U.S. DEPARTMENT OF THE INTERIOR
OFFICE OF SURFACE MINING
RECLAMATION AND ENFORCEMENT
DIRECTIVES SYSTEM

Subject Number:	TSR - 1
Transmittal Number:	882
Date:	APR 0 5 2000

Subject: Handbook for Calculation of Reclamation Bond Amounts

Approval: Margy Wentz Title: Acting Director

1. PURPOSE. This directive establishes the Handbook for Calculation of Reclamation Bond Amounts (Handbook) as guidance for the calculation of reclamation bond amounts by the Office of Surface Mining Reclamation and Enforcement (OSM).

2. SUMMARY OF CHANGES. The 1987 Handbook has been updated and revised to reflect recent information and policy guidance. The major changes included in this revision are:

Chapter 1 has been expanded to describe applicable situations involving the calculation or recalculation of reclamation costs, including the statutory and regulatory requirements.

Guidance for bond calculations for subsidence damage repair costs and water supply replacement was added to Chapter 1, Chapter 2 (Step 2: IV. Other Direct Reclamation Costs) and related Worksheet 15.

Guidance for bond calculations for long-term treatment of unanticipated, pollutional discharges was added to Chapter 1, Chapter 2 (Step 2: IV. Other Direct Reclamation Costs) and related Worksheet 15.

Chapter 2, Step 3, adjustment of direct costs for inflation, was added to the bond calculation procedures and related Worksheet 16.

Chapter 2, Step 4, estimates of indirect costs for contingency allowances, engineering redesign costs, profit and overhead, and project management fee, were reviewed and adjusted to reflect the current range of costs. Graphs 1 and 2 related to profit and overhead, and project management fee were updated.

Chapter 3: "Special Considerations for Calculation of Incremental, Cumulative, and Phase Bonds," was added to give guidance in cases where an applicant elects to post bond under one of these situations.

Chapter 4: "Bond Release" and related Worksheets 17 and 18 were added.

All references cited in Chapters 1-4 are contained on one page following Chapter 4.

Appendix A - Bond Calculation Worksheets - was updated to reflect all text changes.

Appendix B - Examples - was updated to reflect the new worksheets and any new information available, such as equipment specifications.

Appendix C - Guidance for Equipment Selection - was updated to reflect current information.

Appendix D - Calculation of Bond Amounts for Long-Term Treatment of Pollutional Discharges - was added.

Appendix E - Metric Conversion Table - was added.

3. DEFINITIONS. None.

4. POLICY/PROCEDURES.

a. Policy.

(1) OSM personnel must use the Handbook, established by this Directive, when calculating bonds or determining bond amounts under a Federal program, Federal lands program or whenever OSM issues a permit for surface coal mining operations.

(2) OSM personnel may use the Handbook during oversight of approved State programs as a technical guide when assessing the adequacy of bonds. However, such use is limited to that approved in oversight procedures and guidance. The Handbook must not be used to compel States to adhere to the methods in the Handbook.

b. Responsibilities.

(1) The Assistant Director, Program Support, is responsible for developing and maintaining the Handbook.

(2) The Regional Directors are responsible for ensuring use of the Handbook in the assessment of bond adequacy as part of the Federal permitting process. The Handbook may be used as a guide during oversight of approved State programs.

c. Procedures. Procedures to calculate bonds are contained in the Handbook. Revisions/modifications to the Handbook will be made as needed using the Directives System process.

5. REPORTING REQUIREMENTS. None.

6. REFERENCES.

a. The Surface Mining Control and Reclamation Act of 1977 (SMCRA), Sections 509 and 519.

b. 30 CFR Part 800.

c. OSM Policy Statement - "Policy Goals and Objectives on Correcting, Preventing and Controlling Acid/Toxic Mine Drainage," March 31, 1997.

7. EFFECT ON OTHER DOCUMENTS. The Handbook supersedes all other OSM guides for determining bond amounts where OSM is the regulatory authority, including prior versions of TSR-1, Transmittal Number 360, dated 07/21/87 and related change notice TSR-1-1, Transmittal Number 758, dated 1/13/93.

8. EFFECTIVE DATE. Upon Issuance.

9. CONTACT. Program Support Directorate, (202) 208-4264.

10. KEYWORDS. Performance Bond, Bond Calculation, Bond Release.

HANDBOOK

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Revised April 2000

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PREFACE

This Handbook establishes a technically sound, consistent methodology to calculate the amount of performance bond required for surface coal mining operations under the Surface Mining Control and Reclamation Act of 1977 (SMCRA or the Act) when the Office of Surface Mining Reclamation and Enforcement (OSM) is the regulatory authority. OSM first adopted the Handbook as policy guidance in 1987, with minor revisions in 1993. The current version, which was developed by an OSM work group comprised of representatives from each region and headquarters, contains substantial updates and revisions in response to management direction and user recommendations.

Several other Federal agencies, numerous companies in the coal industry, the coal-producing states, and states with non-coal mining use the Handbook as an organized approach to cost estimation. Also, many individuals have attended OSM's bonding workshop on cost estimation. Consulting engineers in both the U.S. and Canada have requested and received copies of the Handbook, and training was provided to the Indonesian environmental agency on its use.

Because the Handbook relies upon standard engineering cost-estimating procedures to develop site-specific costs for each reclamation activity, users should be familiar with standard engineering principles, equipment productivity guidebooks, and construction cost reference manuals. The mention of trade names of commercial equipment and products in this Handbook is for illustrative purposes only and does not constitute endorsement or recommendation by OSM.

Handbook users are encouraged to submit suggested revisions to OSM work group members for consideration in future editions. Members and the OSM offices they represent are:

Paul Behum	Mid-Continent Region, Alton, IL
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Please consult the directory located on OSM's Home Page at http://www.osmre.gov for current contact information.

CHAPTER 1

INTRODUCTION

BACKGROUND AND PURPOSE

One of the major purposes of the Surface Mining Control and Reclamation Act of 1977 (SMCRA or the Act) is to ensure adequate reclamation of all areas disturbed by surface coal mining operations. Section 509 of the Act and its implementing regulations at 30 CFR Part 800 require that, prior to permit issuance, the applicant file a performance bond with the regulatory authority in an amount determined by the regulatory authority. The performance bond provides a guarantee that funds will be available to the regulatory authority to complete the approved reclamation plan in the event that the permittee fails to do so.

This Handbook establishes a bond calculation methodology for use when OSM is the regulatory authority. Since neither SMCRA nor the Federal regulations require adherence to a specific methodology, State regulatory authorities are free to use the Handbook or any other method of bond calculation that results in the establishment of performance bond amounts that meet all regulatory program requirements.

This Handbook applies to all situations involving the calculation or recalculation of reclamation costs when OSM is the regulatory authority, including:

- Determination of the amount of bond initially required for permit issuance. See 30 CFR 773.15(d) and 800.11.

- Determination of the amount of bond required before mining advances into any succeeding increments (under incremental bonding) or operational stages (under cumulative bonding) of the permit area. See 30 CFR 800.11(b) and (c).

- Determination of any increases in bond required as a result of a permit revision that alters the calculations or assumptions underlying the reclamation cost estimate for the existing permit and bond. See 30 CFR 800.15(d).

- Determination of any decrease in the amount of bond that may be approved as a result of a change in the operation plan that reduces the future cost of reclaiming mined land. See 30 CFR 800.15(c).

- Evaluation of bond adequacy at the time of permit renewal. See 30 CFR 774.15(b)(2)(iii) and (c)(1)(v). Unless the renewal application also includes a request for a permit revision, the rules do not expressly require this evaluation. However, the regulatory authority may reasonably interpret 30 CFR 774.15(c)(1)(i), when read in conjunction with 800.4(g), as authorizing an evaluation of bond adequacy at that time.

- At the discretion of the regulatory authority, evaluation of bond adequacy at the time of mid-term permit review or as part of the process of reviewing requests for temporary cessation of operations.

- Determination of the amount of bond to be retained at the time of Phase I or Phase II bond release. See 30 CFR 800.40(c).

- Determination of the amount of bond that must be posted to guarantee correction of material damage from subsidence or replacement of a water supply damaged by underground mining. See 30 CFR 817.121(c)(5).

