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*Help Instruction File:*

# Labor Module Overview

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Provided by the Office of Surface Mining Reclamation and Enforcement (OSMRE), the Pennsylvania Department of Protection (PADEP), the U.S. Geological Survey's (USGS) and the West Virginia Department of Environmental Protection (WVDEP).

# Labor Module Overview

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## 1.0 Objective

In the AMDTreat program, the Labor module is considered a project component of a mine drainage treatment facility. The Labor module can be utilized to determine the labor costs associated with operating and maintaining a treatment facility. Therefore, the AMDTreat program includes this module to allow the user to capture the labor costs associated with operating and maintaining the components at a mine drainage treatment facility.

The objectives of the overview are to (1) Provide an understanding of the labor efforts needed to operate and maintain the components of a mine drainage treatment facility and (2) Provide an overview of the Labor module to guide users in developing a cost estimate for the labor needed to operate and maintain a mine drainage treatment facility. The information is presented in two sections, **Overview and Application** and **Labor Module Overview**.

## 2.0 Overview and Application

A basic understanding of the Labor module for operating and maintaining a mine drainage treatment system is required to develop an accurate labor cost estimate using the AMDTreat software. These topics are discussed below before discussing the Labor module interface and functionality to provide the necessary context. The Overview and Application section is organized into two parts: (1) Functions and (2) Configuration & Application.

### 2.1 Functions

As mentioned in Section 1.0, the Labor module can serve multiple functions or needs depending on the operation and maintenance requirements of a mine drainage treatment facility. The following is a list of the multiple functions or ways the Labor module can be applied:

1. Site visits for general inspection of the treatment facility components.
2. Site visits to clear brush and debris from treatment facility components (i.e. wetlands, bioreactors, and/or vertical flow ponds, etc.)
3. Site visits to ensure water is flowing into and out of all treatment components properly.
4. Site visits to check for any human or animal interference with treatment components.
5. Flushing system components as needed based on the established operations and maintenance plan.
6. Checking the operation, chemical supply volumes, and overall operation of components involving the regular addition of chemicals.

### 2.2 Configuration & Application

General engineering principles should be employed when considering the use of the Labor module as part of a treatment system. It should also be noted that most of the treatment modules have a space to accommodate the labor effort (operation and maintenance under annual costs), and care should be taken

to make sure that effort is accounted for but not duplicated. The Labor module presented here is intended for annual operation and maintenance costs of the entire mine drainage treatment facility.

## 3.0 Labor Module Overview

This section focuses on describing the specifics of the AMDTreat Labor module.

### 3.1 Layout and Workflow

In general, inputs are on the left-hand side of the module and calculated outputs are on the right side. The module Input Parameters are on the left-hand side and include the following options (1) Estimate Labor Cost and (2) Enter Established Annual Labor Cost:

1. Estimate Labor Cost
  - A. Site Visits per Week
  - B. Site Labor per Visit (hours)
  - C. Travel Time per Visit (hours)
  - D. Unit Labor Cost (\$/hour)
2. Enter Established Annual Labor Cost (\$/year)

Module output is provided on the right-hand side of the module. Module outputs are arranged into two sections: (1) Total Annual Cost and (2) Recapitalization Cost [also known as Net Present Value (NPV)] in other modules.

The estimated annual cost of labor is provided under the Annual Cost heading. The final output section includes the NPV analysis. The Recapitalization section provides an estimate of the total cost of labor to operate and maintain the treatment system components for a defined time period.

A general overview of the module input and output sections is presented below, however, users are directed to the tool tips located within the module that provide additional detailed information, such as definitions of terminology. In most cases, the tool tips are accessed by clicking on the information icon (  ) in each of the subheadings in the module.

## 3.2 Module Inputs

**3.2.1 Estimate Labor Cost:** The user can select either Estimate Labor Cost or Enter Established Annual Labor Cost. First, we will focus on the Estimate Labor Cost selection.

**3.2.1.1 Site Visits per Week:** This allows the user to define the number of site visits per week. This is the number of site visits per week estimated to operate and maintain the treatment system components.

**3.2.1.2 Site Labor per Visit:** This is the number of hours spent on site during each site visit.

**3.2.1.3 Travel Time per Visit:** This is the number of hours round trip spent driving to visit the site. If it is known that the travel time to the site is one hour, then the travel time per visit is two hours.

*3.2.1.4 Unit Labor Cost:* This is the unit cost per hour of labor.

