

CHAPTER 1

PURPOSE OF THIS HANDBOOK

The purpose of this handbook is to interpret the Regulations of the Surface Mining Control and Reclamation Act of 1977 (Public Law 95-87) (hereafter referred to as the Act) as they affect the operators of small surface coal mines (a small mine operator is defined in the Act as one with an annual coal production of less than 100,000 tons). Further, the purpose of this handbook is to make it easier for the small operator to compare his operation with the act in order to determine compliance with the regulations. Part 795 of the Regulations deals specifically with the Small Operator Assistance Program. This program relieves the operator of the cost of carrying out certain hydrologic and geologic analyses required by the Regulations.

The emphasis of this handbook is on the protection of water resources during mining and reclamation operations. As almost all the operations in surface mining directly or indirectly affect water we have included some operations which may only marginally affect water quality or hydrology.

Anthracite mining, lignite mining, coal processing, refuse disposal, and slurry disposal are not covered in this handbook. Design guidelines for slurry impoundments and coal refuse piles may be found in "Design Guidelines for Coal Refuse Piles and Water, Sediment, or Slurry Impoundments and Impounding Structures," MESA Technical Support Center, Pittsburgh, PA, April 1976.

The area covered by this handbook includes only that east of the 100th meridian west longitude.

USE OF HANDBOOK

The best way to use this handbook is to look directly at the drawings in Chapter 4 which describe various surface mining methods and the operations which are involved in each. The first drawing for each method shows an unregulated mine, and the key below identifies problems which arise during and after mining and the Sections of the Regulations which are intended to solve these problems. The next drawing for each method shows phases of a mine which meet the requirements of the new Regulations. The key below identifies each operation, the Section of the Regulations relevant to that operation and the title and number of "Data Sheets." These data sheets make up Chapters 6 and 7 of the Handbook and contain guidelines for measures necessary to meet the Performance Standards of the Regulations.

Chapter 5 is very important. It contains information on premining surveys and planning. Careful pre-planning of mine operations is critical if the requirements of the Regulations are to be met, (particularly the need for contemporaneous reclamation) at a reasonable cost. Failure to preplan will inevitably result in non-compliance notices, double handling of overburden and other time and money wasting problems.

Many of the measures which are described on the data sheets are required as part of the Performance Standards contained in the Regulations, most of which are included in Part 816, Chapter VII, Subchapter K, though Performance Standards for specific categories of mining mountain top removal, steep slopes, prime farmlands and auger mining, are found in Parts 824, 826, 823 and 819 respectively.

The effectiveness of some of the measures in this handbook have not actually been established. The lack of experiments which have monitored the impact of various mining methods and protection measures is a serious problem. EPA is at present sponsoring a study in Kentucky to monitor the effectiveness of the Modified Block Cut Method of surface mining in controlling sediment. The assumed advantages of the Modified Block Cut Method (no spoil on the down slope, complete elimination of the highwall, 60% less acres disturbed, minimization of double handling, etc.) and the disadvantages (scheduling complications, higher capital requirement for

equipment, etc.) will be quantified. The study will also monitor water quality and quantity to satisfy a need to quantify the effectiveness of the method itself in reducing sedimentation (DNR, Kentucky 1977).

Costs of measures in this handbook have not been included. The Regulations require that the reclamation plan (requirement for Permit Application) include a cost estimate [780.18(b)(2)]. Costs, however, are mostly so site-specific that general cost guidelines are of doubtful value. Only where realistic costs can be given have they been included.

The operator will find little information on costs in published sources as most refer to operations which do not conform to the new performance standards. It was also noted by Davis in 1977 that often, costs vary widely due to differences in the procedure used to estimate costs. He suggested that reclamation costs were approximately 10% of gross revenue, 5-8% of the \$11-\$22 a ton cost of production or 30% of the cost of coal production (4). Some 1974 costs are also given by Doyle (et al.) in a report in which he analyzes pollution control costs (6).

The small operator should understand his true unit costs and break-even stripping ratios in order to stay solvent, particularly in a time of rapidly shifting costs and sales prices for coal. The authors of this handbook realize that the small mine operator has to work within a tight profit margin in a high risk, high front-end capital undertaking. This handbook advocates self reliance in premining planning for cost-effective reclamation meeting the requirements of the Act.