- Determination of the amount of bond that must be posted to guarantee treatment if an unanticipated pollutional postmining discharge requiring long-term treatment develops. See OSM's March 31, 1997, statement entitled "Policy Goals and Objectives on Correcting, Preventing and Controlling Acid/Toxic Mine Drainage."

In addition, if a State regulatory authority uses the Handbook or a variation thereof to calculate bond amounts, OSM may use the Handbook to conduct oversight evaluations of bond adequacy, but only after making necessary State-specific modifications such as replacement of Davis-Bacon wage rates with whatever rates apply under State law. When conducting oversight in States that do not rely upon the Handbook to calculate bond amounts, OSM may use the Handbook as a tool to estimate reclamation costs.

Because the Handbook relies upon standard engineering cost-estimating procedures to develop site-specific costs for each reclamation activity, users should be familiar with standard engineering principles, equipment productivity guidebooks, and construction cost reference manuals.

The mention of trade names of commercial equipment and products in this Handbook is for illustrative purposes only and does not constitute endorsement or recommendation by OSM.

STATUTORY AND REGULATORY REQUIREMENTS

Section 507(d) of SMCRA requires each applicant to submit, as part of the permit application, a reclamation plan in sufficient detail to demonstrate compliance with the reclamation standards of the applicable regulatory program. Section 509(a) of the Act and its implementing regulations at 30 CFR 800.14(b) require that the applicant file a bond in an amount sufficient to cover the cost of reclamation in accordance with the approved plan should the regulatory authority have to perform the reclamation in the event of bond forfeiture.

Under 30 CFR 773.15(d) and 800.11(a), a permit applicant must file a bond or bonds before the regulatory authority may issue a permit. According to 30 CFR 800.11(b)(1), the bond or bonds must cover either the entire permit area or an identified increment of land within the permit area upon which the operator will initiate and conduct surface coal mining operations during the initial term of the permit. Under 30 CFR 800.11(d)(2), the applicant also has the option of filing a cumulative bond. As provided in 30 CFR 800.11(d)(1), a permit applicant's choice of bonding scheme (entire permit area, incremental, or cumulative) is subject to regulatory authority approval.

Incremental and cumulative bonds are similar in that the permittee or permit applicant initially posts bond for only part of the proposed operation within the permit area. However, under the incremental method, each bond applies only to a specific increment of the permit area, while under the cumulative method each bond applies to the entire permit area even though the permittee may be authorized to disturb only a specified portion of the permit area. Under both the cumulative and the incremental methods, the permit application must identify the amount of bond required for the land to be disturbed by each stage of the operation (when using cumulative bonding) or increment of the permit area (when using incremental bonding). The permittee must file any additional bond or bonds required for each successive stage of the operation or increment of the permit area before beginning that stage of the operation or disturbing that increment of the permit area (30 CFR 800.11(b)(2), (b)(3), (b)(4), and (c)).

Under 30 CFR 800.11(b)(4), independent increments must be of sufficient size and configuration to provide for efficient reclamation operations should bond forfeiture occur.

Under 30 CFR 800.13(a)(2), the regulatory authority has the discretion (but not the obligation) to accept a separate bond or bonds for each phase of reclamation as defined in 30 CFR 800.40(c).

Under 30 CFR 800.14(a), the regulatory authority must determine the amount of the bond based upon:

- The requirements of the approved permit and reclamation plan;
- The probable difficulty of completing reclamation, giving consideration to factors such as topography, geology, hydrology, and revegetation; and
- The applicant's estimate of the cost of completing the reclamation plan, although the regulatory authority is not limited by this estimate.

Paragraph (b) of 30 CFR 800.14 requires that the bond amount be sufficient to ensure completion of the reclamation plan if the work has to be performed by the regulatory authority in the event of forfeiture. In no case may the bond amount be less than $10,000.

Under 30 CFR 800.15 and section 509(e) of SMCRA, the regulatory authority must re-evaluate bond adequacy and adjust bond amounts as appropriate whenever the permit acreage increases or decreases or the cost of future reclamation changes. However, any bond reduction requested as a result of reclamation work performed must be processed as an application for bond release under 30 CFR 800.40.

A bond reduction under 30 CFR 800.15(c) must be justified solely upon a demonstration that the reclamation cost estimates that form the basis for the existing bond amount are no longer valid for reasons other than the performance of reclamation work. Situations that qualify for bond reduction through the bond adjustment process include deletion of undisturbed acreage from the permit area (unless deletion of the acreage would not lower the maximum reclamation cost liability for the permit or increment), technological advances that reduce the unit costs of reclamation, changes in the mining plan (such as a decision not to remove the lowest coal seam) that result in an operation of more limited extent than originally approved and bonded, and an alteration in the postmining land use that reduces reclamation costs.

Completion of reclamation activities such as backfilling or topsoil replacement does not qualify as a change in the cost of future reclamation. See 48 FR 32944-45, July 19, 1983. The permittee must apply for bond release to obtain a bond reduction under these circumstances.

Under 30 CFR 800.15(d), the regulatory authority must conduct a bond adequacy review whenever the approved permit is revised. The regulatory authority must require adjustment of the bond amount to reflect any increase in reclamation costs resulting from the permit revision.

Under section 519(c) of the Act and 30 CFR 800.40(c), the regulatory authority may reduce bond amounts in accordance with a phased release schedule as reclamation is completed. However, the amount of bond remaining after each of the first two phases must be sufficient to assure completion of remaining reclamation obligations, which means that, after conducting the inspection and evaluation required by 30 CFR 800.40(b)(1), the regulatory authority must recalculate reclamation costs to determine how much bond to retain and how much, if any, may be released.

Under 30 CFR 817.121(c)(5), the regulatory authority must require the permittee to obtain additional performance bond to cover the costs of repairing, replacing, or providing compensation for material damage to protected structures when the damage is a result of subsidence caused by underground mining operations. The same requirement applies to subsidence-related material damage to surface lands and to certain drinking, domestic, or residential water supplies adversely impacted by underground mining operations. Both requirements apply only if the permittee fails to correct the damage within a specified time and the damage is not fully covered by the permittee's liability insurance policy.

Finally, OSM's March 31, 1997, acid mine drainage policy statement clarifies that the performance bond or an equivalent form of financial assurance must be adequate to ensure completion of the hydrologic reclamation plan approved in the permit. In essence, whenever unanticipated pollutional discharges requiring long-term treatment develop, the regulatory authority must adjust the bond amount (or require equivalent financial assurance) to cover all future costs of monitoring, evaluating, abating, and treating those discharges to the extent necessary to avoid causing material damage to the hydrologic balance.

ASSUMPTIONS

The Handbook's bond calculation methodology assumes that:

- The bond amount will reflect the cost of engaging a third-party contractor to complete the reclamation plan.

- The bond amount will reflect the "worst case scenario;" i.e., the cost of reclaiming the site if the permittee forfeits the bond at the point of maximum reclamation cost liability, under the reclamation and operation plans approved as part of the permit. Calculating the bond amount in this manner should ensure the availability of adequate reclamation funds at all times during the life of the operation.

- The reclamation and operation plans submitted as part of the permit application and any special permit conditions imposed by the regulatory authority will serve as the basis for determining the amount of performance bond required. The regulatory authority will independently calculate reclamation cost estimates; it will consider but not rely upon cost estimates supplied by the permit applicant.

- The permittee will be in compliance with the approved reclamation and operation plans, permit conditions, and performance standards at all times.

- The regulatory authority will routinely reevaluate bond adequacy and require bond adjustments as authorized or mandated by 30 CFR 800.15.

- The initial calculation of bond amounts will not include remediation costs for events such as acid mine drainage and landslides that are not anticipated in the approved permit or reclamation plan. Should an unanticipated event occur, the regulatory authority must require a permit revision and adjust the bond amount to include any additional reclamation costs.

METHODOLOGY

The methodology in this Handbook reflects standard construction industry cost-estimating procedures for determining demolition, earthmoving, and revegetation costs, which are the most significant elements of the reclamation cost estimate.

Equipment productivity data, hourly rates and other costs used in the examples in Appendix B are taken from the sources referenced throughout this document. Rounding was applied in preparing the examples as follows:

- Equipment productivity hours are rounded to the nearest hour, and

- Total bond amounts are rounded to three significant digits.

