived from previous experience on similar projects. This historical data must be analyzed and organized to be readily available for the estimator's use.

The sources of prices on mechanical equipment are the manufacturers who are generally willing to give prices that range from list prices to firm quotations. Many manufacturers also provide handbooks for estimating the productivity and operating costs of their equipment. The following is a sampling of cost guides available. Be sure to read and understand the introductions of these books, to determine the particular qualifications and applications.

Robert Snow Means Co., Building construction cost data:  
Duxbury, MA, annual editions.

McGraw-Hill Information Systems Co., Construction pricing and scheduling manual: New York, NY, annual editions.

Western Mine Engineering Inc., Mining cost service: Spokane, WA, periodic updates.

In addition, NPS Central Engineering Services and Mining and Minerals Branch are sources of cost information.

#### COSTING PROCEDURE

The next section contains two summary worksheets -- the first for project construction costs and the second for annual project maintenance costs. Each cost heading has a page reference for a detail worksheet. Go to that page, fill-in the applicable worksheet blanks, and perform the indicated calculations. Sum the cost items and carry forward to the summary worksheet as instructed. Complete the cost estimate by performing the subtotals and totals indicated on the summary worksheets.

It may be helpful to preview the preceding steps early in project planning to learn what is required to complete a cost estimate. This preview can be a guide for obtaining the required information.