### 3.2.2 Enter Established Annual Labor Cost:

This section allows the user to enter an actual annual labor cost, if known from previous experience and/or an existing treatment system with established labor costs.

*3.2.2.1 Actual Annual Labor Cost:* This number is the actual annual cost of labor in \$/year.

## 3.3 Module Outputs

**3.3.1 Total Annual Cost:** This section provides an estimate of the annual cost of labor to operate and maintain the treatment system components. For the Enter Established Annual Labor Cost option, the user can enter a known or flat fee annual cost.

**3.3.2 Recapitalization Cost:** The Recapitalization Cost section determines the cost to operate and maintain the treatment system components over a specified time period. The NPV calculates the present-day financial investment required to generate the income to pay for future operation and maintenance costs. Both **Financial Variables** and **Cost Categories** are required to calculate the NPV.

*3.3.2.1 Financial Variables* - The Term of Analysis, Inflation Rate, and Rate of Return are three variables used in the NPV calculations. The default values for these terms are shown under the Net Present Value section of each module. Users must access the Net Present Value menu at the top of the main user interface to change the default values as they would apply to all modules used for an entire treatment system. While NPV is determined for each AMDTreat module activated by the user, the goal is to determine a total NPV for an entire mine drainage treatment system project (a collection of cost estimates for individual modules creates a treatment system project in AMDTreat). Therefore, a single value for Term of Analysis, Rate of Return, and Inflation Rate is applied to all modules and cannot vary between modules.

- **Term of Analysis:** The time period used by the NPV calculation to determine the financial investment required to pay for all future costs of the treatment system.
- **Inflation Rate:** Represents the average price increase of goods and services over time. AMDTreat uses the inflation rate to calculate the future cost of the annual operation and maintenance (O&M) and recapitalization items.
- **Rate of Return:** Describes the expected profit on an investment.

*3.3.2.2 Cost Categories* - For each treatment module, AMDTreat provides a default list of recommended equipment and materials that require recapitalization. In addition, AMDTreat provides recommendations (default values) for life cycle and replacement percentage. Users can click on the default values for life cycle or replacement percentage and use the +/- buttons to change the default values. In addition, users can select custom cost and enter a new cost to represent the current cost of the equipment. Users can add new recapitalization items or deactivate/delete existing items for calculating the NPV.

- Annual Operation and Maintenance Cost: By default, AMDTreat transcribes the annual O&M cost from the Annual Cost section to the recapitalization cost section. The program assumes the module is being used to estimate the annual cost for a treatment system component, so it automatically transcribes the annual cost to the NPV section. If this is not the case or the user wants to use some other annual cost, the Use Custom box can be selected to allow the user input of a different annual cost to utilize in the recapitalization cost calculation.
- Recapitalization Cost: Certain treatment system components, especially mechanical and water conveyance equipment, require periodic replacement. The recapitalization cost of an item is an estimate of the amount of money required to pay for future replacement costs for the item. In addition to the Financial Variables described above, three additional values are required to calculate the NPV of recapitalization costs, the present-day equipment cost, the life cycle, and the replacement percentage.
- Default Cost: This represents the current cost to purchase the equipment or material.
- Life Cycle: The time frame between equipment or material replacement is its life cycle. Some equipment manufacturers provide recommended life cycles for their equipment to provide consumers with an estimate of how long the equipment is expected to be operational. Some life cycles, such as those used for treatment media (limestone), are based on best professional judgement. Some operators prefer to periodically purchase and replace equipment/materials before failure to preserve the continuity of operations, while others wait until failure to replace an item.
- Replacement Percentage: The replacement percentage is an adjustment factor to the default cost to accommodate situations where the entire piece of equipment or all of the material does not require recapitalization.

*3.3.2.3 Rationale for Recapitalization Recommendations* - Recapitalization recommendations are based on professional experience of the AMDTreat Team and may not apply to all situations. Users are encouraged to customize the recapitalization assumptions to their treatment scenario. AMDTreat Team members are located in Pennsylvania and West Virginia and have collective experience in design, funding, and/or operation/maintenance for over 100 passive treatment systems. Users may have different experience and opinions than those listed.

By default, the AMDTreat Labor module only has Annual Cost, which can be manipulated under the NPV section. There is also a custom cost field. Users can delete or modify any of the default recapitalization items by either deselecting the item or by setting the replacement % to zero. If the item is deselected the total cost for the item will still be shown but the cost will be subtracted from the NPV cost, shown in the NPV heading.