DATA SOURCES

There are four major sources of the information needed to calculate bond amounts:

- The reclamation and operation plans in the permit or permit application.
- Equipment productivity and performance guidebooks.
- Construction cost reference manuals.
- Contract and cost data from State and Federal abandoned mine land and bond forfeiture reclamation programs; the Tennessee Valley Authority; the Natural Resources Conservation Service (formerly the Soil Conservation Service); State, Bureau of Indian Affairs, Tribal and Federal forestry and wildlife agencies; the Cooperative Extension Service; and the Department of Labor for wage rates. These sources may provide local costs for tasks or materials.

The reclamation and operation plans in the permit or permit application provide essential information on the type of mining to be conducted, the sequence of mining and reclamation activities within the permit area, spoil and topsoil handling, haul distances, extent of areas to be disturbed, structures needed during the mining operations, final surface configuration, revegetation standards and techniques, and postmining land use considerations (such as retention of roads, ponds, and other structures).

Equipment productivity and performance guidebooks are extremely useful when estimating earthmoving costs. Most heavy equipment manufacturers publish guidebooks containing performance data. For example, the *Caterpillar Performance Handbook* includes data on tractors, loaders, scrapers, haulage vehicles, small hydraulic shovels and excavators, in addition to a variety of other information such as estimating methodologies and heavy equipment cost accounting.

To calculate bond amounts, these guidebooks should be used in combination with a comprehensive equipment cost reference manual, such as the PRIMEDIA Information, Inc. (formerly K-III Directory Corp. and Dataquest, Inc.) *Cost Reference Guide for Construction Equipment* or the *Contractors Equipment Cost Guide*. These reference manuals, which are updated periodically, provide hourly

ownership and non-wage operating costs for a wide range of heavy equipment. Because all contracts awarded by OSM to reclaim lands for which it is the regulatory authority are direct Federal contracts, labor costs for equipment operation must reflect Davis-Bacon wage rates as established by the Department of Labor. Any wage rates provided by the Department of Labor, which are used in the reclamation estimate, should be documented to include the date, state, county, construction type and wage number.

The R. S. Means Company, Inc., also publishes construction-related cost data including *Means Building Construction Cost Data*, *Means Heavy Construction Cost Data*, and *Means Site Work and Landscape Cost Data*. Means guides contain an extensive array of line-item costs for building construction. These reference manuals, which are updated annually, are especially useful for estimating material acquisition costs and the costs of specific reclamation tasks such as structure demolition. Because the Handbook provides for a separate determination of profit and overhead (see *Chapter 2 and Worksheet 16*), only use "bare cost" data from the reference manuals. Bare costs do not include profit and overhead.

CHAPTER 2

BOND CALCULATION PROCEDURES

There are five major steps in the bond calculation process:

- Determine the point of maximum reclamation cost liability.
- Estimate direct reclamation costs such as earthmoving, revegetation, and the removal and demolition of structures not to be retained as part of the postmining land use.
- Adjust direct costs for inflation.
- Estimate indirect reclamation costs, including contractor and equipment mobilization and demobilization charges, contingency allowances, redesign expenses (including surveying, aerial photography, and monitoring in support of this effort), profit and overhead, and contract management fees.
- Calculate the total bond amount.

Appendix A contains worksheets for the orderly completion and documentation of each step. Appendix B provides examples of completed worksheets. Appendix E contains a metric conversion table for use when permitting information is submitted in metric units.

STEP 1: DETERMINE POINT OF MAXIMUM RECLAMATION COST LIABILITY

Since this is the most important step in the cost-estimating procedure, complete *Worksheet 1* only after carefully studying the operation and reclamation plans in the permit application.

This point will differ for each operation depending on the nature and complexity of the operation, the number of factors present, and the operation and reclamation plans. Generally, the greatest reclamation cost liability occurs at the point in the permit term at which one or more of the following conditions exist:

- The greatest area of disturbance or the greatest area requiring final grading, topsoil placement, and revegetation.

- The largest volume of material to be backfilled and graded to establish suitable postmining contours. For multiple-seam mining operations, this is the point at which coal extraction from the lowest coal seam is complete, most of the overburden removed to that point has been placed in excess spoil fills, and little or no backfilling has occurred.

- The longest haul distance between spoil or topsoil storage areas and the final placement location.

- The greatest number of on-site structures.

- The point at which refuse piles require the largest amount of cover material.

- Maximum disturbance of areas with special reclamation needs or special materials handling plans, such as sites with prime farmland soils, acidic or toxic materials, difficult topographic situations, or underground mine workings that must be sealed.

As with all engineering estimates, the bond calculation should be supported by documentation of all assumptions, references, and data sources.

STEP 2: ESTIMATE DIRECT RECLAMATION COSTS

Reclamation of most surface coal mining operations includes the following sequence of activities:

- Structure demolition and disposal, including the removal of mining-related buildings and other structures and facilities that are not approved for retention as part of the postmining land use.

- Earthmoving, including backfilling and rough grading, spoil ridge reduction, highwall elimination, final pit elimination, pond and road reclamation, final grading, and topsoil replacement.

- Revegetation.

In addition, other tasks such as sealing mine portals and pumping and treating impounded water may be necessary as part of the reclamation process.

This section describes how to estimate the cost of each of these activities.

I. Structure Demolition and Disposal (*Worksheet 2*)

With the exception of structures approved for retention as part of the postmining land use, the regulations require the reclamation of all haul and access roads and the removal and disposal of all mining-related buildings, crushers, coal storage bunkers and silos, conveyor systems, fences, foundations, power lines, rail spurs, utilities, storage facilities for equipment and supplies, and other similar structures within the permit area.

For cost estimation purposes, removal of a structure means demolition of the structure. Below-grade foundations and buried utilities may be left in place when compatible with the approved postmining land use.

With respect to the reclamation of roads that are not approved for retention as part of the postmining land use, the structure demolition cost category includes expenses associated with the removal and disposal of bridges and culverts, as well as any road-surfacing materials that are incompatible with the postmining land use or revegetation requirements. Other road reclamation costs such as grading and scarification are more properly included in the earthmoving and revegetation cost categories.

Unless the reclamation plan documents that the pertinent solid waste disposal authority has approved on-site disposal, all structure demolition cost estimates must include transportation expenses, landfill disposal fees, and other costs associated with the disposal of demolition debris in an approved solid waste disposal facility. The approval of the solid waste disposal authority may not be necessary for the disposal of loose road-surfacing materials (shale, gravel, or crushed stone) in the backfill.

Include costs for disposal of abandoned equipment and supplies. Because there is no reasonable means of predicting whether equipment and supplies or other materials with potential resale value will be left on site at the time of bond forfeiture, do not allow credit for the salvage value of building materials or abandoned equipment and supplies.

Use *Worksheet 2* and appropriate reference manuals such as the Means guides to calculate costs associated with the demolition and removal of structures. When using reference manuals, avoid data that incorporate overhead and profit. The Handbook provides a different method for estimating overhead and profit (see *Worksheet 16* and Graph 2).

II. Earthmoving (*Worksheets 3 through 13*)

A. Introduction

For most surface mining operations, earthmoving is the major reclamation cost. Necessary earthmoving activities most commonly include backfilling, grading, placement of cover materials (especially on coal refuse disposal sites), and topsoil redistribution. Backfilling consists of the mass transport of spoil to eliminate spoil piles, pits, and highwalls.

Grading commonly includes:

- Removing diversions and siltation structures,
- Reshaping road cut-and-fill slopes,
- Reconstructing stream channels,
- Recontouring all disturbed areas to restore appropriate drainage patterns and facilitate the postmining land use,
- Preparing the site for topsoil redistribution, and
- Ripping or scarifying the regraded overburden necessary to ensure topsoil adhesion.

To estimate costs for earthmoving activities, complete *Worksheets 3* through *13*, following the instructions below and the examples in Appendix B. *Worksheet 3*, the materials handling plan, identifies and describes each type of earthmoving activity needed at the point of anticipated maximum reclamation cost liability. *Worksheets 4A* and *4B* provide two alternatives for calculating the volumes of materials to be handled. *Worksheets 5* through *12* provide a means of calculating site-specific equipment productivity data for various types and models of equipment, using the equipment productivity and performance guidebooks listed in Chapter 1.