THE OPPORTUNITY FOR SMALL OPERATOR

The surface mine operator, in extracting small, or isolated deposits of coal, thin or faulted seams, is playing an important role in the national energy policy of maximizing the use and conservation of the coal resource which is one of the stated objectives of the Performance Standards (Subchapter K). Probably more than 30 million acres (12 million ha) of land in the Eastern coal province alone cover strippable coal reserves (see Table 1). As large operators expand and concentrate on more extensive blocks of coal for largely automated machinery, the role of small operations in exploiting isolated and difficult coal deposits will expand. The public's acceptance of, and confidence in, the coal mining industry generally depends on the performance of all operators in solving some of the problems which are described in Chapter 2.

Both large and small surface mine operators can help local communities achieve some of their goals by creating post-mining landforms which are consistent with the needs of the community. Cases of airstrips, lakes, waterstorage impoundments, industrial sites, recreational centers, residential and commercial sites have been recorded. Variance from the "approximate original contour" requirement [816.101(b)(1)] can be obtained for approved post-mining land uses [824.11]. "Restored lands can be more fertile than before, aquifers constructed that can be relied upon to meet the growing demand for water within mining regions, mines can be used to dispose of solid waste and to treat sewage effluent and sludge produced by our growing population, to reduce flood flows, increase base flow, or to provide new recreational opportunities." (9) The actual improvement of the capability of land as a result of surface mining may not be feasible in all cases, particularly in the difficult terrain of Appalachia, but it is frequently a possibility. It should be noted that not only land-use but also the hydrologic environment can be improved as a result of surface mining.

New mining methods make feasible a more comprehensive approach to surface mining. For instance, the isolated "apple cores" or "biscuits" of unmined mountain tops in hilly terrain can be eliminated by Mountaintop-Removal. Many of these new methods rely on large-scale operations and are therefore beyond the scope of smaller mine operations. Some new methods are applicable to small operations. A more comprehensive approach and more attention to the post-mining use of land is what is needed and this means more emphasis on preplanning. Comprehensive planning also makes possible the more extensive reclamation of orphaned land (unreclaimed land previously affected by surface mining). This not only can result in an improvement in the land use of the area but also significantly improved water quality, mainly through a reduction in acid mine drainage and sedimentation. In the early 1970's land in Appalachia was being disturbed by strip mining at the rate of about 31,000 acres per year (12 ha/year); at that date 1 million acres (404,700 ha) had already been

affected by strip mining and very little had been done to reclaim it (5). Between 1930 and 1971 3.6 million acres (1.46 million ha) of land in the US were used for surface mining of which barely 40 percent were reclaimed (2).

It is possible through the preplanning of mining operations not only to reclaim abandoned surface mine workings, but also in some cases to "daylight" old underground workings to reduce acid mine drainage. In some cases it has been possible to dispose of coal refuse heaps in surface mine workings. SMO's should explore the SOAP provisions which present incentives to operators for the reclamation of orphaned lands as part of their surface mine operations. (Grants available under Parts 872 and 886 of Subchapter R.)

The Regulations contain a procedure for identifying lands which are unsuitable for surface mining because mining operations would be incompatible with existing land-use plans, significantly damage natural systems, result in a substantial loss in the productivity of water supply, or endanger life or property due to flooding [762.11]. This handbook applies to those lands which can be mined and shows how to prevent problems from occurring. An understanding of water movement over the surface and through the topsoil and spoil is important in designing measures to establish vegetation, to control erosion, to stabilize spoil and to control water pollution on drastically disturbed lands (1).

Table 2 presents the characteristics of small mine operations. The SMO will be well aware of these. The implications of these characteristics and any pertinent provisions of the Small Operators Assistance Program (SOAP) are included in the Table.