B. Materials Handling Plan (*Worksheet 3*)

Use *Worksheet 3* to identify and describe each specific earthmoving activity required as a result of the configuration of the operation at the point of maximum reclamation liability. The determination of equipment needs, productivity, and

costs will depend on the information provided on this worksheet. Development of the materials handling plan requires determination of the volume of material to be handled, haul distances and grades, and the types of equipment to be used, as discussed below:

- Material Volume Estimates

  Using the reclamation and operation plans in the permit application, compare the pre-reclamation and post-reclamation topography of the site to determine the amount of material that must be handled. Use standard engineering methods to calculate earthmoving volumes. For example, a series of pre-reclamation and post-reclamation cross sections can be used to calculate volumes by the average-end-area method (see *Worksheet 4A*). Alternatively, use *Worksheet 4B* to estimate earthmoving needs by calculating the volume of a series of geometric shapes that resemble the difference between pre- and post-reclamation topography. Appendix B contains examples of these two approaches. You may also determine earthmoving volumes using computer programs such as Dynamic Graphics, Inc's, *earthVision*, Carlson Software's *SurvCADD*, and Civil Software Design's *SEDCAD* programs. This software is available from OSM's Technical Information System (TIPS). Document all calculations regardless of the method selected.

  Material volume is defined according to its state in the earthmoving process. The three measures of volume are bank cubic yards (BCY), loose cubic yards (LCY), and compacted cubic yards (CCY). Swell is the increase in volume resulting from a change from bank state to loose state; i.e., the increase in volume caused by excavation. Excavation causes fragmentation, which results in an increase in void spaces.

  All excavated materials settle over time, reducing both the void spaces and overall volume. In addition, mechanical compaction results in some immediate volume shrinkage. Hence, the loose volume of material required to backfill an open pit is greater than the pit void space (pit volume) because of the shrinkage and compaction of the loose backfill material that occurs during and after placement in the pit.

  One cubic yard of material lying in its undisturbed, geologic state is 1 BCY. One cubic yard of material that has been excavated and has expanded in volume as a result of the fragmentation that occurs during excavation is 1

LCY. One cubic yard of excavated material that has been subsequently compacted during placement is 1 CCY.

Most equipment productivity calculations are based on moving loose volumes of material. Therefore, convert in-place volumes to be moved to loose volumes.

The reclamation and operation plans in the permit application identify the type of overburden materials present within the permit area. Generally, they also specify swell and shrinkage factors for these materials. Verify this information by comparison with swell and shrinkage factors in appropriate equipment guidebooks or other standard engineering reference materials.

Some equipment manuals refer to a load factor, which is the loose density divided by the bank density. Multiply the loose volume of material by the load factor to determine bank volume. This calculation is necessary to estimate productivity and payloads in terms of bank cubic yards (BCY). Use the following equation to determine the swell factor using a load factor:

$$\text{Swell Factor} = (100 \div \text{load factor}) - 100$$

- Haul Distance Estimates

Using the reclamation and operation plans in the permit application (including designated haul roads and routes), determine haul distances for each area where backfilling, grading, topsoil replacement, or other earthmoving activities will occur. Identify the approximate centroid (surface expression of the center of mass) of each source material and its destination and determine the centroid-to-centroid distance.

- Grade Estimates

Haul grades and surface conditions greatly impact equipment productivity and may limit the type of equipment that can be used. Most equipment productivity and performance guides express these limitations in terms of the total resistance of the haul, which is the sum of the rolling resistance and grade resistance. The guides contain tables that convert rolling resistance to an equivalent percent grade for various types of road and surface conditions.

- Equipment Selection

  Equipment selection for cost estimation purposes is a two-step process:

  First, select the type of equipment (for example, bulldozer or scraper) based on the guidance in this Handbook, information in equipment productivity and performance guides, the reclamation and operation plans in the permit application, and experience.

  Second, select the model and size of equipment based on information contained in the materials handling plan (*Worksheet 3)*, the reclamation and operation plans in the permit application, and equipment productivity and performance guides.

  For both the first and second steps, complete *Worksheets 5* through *12* for several types and models of readily available equipment to determine the most cost-effective equipment type and model or combination of equipment types and models for each earthmoving activity.

  When completing *Worksheet 13* (earthmoving costs), use an industry publication containing recent cost data for construction equipment to determine hourly equipment ownership costs. PRIMEDIA Information, Inc.'s *Cost Reference Guide for Construction Equipment* (*CRG*) is one example of such a publication.

  Use regional Davis-Bacon wage rates from the Department of Labor to determine hourly labor costs (see the examples in Appendix B). In some cases other local costs may be appropriate and can be substituted for the *CRG* and Davis-Bacon rates. The Department of the Interior's Acquisition Regulations (DIAR) require compliance with the Indian Self-Determination and Education Assistance Act (25 U.S.C. 452) when reclamation contracts are let on Indian lands. Thus, local tribal wage rates must be considered when calculating the potential cost of reclamation. This information can be obtained from regional Bureau of Indian Affairs offices or on Navajo lands, through the Office of Navajo Labor Relations. Justify and document any substitutions from the regional Davis-Bacon wage rates.

  Do not automatically select the equipment listed in the operation and reclamation plans submitted by the applicant. In the event of forfeiture, equipment such as draglines, large shovels and equipment unique to the permittee most likely will not be available to potential contractors. Before

calculating earthmoving costs for operations that plan to use this type of equipment, check with several regional earthmoving contractors to determine what equipment may be available. To maintain compliance with Federal procurement requirements, do not base calculations on equipment available to only one contractor.

Appendix C provides additional guidance on equipment selection, operation, and productivity.

Equipment needs for typical earthmoving activities are described below:

Spoil Ridge Reduction: Operations that use area mining methods normally rely upon bulldozers to move the tops of the spoil ridges into the valleys between the ridges.

Final Pit /Highwall Elimination: Bulldozers are usually the equipment of choice to fill the last pit with material obtained from adjacent spoil ridges or the area above the highwall (when approved in the permit). When the mining method requires the use of stockpiled overburden, scrapers or a combination of trucks and loaders are typically used to move stockpiled materials to the pit. When trucks and loaders are used, bulldozers spread the material in the pit area. If the pit is to be reconfigured for retention as a permanent impoundment, bulldozers are normally used to reduce the highwall and spoil slopes to acceptable grades.

In some cases the reclamation plan may not address this reclamation need. For example, the reclamation and operation plans for a mountaintop removal operation would assume complete removal of the top of the mountain, meaning that no highwall elimination would be necessary. However, if a highwall exists at the time of bond forfeiture, we would need to use methods such as ripping or blasting to eliminate the highwall.

Final Grading: Scrapers, bulldozers, and motor graders are commonly used to recontour backfilled areas, excess spoil disposal structures, and other disturbed areas to facilitate proper drainage and the approved postmining land use and to prepare disturbed areas for topsoil redistribution. In some cases, especially for sites formerly used as roads or support facilities, ripping with bulldozers may be required to reduce compaction in the root zone and provide a slightly rough surface to promote topsoil adhesion.

Topsoil Redistribution: Topsoil redistribution involves the use of scrapers, front-end loaders, trucks, bulldozers, and/or graders. The choice of equipment depends on grade, the haul distance between stockpiles and placement areas, and the volume of material to be moved. Prime farmland requires more attention to equipment selection and material handling to ensure proper soil horizon placement, soil depth, and compaction.

Removal of Diversions and Siltation Structures: Bulldozers are generally adequate to grade out diversions and excavated siltation structures. In some cases, a hydraulic backhoe excavator or small dragline is required to dredge accumulated sediment.

Covering Exposed Coal Mine Waste or Other Acid- or Toxic- Forming Materials: When the reclamation and operation plans require the application of cover material prior to revegetation, the same equipment considerations as those discussed under "*Topsoil Redistribution*" apply to the transport and distribution of this material. Examples include the covering of coarse coal mine refuse, slurry impoundments and coal stockpile pads.

C. Equipment Productivity and Costs (*Worksheets 5 through 13*)

As discussed above, development of the materials handling plan requires a determination of equipment productivity and earthmoving costs. Use *Worksheets 5* through *12* to calculate the production of individual pieces of equipment and the hours required for the job. Use *Worksheet 13* to calculate earthmoving costs.

Generally, the productivity of a piece of equipment is expressed in cubic yards per hour. Common factors governing equipment productivity are capacity, cycle time, site conditions, and material characteristics.

Reclamation jobs do not operate at 100% efficiency. Complex factors such as operator skill, repairs and adjustments, and personnel and job layout delays are either addressed individually as part of the "Operator Factor" (see *Worksheet 5*) or combined in an "Efficiency Factor" (see *Worksheets 5* through *12*). When site-specific data are not available use the information below as guidance.

EFFICIENCY FACTOR

Conditions	Crawler Equipment	Rubber-tired Equipment
Excellent	0.92 55 min/hr	0.83 50 min/hr
Average	0.83 50 min/hr	0.75 45 min/hr
Unfavorable or Night	0.75 45 min/hr	0.67 40 min/hr

To calculate the number of hours that the equipment is needed, apply productivity rates to the amount of material that must be moved. To determine the hourly cost of equipment during the reclamation operation, adjust the components of the hourly costs in the *CRG* for the number of shifts, fuel costs, etc., as applicable.

III. Revegetation (*Worksheet 14*)

Use *Worksheet 14* to calculate costs associated with revegetation efforts. The initial revegetation process generally consists of seedbed preparation, including such tasks as soil sampling, application of soil amendments (fertilizer, lime, etc.), seeding, planting, and mulching. *Worksheet 14* refers to this as "Initial Seeding." Calculate this cost for all disturbed areas within the worst-case scenario. The reclamation plan will specify the soil condition and species mix. It will also clarify whether irrigation and the planting of trees and shrubs are necessary. Potential sources of cost information for these requirements include the Cooperative Extension Service; agricultural supply firms; agricultural publications; revegetation contractors; landscaping services; Federal, State and Tribal forestry agencies; and State, Federal and Tribal abandoned mine land and bond forfeiture reclamation contracts and programs.

Weather and site conditions may result in complete or partial failure of an initial revegetation effort. The cost estimate must also include reseeding and replanting expenses associated with vegetative failures, including all disturbed lands within the permit area not yet released. This reseeding and replanting cost is based on site conditions and historic vegetative failure rates for the operation being evaluated, or similar operations on similar sites. This reseeding and planting cost

estimate must include an allowance for any soil sampling, regrading and earthmoving costs necessary to evaluate and repair the site as part of the reseeding/replanting effort.

Worksheet 14 covers the following aspects of revegetation:

- Initial seeding and planting of the worst-case scenario area.
- Vegetative failure of the worst-case scenario area (i.e., reseeding and replanting needed).
- Vegetative failure for any other unreleased disturbed areas within the permit area (i.e., reseeding and replanting needed).

IV. Other Direct Reclamation Costs (*Worksheet 15*)

Depending upon site conditions and applicable requirements of the reclamation and operation plans, other necessary reclamation activities may include:

- Pumping and treating impounded waters.
- Replacing wetlands.
- Sealing underground mine entries and openings.
- Plugging auger holes.
- Sealing monitoring wells and other drilled holes.
- Constructing rock drains.
- Disposing of toxic, hazardous, and other solid (noncoal) waste in accordance with state and Federal laws and local ordinances.
- Maintaining roads during reclamation including grading, surfacing, ditches and culverts, and snow removal.
- Maintaining ponds.

- Water sampling and monitoring to the extent required to comply with any necessary Federal, State, or local permits.

- Evaluating and rehabilitating structures to be retained as part of the postmining land use (ponds, roads, diversions, etc.).

In addition, two other potential cost considerations may arise after permit issuance:

- Under 30 CFR 817.121(c)(5), unless the permittee corrects the damage within a specified time or has sufficient insurance coverage, the regulatory authority must require the permittee to obtain additional performance bond to cover the cost of (1) correcting subsidence-related material damage to surface lands and protected structures, and (2) replacing certain water supplies adversely impacted by underground mining operations.

- If an unanticipated pollutional discharge requiring long-term treatment develops, the regulatory authority must adjust the bond or require the permittee to post equivalent financial assurance to cover all foreseeable abatement and future treatment costs.

Since there is no established method of estimating costs for most of the activities listed under this heading, use best professional judgement to calculate bond amounts on a case-by-case basis. In some instances, the construction cost reference manuals listed in Chapter 1 may prove useful. Use *Worksheet 15* to explain the basis for all cost estimates for these activities.

Use Means guides or obtain estimates from several local contractors to determine the amount of bond required to guarantee repair of subsidence-related damage to surface lands and protected structures. Similarly, use estimates from local drilling and plumbing contractors to estimate the bond amount required to guarantee replacement of damaged water supplies and delivery systems.

Appendix D provides general guidance on the calculation of bond amounts needed to cover abatement and long-term treatment costs associated with unanticipated pollutional discharges.

STEP 3: ADJUST DIRECT COSTS FOR INFLATION

This step addresses anticipated inflationary increases in reclamation costs during the permit term and after permit expiration but before final bond release.

I. During a Permit Term

There are two approaches for addressing inflation during a permit term. One approach uses an inflation factor to increase the initial bond amount to reflect inflation for the full permit term. The other approach does not include inflation as an element of the initial bond calculation. Instead, it requires recalculation and adjustment of bond amounts on a fixed schedule (at a minimum during the mid-term permit review process and at permit renewal) to cover any reclamation cost increases due to inflation.

Adjustment Using 5-Year Permit Term

To calculate the inflation factor for a 5-year permit term under the first approach, use the formula below and an index such as the *Construction Cost Indexes* (CCI) in the Engineering News Record (ENR) (http://www.enr.com). We recognize that other cost indexes may be appropriate to use in lieu of the one suggested, but for purposes of this example, we chose the CCI. For further information on the construction cost index, see "Cost History, Keeping Track of a Moving Target," *Engineering News Record*, March 30, 1992, pages 42-47.

> Divide the CCI for the current month and year by the CCI for the same month five years earlier, assuming the term of the permit is five years. For example, if the current month and year is February 1999, divide the CCI for February 1999 by the CCI for February 1994.

Example: CCI (February 1999): 5992 CCI (February 1994): 5371

Inflation factor: 5992 ÷ 5371 = 1.11562 [Enter on *Worksheet 16.*]

Total inflation (5 years): 11.562%

Multiply the Total Direct Costs from *Line 5* of *Worksheet 16* by the inflation factor to compute the Inflated Total Direct Costs.

Adjustment Using a Schedule

Under the bond adjustment schedule approach, we must periodically either recalculate all reclamation cost estimates or use an appropriate inflation factor to adjust the previous reclamation cost estimates to account for inflation since the time of the previous bond calculation. When using this approach, *Lines 5* and *6* of *Worksheet 16* will be the same. Add a footnote describing the bond adjustment schedule.

Adjustments for inflation also may be considered when permit revisions change the costs of reclamation.

II. After Permit Expiration

We also must consider inflation when calculating the amount of bond to be retained after Phase I or II bond release. For these calculations, use a base period equal to the minimum revegetation responsibility period under 30 CFR 816/817.116(c), since there is no permit required for reclamation and hence no midterm permit reviews or permit renewals. See *Worksheets 17* and *18*. As an alternative, you may establish a periodic bond adjustment schedule during the revegetation responsibility period. The bond would then be adjusted for inflation in accordance with the schedule.

STEP 4: ESTIMATE INDIRECT RECLAMATION COSTS

Use *Worksheet 16*, standard reference materials, and the procedures set forth below to calculate indirect costs, which include contract preparation costs and other administrative expenses that the regulatory authority would not incur in the absence of forfeiture. Explain any deviations from the standard reference materials in an attachment to the worksheet. Compute indirect costs as a percentage of the inflated direct costs as shown on *Worksheet 16*, Lines 7 through 11.

I. Mobilization and Demobilization

This category of indirect costs is an allowance for the cost of moving equipment to and from the reclamation site. Costs will vary based on the type and number of equipment to be hauled and the distance to the site.

Consider whether a separate mobilization/demobilization will be necessary to remove sedimentation ponds and associated diversions at a later date and calculate costs accordingly.