TABLE 1

STRIPPABLE RESERVES OF COAL IN THE US EAST OF THE 100TH MERIDIAN W LONGITUDE					
Coal Province	Strippable Resource	Strippable Reserves*	STRIPPABLE RESERVES/MILLIONS OF SHORT TONS		
			Low Sulphur	Medium Sulphur	High Sulphur
Eastern-Province Appalachian Region	26,533	5,171	1,862	1,433	1,876
Interior & Gulf Provinces	32,785	7,296	13	535	6,748

*Reserves - coal available to be stripped with existing technology.

Source: Bureau of Mines, "Strippable Reserves of Bituminous Coal and Lignite in the US," US Dept. of the Interior, Information Circular 8531, 1968.

TABLE 2

SMALL MINE OPERATIONS		
Characteristics of Small Operations	Implications	Provisions of SOAP
1. Small operations are capable of exploiting small or isolated deposits and coal rights.	More complete utilization of the resource.	None.
2. Lack of specialist exploration team and specialized exploration equipment.	Tendency to minimize exploration.	SOAP will pay to have exploratory test borings analyzed by a qualified laboratory and consultant.
3. Lack of specialist to carry out pre-mining surveys, data collection, application processing, etc.	Tendency to minimize pre-planning and application preparation.	SOAP will pay for the determination of the probable hydrologic results of the proposed mining and reclamation operation and for a statement of results of analyses of test borings and core sampling.
4. Lack of capital restricts purchase of equipment with large capacity.	This may make some mining methods unfeasible (especially those requiring the shifting of large amounts of overburden), e.g. mountain top removal.	None.
5. The expense and lack of flexibility of large prime earthmoving equipment.	Tendency of small operators to rely on smaller, more flexible machinery.	None.
6. Small operations rarely have coal preparation plants and coal is either sold directly to the consumer or preparation is carried out by contract.	More coal trucks on the public roads.	None.
7. Most small operations do not employ full-time maintenance crews.	Small operations may experience serious delays due to down time of equipment making scheduling difficult.	None.
8. Small operations often sell coal on the spot market and do not have the capability to blend coal.	Small operations are therefore susceptible to market fluctuations which may make it difficult to stick to the program outlined in the operation plans (Part 780).	None.

REFERENCES:

- (1) Gardner, H.R., Woolhiser, D.A., 1978, "Hydrologic and Climatic Factors," Proc. Reclamation of Drastically Disturbed Lands Symp., Schaller, F.W. and Sutton, P., (eds.), ASA, CSSA, SSSA, Madison, WI.
- (2) Randall, A., Johnson, S., Pagoulatos, A., 1978, "Environmental and Aesthetic Considerations in Surface Mining Policy," Proc. Reclamation of Drastically Disturbed Lands Symp., Schaller, F.W. and Sutton, P., (eds.) ASA, CSSA, SSSA, Madison, WI.
- (3) Ramani, R.V., Grim, E.C., 1978, "Surface Mining - A Review of Practices and Progress in Land Disturbance Control," Proc. Reclamation of Drastically Disturbed Lands Symp., Schaller, F.W. and Sutton, P., (eds.), ASA, CSSA, SSA, Madison, WI.
- (4) Davis, H., July 1977, "How Mining Companies Use Reclamation Experts," Coal Age, pp. 43-44.
- (5) Curtis, W.R., 1971, "Strip Mining, Erosion and Sedimentation," Transactions of the ASAE, Annual Meeting, Minneapolis, MN.
- (6) Doyle, F.J., Bhatt, H.G., Rapp, J.R., 1974, "Analysis of Pollution Control Costs," EPA 670/2-74-009.
- (7) Kentucky DNR, July 1977, "Onsite Control of Sedimentation Utilizing the Modified Block-Cut Method of Surface Mining," EPA 600/7-77-068.
- (8) US Mining Enforcement and Safety Administration, April 1976, "Design Guidelines for Coal Refuse Piles and Water, Sediment, or Slurry Impoundments and Impounding Structures," MESA's Tech. Support Center, Pittsburgh, PA.
- (9) Ramini, R.V. and Clar, M.L., 1978, "Users' Manual for Premining Planning of Eastern Surface Coal Mining - Executive Summary," Intragency Energy/Environmental Research and Development Program Report, EPA 600/7-78-180.