Mobilization and demobilization costs normally range up to 10 percent of the total direct costs. Unusual time constraints, a need for special equipment, the presence of non-standard features or conditions that hinder equipment mobility, or a remote location may require actual cost estimates that could result in the use of a higher percentage. Enter this cost estimate on Line 7 of *Worksheet 16*. Explain the basis for the estimate on the worksheet or in an attachment.

II. Contingency Allowances

The bond amount must include a contingency allowance to cover unanticipated costs resulting from unexpected natural events and uncertainties associated with the assumptions that form the basis for the operation and reclamation plans and reclamation cost estimates. This category does not include any activity for which the reclamation and operation plans provide sufficient information to enable calculation as a direct cost. The contingency allowance covers only truly unexpected and unforeseeable events.

Calculate the contingency allowance as a percentage of the total direct costs on Line 8 of *Worksheet 16*. Based on the *1998 Means Heavy Construction Cost Data*, this allowance should range between 3 and 5 percent of the total direct costs.

III. Engineering Redesign Costs

For various reasons, the reclamation and operation plans in the permit application may not reflect site conditions at the time of bond forfeiture. In addition, they may not be sufficiently detailed to serve as contract plans and specifications. Therefore, in the event of bond forfeiture, the regulatory authority may have to supplement or modify these plans. Necessary activities may include:

- Preparing maps and plans to show the extent of required reclamation.
- Surveying topsoil and overburden stockpiles to determine the amount of material available.
- Analyzing topsoil and overburden stockpiles to determine whether special handling is necessary.

- Evaluating structures to assess the difficulty of demolition and removal.

- Evaluating impoundments and roads to determine any special reclamation needs (such as the presence of toxic materials), the feasibility of leaving those structures in place, and the rehabilitation needed to ensure stability and facilitate the postmining land use.

- Assessing the condition of areas reclaimed by the permittee to determine whether additional work is needed to complete the reclamation plan.

- Preparing contract documents.

Calculate the engineering redesign costs as a percentage of the total direct costs on Line 9 of *Worksheet 16*. Based on the *1998 Means Building Cost Data*, the allowance for these engineering fees (landscape and site development) should range between 2.5% and 6% of the total direct costs. If you deviate from the recommended percentages, include an explanation on *Worksheet 16*.

IV. Profit and Overhead

Because we contract with a third party to perform the actual reclamation work, the bond amount must include an allowance for the contractor's profit and overhead. As noted in Chapter 1 under "Data Sources," all data used to estimate direct reclamation costs in Step 2 of Chapter 2 include only bare costs, which exclude any allowance for contractor's profit and overhead expenses.

A reasonable profit margin may range from a minimum of 10% of the total direct costs for very large jobs to as high as 30% of the total direct costs for very small jobs.

Because reclamation operations differ greatly in size and complexity, overhead costs will vary greatly depending on the assets, operating techniques, business structure, and financial condition of individual contractors. For example, to complete the same job, some contractors may not need field offices, shops, or site-specific office personnel, while other contractors will have complete on-site support facilities.

However, all construction and reclamation contractors have overhead costs in addition to the direct costs of equipment, labor and materials that we have already calculated in Step 2 of this chapter. These additional costs normally

include field support staff and services, labor benefits (at 35% of labor and supervisory costs, these costs may range between 1% and 7% of the total direct costs), costs of temporary facilities or company offices, office equipment and utilities, security, storage, insurance, taxes, and bonds (including the cost of obtaining and posting a contract performance bond), permits, and company vehicles.

A reasonable allowance for generally accepted overhead costs is a minimum of 5% of the total direct costs.

To simplify the process, Graph 1, Profit and Overhead, combines profit and overhead into a single cost allowance, calculated as a percentage of the total inflated direct costs on *Worksheet 16*. This graph is based on the *1998 Means Building Construction Cost Data*.

V. Project Management Fee

This fee covers the cost of hiring a project management firm to inspect and supervise the work performed by the reclamation contractor. Additional management tasks may include dam inspection. Use Graph 2, Project Management Fee, to calculate this fee. This graph reflects the construction cost data in *1998 Means Building Construction Cost Data*.

STEP 5: CALCULATE THE TOTAL PERFORMANCE BOND AMOUNT

Add all entries for direct and indirect reclamation costs on *Worksheet 16* to determine the amount of bond required.

At the bottom of *Worksheet 16*, there is a space to record a construction cost index. In the absence of major changes to the reclamation and operation plans, this index allows the inflation factor portion of the bond estimate to be updated periodically without redoing the direct cost calculations needed to establish the initial bond amount. The cost index referenced is the "Construction Cost Index" published monthly in the *Engineering News Record* (McGraw-Hill, NY).

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CHAPTER 3

SPECIAL CONSIDERATIONS FOR CALCULATION OF INCREMENTAL, CUMULATIVE, AND PHASE BONDS

The bond calculation methodology in Chapter 2 and the assumptions in Chapter 1 presume that the permit applicant will post bond for the entire permit area prior to permit issuance. However, the same methodology and assumptions apply when the applicant elects to post bond on an incremental or cumulative basis, or use phase bonds.

INCREMENTAL BONDS

If the applicant selects the incremental method of bonding, use Chapter 2 to estimate reclamation costs and determine the amount of bond required for each increment, rather than for the entire permit area. Because the bond posted for each increment applies only to that increment, treat each increment as a separate mining and reclamation unit with its own maximum reclamation cost liability. When using incremental bonding, the permittee may not transfer bond coverage from reclaimed acreage in one increment to land in another increment.

Under 30 CFR 800.11(b)(3), the permit applicant must identify both the initial and successive bonding increments, together with the amount of bond proposed to be provided for each increment. However, the regulations do not apply this requirement to the regulatory authority. Instead, they provide only that, at the time of permit application approval, the regulatory authority must calculate the amount of bond required for the initial increment. The regulatory authority must then calculate the required bond amount for each successive increment at the time that the permittee proposes to disturb that increment. At its discretion, the regulatory authority may calculate the amount of bond required for each successive increment at the same time that it calculates the amount of bond required for the initial increment.

CUMULATIVE BONDS

If the applicant selects the cumulative method of bonding, use Chapter 2 to estimate reclamation costs and determine the amount of bond required for the initial stage of operations. As with incremental bonding, treat this initial stage of operations as a separate mining and reclamation unit with its own maximum

reclamation cost liability. However, legal liability under the bond posted for the initial stage applies to the entire permit area, as do bonds posted for all successive operational stages. Hence, unlike incremental bonding, the reclamation cost estimates and bond calculations for each successive operational stage must include all previously bonded operational stages.

For example, a permittee may choose to post bond annually for the term of the permit based on anticipated disturbance during each year of the permit term. Under this scenario, the permittee initially would post a bond in an amount sufficient to cover the maximum reclamation cost liability that would be encountered during the first year of the permit term under the approved reclamation plan. The permittee would then supplement that bond with additional bonds during each of the following years until the amount of bond on file is sufficient to cover the maximum reclamation cost liability for the entire permit area. The annual supplement plus the amount of bond posted for previous years must always be sufficient to cover the maximum reclamation cost liability associated with both the upcoming year and all previous years. The bond amount may not be reduced unless the reduction occurs through the bond release process.

As with incremental bonding, under 30 CFR 800.11(b)(3), a permit applicant proposing to use the cumulative method of bonding must identify both the initial and all successive portions of the permit area for which bond will be posted, together with the amount of bond proposed to be provided for each portion. However, the regulations do not apply this requirement to the regulatory authority. Instead, they provide only that, at the time of permit application approval, the regulatory authority must calculate the amount of bond required for the initial portion. The regulatory authority must then calculate the required bond amount for each successive portion at the time that the permittee proposes to disturb that portion. At its discretion, the regulatory authority may calculate the amount of bond required for each successive portion at the same time that it calculates the amount of bond required for the initial portion.

In summary, under the cumulative method of bonding, when the permittee proposes to advance beyond the initial operational stages, we must calculate maximum reclamation cost liabilities for both the entire permit area and the portion of the permit area proposed for disturbance. Once the operation reaches the point of maximum reclamation cost liability for the permit area as a whole, we may not need to require any additional bond for subsequent disturbance, but neither may we return any of the bond already posted unless we and the permittee adhere to the bond release criteria and procedures of 30 CFR 800.40.

PHASE BONDS

Under 30 CFR 800.13(a)(2), the regulatory authority has the discretion to either accept or reject use of the phase bonding method.

When using phase bonding, the permit applicant posts separate bonds for each phase of reclamation as defined in 30 CFR 800.40. The applicant has the choice of posting these bonds for the entire permit area or using either the incremental or cumulative method of bonding. In all cases, the applicant or permittee must post bonds sufficient to cover all reclamation phases for the land to be disturbed prior to initial disturbance. For example, the permittee may not delay submission of a Phase II bond until Phase I reclamation is completed.

Under 30 CFR 800.13(a)(2), each phase bond must specify in detail the scope of work that it guarantees. This requirement is important because, with a few exceptions, 30 CFR 800.40 does not clearly specify the permitting requirements and performance standards that each phase covers. Nor does it establish bright-line liability distinctions. For example, topsoil replacement may be either a Phase I or Phase II activity. Therefore, before we can calculate reclamation cost estimates using the worksheets in Appendix A, we need to know which of those reclamation activities will be covered by which phase bond.

At a minimum, each Phase I bond must cover backfilling, regrading, and structure demolition. Each Phase II bond must cover topsoil replacement (when not included in Phase I), removal of temporary erosion and sedimentation control structures, and establishment of revegetation. Phase III has no clearly defined liabilities apart from demonstration of revegetation success and reestablishment of vegetation in the event of failure. Therefore, we recommend that Phases II and III be covered by a single bond.

Use the methods in Chapter 2 to estimate the maximum reclamation cost liability and calculate the amount of bond required for each phase of reclamation. The area to which this calculation applies depends upon whether the permittee posts bond for the entire permit area or selects an incremental or cumulative approach.

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CHAPTER 4

BOND RELEASE

REGULATORY BACKGROUND

Under 30 CFR 800.40(b)(1) and section 519(b) of the Act, the regulatory authority must, upon receipt of a bond release application, inspect and evaluate the reclamation work, including an assessment of the degree of difficulty in completing any remaining reclamation. This evaluation also must determine whether pollution of surface and ground water is occurring, the probability of future occurrence, and the estimated cost of abating this pollution.

Under 30 CFR 800.40(c)(1) and section 519(c)(1) of the Act, the regulatory authority may release up to 60 percent of the bond upon completion of Phase I reclamation, which includes backfilling, regrading, and drainage control. As a practical matter, Phase I bond release includes structure demolition and removal, as necessary. Phase I bond release is discretionary on the part of the regulatory authority, depending upon the results of the evaluation required under 30 CFR 800.40(b)(1) and an evaluation of remaining reclamation costs.

Under 30 CFR 800.40(c)(2) and section 519(c)(2) of the Act, for lands other than prime farmland, the regulatory authority may release an additional amount of bond after establishment of revegetation, provided the lands are not contributing suspended solids to streamflow or runoff outside the permit area in excess of State and Federal water quality requirements. Normally, this phase (Phase II) also includes topsoil replacement and removal of temporary erosion and sedimentation control structures. At this phase, the regulatory authority must retain sufficient bond to cover the cost of having a third party reestablish revegetation during the revegetation responsibility period in accordance with the approved reclamation plan.

For prime farmland, Phase II bond release is contingent upon proof of soil productivity as determined by crop yields equivalent to yields from non-mined lands. For all practical purposes, this results in a combination of Phase II and III bond release.

Finally, under 30 CFR 800.40(c)(3) and section 519(c)(3) of the Act, the regulatory authority may release the remainder of the bond once the revegetation responsibility period expires and the permittee meets all reclamation

requirements of the permit and approved regulatory program. This action is sometimes referred to as Phase III bond release.

DISTINCTION BETWEEN BOND ADJUSTMENT AND BOND RELEASE

As discussed in Chapter 1, reduction of bond amounts using the bond adjustment provisions of 30 CFR 800.15 is allowable only if the reclamation cost estimates that form the basis for the existing bond amount are no longer valid for reasons other than the performance of reclamation work. To obtain a reduction in bond amount on the basis of reclamation work performed, the permittee must apply for bond release in accordance with 30 CFR 800.40.

CALCULATION OF ALLOWABLE BOND RELEASE AMOUNTS

Upon receipt of a bond release application, we must calculate the cost of completing all remaining reclamation requirements for the entire permit area (or, if the permittee used the incremental bonding method, for the entire increment). Use *Worksheet 17* to calculate remaining reclamation costs when considering Phase I bond release. Use *Worksheet 18* to calculate these costs when considering Phase II bond release. Complete *Worksheets 1 through 15* as necessary to support these computations.

In all cases, we must retain sufficient funds to complete all remaining reclamation obligations, including those identified as a result of the inspection and evaluation conducted under 30 CFR 800.40(b)(1). In addition, at Phase I we may not release more than 60 percent of the total amount of bond posted for the area to which the release application applies. See 30 CFR 800.40(c)(1). Therefore, even when the permittee uses phase bonding, we may not release more than 60 percent of the total amount of bond posted for all phases for the applicable area. Although liability under the Phase I bond is limited to Phase I reclamation activities, we must retain at least 40 percent of the total bond posted for the area until Phase II reclamation has been completed and a Phase II liability release approved.

FINANCIAL CONSIDERATIONS FOR POLLUTIONAL DISCHARGES

If pollutional discharges or other conditions causing material damage to the hydrologic balance outside the permit area exist at the time of application for bond release, we must retain a sufficient amount of bond at each phase of release to cover long-term treatment and remediation costs. See Appendix D for guidance on calculating bond amounts for long-term treatment of pollutional

discharges. This bond may not be released until treatment is no longer necessary to prevent material damage to the hydrologic balance.

In lieu of retention of existing bond, the permittee may, subject to regulatory authority approval, establish a separate financial guarantee under 30 CFR Part 800 to cover all foreseeable discharge treatment and material damage remediation costs. This is a type of bond to cover one aspect of the operation. As stated above, the bond release for this aspect would not occur until treatment is no longer necessary to prevent material damage to the hydrologic balance.

Depending on individual circumstances, acceptable financial assurance instruments may include surety bonds, trust funds, pollution liability insurance, general liability insurance, environmental liability insurance, and site liability environmental exposure insurance. At the time of this publication, examples of firms that offer the insurance products mentioned above include:

American International Group, Inc. (AIG)	http://www.aig.com
Beacon Hill Associates, Inc.	http://www.b-h-a.com
National Environmental Coverage Corp.	http://www.necc.com
Smith-Manus Agency, Inc.	http://www.smith-manus.com

We do not endorse any of these insurers or products and we do not guarantee the accuracy of the information posted at Internet sites.

Finally, the permittee has the option of addressing this obligation outside the bonding process and the requirements of 30 CFR Part 800 by entering into an enforceable contract with another party to assume treatment or remediation responsibilities. See the preamble to 30 CFR 700.11(d)(1)(ii) at 53 FR 44362, col. 1, November 2, 1988.

RELEASE OF BOND POSTED TO GUARANTEE WATER SUPPLY REPLACEMENT OR CORRECTION OF SUBSIDENCE DAMAGE

Under 30 CFR 817.121(c)(5), in certain situations, the regulatory authority must require the permittee to obtain additional performance bond to cover the costs of repairing, replacing, or providing compensation for material damage to protected structures when the damage is a result of subsidence caused by underground mining operations. The same requirement applies to subsidence-related material damage to surface lands and to certain drinking, domestic, or residential water supplies adversely impacted by underground mining operations.

The preamble to this rule states that the release procedures of 30 CFR 800.40 apply to bond posted under this rule. However, land, structures, and water supplies covered by this bond generally lie outside the permit area. Hence, there is no revegetation responsibility period and no need for a phased bond release. Provided all other release criteria and procedural requirements of 30 CFR 800.40 are met, we may release the entire bond amount posted under 30 CFR 817.121(c)(5) once the water supply is replaced, the damage to surface lands or protected structures is repaired, or the owner is compensated for damage to protected structures.

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Note: Various sections of this reference are updated quarterly; overall the book is updated annually.

Means *Building Construction Cost Data*, R.S. Means Company, Inc., Kingston, MA, 1998.

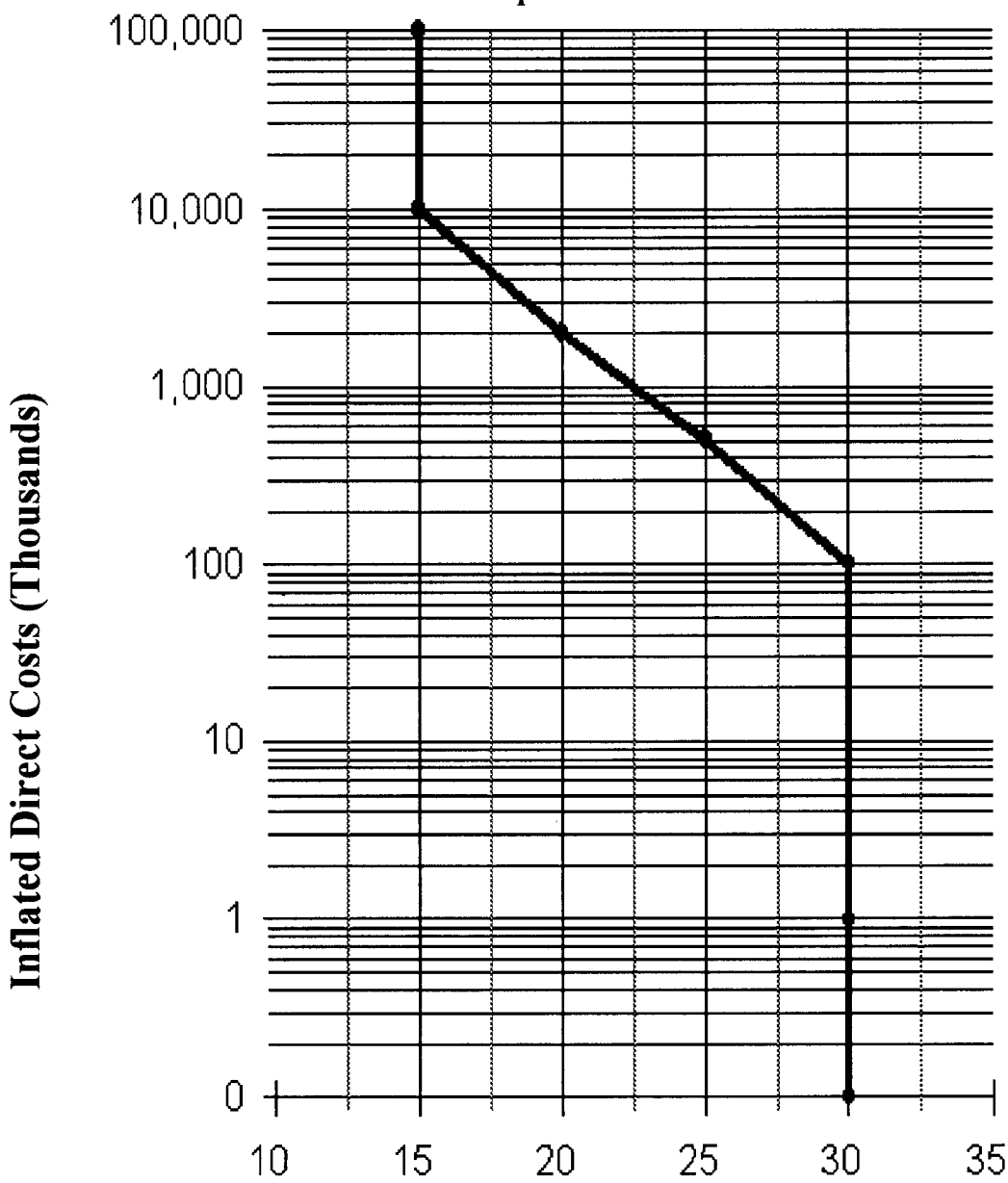
Means *Heavy Construction Cost Data*, R.S. Means Company, Inc., Kingston, MA, 1998.

Means *Site Work and Landscape Cost Data*, R.S. Means Company, Inc., Kingston, MA, 1998.

Graphs 1 and 2

Profit and Overhead

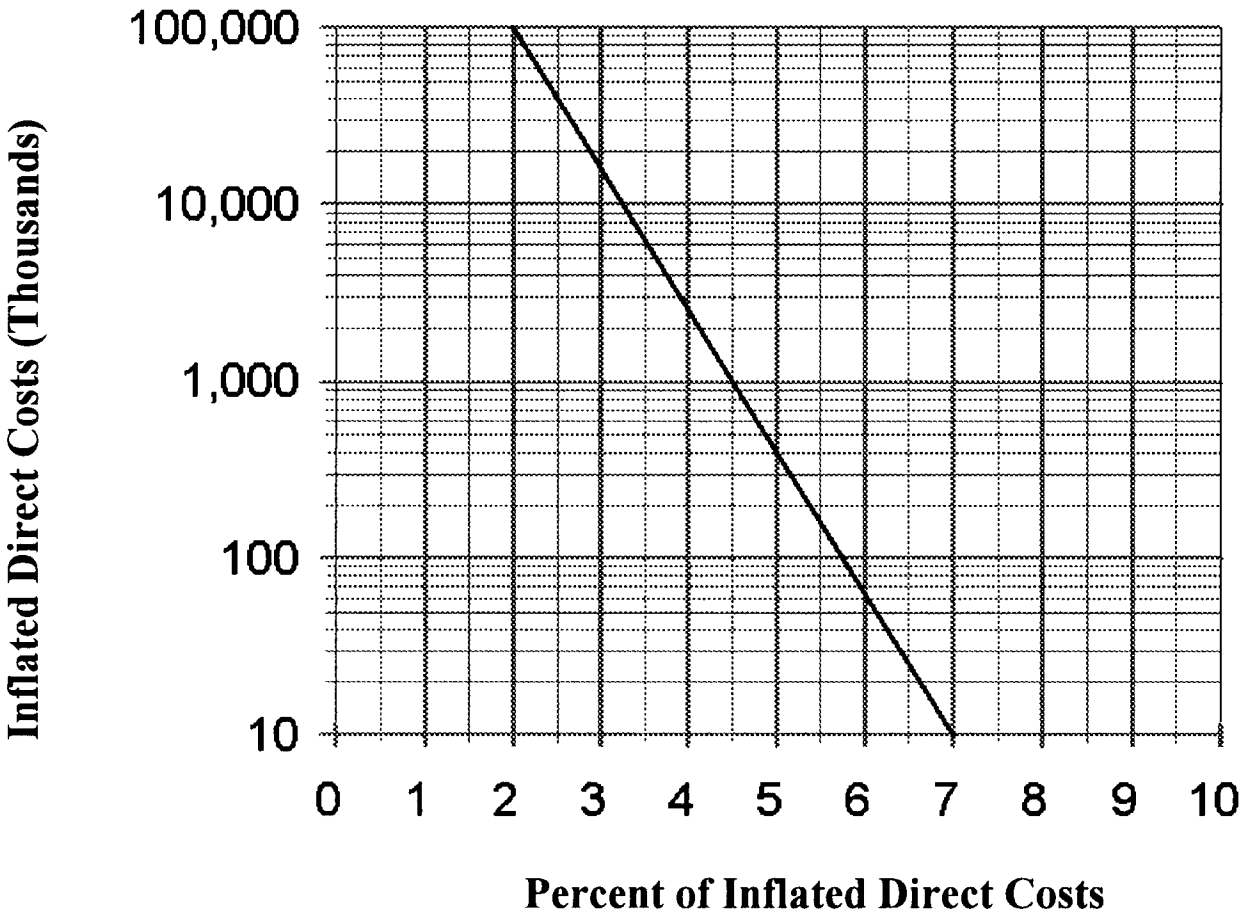
Graph 1



Graphical representation of
Reference lines 010 000 062 0300 through 0450
From Means 1998 *Building Construction Cost Data*,

Project Management Fee

Graph 2



Graphical extension of
Reference lines 010 000 016 0050 and 0300
From Means 1998 *Building Construction Cost Data*,

A. Bond Calculation Worksheets

APPENDIX A

BOND CALCULATION WORKSHEETS